Closure and Reclamation Plan
Liard South, Northwest Territories

May 2022

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1.0 PLAIN LANGUAGE SUMMARY

The proceeding Closure and Reclamation Plan (CRP) lays out the planned approach to site closure for Paramount Resources Ltd.'s (Paramount) Liard South field which incorporates the following well sites: A-01, F-36, I-02, I-46, N-01 and O-35, and associated areas (project components).

The goal of the closure and reclamation program is to return the applicable sites and project components to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities.

Phase 1 and 2 assessments, as describe in section 4.1 and 4.3, have been completed on all sites and the outcomes of these assessments as well as any remediation required are provided in Table 3. Details of the additional work planned to be completed at each project component are provided in Table 4.

2.0 INTRODUCTION

2.1 Purpose and Scope

Paramount hereby submits this final CRP for the Liard south field. The scope of this CRP includes the following well sites and associated areas as applicable: A-01, F-36, I-02, I-46, N-01 and O-35. A map of the Liard south field is provided in Appendix A.

2.2 Goal of the Closure and Reclamation Plan

The goal of the closure and reclamation program is to return the applicable sites and project components to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities.

2.3 Closure and Reclamation Planning Team

The current reclamation and closure team consists of the following Paramount personnel:

Table 1 Closure Planning Team

Role	Name	Contact
Director, Asset Management	John Hawkins	Telephone: 403-817-5074 Email: john.hawkins@Paramountres.com
Environmental Coordinator	Ian Keir	Telephone: 403-817-5077 Email: ian.keir@Paramountres.com
Regulatory and Community Affairs Advisor	Terence Hughes	Telephone: 403-206-3859 Email: terence.hughes@Paramountres.com

2.4 Engagement

The level of engagement with stakeholders by Paramount, has been and will continue to be, reflective of its activity level in the area. Prior to and during construction and development activities engagement activities were more frequent and intense and included studies, community meetings, open houses, meetings with community leaders and Councils, telephone calls and both written and electronic notifications. Communications have been limited to telephone calls and electronic notifications for the CRP due to COVID.

3.0 PERMANENT CLOSURE AND RECLAMATION

3.1 Definition of Permanent Closure and Reclamation

Permanent closure is the final closure of a site with no foreseeable intent by the proponent to return to either active exploration or development. Permanent closure indicates that the proponent intends to have no activity on the site aside from post-closure monitoring and potential contingency actions. Permanent closure does not, however, preclude the proponent or another party from pursuing opportunities at the existing site or in the area at a time beyond the foreseeable future.

Paramount will be seeking permanent closure of the Liard south field. Paramount does not anticipate any negative residual effects to remain after reclamation is complete.

3.2 Permanent Closure and Reclamation Requirements

Table 2 Project Component Descriptions and Conditions

Project Component Description				Site Conditions	
Locations	**Components**	**Dimensions**	**Current Status**	**Existing**	**Final**
Barge Site	Barge site	~200 x 160 m	Built	Well vegetated with good successional growth throughout.	The existing site conditions are final and meet the applicable reclamation criteria once it is confirmed that no invasive species are present.
Camp Site	Camp site	N/A	Not built	N/A	N/A
I-02	Well site	150 x 150 m	Built	Constructed cut/fill site with no infrastructure remaining. The site was stripped and prepared for assessment work in January 2022. Existing vegetation was	Stable slopes, no erosion, >80% ground cover with native species and no invasive species present.

Project Component Description				Site Conditions	
Locations	**Components**	**Dimensions**	**Current Status**	**Existing**	**Final**
				preserved where possible.	
	Decking site	75 x 50 m	Built	Well vegetated with good successional growth.	The existing site conditions are final and meet the applicable reclamation criteria once it is confirmed that no invasive species are present.
	Camp	60 x 40 m	Built	Two water wells (one within camp area and one offsite) with gravel around them and sparse areas.	No infrastructure, no erosion, >80% ground cover with a native species and no invasive species present.
I-46	Well site	150 x 150 m	Abandoned	Site was reclaimed and seeded in Q1 2022.	No erosion, >80% cover with native species and no invasive species present.
	Camp	60 x 40 m	Built	Appears to be well vegetated throughout with good successional growth.	The existing site conditions are final and meet the applicable reclamation criteria once it is confirmed that no invasive species are present.
F-36	Well site	150 x 150 m	Suspended	The site was reclaimed and seeded in Q1 2022.	No erosion or excess standing water, >80% ground cover with native species and no invasive species present.
	Decking site	N/A	Not built	N/A	N/A
	Borrow pit	N/A	Not built	N/A	N/A
O-35	Well site	150 x 150 m	Abandoned	No infrastructure remaining, site was reclaimed and seeded in Q1 2021.	Stable slopes, no erosion, >80% ground cover with native species and no invasive species present.
	Borrow pit and sump	Irregular, 1.52 hectares (ha)	Built	Borrow pit was not fully constructed but a	Stable slopes and vegetation throughout the site

Project Component Description				Site Conditions	
Locations	**Components**	**Dimensions**	**Current Status**	**Existing**	**Final**
				narrow trench holding water is visible. Cut lines radiate across the site from the southwest corner. Good vegetation growth present throughout the site aside from the noted features.	and surrounding the open water. >80% ground cover with native species and no invasive species.
	Camp	60 x 30 m	Built	Appears to be well vegetated throughout.	The existing site conditions are final and meet the applicable reclamation criteria once it is confirmed that no invasive species are present.
Borrow Pit (northwest of bridge)	Borrow pit	N/A	Not built	N/A	N/A
N-01	Well site	150 x 150 m	Abandoned	No infrastructure remaining, site was reclaimed and seeded in Q1 2021.	Stable slopes, no erosion, >80% ground cover with native species and no invasive species present.
	Camp	60 x 30 m	Built	Appears well vegetated throughout.	The existing site conditions are final and meet the applicable reclamation criteria once it is confirmed that no invasive species remain.
	Borrow pit	60 x 40 m	Built	Locations is slightly west of the location on the map, borrow pit is visible and holding water with good vegetation growth around the edges.	The existing site conditions are final and meet the applicable reclamation criteria once it is confirmed that no invasive species remain.

Project Component Description				Site Conditions	
Locations	**Components**	**Dimensions**	**Current Status**	**Existing**	**Final**
A-01	Well site	150 x 150 m	Abandoned	No infrastructure remaining, appears to be vegetated throughout with no major concerns visible in aerials.	>80% ground cover with native species, no invasive species present, no concerns with slopes or stability, no concerns with drainage.
	Camp	N/A	Not built	N/A	N/A

3.3 Closure Objectives and Criteria

3.3.1 Remediation

Samples collected during the Phase 2 Environmental Site Assessment (described below) were compared with the Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Where concentrations of the analyzed parameters were reported above the applicable guidelines, site-specific data was utilized to complete Desktop Remediation™ and eliminate receptor pathways that were not applicable to all sites resulting in revised standards from the Ministry of Environment and Natural Resources or Alberta Tier 1 Soil and Groundwater Guidelines which were utilized as the applicable criteria for confirming each site was remediated appropriately.

3.3.2 Reclamation

All the locations within the scope of this plan are located on forested Crown land adjacent to the British Columbia (BC) provincial border, therefore the restoration requirements from section 19 of the Environmental Protection and Management Regulation (EPMR) will be utilized as the closure objectives for the reclamation phase of the CRP. These requirements are as follows (Queen's Printer, 2016):

- de-compact any soils compacted by the oil and gas activity (not applicable to road rights of way);
- redistribute any retrievable surface soils that were removed from the operating area during construction so that the soil structure is restored, to the extent practicable, to its condition before the oil and gas activity was begun (not applicable to road rights of way);
- if the natural surface drainage pattern was altered by the carrying out of the oil and gas activity, restore, to the extent practicable, the drainage pattern to its condition before the alteration;
- re-vegetate any exposed soil on the operating area using seed or vegetative propagules of an ecologically suitable species that
    - promotes the restoration of the wildlife habitat that existed on the area before the oil and gas activity was begun, and
    - stabilizes the soil if it is highly susceptible to erosion;
- remove any structure that was constructed to cross a stream, wetland or lake and ensuring that the site of the structure is in a stable condition;
- stabilize any cut slopes or fill slopes in well sites and facility areas;
- re-contour bladed areas or excavations in pipeline corridors and seismic lines.

The criteria that will be used to assess whether restoration of a site is complete are as follows:

- Vegetation cover is >80% of ground cover.
- Species diversity and composition is compatible with the surrounding land-use.
- Slopes have been stabilized.
- Drainage on and around the site is consistent with off-site areas and does not result in increased erosion potential or ponding.

4.0 CLOSURE AND RECLAMATION PROGRAM SUMMARY

This CRP intends to describe the reclamation strategy and provide updated timelines and a description of activities for the locations identified in the Purpose and Scope above. The following information provides an overview of the closure and reclamation process and a summary of activities at the Site to date.

4.1 Phase 1 Environmental Site Assessment

The primary objective of a Phase 1 Environmental Site Assessment (P1 ESA) is to determine whether a site is or may be contaminated and to identify areas of potential environmental concern (APECs) and contaminants of potential concern (COPCs).

P1 ESAs have been completed for all sites and are attached in Appendix B.

4.2 Abandonment and Surface Equipment Removal

The well head at F-36 was abandoned and cut and capped in January 2022 and the well head at I-02 was abandoned and cut and capped in February 2022. The Shiha pipeline riser at F-36 is still to abandoned.

4.3 Phase 2 Environmental Site Assessment

The purpose of a Phase 2 Environmental Site Assessment (P2 ESA) is to determine, through intrusive sampling of the APECs identified in the P1 ESA, the presence or absence of COPCs and to determine the extent of any areas of environmental concern (AECs). P2 ESAs have been completed at all locations and are attached in Appendix B.

4.4 Desktop Remediation (DTR)™

SynergyAspen Environmental Inc. (SynergyAspen) reviewed the existing assessment information, and using site-specific data collected during either the initial Phase 2 assessment or supplementary investigations as required, the applicable receptor pathways for each site were revised which resulted in updated standards for some of the parameters with identified failing concentrations.

4.5 Remediation

Remediation can include off-site disposal, on-site treatment, as well as passive treatments including monitoring for natural attenuation.

As a result of the P2 ESA, DTR and Supplementary Site Investigation (SSI) at the F-36, site hydrocarbons impacts were identified at well centre and were excavated in January 2022 and disposed off-site at an approved landfill in British Columbia.

4.6 Reclamation

While reclamation can refer to the entire process described above, in this instance it refers to reclamation earthworks, revegetation and the evaluation of the successful re-establishment of disturbed areas to an equivalent land capability as the surrounding areas. Reclamation earthworks involves re-establishing topography and drainage so that it is similar to off-site conditions and re-establishing soil profiles, where necessary, to provide suitable medium for revegetation. Revegetation is considered successful when areas disturbed by the gas field development and remediation have vegetation communities established that are self-sustaining and on the trajectory towards equivalent land capability to the surrounding areas. This will be determined when the vegetative cover and species assemblage is similar to equivalent community types in the surrounding areas (i.e. 80% percent cover of vegetation within the applicable project component). Prevalence of invasive species should be no greater than the surrounding areas.

Only one site has reclamation earthworks remaining, I-02, as detailed in Table 4 below. Both I-02 and A-01 have revegetation activities planned, as detailed in Table 4.

4.7 Post-Closure Monitoring

Post-reclamation activities will consist of reconnaissance level vegetation and terrain monitoring to confirm reclamation success. Monitoring is anticipated to occur annually, during summer months for a period of approximately 3 years, dependent on site-specific conditions and the timing of reclamation activities.

Vegetation monitoring will include documentation of revegetation and checking the site for invasive species. Terrain monitoring will include identification of erosion and settlement concerns. If the presence of standing water is observed, it will be monitored and sampled as necessary. If during the annual monitoring or from sampling concerns are identified that need to be addressed, minor reclamation treatments will be conducted via helicopter. These could include invasive species management, scarification, recontouring, installation of erosion control measures, seeding and other vegetation management techniques.

Table 3 Assessment and Remediation Summary

Location	Project Component	Phase 1 Outcome	Phase 2 Outcome	DTR Outcome	Remediation Outcome
Barge Site	Barge site	Not applicable – no impacts anticipated based on historical activity and aerial review	Not applicable.	Not applicable.	Not applicable.
I-02	Well site	Identified the following APECs: • Well centre • DWDA • Flare pit • Flare stack • Aboveground Storage Tank (AST) area	No remediation required.	Not applicable.	Not applicable.
	Decking site	Not applicable – no impacts anticipated based on historical activity and aerial review	Not applicable.	Not applicable.	Not applicable.
	Camp	Not applicable – no impacts anticipated based on historical activity and aerial review	Not applicable.	Not applicable.	Not applicable.
I-46	Well site	Identified the following APECs: • Well centre • Possible depression • DWDA	DWDA was not identified by exploratory drilling. Arsenic impacts were identified throughout.	Arsenic impacts were justified based on statistical analysis, sample depth and relative risk to receptors.	Not applicable.
	Camp	Not applicable – no impacts anticipated based on historical activity and aerial review	Not applicable.	Not applicable.	Not applicable.
F-36	Well site	Identified the following APECs: • Well centre • Production facility • Former spills • Flare stack	Hydrocarbon impacts were identified at well centre, the flare stack and the DWDA. Chromium was	Comparison with CCME, NT Environmental Guidelines and BC CSR guidelines eliminated the arsenic, chromium	An SSI confirmed the hydrocarbons at well centre require remediation. They were excavated and disposed in

Location	Project Component	Phase 1 Outcome	Phase 2 Outcome	DTR Outcome	Remediation Outcome
		• Drilling Waste Disposal Area (DWDA) • Flare pit	identified at well centre and naphthalene in the flare stack.	and salinity concerns. Ethylbenzene remained at one subsurface sample from the flare area. The F2 and F3 surface impacts at well centre remained and require further delineation.	January 2022. The ethylbenzene in the flare area was not reproducible and was determined to be a spatial anomaly, therefore no environmental concern remains on-site.
O-35	Well site	Identified the following APECs: • Well centre • Production facility/flare stack • Former spill areas at well centre and AST area • Remote DWDA • Potential drilling flare pit	Hydrocarbons and polycyclic aromatic hydrocarbons (PAH) were identified in the flare pit area.	F2 eliminated based on sample depth and eliminating the groundwater receptor pathway. Benzene, toluene and ethylbenzene were compared with NT Environmental Guidelines and no longer exceeded. The PAH concentrations were eliminated based on removing the freshwater aquatic life pathway and based on the depth of the impacted samples.	Not applicable.
	Borrow pit & Sump	See above, remote DWDA was identified as an APEC.	Hydrocarbons were identified in the remote DWDA.	See above.	Not applicable.
	Camp	Not applicable – no impacts anticipated based on historical activity and aerial review	Not applicable.	Not applicable.	Not applicable.
N-01	Well site	Identified the following APECs: • Well centre • Production	Hydrocarbons identified at well centre and in the flare	Ethylbenzene and F2 were compared with the Environmental	Not applicable

Location	Project Component	Phase 1 Outcome	Phase 2 Outcome	DTR Outcome	Remediation Outcome
		facility area • Flare stack and knockout tank • Former spill in the northeast corner • Former methanol spill	area. Salinity impacts were identified at well centre.	Guidelines and no longer exceeded. The salinity parameters were determined to be naturally occurring.	
	Camp	Not applicable – no impacts anticipated based on historical activity and aerial review	Not applicable	Not applicable	Not applicable
	Borrow pit	Not applicable – no impacts anticipated based on historical activity and aerial review	Not applicable	Not applicable	Not applicable
A-01	Well site	Identified the following APECs: • Well centre and DWDA	F2 and zinc impacts were identified at well centre, all other parameters met the applicable criteria.	Eliminated the drinking water pathway and revised the applicable standard for zinc based on sample depth, therefore no impacts remain.	Not required.

5.0 PROGRESSIVE RECLAMATION

Progressive reclamation is not applicable as Paramount is pursuing final permanent closure of the Liard south field.

6.0 TEMPORARY CLOSURE

Paramount has no intention of resuming activities on sites slated for closure. Therefore, temporary closure is not applicable to this CRP.

7.0 INTEGRATED SCHEDULE OF ACTIVITIES

The CRP will be implemented over multiple years and will be subject to changes as new information becomes available. Table 2 below presents the proposed sequence of events.

Table 4 Proposed Sequence of Events

Location(s)	Project Component(s)	Action	Rationale	General Timeframe
• Barge site • I-02 • I-46 • F-36 • O-35 • N-01 • A-01	• Barge Site • Well site, camp and decking site • Well site, camp • Well site • Well site, borrow pit & sump, camp • Well site, camp, borrow pit • Well site	Annual Site Visit	To assess reclamation status and confirm reclamation criteria have been met or to ensure that revegetation is on an appropriate trajectory and to monitor for undesirable species presence.	Summer 2023
I-02	Well site and Camp	Resample sump, replace sump cap and replace surface soils (subsoil and topsoil). Decommission water wells (off-site and at camp).	Complete reclamation earthworks to meet end land use goals.	Q1 2024
I-02	Well site and Camp	Seed bare and sparse areas.	Complete revegetation to meet end land use goals.	Q1 2024
A-01	Well site	Conduct tree planting.	Complete initial reclamation work to meet the criteria listed within this CRP.	Summer 2023
All sites	All components	Site closure	Conduct a site visit with the inspector with the intention of receiving final regulatory closure on the site.	2024-2026

8.0 FINANCIAL SECURITY

An updated Security Estimate has been provided.

APPENDIX A

Liard South Map

MOUNT COTY
60°20',123°30'

MCKAY LAKES
60°20',123°15'

60°20',123°00'

60°10',123°30'

60°10',123°15'

60°10',123°00'

FORT LIARD

Betalamea Lake

Petitot River

K-36

BORROW PIT & STAGING AREA

CAMP

RESIDENCE

SDL124

SDL124

BARGE SITE

CAMP SITE

I-02 DECKING SITE

CAMP

BRIDGE 5X15m

FORT LIARD HIGHWAY

A-47 (NOT DRILLED)

I-46 ABANDONED

CAMP

F-36 SUSPENDED

DECKING SITE
BORROW PIT

O-35 ABANDONED

M-25 (NOT DRILLED)

BORROW PIT & SUMP

BORROW PIT

BRIDGE 18.4X5m

Water Source #3 (Mea Goh Cho Lake)

SDL123

BRIDGE

STANLEY BERTRAND TRAPPER CABIN

CAMP

N-01 ABANDONED

BORROW PIT

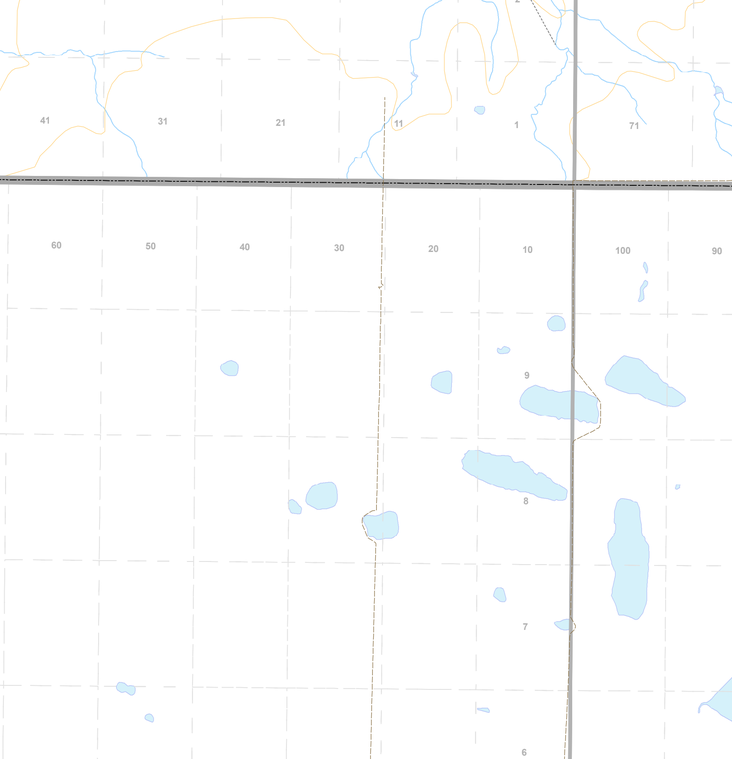
CAMP

A-01 ABANDONED

NORTHWEST TERRITORIES

BRITISH COLUMBIA

MAXHAMISH COMPRESSOR



Paramount resources ltd.

OVERVIEW MAP SHOWING

FORT LIARD SOUTH

As-Build June 2017
60°20', 123°30" to 60°10", 123°00'
NORTHWEST TERRITORIES

2 1 0 2 4 6 Kilometers

2 1 0 2 4 Miles

Scale: 1:50,000

Legend

Leases
- Abandoned
- Built
- Built - Tied-in
- Foreign
- Reclaimed
- Suspended

Facilities
- Camp - Built
- Camp - Foreign
- Battery - Built
- Sump - Built
- Borrow Pit - Built
- Decking Site - Built

Gathering System
- Built
- Not Used
- Not Built
- Foreign

Access Roads
- Access Built
- Access Foreign
- Road
- Built
- Foreign
- Bridge
- Gas Plant / Compressor
- Cabins

Transportation
- Highway
- Old Paramount Ice Road
- Road
- Trail
- Cut Line

Boundaries
- SDL Lands
- Provinical Boundaries
- Contours

Hydrography
- Waterbody
- Watercourse

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Job No.: 170347C **MXD No.:** 170347-OM-02.mxd **Coordinate System:** NAD 1983 UTM Zone 10N

REVISION	DESCRIPTION	DRAWN BY	DATE
00	Original Map Created	KDG	2017-06-27

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APPENDIX B

Environmental Assessment Reports

I-02

LIMITED PHASE 1 ENVIRONMENTAL SITE ASSESSMENT

Former Wellsite
Para et al Mount Coty I-02
300/I-02 60-20-123-30 /1
WID 1884

Fort Liard, Northwest Territories

Prepared for:
Paramount Resources Ltd.

SYNERGYASPEN PROJECT No. PAR 6206

March 24, 2021



EXECUTIVE SUMMARY

At the request of Paramount Resources Limited (Paramount), SynergyAspen Environmental Inc. (SynergyAspen) completed a Limited Phase I Environmental Site Assessment (Phase I) for former wellsite *Para et al Mount Coty I-02* with unique well identifier 300/I-02 60-20-123-30/1 with well identification number 1884 (the Site). The Site is in a remote forested area, approximately 6 kilometers south of Fort Liard, Northwest Territories (NWT).

The scope of this Limited Phase I included a review of available background and historical information including aerial photographs, NWT government databases, topographic maps, and interviews with persons knowledgeable about the Site. The Phase I was limited due to having no site visit completed, therefore no site photos or evaluation of landscape or vegetation were provided.

Based on SynergyAspen's review of available information, SynergyAspen has identified the following areas of potential concern (APECs):

APEC	Rationale	Source Description	PCOCs
A) Wellhead	The wellbore was located at the centre of the Site.	Drilling Mud, Petroleum Hydrocarbons, Condensate, Metals, Produced Water	Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Fraction 1 to 4 Petroleum Hydrocarbons (F1-F4G); Polycyclic Aromatic Hydrocarbons (PAHs); Metals; Salinity
B) On-site Drilling Waste Disposal Area (DWDA)	Drilling waste disposal failed Compliance Option #2 based on lack of information regarding disposal of recovered DST fluids; and drilling waste failed the Option 2 salinity and barite loading calculations. DWDA was located west-southwest of well center on the Site, per 2004 aerial photo.	Drilling mud, additives, petroleum hydrocarbons, condensate, metals, drill cutting, workover fluids, well treatment chemicals and produced water	BTEX & F1-F4G; PAHs; Metals; Salinity
C) Flare Area	A flare pit was noted in the north of the well centre.	Petroleum Hydrocarbon, Metals, Produced Water	BTEX & F1-F4G; PAHs; Metals; Salinity
D) Flare Stack	A flare stack was noted in the northwest corner of the site.	Petroleum Hydrocarbon, Metals, Produced Water	BTEX & F1-F4G; PAHs; Metals; Salinity

APEC	Rationale	Source Description	PCOCs
E) Above-ground Storage Tank (AST) Area	A 400barrel AST was noted in the northeast corner of the site.	Petroleum Hydrocarbon, Metals, Produced Water	BTEX & F1-F4G; PAHs; Metals; Salinity

The executive summary should be read in conjunction with the entire report for a complete understanding of our rationale, conclusions, and recommendations.

The general limitations of this document are contained in Section 7.

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TABLES

TABLE A: Summary of On-Site and Off-Site General Information 2

DRAWINGS

- PAR6206-001 – Site Location Plan
- PAR6206-002 – Areas of Potential Environmental Concern
- Site Survey Plan

APPENDICES

I. Aerial Imagery
II. Assessing Drilling Waste Disposal Areas
III. Spill Search: Environment & Natural Resources NT
IV. Water body Search Results
V. Paramount I-02 Well Files
VI. NWT Orogo™ File Information

1. INTRODUCTION

At the request of Paramount Resources Limited (Paramount), SynergyAspen Environmental Inc. (SynergyAspen) completed a Limited Phase I Environmental Site Assessment (Phase I) for former wellsite *Paramount et al Mount Coty I-02* with unique well identifier 300/I-02 60-20-123-00/1 with well identification number 1884 (the Site). The Site is in a remote forested area, approximately 6 kilometers south of Fort Liard, Northwest Territories (NWT).

The purpose of the Limited Phase I was to identify:

- Past and present uses on the Site;
- Areas of potential environmental concern (APECs) at the Site; and,
- Potential contaminants of concern (PCOCs) related to the APECs that may have potentially impacted the Site.

The scope of this Limited Phase I included a review of available background and historical information including aerial photographs, NWT government databases, topographic maps, and interviews with persons knowledgeable about the Site. The Phase I was limited due to having no site visit completed, therefore no site photos or evaluation of landscape or vegetation were provided.

This Limited Phase I was completed in general accordance with the requirements established by the Alberta Environment and Parks (AEP) regulations, and the Canadian Standards Association (CSA) Standard Z768-01 (R2006) for Phase I Environmental Site Assessments.

2. SITE AND SURROUNDING PROPERTY DESCRIPTION

The Site was a former wellsite, with current well operation listed as suspended, located on Crown land approximately 7.5 km southwest of Fort Liard. The wellsite was approximately 150 meters (m) x 150m (2.25 hectares [ha]), with a campsite measuring 60m x 40m (0.24ha) located south of the wellsite access road, and a 50m x 75m (0.38ha) decking site on the southeast corner of the Site. The Site is accessed in the winter by an existing seismic line, from an existing winter road, the South Liard Road. The Site and surrounding land are shown on Drawing PAR6206001. The survey and aerial photographs are included in the appendix.

2.1. General Information

Table A summarizes the general information regarding the Site's location, topography, hydrogeology, and surrounding land uses based on a review of available information sources. As a site visit was not included in the scope for this Limited Phase I, current photographs of the Site and surrounding lands were not available.

TABLE A: Summary of On-Site and Off-Site General Information

Item	Description
Site Visit Date	N/A – site visit not conducted
Latitude & Longitude:	60° 11' 34.008" N; 123° 30' 18.78" W
Landowner	Paramount Resources Limited
Legal Description	**UWI 300/I-02 60-20-123-00/0**
WID	**1884**
Primary Land uses	Remote forested and muskeg area
Property Description and Size	Wellsite 150mx150m; campsite 60mx40m; decking 50mx75m
Construction Date	c. 2000
Spud Date	October 16, 2000
Rig Release Date	December 9, 2000
Total Depth	1744 m
Status	Suspended
Abandonment Date	According to OROGO well information, the well will be abandoned in 2021.
Former On-Site Facilities	Wellhead; drilling waste disposal area (DWDA) west of well center; flare pit 50m north of well center
Former Off-Site Facilities	Campsite; decking site
Spills/Surface Conditions	There were no spills reported for the Site (Appendix III).

Item	Description
Topography:	
Site and Regional Surface Grade	Regional grade appears to be to the southwest, towards a ravine ~180m southwest
Hydrology & Hydrogeology:	
Nearest Surface Water	Liard River is located ~2.3km northwest. There is a pond located ~960 m north of the Site.
Water Wells	There were no water wells noted within 500m of the Site (Appendix IV).

2.2 Interviews

An interview with Terence Hughes, Regulatory and Community Affairs Advisor for Paramount, indicated that water well licenses were not issued for the Site. There were no facilities on the Site, and waste storage and disposal were managed at the time of drilling (Hughes, 2021).

2.3 Aerial Photograph Information

Available aerial photographs for the Site and surrounding area were obtained. Copies of the aerial photographs and review notes are included in Appendix I.

2.2 Paramount Well File Information

Well file information for the Site included applications and permits, drilling information including the well report and drilling fluid lists, inspection reports, geological information, and correspondence. Well file information is provided in Appendix V.

In 1999, the I-02 well was proposed for drilling using an invert-based drilling fluid system, however that was changed in 2000 to drilling with a gel-chemical drilling fluid system. The drilling waste was mix-bury-covered on-site, west of well center, and a flare pit was noted approximately 50m north of well center, as seen in the 2005 inspection report photos for the Site. Seven drill stem tests (DSTs) were conducted for the well. Notes for disposal of recovered fluids indicated using the flare pit during testing.

The well was re-completed in 2001 to abandon the Mattson formation, and perforate the Fantasque formation. The operation was permitted to flare 750 thousand m^3 of sweet gas in total.

2.3 NWT OROGO Site Registry Information

The NWT Office of the Regulator of Oil and Gas Operations (OROGO) Site registry was searched for information regarding the Site. Information included the final well report, with general drilling information, drill stem testing reports, and site inspection information. The scanned drilling tour reports in the file were mostly illegible, and drilling additive amounts were taken from invoices in the Paramount well file.

A site plan showed a flare stack in the northwest corner of the Site, and a 400-barrel aboveground storage tank (AST) in the northeast corner of the Site. OROGO file information is provided in Appendix VI.

2.4 Previous Environmental Assessments and Reports

There were no previous environmental assessments or reports available for review for the Site. Site inspection reports in the well file showed the drilling waste disposal area west of well center, holding water. The DWDA is visible in the aerial photographs for the Site. Also, from the inspection photos, the flare pit is visible north of well center approximately 50m, at the edge of the pad.

3. ALBERTA DRILLING WASTE DISPOSAL CHECKLIST

The I-02 well was drilled with gel-chemical drilling fluid, a flocculated water system. Gel-chemical (Mil-gel slurry) fluid was used from surface to 500m depth; a flocculated water system (gypsum/calcium nitrate/Mil-SOS) from 500m to the Garbutt formation; and a gel-chemical system (Mil-gel/Chemical system) to the total depth of 1744m.

A DWDA sampling report was provided in the well file for the Site. However, the Disposal Notification form in the report was for site d-24-G/94-P-05, a site in the Maxhamish Lake area of northeastern British Columbia. The disposal report information therefore did not apply to the Site (Alpine Environmental Ltd., 2001). A site sketch in the DWDA sampling report reflected aerial information for the Site, and showed the DWDA west-southwest of well center, and the flare pit north of well center, along the bermed boundary.

Seven drill stem tests (DSTs) were conducted for the well. Information in the well file indicated flaring to the flare pit. The report from DST #3 indicated disposal of recovered DST fluids into the flare pit area north of well center. The recovery from the DSTs were the following:

- DST #1: 180m “slightly oil-stained” gasified drilling fluid
- DST #2: no recovery
- DST #3:102m of gasified drilling fluid, no salinity
- DST #4: 710m of “mostly fresh” water, 2000ppm salinity
- DST #5: 56m of drilling mud and fresh water
- DST #6: 190m fresh water
- DST #7: 75m fresh water

Compliance Option #2 was used to assess the drilling waste for the well. Drilling tour reports in the Orogo file were mostly illegible, and invoices in the Paramount well file were used for the drilling fluid additive amounts. A Phase II ESA is required for the DWDA on the Site due to drilling waste failing the barite and salt-loading calculations, and lack of information regarding drill stem test returns disposal. Assessment of the flare pit/area north of well center is recommended at the same time. Well information and notes are provided in Appendix II.

4. CONCLUSIONS AND RECOMMENDATIONS

Based on SynergyAspen's review of available documentation, a Phase II ESA is required for the Site. The following APECs and associated PCOCs require assessment:

APEC	Rationale	Source Description	PCOCs
A) Wellhead	The wellbore was located at the centre of the Site.	Drilling Mud, Petroleum Hydrocarbons, Condensate, Metals, Produced Water	Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Fraction 1 to 4 Petroleum Hydrocarbons (F1-F4G); Polycyclic Aromatic Hydrocarbons (PAHs); Metals; Salinity
B) On-site Drilling Waste Disposal Area (DWDA)	Drilling waste disposal failed Compliance Option #2 based on lack of information regarding disposal of recovered DST fluids; and drilling waste failed the Option 2 salinity and barite loading calculations. DWDA was located west-southwest of well center on the Site, per 2004 aerial photo.	Drilling mud, additives, petroleum hydrocarbons, condensate, metals, drill cutting, workover fluids, well treatment chemicals and produced water	BTEX & F1-F4G; PAHs; Metals; Salinity
C) Flare Area	A flare pit was noted north of the well centre.	Petroleum Hydrocarbons, Condensate, Metals, Produced Water	BTEX & F1-F4G; PAHs; Metals; Salinity
D) Flare Stack	A flare stack was noted in the northwest corner of the site.	Petroleum Hydrocarbon, Metals, Produced Water	BTEX & F1-F4G; PAHs; Metals; Salinity
E) Above-ground Storage Tank (AST) Area	A 400-barrel AST was noted in the northeast corner of the site.	Petroleum Hydrocarbon, Metals, Produced Water	BTEX & F1-F4G; PAHs; Metals; Salinity

5. PROFESSIONAL STATEMENT

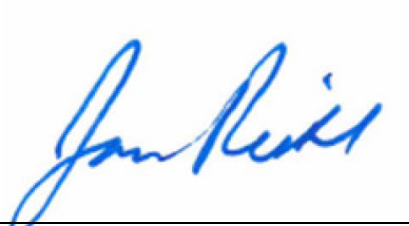
The above work was completed in accordance with Alberta Environmental Site Assessment and CSA Phase I ESA standards. SynergyAspen certifies that those who produced this report have demonstrable experience and knowledge to complete the scope of work, as described, at this Site.

Respectfully Submitted,

SynergyAspen Environmental Inc.



Azadeh Khojasteh, M.Sc., M.Eng., P.Ag.
Environmental Project Manager



Jason Richl, B.Sc., P.Ag. (AB)
Environmental Client Manager

6. REFERENCES

Alberta Environment and Parks (AEP). 2016. *Alberta Environmental Site Assessment Standard*. March 1, 2016.

Alberta Energy Regulator (AER) 2014. Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification. March 2014.

Canadian Standards Association (CSA). 2014. Phase I Environmental Site Assessment. Publication Z768-01 (R2016). January 1, 2016. 48pp.

Government of Northwest Territories. 2020. Office of the Regulator of Oil and Gas Operations (OROGO) - Public Registry. Searchable database website Accessed Dec 21, 2020: https://www.orogo.gov.nt.ca/en/registry/documents.

Government of Northwest Territories. 2020. ATLAS Interactive web-based mapping. Website: https://www.maps.geomatics.gov.nt.ca/HTML5Viewer_Prod/index.html?viewer=ATLAS. Accessed Dec 21, 2020.

Hughes, Terence. 2021. Personal communication – email. January 5, 2021.

Northwest Territories Environment and Natural Resources. 2020. Searchable database of spill information. Website: https://www.enr.gov.nt.ca/en/spills. Accessed Dec 21, 2020.

7. USER RELIANCE AND GENERAL LIMITATIONS

7.1. User Reliance

SynergyAspen Environmental Inc. (SynergyAspen) prepared this report for the sole use of Paramount Resources Limited, hereafter referred to as the Client. The Client was privy to the establishment of this project's scope and is aware of its terms and conditions.

Should the Client submit this report to a regulatory authority, the regulatory authority may rely on the results within the context of the document's General Limitations for the purpose of determining whether the Client is meeting (has met) its requirements concerning applicable environmental regulations.

Third party reliance is subject to the scope of work agreed upon by SynergyAspen and the Client and is only suitable within the limitations of the project/document. The activities detailed herein were performed for the Client and this document may not be appropriate for the purposes of a relying party. Application of this document for aims beyond those practically intended by the Client and SynergyAspen is at the exclusive risk of the user. SynergyAspen does not accept legal responsibility for any damages toward any third party as a result of the application, use of, or any conclusion drawn based on this report.

As far as the nature of these investigative activities involves professional opinion, SynergyAspen offers no assurance that the results contained herein support a particular course of action. The investigative activities may have included the application of judgment to scientific principles; hence certain results of this work may be based on subjective interpretation. Professional opinions expressed herein are derived from the specifics currently available within the confines of the existing information, scope of work, budget, and schedule.

7.2. General Limitations

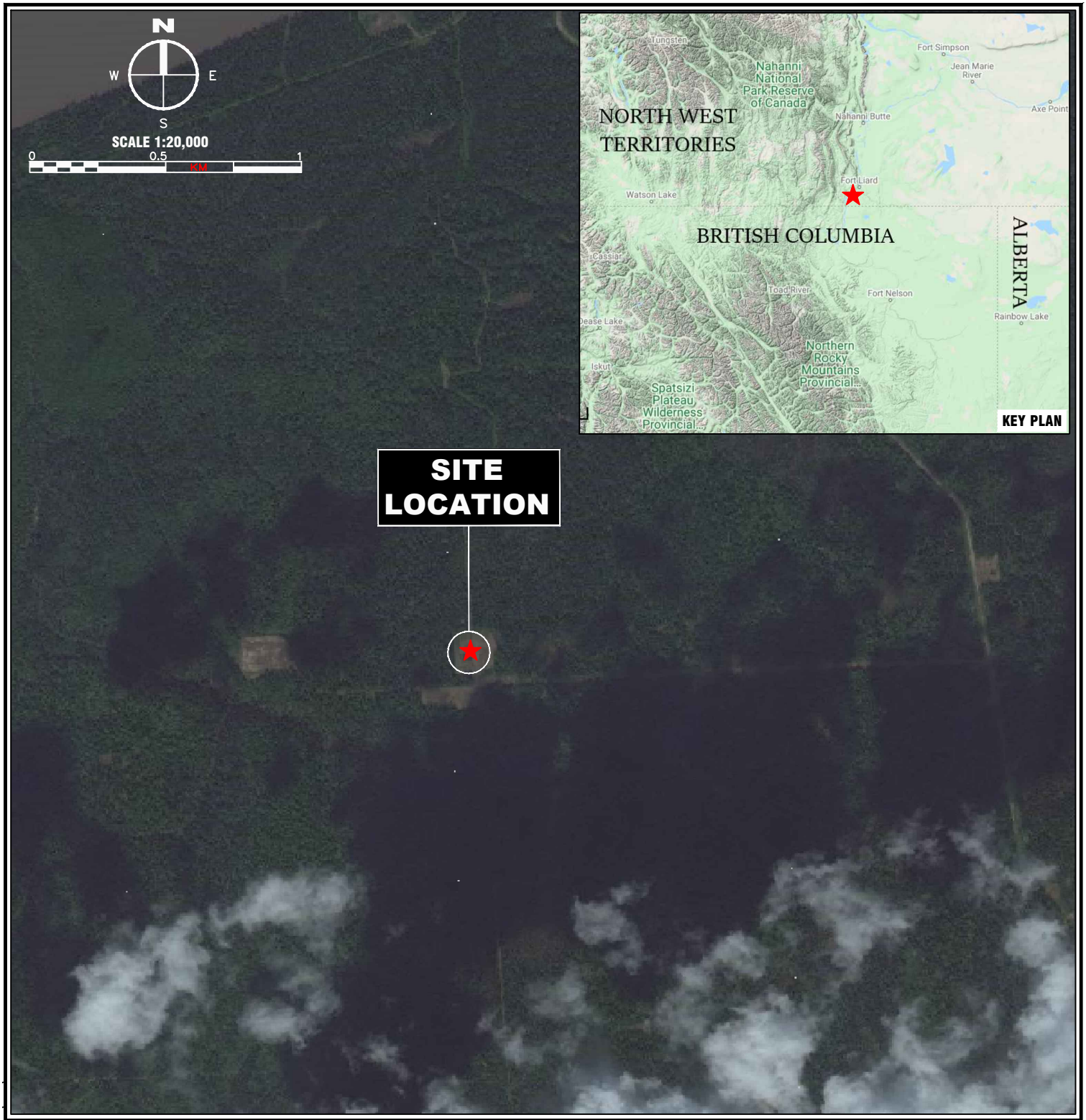
The results and conclusions herein were developed according to the degree of care and skill generally exercised by contemporary environmental professionals within similar conditions and localities. The findings herein are somewhat reliant upon information provided by others. If any of the information is erroneous, amendments to the results, conclusions, and recommendations may be required.

The results, conclusions and recommendations SynergyAspen presents herein represent SynergyAspen's best professional judgement according to the site conditions and on available information during preparation of this report. They were determined explicitly for this site and are somewhat reliant upon visual observation of the site, subsurface investigation at specific locations and depths, and select analysis of specific materials (as detailed herein).

While this assessment has attempted to identify all areas of potential environmental concern at the Site, it is possible that other areas of potential environmental concern may have escaped detection due to imprecise government records, undocumented historical environmental accidents, or other undocumented activities that resulted in contamination.

DRAWINGS

- PAR6206-001 – Site Location Plan
- PAR6206-002 – Areas of Potential Environmental Concern
- Site Survey Plan



CHK	BY	REVISION DESCRIPTION	DATE	REV.
JC	GA	ISSUED TO CLIENT	–	–
–	–	–	–	–

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
–	–	–	–
–	–	–	–

LEGEND

★ LIARD I–02

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. DATA COMPILED BY SYNGIS: SYNERGYASPEN GEOGRAPHIC INFORMATION SYSTEM.
3. BING IMAGERY
4. ORIGINAL DRAWING PAPER SIZE 8.5x11 INCHES.

SynergyAspen ENVIRONMENTAL

TITLE:

SITE LOCATION PLAN
(60° 11' 33.15" N, 123° 30' 27.70" W)

CLIENT NAME: Paramount Resources Ltd.			
SITE LOCATION:	DATE: 2021–02–11		PAR6206
I–02 LIARD	SCALE: 1:20,000	DWG No:	001
	DWN: TW CHK'D: AK		

PLOT: 20210308.1220



APEC Label	APECs	Potential Source of PCOCs	PCOCs IN SOIL
A	Wellhead	Drilling Mud, Petroleum Hydrocarbons, Condensate, Metals, Produced Water	BTEX, F1-F4G, PAHs, Metals and Salinity
B	On-site Drilling Waste Disposal Area (DWDA)	Drilling mud, Additives, Petroleum Hydrocarbons, Condensate, Metals, Drill Cutting, Workover Fluids, Well Treatment Chemicals and Produced Water	BTEX, F1-F4G, PAHs, Metals and Salinity
C	Flare Area	Petroleum Hydrocarbon, Metals, and Produced Water	BTEX, F1-F4G, PAHs, Metals and Salinity
D	Flare Stack	Petroleum Hydrocarbon, Metals, and Produced Water	BTEX, F1-F4G, PAHs, Metals and Salinity
E	Above-ground Storage Tank (AST) Area	Petroleum Hydrocarbon, Metals, and Produced Water	BTEX, F1-F4G, PAHs, Metals and Salinity

CHK	BY	REVISION DESCRIPTION	DATE	REV.
JR	GA	ISSUED TO CLIENT	–	0

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
3111-0728WS	SURVEY PLAN OF WELLSITE	1999-07-09	–
–	–	–	–
–	–	–	–

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM SURVEY PLAN. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
3. GOOGLE EARTH – 2020.
4. ORIGINAL DRAWING PAPER SIZE 17x11 INCHES
5. PLEASE REFER TO SUMMARY OF APECS ASSOCIATED WITH FORMER ACTIVITIES TABLE FOR REFERENCE TO REMOTE SUMP LOCATIONS.

LEGEND

- WELLBORE
- APPROXIMATE LEASE BOUNDARY

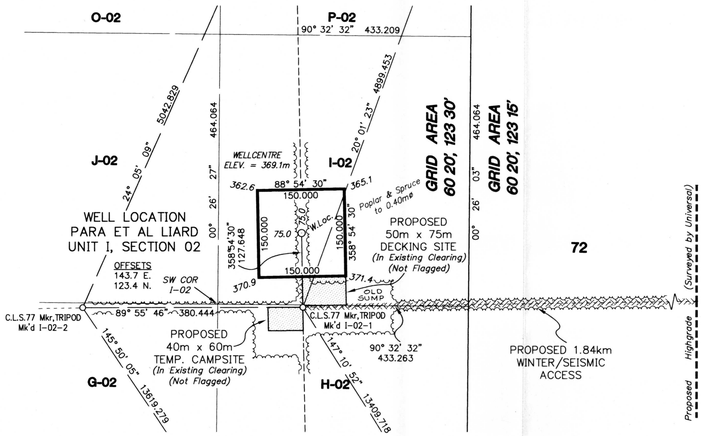
SynergyAspen ENVIRONMENTAL

TITLE:

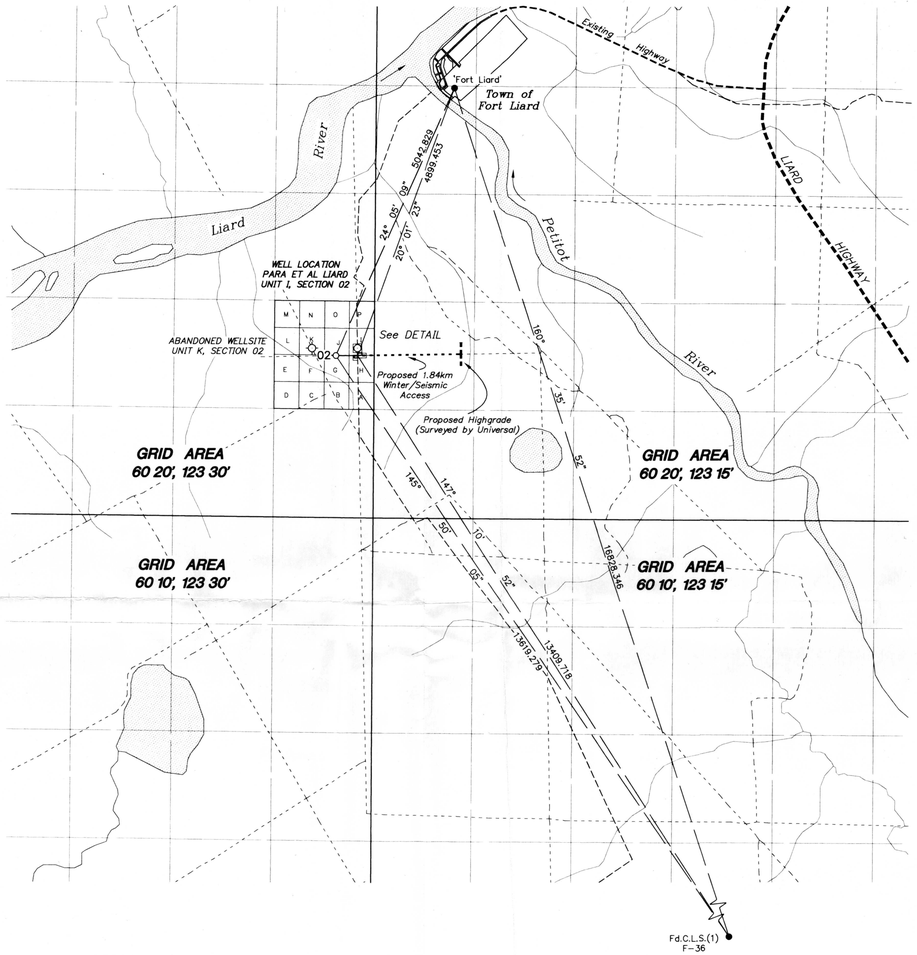
AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

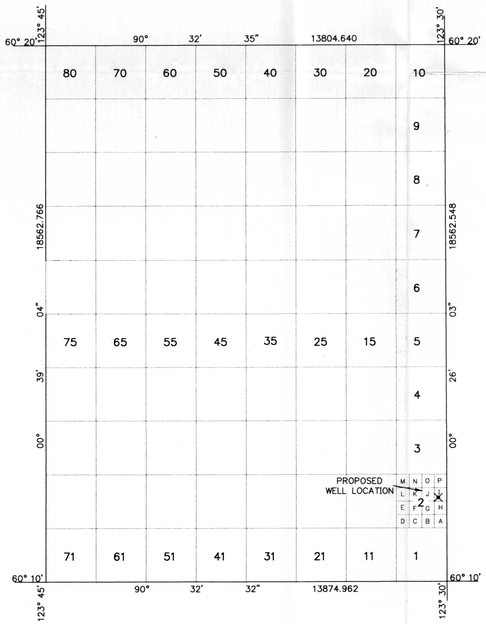
CLIENT NAME: Paramount Resources Ltd.			
SITE LOCATION:	DATE: 2021-02-11		PAR6206
I-02 LIARD	SCALE: 1:1,000	DWG No:	002
	DWN: TW CHK'D: AK		

FILE: P:\PARAMOUNT RESOURCES\PAR6206 – I-02\DRAWINGS & SURVEY\2021\PAR6206



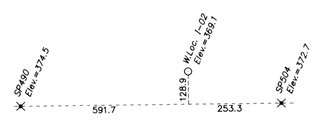
DETAIL
UNIT I, SECTION 02
SCALE 1:5,000





GRID AREA 60°20', 123°30'
SCALE 1:100,000

SHOT POINT DETAIL
NOT TO SCALE



AREAS REQUIRED:

WELLSITE:	150mx150m =	2.25 ha.
DECKING SITE:	50mx75m =	0.38 ha.
TEMP. CAMPSITE:	40mx60m =	0.24 ha.
TOTAL:		2.87 ha.

All coordinates shown are on 1927 North American Datum.
Wellsite control established using differentially corrected GPS observations.
Final coordinate values for control were transformed from NAD83 datum to NAD27 datum using National Transformation Version 2 program.
Geodetic Survey of Canada published coordinate values for monument 'Fort Liard' were held fixed. Adjusted values for Fd.CLS(1) F-36 Grid Area 60°10', 123°15' and comparison to published coordinates are shown below.

GEOGRAPHIC AND UTM COORDINATES, (1927 NAD)

Station	Latitude	Longitude(W)	Northings	Eastings
CONTROL MONUMENTS				
Fort Liard(Publ. & Fixed)	60°13'59.011"	123°28'31.881"	6677255.686	473662.363
Fd.CLS(1) F-36 (Adj.)	60°05'27.349"	123°22'22.874"	6661390.140	479250.165
CLS(1) F-36 (Pub.)	60°05'27.349"	123°22'22.878"	6661390.164	479250.101
GRID AREA				
NE	60° 20' 00"	123° 30' 00"	6688433.574	472391.290
NW	60° 20' 00"	123° 45' 00"	6688564.420	458587.270
SE	60° 10' 00"	123° 30' 00"	6669871.559	472250.652
SW	60° 10' 00"	123° 45' 00"	6670002.853	458376.311
I-02, NE	60°11'45.001"	123°29'59.999"	6673119.912	472275.264
I-02, NW	60°11'45.027"	123°30'28.124"	6673124.007	471842.074
I-02, SE	60°11'30.001"	123°29'59.999"	6672655.861	472271.748
I-02, SW	60°11'30.027"	123°30'28.124"	6672659.962	471838.504
TRAVERSE STATIONS				
I-02-1	60°11'29.885"	123°30'18.576"	6672654.446	471985.553
I-02-2	60°11'29.775"	123°30'43.260"	6672653.978	471605.280
PROPOSED WELL				
I-02	60°11'34.008"	123°30'18.797"	6672782.014	471983.122

PLAN AND FIELD NOTES
OF SURVEY OF
PROPOSED EXPLORATORY WELL
PARA ET AL LIARD
IN UNIT I, SECTION 02
GRID AREA 60° 20' , 123° 30'
NORTHWEST TERRITORIES
CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50,000
0m 500m 1000m 2000m 3000m 4000m 5000m

SURVEYED FOR
PARAMOUNT RESOURCES LTD.

BY : R.O. BLACKALL, CLS
JULY, 1999.

LEGEND
UTM coordinates are computed for Zone 10, central meridian 123° W.
Bearings were derived from differentially corrected GPS Observations and are referred to Meridian 123° W.
Distances are expressed in metres and decimals thereof.
Distances shown in traverse are measured distances reduced to the horizontal at general ground level.
For the computation of coordinates measured distances have been reduced to the UTM plane by multiplying them by an average combined scale factor of 0.9995511. Coordinates were then adjusted to fit the control.
Distances shown on grid area subdivisions are UTM plane.
Authorized control monuments found ..... ●
Monuments placed ..... ○
Mkr. denotes metal marker post 2.0m long placed 0.30m N.
Elevations were derived from Geodetic Survey of Canada Monument 'Fort Liard' Elev. = 216.299m

Survey was completed prior to drilling; therefore well as drilled may not necessarily agree with proposed location.

"Certified Correct and completed on the 03rd day of July, 1999.

R.O.Blackall Canada Land Surveyor

Date: July 9, 1999

R.O'Brian Blackall
Comm. No. 1248

PARAMOUNT RESOURCES LIMITED

WITNESS

DATE

REV.No.	DESCRIPTION	DATE

McELHANNEY
LAND SURVEYS LTD.
10014 - 97th Ave., Suite 202
Fort St. John, British Columbia
Phone:(250)787-0356, Fax:(250)787-0310

DATE : 99/07/08 JOB No.: 3111-07285WS LOG REC

APPENDIX I

Aerial Imagery

SynergyAspen ENVIRONMENTAL

Port Moody Office
2328 Clarke Street
Port Moody, BC
V3H 1Y8
PH: 604-931-1026
FX: 604-931-1046

Fort St. John Office
9904 106 Street
Fort St. John, BC
V1J 1V8
PH: 250-785-1030
FX: 250-785-1034

Paramount Resources Ltd. WID# 1844: PARA ET AL MOUNT COTY I-02 – Historic Photos



PHOTOGRAPH 1: View of well head, facing north



PHOTOGRAPH 2: View of wellhead, facing east



PHOTOGRAPH 3: View from Well Center, facing north.



PHOTOGRAPH 4: View from Well Center, facing east.



PHOTOGRAPH 5: View from Well Center, facing south.



PHOTOGRAPH 6: View from Well Center, facing west.

APPENDIX II

Assessing Drilling Waste Disposal Areas

Compliance Option 2
Drilling Waste Disposal Assessment Checklist

Compliance Option 2 - Drilling Waste Disposal Assessment Checklist

If any response to the checklist questions leads to a Phase 2 ESA requirement or there is insufficient information to complete the Compliance Option Two Checklist, a Phase 2 ESA must be conducted in accordance with Compliance Option Three.

1. General Disposal and Drilling Fluid Information:
The well licensee should be able to review various sources of information pertaining to the drilling activities on-site. Many information sources, other than the *Notification of Drilling Waste Disposal*, *Drilling Waste Management Disposal Form*, or *Drilling Waste Pipeline Disposal Form* can be reviewed for information relating to the drilling waste disposal and drilling fluid systems. These can include Tour Reports, daily drilling records, well files, and contractor invoices.

1.0 Well Information: Unique Identifier (UI) 300/ I-02 60-20-123-30
Spud Date October 16, 2000
Well Depth 1744 m

1.1 Disposal Method (if known)*: Mix-Bury-cover

* If waste was disposed at an AER or ESRD approved facility, list supporting documentation under Reference Documents.

1.2 Disposal Location (if known)**: On-site west-southwest of well center

** If checklist indicates that a Phase 2 ESA (Compliance Option Three) is required, it must be undertaken at the disposal location. If the disposal location is unknown, the Phase 2 ESA must be undertaken at the wellsite.

For the purpose of this form: if the disposal method and/or location remains unknown after all available information sources have been checked, the drilling waste disposal location is assumed to be on-site.

	Yes	No
1.3 Were there other drilling waste disposal events on the site (e.g. wellbore re-entry or another well drilled, using fluids containing drilling fluid additives)?	☐	☒
If yes, were the disposal areas separate from one another?	☐ Drilling waste information must be evaluated for each disposal.	☐ Drilling waste information must be evaluated by combining the drilling fluid additives and well depths. If drilling waste information is missing or incomplete for one or both wells, a Phase 2 (Compliance Option Three) is required.

	Yes	No
1.4 Was a remote site used? If, Yes, is the remote site included in this reclamation application? If not included, is the remote site a multi-well disposal location?	☐ ☐ ☐ In Comments section, indicate which well the remote site will be tied to for the purposes of reclamation	☒ ☐ ☒ Single well remote disposal site must be included with reclamation certificate application, unless it already has received a Reclamation Certificate.
1.5 Has the well licensee reviewed the Daily Drilling Records and other available drilling documentation?	☒	☐ Phase 2 required
1.6 Can it be determined from the available records what type of drilling fluid system was used?	☒	☐ Phase 2 required
1.7 Were water-based drilling fluids used for all sections (i.e., gel chemical drilling fluid systems)? If No, is there evidence that demonstrates the non-water based wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., appropriately approved waste management facility)?	☒ ☐	☐ ☐ Phase 2 required
1.8 Is a mud list available? If Yes, can all the additives on the mud list be identified and described? Record the additives and their description (e.g., chrome-free lignosulfonate, aldehyde-based bactericide, etc.) on the attached form.	☒ ☒	☐ Phase 2 required ☐ Phase 2 required

	Yes	No
1.9 Do the Daily Drilling Records show evidence of a flow or kick that may have resulted in the introduction of produced fluids (i.e., hydrocarbons or salts) into the drilling fluids?	☐	☒
If Yes, is there information/documentation available to demonstrate that they were appropriately treated or disposed of as per *Directive 50* or *Directive 58* (i.e., approved waste management facility)?	☐	☐ Phase 2 required
1.10 Do the Daily Drilling Records show evidence of returned drill stem test fluids?	☒	☐
If Yes, is there information/documentation available to demonstrate that they were appropriately treated or disposed of as per *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐	☒
If treatment or disposal as per *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* cannot be confirmed, is there sufficient information/documentation available to complete the DST calculations?	☒ Show calculation on attached form	☐ Phase 2 required
1.11 Were cement returns buried on-site or at a remote site linked to the well?	☒	☐

2. Hydrocarbon Management

	Yes	No
2.1 Was hydrocarbon-based drilling fluid used? If Yes, is there evidence that wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐ ☐	☒ ☐ Phase 2 required
2.2 Was the well a horizontal oil well? If Yes, is there evidence that wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐ ☐	☒ ☐ Phase 2 required
2.3 Was the well drilled using under-balanced techniques? If Yes, is there information/documentation available to demonstrate that the drilling wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐ ☐	☒ ☐ Phase 2 required
2.4 Was hydrocarbon added to the drilling fluid? If Yes, was the hydrocarbon contaminated drilling waste disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐ ☐	☒ ☐ Phase 2 required

3. Metals (Trace Elements) Management

	Yes	No
3.1 Was the disposal completed before November 1, 2012?	☒ Complete questions 3.2 to 3.5	☐ Go to question 3.6
3.2 Was barite added to the drilling fluid? If Yes, did it meet the requirements specified in the attached metal calculation table?	☒ ☐ Show calculation on attached form	☐ ☒ Phase 2 required
3.3 Was zinc carbonate added to the drilling fluid? If Yes, did it meet the requirements specified in the attached metal calculation table?	☐ ☐ Show calculation on attached form	☒ ☐ Phase 2 required
3.4 Were chrome-based thinners added to the drilling fluid? If Yes, did it meet the requirements specified in the attached metal calculation table?	☒ ☒ Show calculation on attached form	☐ ☐ Phase 2 required
3.5 Were any other additives used that would have triggered testing for metals under Section 3 or 5 of *Directive 50 (1996 version)*? If Yes, are waste analytical data and application rates (land treatment, landspreading) or maximum application (mix-bury-cover) available? If above data are available, did the application rate or maximum application meet *Directive 50* requirements?	☐ ☐ ☐	☒ ☐ Phase 2 required ☐ Phase 2 required
3.6 Did metal concentrations in the waste trigger a requirement for post-disposal sampling? If yes, did all post-disposal samples meet the soil metal endpoints specified in Section 3 of *Directive 50* (2012 version)?	☐ ☐	☒ ☐ Phase 2 required

4. Salinity Management

	Yes	No
4.1 Does the water based drilling waste meet the requirements specified in the attached Salt Calculation Table?	☐ Show calculation on attached form	☒ Phase 2 required
4.2 Was a salt zone encountered during drilling?	☐	☒
If Yes, is there evidence that demonstrates the drilling wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., appropriately approved waste management facility)?	☐	☐ Phase 2 required

Mud Additives (Attach additional pages if necessary.)

Product Name	Amount Used (25kg sacks)	Brief Description of Product
Bicarb soda	3.6	NaCHO3; pH control/Ca remover
BioLose DFE 117	4.5	**Non-fermenting chemically modified starch; filrate reducers**
Caustic Soda	21	NaOH; pH control
Desco	1.5	Chrome base dispersible xantham gum; viscosifier
Ecco Bar Canadian	1175	Assuming this is Barite, added to the barite calculation
Mil-Bar	290	Barite; weighting materials
Mil-Gel	519	Wyoming bentonite; viscosifier
Mil-Gel NT	699	Untreated Wyoming bentonite; viscosifier
Ligco	30	Lignite; thinner/dispersant
Poly Flake	1.5	Polyethylcellulose flakes; lost circulation material
Staflo	16	Polyanionic cellulose; filtrate reducer
Soda Ash	48	Sodium carbonate; calcium remover
Sawdust	71	Sawdust; lost circulation material

Reference Documents (List all source documents used in the completion of this checklist. Attach additional pages if necessary. Documents must be supplied to the AER if requested.)

Petroleum Services Association of Canada – mud list
Environmental Drilling and Completion Fluids Directory
Paramount I-02 hard copy well files
OROGO well file information

Comments (Please provide any additional comments relevant to the decision process within the checklist. Attach additional pages if necessary.)

Compliance Option 2 was used to assess drilling waste disposal for the well.

Daily Mud Records were not available, just a tally sheet in the Final Well report. Mud report was provided without detail information and the days.

Waste disposal failed barite calculation.Seven Drill Stem Tests were conducted, returns included low-salinity salt water, gassified mud, and fresh water. There was no information regarding disposal or treatment of drilling waste or DST fluids. Therefore, a Phase 2 ESA is required for the drilling waste disposal area.

A Phase 2 ESA is required for the drilling waste disposal area due to:

-- drilling waste failed the Barite loading calculations for 3:1 mix-bury-cover;
-- drilling waste failed the salt loading calculations; and
-- no record of proper disposal of drill stem test fluids.

Metal Calculations for Compliance Options One and Two

Note: Different default mix ratios are provided depending on whether the well was drilled before or after October 22, 1996. The 1996 version of *Guide 50* , *Drilling Waste Management,* which was issued by the Energy Resources Conservation Board on this date, increased the minimum mix ratio requirement from 1:1 to 3:1.

Barite:

Directions: Fill in the number of sacks and adjust for sack weight if different than 40 kg. Enter the Well Depth in metres. The spreadsheet will calculate the number of sacks per metre. This value must be less than or equal to **0.22** If the value exceeds the objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Total Number of Sacks (40 kg/sack*)		Well Depth (m)		Mix Ratio**		Sacks per Metre	
1465	÷	1744	÷	3	=	**0.28000765**	**FAIL**

* Sack weight may be adjusted by dividing the number of sacks by 40 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

Zinc Carbonate:

Alternative 1:

If waste zinc, mix ratio and waste dry bulk density data are available use the following calculator to estimate post-disposal zinc concentration.

Directions: Enter the total zinc concentration in mg/kg measured in the waste, the Waste Dry Bulk Density in kg/m^3, and Mix Ratio in the appropriate cells. The spreadsheet will calculate the post-diposal zinc concentration. This value must be less than or equal to **200 mg/kg**. If the value exceeds this objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Waste Zinc Concentration (mg/kg)		Waste Dry Bulk Density* (kg/m^3)		Mix Ratio**						Post-Disposal Zn Concentration (mg/kg)
	x		÷		÷	1500	+	70	=	#DIV/0!

* Waste Dry Bulk Density = (Waste Specific Gravity – 1) x 1600

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

Alternative 2:

If the above data is not available use the following equation to calculate the number of sacks of zinc carbonate added per meter drilled.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Well Depth in metres. The spreadsheet will calculate the number of sacks per metre. This value must be less than or equal to **0.00650**. If the value exceeds the objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Total Number of Sacks (25 kg/sack*)		Well Depth (m)		Mix Ratio**		Sacks per Metre
	÷		÷		=	#DIV/0!

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

= Required Field

Chromium-based Thinner:

Alternative 1:

If waste chromium, mix ratio and waste bulk density data are available use the following calculator to estimate post-disposal chromium concentration.

Directions: Enter the Total Chromium Concentration in mg/kg measured in the waste, the Waste Dry Bulk Density in kg/m3, and Mix Ratio in the appropriate cells. The spreadsheet will calculate the Post-Disposal Chromium Concentration. If this value is greater than 64 mg/kg, a Phase 2 ESA (Compliance Option 3) is required.

Waste Chromium Concentration (mg/kg)		Waste Dry Bulk Density* (kg/m^3)		Mix Ratio						Post-Disposal Cr Concentration (mg/kg)
	x		÷		÷	1500	+	30	=	#DIV/0!

* Waste Dry Bulk Density = (Waste Specific Gravity – 1) x 1600

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

Alternative 2:

If the above data is not available use the following equation to calculate the number of sacks of chrome thinner added per meter drilled. If the number of sacks exceeds the limits below, a Phase 2 is required.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Well Depth in metres. The spreadsheet will calculate the number of sacks per metre. This value must be less than or equal to **0.020.** If the value exceeds the objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Total Number of Sacks (25 kg/sack*)		Well Depth (m)		Mix Ratio**		Sacks per Metre	
1.5	÷	1744	÷	3	=	0.000286697	**PASS**

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

= Required Field

Salt Calculations for Option 2:

Alternative 1

If the volume of drilling waste is known, use the following calculator to determine the NaOH Equivalent Sacks per m^3 of waste. If this value is greater than **0.10**, a Phase 2 ESA (Compliance Option 3) is required.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Waste Volume in cubic metres. The spreadsheet will calculate the NaOH Equivalent Sacks per Metre.

Additive	Number of Sacks (25 kg/sack*)		NaOH Equivalency Factor		NaOH Equivalent Sacks
Caustic Soda		X	1.00	=	0
Soda Ash		X	0.75	=	0
Sodium Chloride		X	0.68	=	0
Sodium Bicarbonate		X	0.95	=	0
Sodium Silicate		X	1.37	=	0
Sodium acid pyrophosphate (SAPP)		X	0.22	=	0
Calcium Chloride		X	0.72	=	0
Calcium Nitrate		X	0.34	=	0
Envirofloc		X	0.41	=	0
Gypsum**		X	0.59	=	0
Lime**		X	1.08	=	0
** Maximum number of sacks = 0.02 x well depth (m)					
Potassium chloride		X	0.54	=	0
Potassium sulphate		X	0.46	=	0
Caustic potash		X	0.71	=	0
Potassium formate		X	0.47	=	0
Potassium silicate		X	0.32	=	0
Potassium nitrate		X	0.40	=	0
Diammonium phosphate		X	0.63	=	0
Ammonium nitrate		X	0.57	=	0
Ammonium sulphate		X	0.61	=	0
Drill Stem Test Returns		X	0.68	=	0

Total NaOH Equivalent Sacks	=	0
Waste Volume (m^3)	÷	
NaOH Equivalent Sacks per m^3	=	**#DIV/0!**

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Note: Up to 0.02 sacks of gypsum and lime per metre of well depth should be counted with other salt additives. Gypsum and lime must be calculated separately. Because of the limited solubility of gypsum and lime, sacks in excess of this value need not be counted.

= Required Field

Alternative 2

If the volume of drilling waste is not known, use the following calculator to determine the NaOH Equivalent Sacks per metre of well depth. This value must be less than **0.0260** for wells drilled before October 22 1996, or **0.0350** for wells drilled on or after this date. If the value exceeds the target, a Phase 2 ESA (Compliance Option 3) must be conducted.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Well Depth in metres. The spreadsheet will calculate the NaOH Equivalent Sacks per Metre.

Additive	Number of sacks (25 kg/sack*)		NaOH Equivalency Factor		NaOH Equivalent Sacks
Caustic Soda	21	X	1.00	=	21
Soda Ash	48	X	0.75	=	36
Sodium Chloride		X	0.68	=	0
Sodium Bicarbonate	3.6	X	0.95	=	3.42
Sodium Silicate		X	1.37	=	0
Sodium acid pyrophosphate (SAPP)		X	0.22	=	0
Calcium Chloride		X	0.72	=	0
Calcium Nitrate		X	0.34	=	0
Envirofloc		X	0.41	=	0
Gypsum**		X	0.59	=	0
Lime**		X	1.08	=	0
** Max = 0.02 x well depth (m)					
Potassium chloride		X	0.54	=	0
Potassium sulphate		X	0.46	=	0
Caustic potash		X	0.71	=	0
Potassium formate		X	0.47	=	0
Potassium silicate		X	0.32	=	0
Potassium nitrate		X	0.40	=	0
Diammonium phosphate		X	0.63	=	0
Ammonium nitrate		X	0.57	=	0
Ammonium sulphate		X	0.61	=	0
Drill Stem Test Returns	1.91	X	0.68	=	1.2988

Total NaOH Equivalent Sacks	=	61.7188
Well Depth (m)	÷	1744
NaOH Equivalent Sacks per Metre	=	**0.03538922** **FAIL**

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Note: Up to 0.02 sacks of gypsum and lime per metre of well depth should be counted with other salt additives. Because of the limited solubility of gypsum and lime, sacks in excess of this value need not be counted.

= Required Field

Drill Stem Test Return Calculations for Compliance Option Two

Salinity:

Note: Either the resistivity or the chloride calculation must be completed. It is not necessary to complete both calculations. Resistivity data should be used when available. If resistivity is not available, the chloride calculation should be used. If the volume is specified but neither chloride nor resistivity is available, use the default concentration in the chloride calculation. If no volume is available, a Phase 2 (Compliance Option 3) is required.

Alternative 1: Resistivity

Directions: Enter the drill stem diameter for the drill stem test (DST) section in millimeters, the length of the DST return (including mud returns) in metres and the resistivity of the DST fluid in ohms. The spreadsheet will calculate the equivalent number of sacks. This value must be entered in the salt calculation in the cell labelled "Drill Stem Test Returns".

Inner Diameter of Pipe (mm)	Length of Drill Stem Test Return (m)	Volume of Returns (m^3)				Resistivity (Ohms)*		Number of Sacks
		0	x	0.28	÷		=	#DIV/0!
		0	x	0.28	÷		=	#DIV/0!
		0	x	0.28	÷		=	#DIV/0!
		0	x	0.28	÷		=	#DIV/0!
		0	x	0.28	÷		=	#DIV/0!
		0	x	0.28	÷		=	#DIV/0!
						Total number of sacks	=	0

* Resistivity values from formation water databases or adjacent wells are currently not acceptable.

Alternative 2: Chloride

Directions: Enter the drill stem diameter for the drill stem test (DST) section in millimeters, the length of the DST return (including mud returns) in metres and the chloride concentration of the DST fluid in mg/L. The spreadsheet will calculate the equivalent number of sacks. This value must be entered in the salt calculation in the cell labelled "Drill Stem Test Returns".

Inner Diameter of Pipe (mm)	Length of Drill Stem Test Return (m)	Volume of Returns (m^3)*		Chloride Concentration* (mg/L)				Number of Sacks
114	710	7.2433206	x	2000	÷	7600	=	1.906137
0		0	x		÷	7600	=	0
		0	x		÷	7600	=	0
		0	x		÷	7600	=	0
		0	x		÷	7600	=	0
		0	x		÷	7600	=	0
						Total number of sacks	=	1.906137

*If chloride concentration is not specified, use 215,000 mg/L. Chloride concentrations from formation water databases or adjacent wells are currently not acceptable.

= Required Field

Hydrocarbons

Directions: Enter the drill stem diameter for the drill stem test (DST) section in millimeters, the length of the DST return in metres, the percent oil content of the DST fluid, the well depth in metres and the mix ratio. The spreadsheet will calculate the post disposal oil concentration If this value is greater than **0.10%** (dry weight) in subsoil or **0.50%** (dry weight) in topsoil, a Phase 2 ESA (Compliance Option 3) is required.

Inner Diameter of Pipe (mm)	Length of Drill Stem Test Return (m)	Volume of Returns (m^3)		Oil Content (%)*		Vol. of Oil (m^3 x 100)
114	180	1.8363348	**x**	100.00%	**=**	183.63348
		0	**x**		**=**	0
		0	**x**		**=**	0
		0	**x**		**=**	0
		0	**x**		**=**	0
		0	**x**		**=**	0
				Total Volume of Oil	**=**	183.63348
					÷	0.6
				Well Depth (m)	÷	1744
				Mix Ratio**	÷	3
				Post-Disposal Oil Concentration (%)	=	0.0584969

* Actual measured oil concentration must be used if available. If only visual descriptions are available then use the following to estimate oil concentration:

Flecked = 5%

Emulsion = 25%

Oil or oil-cut mud= 100%

Do not include gas-cut mud or mud with no indication of oil.

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter “3”. If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

= Required Field

APPENDIX III

Spill Search: Environment & Natural Resources NT

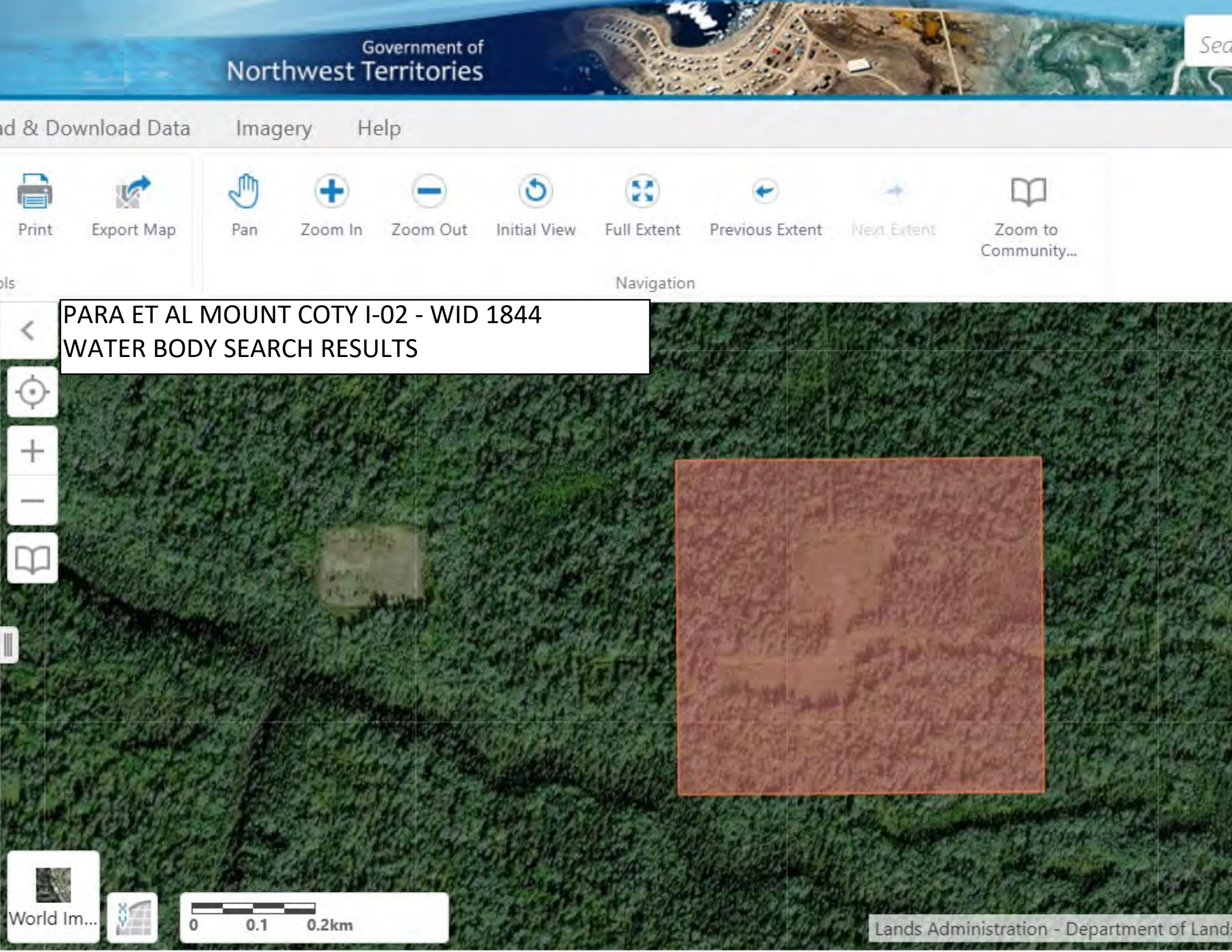
NWT Environment and Natural Resources - Spill Search - Paramount Resources Ltd. 1999-2021

Spill	Occurance Date	Spill Regio	Location	Location Description	Product Spilled	Quantity	Measurem	Spill Cause	Lead Agency
spill-2013310	10-Sep-13	South Slav	Paramoun	H-03 Battery Cameron lat D60 M02 S59 Long D117 M32 S05	Wastewater (sewage, mine tailings)	1	Cubic Met	Pipe Leaks	CER - Canada Energy Regulator
spill-2012030	8-Feb-12	South Slav	Paramoun	Cameron Hills D-11	Wastewater (sewage, mine tailings)	5000	Litres	Fitting Lea	CER - Canada Energy Regulator
spill-2011384	28-Sep-11	South Slav	Paramoun	Paramount Cameron H-03-Bit	Wastewater (sewage, mine tailings)	10000	Litres	Pipe Leaks	CER - Canada Energy Regulator
spill-2011051	8-Mar-11	South Slav	Paramoun	E-52 Cameron Hills	Drilling Muds	300	Litres	Tank Leak	CER - Canada Energy Regulator
spill-2011037	24-Feb-11	South Slav	Paramoun	Para et al Cameron 2H-03	Drilling Muds	2000	Litres	Overflow E	CER - Canada Energy Regulator
spill-2011030	18-Feb-11	South Slav	Paramoun	Para et al Cameron 2H-03	Drilling Muds	300	Litres	Tank Leak	CER - Canada Energy Regulator
spill-2011012	24-Jan-11	South Slav	Paramoun	Cameron Hills 02-H03	Drilling Muds	5000	Litres	Tank Leak	CER - Canada Energy Regulator
spill-2010043	19-Feb-10	South Slav	Paramoun	N-06 Wellsite 60:05:50N 117:31:17W	Drilling Muds	2000	Litres	Fitting Lea	CER - Canada Energy Regulator
spill-2010038	14-Feb-10	South Slav	Paramoun	Cameron Hills F-77 Wellsite	Drilling Muds	250	Litres	Fitting Lea	CER - Canada Energy Regulator
spill-2010029	7-Feb-10	South Slav	Paramoun	Cameron Hills F-77 Wellsite	Drilling Muds	200	Litres	Overflow E	CER - Canada Energy Regulator
spill-2009109	21-Mar-09	South Slav	Paramoun	Cameron Hills Battery H-03	Petroleum - other (bunker, asphalt, propane)	14000	Litres	Overflow E	CER - Canada Energy Regulator
spill-2008546	17-Nov-08	South Slav	Paramoun	Cameron Hills Well J-74	Mixed load	0	Litres	Pipe Leaks	CER - Canada Energy Regulator
spill-2008047	15-Feb-08	South Slav	Paramoun	H-05 Plant Cameron Hills	Petroleum - other (bunker, asphalt, propane)	1000	Litres	Other	CER - Canada Energy Regulator
spill-2007541	3-Dec-07	South Slav	Paramoun	H-03 Cameron Hills Battery	Chemicals (including transformer oils)	0	Litres	Deliberate	CER - Canada Energy Regulator
spill-2007318	25-Jun-07	Deh Cho	Paramoun	SE Fort Liard Well N-01 60:0?:52N 123:16:2W	Petroleum - other (bunker, asphalt, propane)	135	Litres	Collision o	CIRNAC - Crown-Indigenous Relations and Northern Affairs Canada
spill-2007319	1-May-07	South Slav	Paramoun	Cameron Hills H-03 Battery Plant	Wastewater (sewage, mine tailings)	3	Litres	Pipe Leaks	CER - Canada Energy Regulator
spill-2007044	9-Feb-07	South Slav	Paramoun	North of Cameron Hills Plant on Winter Road 60:08:4037N 117:35:537	Petroleum - lubricating oil (lube, hydraulic)	180	Litres	Fitting Lea	CIRNAC - Crown-Indigenous Relations and Northern Affairs Canada
spill-2007043	8-Feb-07	South Slav	Paramoun	North of Cameron Hills on Winter Road 60:08:016N 117:34:670W	Petroleum - fuel oil (jet A, diesel, turbo A, heat)	500	Litres	Tank Leak	CIRNAC - Crown-Indigenous Relations and Northern Affairs Canada
spill-2007012	13-Jan-07	South Slav	Paramoun	L-47 60:06:3195N 117:39:2372W	Petroleum - other (bunker, asphalt, propane)	4	Cubic Met	Other	CER - Canada Energy Regulator
spill-2006390	11-Oct-06	South Slav	Paramoun	Cameron Hills H-03 Battery	Wastewater (sewage, mine tailings)	600	Litres	Other	CER - Canada Energy Regulator
spill-2006351	10-Sep-06	South Slav	Paramoun	Cameron Hills H-03 Plant Site	Petroleum - other (bunker, asphalt, propane)	40	Litres	Other	CER - Canada Energy Regulator
spill-2006125	1-Apr-06	Deh Cho	Paramoun	Liard North K-29	Wastewater (sewage, mine tailings)	500	Litres	Pipe Leaks	CER - Canada Energy Regulator
spill-2005476	4-Oct-05	Deh Cho	Paramoun	F-25 Process Building	Chemicals (including transformer oils)	200	Litres	Pipe Leaks	CIRNAC - Crown-Indigenous Relations and Northern Affairs Canada
spill-2005027	23-Jan-05	Deh Cho	Paramoun	K-29 Site New Cooler (2K-29)	Petroleum - Natural Gas	5000	Cubic Met	Pipe Leaks	CER - Canada Energy Regulator
spill-2004671	12-Dec-04	Deh Cho	Paramoun	K29 Wellsite	Petroleum - Natural Gas	20000	Cubic Met	Fitting Lea	CER - Canada Energy Regulator
spill-2003756	18-Dec-03	South Slav	Paramoun	H-03 Plant Site 60:10N 117:30W	Chemicals (including transformer oils)	22	Litres	Pipe Leaks	CER - Canada Energy Regulator
spill-2003752	17-Dec-03	South Slav	Paramoun	Cameron Hills H-03 Plantsite	Petroleum - lubricating oil (lube, hydraulic)	15	Litres	Other	CER - Canada Energy Regulator
spill-2003753	17-Dec-03	South Slav	Paramoun	Cameron Hills H-03	Petroleum - lubricating oil (lube, hydraulic)	20	Litres	Other	CER - Canada Energy Regulator
spill-2003754	17-Dec-03	South Slav	Paramoun	Cameron Hills H-03	Petroleum - lubricating oil (lube, hydraulic)	2	Litres	Other	CER - Canada Energy Regulator
spill-2003601	30-Sep-03	South Slav	Paramoun	K74 Oil Well 60:10N 117:15W	Chemicals (including transformer oils)	2	Litres	Other	CER - Canada Energy Regulator
spill-2003602	29-Sep-03	South Slav	Paramoun	K74 Oil Well 60:10N 117:15W	Petroleum - lubricating oil (lube, hydraulic)	6	Litres	Pipe Leaks	CER - Canada Energy Regulator
spill-2003334	14-May-03	South Slav	Paramoun	Cameron Hills H-03	Petroleum - crude oil	40	Litres	Other	CER - Canada Energy Regulator
spill-2003285	19-Apr-03	South Slav	Paramoun	Cameron Hills H-03 Grid	Petroleum - crude oil	36729	Litres	Pipe Leaks	CER - Canada Energy Regulator
spill-2003278	17-Apr-03	South Slav	Paramoun	60:10N 117:30W	Petroleum - crude oil	150	Litres	Other	CER - Canada Energy Regulator
spill-2003243	8-Apr-03	South Slav	Paramoun	60:03N 117:29W Cameron Hills	Petroleum - unknown	40	Litres	Other	CIRNAC - Crown-Indigenous Relations and Northern Affairs Canada
spill-2003232	5-Apr-03	South Slav	Paramoun	H-03 60:10N 117:30W Lease Cameron Hills	Chemicals (including transformer oils)	1	Litres	Fitting Lea	CER - Canada Energy Regulator
spill-2003134	6-Mar-03	South Slav	Paramoun	D-49 Cameron Hills	Petroleum - crude oil	180	Litres	Other	CER - Canada Energy Regulator
spill-2003145	6-Mar-03	South Slav	Paramoun	H-03 Plant Site Cameron Hills	Petroleum - other (bunker, asphalt, propane)	30	Litres	Other	CER - Canada Energy Regulator
spill-2003144	5-Mar-03	South Slav	Paramoun	D-49 Lease Cameron Hills	Petroleum - lubricating oil (lube, hydraulic)	5	Litres	Fitting Lea	CER - Canada Energy Regulator
spill-2003131	3-Mar-03	South Slav	Paramoun	H-03 Battery Lease Cameron Hills	Petroleum - fuel oil (jet A, diesel, turbo A, heat)	5	Litres	Overflow E	CER - Canada Energy Regulator
spill-2003099	15-Feb-03	South Slav	Paramoun	H-03 Plant Cameron Hills 60:02N 117:30W	Petroleum - lubricating oil (lube, hydraulic)	1	Litres	Pipe Leaks	CIRNAC - Crown-Indigenous Relations and Northern Affairs Canada
spill-2003012	9-Jan-03	South Slav	Paramoun	1 Km N of Cameron River 60:06:39N 117:30:05W	Petroleum - lubricating oil (lube, hydraulic)	23	Litres	Fitting Lea	CIRNAC - Crown-Indigenous Relations and Northern Affairs Canada
spill-2002342	24-May-02	South Slav	Paramoun	Cameron Hills C50 60:10N 117:30W	Petroleum - Natural Gas	0	Litres	Pipe Leaks	CER - Canada Energy Regulator
spill-2002288	1-Apr-02	South Slav	Paramoun	H03 60:02N 117:30W	Petroleum - lubricating oil (lube, hydraulic)	2	Litres	Pipe Leaks	CER - Canada Energy Regulator
spill-2002223	26-Mar-02	South Slav	Paramoun	C74 60:10:00N 117:15:00W	Petroleum - lubricating oil (lube, hydraulic)	75	Litres	Other	CER - Canada Energy Regulator
spill-2002224	26-Mar-02	South Slav	Paramoun	C74 60:10:00N 117:15:00W	Petroleum - unknown	800	Litres	Overflow E	CER - Canada Energy Regulator
spill-2002175	5-Mar-02	South Slav	Paramoun	C50 Lease	Chemicals (including transformer oils)	36	Litres	Fitting Lea	CIRNAC - Crown-Indigenous Relations and Northern Affairs Canada
spill-2007513		Deh Cho	Paramoun	K-29 Fort Liard West	Chemicals (including transformer oils)	200	Litres	Fitting Lea	CER - Canada Energy Regulator
spill-2006322		Deh Cho	Paramoun	N-01 Well Site 60:00:86N 123:16:08W	Wastewater (sewage, mine tailings)	150	Litres	Pipe Leaks	CER - Canada Energy Regulator

From:https://www.enr.gov.nt.ca/en/spills. Accessed December 28, 2020

APPENDIX IV

Water body Search Results


Government of
Northwest Territories
ad & Download Data
Imagery
Help
Print
Export Map
Pan
Zoom In
Zoom Out
Initial View
Full Extent
Previous Extent
Next Extent
Zoom to Community...
Navigation
PARA ET AL MOUNT COTY I-02 - WID 1844
WATER BODY SEARCH RESULTS
World Im...
0
0.1
0.2km
Lands Administration - Department of Lands

APPENDIX V

Paramount I-02 Well Files
(Available upon request)

PHASE 2 ENVIRONMENTAL SITE ASSESSMENT

Former Wellsite Para et al Mount Coty I-02
Unique Well Identifier: 300/I-02 60-20-123-00/0
WID: 1884
Fort Liard, Northwest Territories

Prepared for:
Paramount Resources Ltd.

SynergyAspen Project No. PAR6206
PERMIT NUMBER: 1001717

May 10, 2022



EXECUTIVE SUMMARY

On behalf of Paramount Resources Ltd. (Paramount), SynergyAspen Environmental Inc. (SynergyAspen) has completed a Phase 2 Environmental Site Assessment (Phase 2 ESA) for former wellsite, Para et al Mount Coty I-02, with unique well identifier (UWI) 300/I-02 60-20-123-00/0 and well identification number (WID#) 1884 (the Site). The Site is located on Crown land in a remote forested and muskeg area, approximately 6 kilometres south of Fort Liard, Northwest Territories (NT). The well was cut and capped on February 9, 2022.

The objective of this Phase 2 ESA was to assess the areas of potential environmental concern (APECs) and evaluate the presence/absence of potential contaminants of concern (PCOCs) in soil at the Site above an applicable numerical standard/guideline/criterion at each APEC. This Phase 2 was completed in general accordance with the requirements established by the Alberta Environmental Site Assessment Standard (Alberta Environmental and Parks (AEP), 2016) and the Canadian Standards Association (CSA) guidelines.

SynergyAspen advanced eighteen (18) boreholes across five (5) APECs and a background location. The five APECs included the wellbore area, the Drilling Waste Disposal Area (DWDA), the flare area, the ASTs, and the flare stack. Additionally, two hand auger test holes were completed within the DWDA due to soft ground conditions preventing access with the drill rig, though sampling from these hand augers was unsuccessful. Twelve (12) test pits were also advanced in and around the North Pit of the DWDA to provide evidence that the native walls of the DWDA were not contaminated.

Soil stratigraphy generally observed within the lease was silt and silt and clay. Data from the boreholes and test pits was used to create a cross-section of the DWDA, which showed that the DWDA was enclosed laterally and below by native clay material, with a 1.5 m clay cap on the surface.

Selenium concentrations found in the wellbore area and DWDA were marginally greater than the applicable guideline but selenium is not considered to be a parameter of concern and may be attributed to naturally occurring variations and not anthropogenic in nature. Barium concentrations measure using the Strong Acid Leachate and True Total Barium methods were found to exceed the applicable Guidelines. All barium concentrations exceeding the applicable Alberta Guidelines are considered to not be a risk to receptors due to limited bioavailability and the depth of the samples. Concentrations of all other metals parameters were below the applicable Guidelines.

Hydrocarbon concentrations were found to marginally exceed the applicable Alberta Tier 2 guidelines in the DWDA. These concentrations are horizontally and vertically delineated and are isolated and pose little risk to receptors. Additionally, following reclamation work on the Site these concentrations will meet guidelines as they will be greater than two meters below grade, due to the new grade of the Site. Concentrations of all other hydrocarbon parameters were below the applicable Alberta Tier 2 Guidelines after removal of the FAL and DUA pathways.

SAR measurements were found to exceed the applicable Guidelines in several samples taken from the DWDA. These measurements were all present below the rooting zone, and a lack of chloride's indicates that these measurements are not as a result of anthropogenic salinity contamination. As such, these measurements pose no risk to receptors. All other salinity parameters were below the applicable Alberta Tier 1 Guidelines

As a result of the Phase II ESA, all APECs have been adequately investigated and no further remedial work is required at the Site. SynergyAspen will return to Site in the Summer of 2022 to perform Site restoration work to assist with Site reclamation and revegetation to return the land to pre-disturbance conditions.

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1. INTRODUCTION

On behalf of Paramount Resources Ltd. (Paramount), SynergyAspen Environmental Inc. (SynergyAspen) has completed a Phase 2 Environmental Site Assessment (Phase 2 ESA) for former wellsite, Para et al Mount Coty I-02, with unique well identifier (UWI) 300/I-02 60-20-123-00/0 and well identification number (WID#) 1884 (the Site). The Site is located on Crown land in a remote forested and muskeg area, approximately 6 kilometres (km) south of Fort Liard, Northwest Territories (NT).

The objective of this Phase 2 ESA was to assess the areas of potential environmental concern (APECs) and evaluate the presence/absence of potential contaminants of concern (PCOCs) in soil at the Site above an applicable numerical standard/guideline/criterion at each APEC. This Phase 2 was completed in general accordance with the requirements established by the Alberta Environmental Site Assessment Standard (Alberta Environmental and Parks (AEP), 2016) and the Canadian Standards Association (CSA) guidelines.

SynergyAspen's work plan was developed based on the Limited Phase 1 Environmental Site Assessment (Phase 1 ESA) completed by SynergyAspen (SynergyAspen Environmental Inc., 2021).

2. SITE DESCRIPTION

The Site location is shown on Drawing 001. The Site, surrounding land uses, summary of APECs, and borehole locations are shown on Drawing 002. Photographs of the Site are provided in Appendix I.

The wellsite was approximately 150 meters (m) x 150 m (2.25 hectares [ha]), with a campsite measuring 60 m x 40 m (0.24 ha) located south of the wellsite access road, and a 50 m x 75 m (0.38 ha) decking site on the southeast corner of the Site. The Site is accessed in the winter by an existing seismic line, from an existing winter road, the South Liard Road.

Table A summarizes general information regarding the Site's location, topography, hydrogeology, and surrounding land uses.

TABLE A: Summary of General Information

Item	Description
Site Latitude, Longitude	60° 11' 33.15" N, 123° 30' 27.70" W
Location/Well Name	Mount Coty I-02, UWI 300/I-02 60-20-123-00/0
Remote Sump Location	None
WID	1884
Well Depth	1,744 m
Well Type	Drill and abandoned; suspended status
Production History	Did not produce
Abandonment Date	Well was Cut and Capped on February 9, 2022
Landowner(s)	Crown land operated by Paramount
Land Use at Surface	Natural land: remote forested and muskeg area
Water Wells within 300 m	A review of the Groundwater Information Network (accessed April 2022) shows no domestic use water wells within the search zone and no water well license was issued for the Site (SynergyAspen Environmental Inc., 2021). A water well was noted on lease, however, the groundwater level measured below grade is 93.5 mbgs. It is unknown how deep this water well was drilled as no historical information was available.
Regional Surface Grade	Field observations recorded shows local surface grade to be to the southwest, towards a ravine ~180 m southwest. A review of the Administration of the Territorial Land Acts System (ATLAS) shows the regional topography to grade towards the southwest, towards the Liard River.
Nearest Surface Water	Liard River is located ~2.3 km northwest. There is a pond located ~960 m north of the Site.
Infrastructure Remaining	Wellhead; drilling waste disposal area (DWDA) west of well centre; flare pit 50 m north of well centre
Barite Site	Yes

3. AREAS OF POTENTIAL ENVIRONMENTAL CONCERN (APECs) SUMMARY

The following environmental report(s) were reviewed to assist in the identification of APECs and any Areas of Environmental Concern (AEC) if present when developing the scope of work for the drilling investigation:

- Limited Phase 1 Environmental Site Assessment by SynergyAspen (SynergyAspen Environmental Inc., 2021): Drilling waste disposal for the Site did not pass Compliance Option #2 due to drilling waste failing the barite and salt-loading calculations, and lack of information regarding drill stem test returns disposal.

APEC locations are provided on Drawing 002. PCOCs and associated regulated parameters for each APEC are presented in Table B, below.

TABLE B: Summary of APECs Associated with Former Activities as identified in Phase 1 ESA

ID	APEC	Potential Source of PCOC	PCOCs in Soil
A	Wellbore Area	Drilling Mud, Petroleum Hydrocarbons, Condensate, Metals, Produced Water	BTEX, PHCs Fraction 1 to 4 (F1-F4), PAHs, Metals, Salinity
B	On-site Drilling Waste Disposal Area (DWDA)	Drilling Mud, Additives, Petroleum Hydrocarbons, Condensate, Metals, Drill Cutting, Workover Fluids, Well Treatment Chemicals, and Produced Water	BTEX, PHCs Fraction 1 to 4 (F1-F4), PAHs, Metals, Salinity
C	Flare Area (Noted in a 2005 inspection report)	Petroleum Hydrocarbons, Condensate and Produced Water	BTEX, PHCs Fraction 1 to 4 (F1-F4), PAHs, Metals, Salinity
D	Flare Stack	Petroleum Hydrocarbon, Metals, and Produced Water	BTEX, PHCs Fraction 1 to 4 (F1-F4), PAHs, Metals, Salinity
E	Above-ground Storage Tank (AST) Area	Petroleum Hydrocarbon, Metals, and Produced Water	BTEX, PHCs Fraction 1 to 4 (F1-F4), PAHs, Metals, Salinity

Notes:
BTEX: benzene, toluene, ethylbenzene, xylenes
PHCs: petroleum hydrocarbon
PAHs: polycyclic aromatic hydrocarbons

It is noted that it is not considered mandatory to test for all parameters identified in Table B in all areas to confirm that the APEC is not contaminated. The necessity for groundwater and soil vapour assessment is subject to the results of the soil analyses.

4. REGULATORY SUMMARY

The Northwest Territories (NWT) Environmental Guidelines for Contaminated Site Remediation (Government of the Northwest Territories (GNWT), 2003) follows and references standards from the CCME documentation. These documents have limited selection of land use criteria, which does not include natural areas. As the Site is located in a remote forested area, it is considered that the following Alberta regulatory standards are applicable at the time this report was prepared:

- Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Alberta Tier 1 Guidelines) (Alberta Environment and Parks (AEP), 2019)
- Alberta Tier 2 Soil and Groundwater Remediation Guidelines (Alberta Tier 2 Guidelines) (Alberta Environment and Parks (AEP), 2019)
- Alberta – Subsoil Petroleum Guidelines for Remote Forested Sites in the Green Area (Alberta Subsoil Guidelines) (Alberta Environment and Sustainable Resource Development (ERSD), 2014).

For this Site, it was determined that the freshwater aquatic life (FAL) pathway can be removed due to the following:

- The Site is located on Crown land in a remote forested area and there are no surface bodies of water found within 300 m of the Site. A water well was noted onsite, however the measured groundwater level was 93.5 mbgs, far below the limits of the investigation of the PCOCs onsite. A review of historical data provides no evidence that the well was drilled for the intention of domestic water use, and due to the remote nature of the Site and the presence of a confining layer that meets hydraulic conductivity guidelines, SynergyAspen does not anticipate any migration of contaminants to the water table.
- The borehole logs and laboratory particle size analysis indicated that the underlying soil is predominately fine-grained soils.

For this Site, it was determined that the domestic use aquifer (DUA) pathway was removed due to the following:

- At least 5 metres of massive, undisturbed, unfractured fine-grained material meeting appropriate guidelines with a bulk hydraulic conductivity that is less than or equal to 1 x 10-7 m/s (AEP, 2019).

- An equivalent thickness of natural, undisturbed geologic material that is more than 5 meters thick and is supported by technical information regarding the lithological properties prepared by the professional conducting the site assessment and accepted by Alberta Environment and Parks (AEP, 2019).

The determination of the applicable groundwater use directly affects the site-specific factors used in determining active soil pathways and subsequently soil guidelines. Water use determination must take into consideration not only the current use, but also the future use of the groundwater aquifers as drinking water sources.

Thus, soil analysis results were compared to the Alberta Tier 1 and Tier 2 Soil Remediation Guidelines for Natural Land Use: fine-grained soils with the FAL and DUA pathways removed, and all other receptors and pathways applicable.

During the Phase II ESA completed by SynergyAspen in 2021/2022, SynergyAspen used the following guidelines to evaluate the analytical data:

- For depths above 1.5 meters below grade (mbg): AB Tier 1 and Tier 2 Natural Area Surface – Natural Fine-Grained Soils

- For depths below 1.5 mbg: AB Tier 1 and Tier 2 Natural Area Sub-Surface – Natural Fine-Grained Soils

Salinity soil quality was compared the Alberta Tier 1 Salt Remediation Guidelines (Alberta Environment and Parks (AEP), 2019) category rating of “Good” for topsoil (<2 dS/m) and subsoil (<3 dS/m), and Sodium Adsorption Ratio (SAR) values were rated “Good” for toposil (<4) and subsoil (<4) based on the salinity values of the background borehole location (BH21-01).

A reference guideline value of 100 mg/kg was used for chloride concentrations to evaluate the extent (vertical and laterial delination) of any anthropogenic chloride impacts (Government of Alberta, 2020).

5. SUMMARY OF PHASE 2 ENVIRONMENTAL SITE ASSESSMENT

Based on the APEC table, SynergyAspen developed a work plan for and completed a Phase II ESA to assess soil quality at the identified APECs. The Phase 2 ESA consisted of the advancement of eighteen (18) boreholes to assess soil quality at the identified APECs and one (1) borehole to assess background conditions. In addition, twelve (12) test pits were advanced in and around the DWDA.

The locations of the boreholes are shown on Drawing 002 and discussed in Table C.

TABLE C: Summary of Rationale for Borehole and Test Pit Placement

Borehole/Test Pit ID	APEC		
	ID	Description	Maximum Drilling/Excavation Depth (m)
BH21-01	n/a	Background	4.9
BH21-02 to BH21-04	A	Wellbore Area	3.0
BH21-05 and BH21-06	B	Flare Pit Area	3.0
BH21-07 to BH21-10; HA21-01 and HA21-02; BH22-11 to BH22-14	C	Drilling Waste Disposal Area (DWDA)	6.0
BH22-15 and BH22-16	D	AST	1.5
BH22-17 and BH22-18	E	Flare Stack	1.5
TP22-01a to TP22-06a; TP22-07 to TP22-12	C	DWDA (inside boundary)	4.0
TP22-01b to TP22-06b	C	DWDA (outside boundary)	4.0

5.1. Methodology

Based on the findings of the Phase 1 ESA and Alberta's Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification (Alberta Energy Regulator (AER), 2014), appropriate borehole and test pit locations were proposed as close to each APEC as practically possible. Prior to ground disturbance, oil and gas companies in the vicinity of the Site were contacted to provide clearance of the field work as NWT does not have a 1 Call system for utility owners. Historical Site plans were reviewed, and a private line locate was completed. Paramount provided a field work permit for the Site.

All boreholes were drilled by Clean Harbors Exploration Services (Clean Harbors) using a heli-portable drill rig with 3¼-inch solid stem augers. Fieldwork was completed in three separate events. The first part of the fieldwork took place between October 4 to 6, 2021, where 11 boreholes were drilled in the background, wellbore area, flare area, and around the outside of the DWDA. Attempts to drill in the DWDA and at the Flare Stack and AST areas were unsuccessful due to unstable ground conditions as a result of moisture. SynergyAspen returned to the site from January 12 to 13, 2022, and advanced seven (7) more boreholes at the AST and flare stack areas, as well as inside the DWDA. A third investigation event took place from February 8 to 10, 2022, in which 12 test pits were advanced in and around the boundary of the DWDA to delineate the boundaries of the DWDA, as well as to provide evidence of a lack of contamination in the native soils surrounding the DWDA. The locations of the boreholes and test pits are presented on Drawing 002.

During borehole advancement and test pit excavation, SynergyAspen personnel recorded the soil type, colour, apparent density, and moisture content. Representative soil samples were collected from each borehole at regular intervals and from discrete soil layers. Following completion, all boreholes were backfilled with drill cuttings from their respective locations. The test pit excavations were backfilled with the excavated, stockpiled material in 75 mm layers, nominally compacted with the excavator bucket, and recontoured to match the surrounding terrain. Additionally, two hand auger test holes were advanced in the DWDA area as the pits within the DWDA area were soft and full of water and the drill rig was not able to access and drill. The ground conditions were too soft to successfully hand auger more than a surficial sample, and as such the hand auger samples were not analyzed.

Descriptions of SynergyAspen's field work methodology for drilling and for collection, handling and field screening of soil samples during the investigation are provided in Appendix II.

All soil samples were placed in laboratory-supplied containers, stored in coolers with ice and transported to Element Materials Technology Canada Inc., an accredited laboratory. Approved methodologies were used to complete laboratory analysis. Soil samples from boreholes and test pits were selectively analyzed for concentrations of parameters listed in Table B.

Sample selection for analytical testing was based upon indications of potentially impacted soil (*i.e.,* field screening for hydrocarbons vapors and electrical conductivity).

5.2. Quality Assurance/Quality Control (QA/QC)

SynergyAspen follows Quality Assurance/Quality Control (QA/QC) protocols for all sampling and analysis and ensures that all data is handled appropriately. Details of the QA/QC program are outlined in Appendix III.

6. RESULTS OF THE PHASE 2 ENVIRONMENTAL SITE ASSESSMENT

6.1. Soil Stratigraphy

Soil stratigraphy generally observed at the background area located in the southwest portion at the Site consisted of silt from the surface to 3.4 metres below ground surface (mbgs) and silt and clay from 3.4 mbgs to the maximum depth of investigation of 5.3 mbgs. Boreholes investigated in the wellbore area consisted of silt and clay. The boreholes in the flare area and DWDA consisted of silt or silt and clay. Test pits investigated in the DWDA area consisted of clay with some to trace sand and trace gravel and cobble outside the DWDA, with test pits inside the DWDA displaying similar stratigraphy but with the addition of organic inclusions. The soil stratigraphy encountered at each borehole and test pit location is presented in the borehole logs included in Appendix IV.

In addition, SynergyAspen used borehole and test pit log data from the Phase 2 ESA to construct a cross-section of the soil stratigraphy present at the DWDA. The results showed that the DWDA consisted of a firm clay cap with trace sand and gravel from surface to approximately 1.5 mbgs, overlaying a soft clay layer of DWDA material to approximately 3.5 mbgs, underlain by a clean bottom layer of clay with trace gravel to approximately 4 mbgs, underlain by a layer of sand fill with trace silt to approximately 5 mbgs, underlain by a native clay layer up to a maximum explored depth of 6 mbgs. In addition, the DWDA was surrounded on all four sides by a clean native clay layer from surface to a maximum explored depth of 6.0 mbgs. Furthermore, SynergyAspen will return to Site in the summer of 2022 to perform additional Site restoration work, during which the DWDA material contained by the native clay layer will be mixed and re-sampled as a due diligence measure to verify in-situ site conditions. Additional material will be added to the area to address any potential settling/compaction work after spring melt and to recontour the area to match the surrounding grade. The cross-sections of the DWDA are presented in Drawings 4 and 5, and the soil stratigraphy encountered within can be found in Appendix IV.

6.2. Grain Size

Four (4) soil samples taken from varying depths (samples BH21-01-02, BH21-01-04, BH21-01-06 and BH21-01-09) at the background location, BH21-01, were analyzed for particle size analysis to determine soil texture. The results of the analyses indicated that the underlying geology is fine-grained and is comprised of loam and clay loam, with an average hydraulic conductivity of 9.5×10^{-8} m/s. Table 1 in the Tables section lists the results of the soil particle size analyses.

6.3. Soil Analytical Results

Concentrations of regulated parameters reported in soil samples collected during the Phase 2 ESA are presented in Tables 2, 3, 4, and 5 in the Tables section; analytical laboratory reports are included in Appendix V.

6.4. QA/QC Results

Three (3) pairs of samples were analyzed for the purposes of QA/QC. Details of the QA/QC relative percent difference (RPD) criteria developed by SynergyAspen are explained in Appendix III. Applicable RPD calculations are presented in Tables 2, 3, 4, and 5. All parameters met the criteria.

Overall, the QA/QC results are acceptable, and the data set is considered reliable.

7. DISCUSSION OF RESULTS

Parameters that were in exceedance of the applicable guidelines are discussed in this section. Investigation of groundwater conditions at the Site is not warranted as soil contamination with potential to migrate to groundwater receptors was not identified.

7.1. Selenium Concentrations at the Site

One soil sample in the wellbore area and two soil samples located in the DWDA marginally exceeded the applicable Tier 1 guidelines for selenium, so an Alberta Tier 2 approach was applied to the results.

SynergyAspen has reviewed the data and based on the nature of selenium in soil pore water, selenium is in the form of selenite, which is a selenium salt that is expected in acidic, organic rich soils. Selenites are usually complexed to iron oxides/hydroxides and clays in acidic and neutral soils and have a very low solubility. Since soil samples are comprised of loam, clay loam, and clay soil, the selenium in the soil sample is likely to be immobile. In addition, the soil conditions (i.e., organic matter with underlying clay) generally decreases phytoavailability for selenium. Therefore, it is SynergyAspen's opinion that, the selenium in the soil sample is unlikely to impact environmental receptors. SynergyAspen considers these concentrations not to be a risk to receptors, and as such these concentrations do not require further investigation.

7.2. Barium Concentrations in the DWDA

From the Phase 1 historical review (SynergyAspen, 2021), the Site is considered a barite site, so samples submitted to the laboratory were run for True Total Barium analysis in addition to the generalized Strong Acid Leachable method of analysis. Analytical results reported elevated barium concentrations exceeding the regular Alberta Tier 1 Guidelines for strong acid and true total barium for samples collected at the DWDA at depths ranging from 2.5 to 3.3 mbgs. The values of these exceedances ranged from 831 to 1,620 mg/kg for strong acid barium and from 10,900 mg/kg to 111,000 mg/kg for true total barium, exceeding the Alberta Tier 1 Standard of 750 and 10,000 mg/kg, respectively. Despite these values, SynergyAspen does not consider these concentrations of barium to be a risk to receptors for the following reasons;

- As the majority of samples were collected below 1.5 mbgs, below the rooting zone, the AB Tier 1 Direct Soil Contact guideline of 200,000 mg/kg for true total barium was considered applicable. This removes all exceedances of true total barium for all samples across the site.

- In addition, all 13 samples that displayed concentrations of barium or true total barium that exceeded the standard Alberta Tier 1 Guidelines were analyzed for extractable toxic Ba^{2+} barium. This concentration is considered to be a better representation of toxic barium that is bioavailable for organisms to ingest. When analyzed using the $CaCl_2$ method for extractable barium, all samples displayed concentrations of barium ranging from 16.2 to 104 mg/kg, well below the applicable guideline of 250 mg/kg as outlined in Table 6: Soil Remediation Guidelines for Barite (Soil Remediation Guidelines for Barite: Environmental Health and Human Health (AEP, 2009)

One exception to the arguments outlined above is present in Sample BH22-03-02 (true total barium of 2,770 mg/kg), which was collected at a depth of 0.7-0.9 mbgs, above the standard criteria of depth ≤1.5mbgs. For this sample, the Wildlife Soil and Food Ingestion pathway guideline for true total barium (10,000 mg/kg) is considered applicable, and thus the observed concentration of true total barium falls below the guideline. In addition, similarly to other samples collected from the Site, this sample also returned relatively a low concentration of 104 mg/kg barium when analyzed with the $CaCl_2$ method, and as such the concentration of bioavailable barium is well below the applicable guideline of 250 mg/kg.

As a result of these analyses, SynergyAspen believes that the barium concentrations present in the DWDA pose no risk to the applicable receptors. As such, barium is not considered a contaminant of concern, and no further investigation is required for this parameter.

7.3. Hydrocarbon Concentrations in the DWDA

Investigation of the DWDA area showed the presence of hydrocarbons in the soil samples collected. After removal of the FAL and DUA pathways (see section 4), the concentration of all hydrocarbon parameters in samples taken from the DWDA were below the applicable standards, with two exceptions. Samples TP22-04a-01 (depth 0.5-1.0 m) and BH22-13-02 (depth 0.7-0.9 m) displayed F2 concentrations of 184 and 156 mg/kg, marginally exceeding the applicable Alberta Tier 2 Guideline of 150 mg/kg. It is SynergyAspen's belief that these marginal exceedances are sufficiently horizontally and vertically delineated to determine that they are isolated and not of significant risk to their applicable receptors. In addition, the test pitting and other environmental work carried out by SynergyAspen has shown that the DWDA is surrounded by native clay material with low hydraulic conductivity values, and as a result concentrations of regulated parameters should not migrate outside of the DWDA to other receptors. As such, as all other concentrations of hydrocarbon parameters fall below the applicable Alberta Tier 2 Guidelines, it is SynergyAspen's belief that the hydrocarbon concentrations in the DWDA require no further environmental investigation. Additionally, after the site is recontoured this soil where the F2 exceedances were identified will be more than two metres below the site grade and below the direct soil contact pathway. Therefore, they would be within the guidelines.

7.4. Sodium Adsorption Ratio (SAR) in the DWDA

Several samples in the DWDA were found to exceed the applicable Alberta Tier 2 Guidelines for Sodium Adsorption Ratio (SAR). These values for SAR were above the rating of "Poor" (> 8) for 18 samples and had values ranging from 8.1 to 28. It is SynergyAspen's belief that these SAR measurements are not of any risk to receptors, as all of the samples with heightened SAR readings were present below the rooting zone (i.e., below 1.5 m). As such, these SAR measurements will not affect the plant life in the area. In addition, as these samples displayed no heightened chloride values indicating anthropogenic impacts (Government of Alberta, 2020), SynergyAspen considers these SAR readings to not be a risk to their applicable receptors and likely not representative of salinity contamination. Finally, the native soils surrounding the DWDA both laterally and below have been shown to be primarily consisting of clay or silt and clay, and have low enough hydraulic conductivity values (average of 9.5×10^{-8} m/s) to contain the concentrations of any regulated parameters. As a result, it is SynergyAspen's belief that the SAR readings in the DWDA require no further investigation.

8. CONCLUSIONS

Conclusions from the Phase 2 ESA are as follows:

- Five APECs were identified for the Site based on the Phase 1 ESA: Wellbore area, DWDA, flare area, flare stack, and AST area.
- A total of eighteen (18) boreholes were drilled to assess PCOCs at the APECs and a background location at the Site. Additionally, two (2) hand auger test holes were completed within the DWDA due to soft and wet ground conditions preventing access by the drilling rig. Twelve (12) test pits were also advanced in and around the DWDA to delineate the boundaries of the DWDA and any impacted soil.
- Soil stratigraphy generally observed within the lease was 'silt' and 'silt and clay'. The FAL pathway was eliminated based on the distance to the nearest surface waterbody and lack of water wells in proximity to the site; the DUA pathway was eliminated via soil stratigraphy and a hydraulic conductivity calculated at less than $1x10^{-7}$ m/s.
- Selenium concentrations found in the wellbore area and DWDA were marginally greater than the applicable guideline but selenium is not considered to be a parameter of concern and may be attributed to naturally occurring variations and not anthropogenic in nature. Barium concentrations measure using the Strong Acid Leachate and True Total Barium methods were found to exceed the applicable Guidelines. All barium concentrations exceeding the applicable Alberta Guidelines are considered to not be a risk to receptors due to limited bioavailability and the depth of the samples. Concentrations of all other metals parameters were below the applicable Guidelines.
- Hydrocarbon concentrations were found to marginally exceed the applicable Alberta Tier 2 guidelines in the DWDA. These concentrations are horizontally and vertically delineated and are isolated and pose little risk to receptors. Additionally, following reclamation work on the Site these concentrations will meet guidelines as they will be greater than two meters below grade, due to the new grade of the Site. Concentrations of all other hydrocarbon parameters were below the applicable Alberta Tier 2 Guidelines after removal of the FAL and DUA pathways.

- SAR measurements were found to exceed the applicable Guidelines in several samples taken from the DWDA. These measurements were all present below the rooting zone, and a lack of chlorides indicates that these measurements are not as a result of anthropogenic salinity contamination. As such, these measurements pose no risk to receptors. All other salinity parameters were below the applicable Alberta Tier 1 Guidelines

As a result of the Phase II ESA, all APECs have been adequately investigated and no further remedial work is required at the Site. SynergyAspen will return to Site in the Summer of 2022 to perform Site restoration work to assist with Site reclamation and revegetation to return the land to pre-disturbance conditions.

9. SIGNATURE PAGE AND CLOSURE

We trust that the information enclosed in this document is satisfactory for your current requirements. If you have any questions or require further details, please contact the undersigned at any time.

Respectfully Submitted,

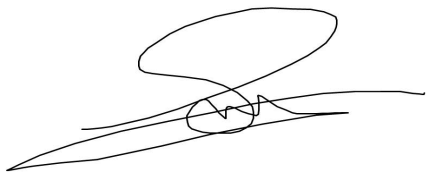
SynergyAspen Environmental Inc.

Report completed by:



Darren Purves (P.Geol (APEGA) for
Marsha Pereira, B.A.Sc.
Environmental Project Manager

Report reviewed by:



Sabrina McCarthy, B.Sc.,GIT.
Environmental Project Manager

10. REFERENCES

Alberta Energy Regulator (AER). (2014). Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification. March 2014.

Alberta Environment and Parks (AEP). (2019). Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 198 pp.

Alberta Environmental and Parks (AEP). (2016). Alberta Environmental Site Asessment Standard. March 01, 2016.

Alberta Environment and Parks (AEP) (2009). Soil Remediation Guidelines for Barite: Environmental health and Human Health.

Canadian Council of Ministers of the Environment (CCME). (1996). Guidance Manual for Developing Site-Specific Soil Quality Remediation Objectives for Contaminated Sites.

Canadian Council of Ministers of the Environment (CCME). (1999 and updates). Canadian Environmental Quality Guidelines. Canadian Council of Ministers of the Environment, Winnipeg.

Government of Alberta. (2020). Subsoil Salinity Tool Version 3.0 User Manual. November 2020.

Government of the Northwest Territories (GNWT). (2003). Guideline for Contaminated Site Remediation. November 2003.

Government of the Northwest Territories (GNWT) Groundwater Information Network (2022), http://gw-info.net. Accessed 5 April 2022.

SynergyAspen Environmental Inc. (2021). Limited Phase 1 Environmental Site Asessment. Former Wellsite Para et al Mount Coty I-02. 300/I-02 60-20-123-30 /1. WID 1884. Fort Liard, Northwest Territories. March 24, 2021.

11. USER RELIANCE AND GENERAL LIMITATIONS

11.1. User Reliance

SynergyAspen Environmental Inc. (SynergyAspen) prepared this report for the sole use of Paramount Resources Ltd., hereafter referred to as the Client. The Client was privy to the establishment of this project's scope and is aware of its terms and conditions.

Should the Client submit this report to a regulatory authority, the regulatory authority may rely on the results within the context of the document's General Limitations for the purpose of determining whether the Client is meeting (has met) its requirements concerning applicable environmental regulations.

Third party reliance is subject to the scope of work agreed upon by SynergyAspen and the Client and is only suitable within the limitations of the project/document. The activities detailed herein were performed for the Client and this document may not be appropriate for the purposes of a relying party. Application of this document for aims beyond those practically intended by the Client and SynergyAspen is at the exclusive risk of the user. SynergyAspen does not accept legal responsibility for any damages toward any third party as a result of the application, use of, or any conclusion drawn based on this report.

As far as the nature of these investigative activities involves professional opinion, SynergyAspen offers no assurance that the results contained herein support a particular course of action. The investigative activities may have included the application of judgment to scientific principles; hence certain results of this work may be based on subjective interpretation. Professional opinions expressed herein are derived from the specifics currently available within the confines of the existing information, scope of work, budget, and schedule.

11.2. General Limitations

The results and conclusions herein were developed according to the degree of care and skill generally exercised by contemporary environmental professionals within similar conditions and localities. The findings herein are somewhat reliant upon information provided by others. If any of the information is erroneous, amendments to the results, conclusions, and recommendations may be required.

The results, conclusions, and recommendations SynergyAspen presents herein represent SynergyAspen's best professional judgement according to the site conditions and based on available information during preparation of this report. They were determined explicitly for this site and are somewhat reliant upon visual observation of the site, subsurface investigation at specific locations and depths, and select analysis of specific materials (as detailed herein).

While this assessment has attempted to identify all areas of potential environmental concern at the Site, it is possible that other areas of potential environmental concern may have escaped detection due to imprecise government records, undocumented historical environmental accidents, or other undocumented activities that resulted in contamination.

TABLES

- TABLE 1: Soil Particle Size Analysis
- TABLE 2: Summary of Soil Analytical Results of Surface Soils Less than 1.5 metres (boreholes)
- TABLE 3: Summary of Soil Analytical Results of Subsurface Soils Greater than 1.5 metres (boreholes)
- TABLE 4: Summary of Soil Analytical Results of Surface Soils Less than 1.5 metres (test pits)

TABLE 5: Summary of Soil Analytical Results of Subsurface Soils Greater than 1.5 metres (test pits)

Client: Paramount
Project #: PAR6206
LSD: I-02
Date: 20-Jan-21
Completed by: Sam Carpenter

Grain Size Diameter - For Plotting (in mm) Based on the Canadian System of Soil Classification

	Gravel	Sand	Silt	Clay
High	75	2.0	0.05	0.002
Average	39	1.0	0.03	0.001
Low	2.0	0.05	0.002	0.0002

High, average and low hydraulic conductivities are based on coarse (high), medium (average) and fine (low) soil diameters that are typical of each soil classification.

Sample Number		**BH21-01-02**	**BH21-01-04**	**BH21-01-06**	**BH21-01-09**				
Depth of Sample (m)		0.41-0.96	1.38-2.2	3.24-3.56	4.68-5				
Field Soil Description		SILT, some clay, trace sand	SILT, clayey, trace sand	SILT, clayey, trace sand	SILT and CLAY, trace sand				
Lab Grain Size Analysis	% Sand	39	38	38	40				
	% Silt	42	39	34	33				
	% Clay	18	23	28	27				
	% Gravel	0	0	0	0				
	TOTAL	100	100	100	100				
% Soil Type to Plot	% Gravel	0	0	0	0				
	% Sand	39	38	38	40				
	% Silt	81	77	72	73				
	% Clay	99	100	100	100				
METHOD OF ANALYSIS		Creager	Creager	Creager	Creager				
D_{20} or D_{10} From Plot (in mm)	High	1.4E-02	1.2E-02	1.1E-02	1.1E-02				
	Average	1.2E-02	1.1E-02	1.0E-02	1.0E-02				
	Low	1.1E-03	1.1E-03	1.0E-03	1.0E-03				
K From Creager or Hazen (m/s)	High (Coarse-grained)	1.7E-07	1.2E-07	9.9E-08	9.9E-08				
	Average (Medium-grained)	1.2E-07	9.9E-08	8.0E-08	8.0E-08				
	Low (Fine-grained)	4.7E-10	4.2E-10	3.8E-10	3.8E-10				
Textural Classification (lab test based on USCS)		Loam	Loam	Clay Loam	Clay Loam				

Grain Size Distribution Graph:
F-36 60-10-123-15 PAR6207



TABLE 1: Soil Particle Size Analysis

APEC	Background			
Borehole ID	BH21-01			
Sample ID	BH21-01-02	BH21-01-04	BH21-01-06	BH21-01-09
Sample Depth (m)	0.41-0.96	1.38-2.2	3.24-3.56	4.68-5
Sample Date	06/Oct/21	06/Oct/21	06/Oct/21	06/Oct/21
Lab Name:	Element	Element	Element	Element
Lot ID:	1525504	1525504	1525504	1525504

Parameter	**Unit**				
Sieve Texture[1]	N/A	Loam	Loam	Clay Loam	Clay Loam
Particle Size Distribution (Sand; 50 µm - 2 mm)	% by weight	39	38	38	40
Particle Size Distribution (Silt; 2 µm - 50 µm)	% by weight	42	39	34	33
Particle Size Distribution (Clay; <2 µm)	% by weight	18	23	28	27

Footnotes:

APEC = Area of Potential Environmental Concern

[1] Fine-grained soils are defined as 50% or more by mass pass a 75 µm seive; coarse-grained soils have less than 50% by mass pass a 75 µm seive (AEP, 2019).

µm = microns or micrometers

mm = milimetres

m = metres below grade/surface

TABLE 2: Summary of Soil Analytical Results of Surface Soils Less than 1.5 metres Below Ground Surface

APEC	Background		Wellbore Area								Flare Area					Drilling Waste Disposal Area						AST							Flare Stack			
Borehole ID	BH21-01		BH21-02			BH21-03			BH21-04		BH21-05				BH21-06	BH21-08		BH21-09	BH21-10	BH22-11	BH22-13	BH22-14	BH22-15			BH22-16			BH22-17		BH22-18	
Sample ID	**BH21-01-01**	**BH21-01-03**	**BH21-02-01**	**BH21-02-06**	QA/QC RPD (%)	**BH21-02-02**	**BH21-03-01**	**BH21-03-02**	**BH21-04-02**	**BH21-04-03**	**BH21-05-02**	**BH21-05-03**	**BH21-05-06**	QA/QC RPD (%)	**BH21-06-01**	**BH21-08-01**	**BH21-08-02**	**BH21-09-01**	**BH21-10-02**	**BH22-11-03**	**BH22-13-02**	**BH22-14-01**	**BH22-15-01**	**BH22-15-02**	**BH22-15-03**	**BH22-16-01**	**BH22-16-02**	**BH22-16-03**	**BH22-17-02**	**BH22-17-03**	**BH22-18-02**	**BH22-18-03**
Sample Depth (m)	0-0.32	1.2-1.52	0-0.32	0-0.32		0.64-0.96	0-0.32	0.64-0.96	0.64 - 0.96	1.2 - 1.52	0.64 - 0.96	1.2 - 1.52	1.2 - 1.52		0.0 - 0.32	0.0 - 0.32	0.64 - 0.96	0.0 - 0.32	0.64 - 0.96	1.2 - 1.4	0.7 - 0.9	0.0 - 0.3	0.0-0.3	0.7 - 0.9	1.2 - 1.4	0.0 - 0.3	0.7-0.9	1.2 - 1.4	0.7 - 0.9	1.2 - 1.4	0.7 - 0.9	1.2 - 1.4
Sample Date	4-Oct-21	4-Oct-21	4-Oct-21	4-Oct-21		4-Oct-21	4-Oct-21	4-Oct-21	5-Oct-21	5-Oct-21	5-Oct-21	5-Oct-21	5-Oct-21		5-Oct-21	5-Oct-21	5-Oct-21	5-Oct-21	6-Oct-21	12-Jan-22	12-Jan-22	13-Jan-22	13-Jan-22	13-Jan-22	13-Jan-22	13-Jan-22	13-Jan-22	13-Jan-22	13-Jan-22	13-Jan-22	13-Jan-22	13-Jan-22
Sample Type	Normal	Normal	Normal	Duplicate		Normal	Normal	Normal	Normal	Normal	Normal	Normal	Duplicate		Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Lab Name:	Element	Element	Element	Element		Element	Element	Element	Element	Element	Element	Element	Element		Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element
Lot ID:	1525504	1525504	1525504	1525504		1525504	1525504	1525504	1525982	1525982	1525982	1525982	1525982		1525982	1525982	1525982	1525982	1526364	1547090	1547090	1547091	1547091	1547091	1547091	1547091	1547091	1547091	1547091	1547091	1547091	1547091
HSVC (ppm)	20	60	15	15		10	30	15	0	0	0	0	0		0	0	15	0	0	15	0	70	40	45	35	55	35	40	85	0	80	40
EC (mS/m)	0.20	0.67	0.88	0.88		0.85	0.82	0.75	0.68	0.86	0.64	0.84	0.84		0.58	0.24	0.69	0.30	0.75	1.14	0.78	0.61	0.59	0.71	0.45	0.20	0.25	0.56	0.21	0.71	0.17	0.37

Chemical Group	Parameter	Alberta Tier 1 Guideline [~1]	Alberta Tier 2 Guideline [9]																														
Hydrocarbons	Benzene	**0.046**	**60**	-	-	-	-	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	-	-	-	<0.005	-	<0.005	<0.005	<0.005	-	0.008	<0.005	-	<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005
	Ethylbenzene	**0.073**	**110**	-	-	-	-	-	<0.005	0.011	-	<0.005	<0.005	<0.005	-	-	-	<0.005	-	<0.005	<0.005	<0.005	-	0.063	<0.005	-	<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005
	Toluene	**0.52**	**120**	-	-	-	-	-	<0.02	<0.02	-	<0.02	<0.02	<0.02	-	-	-	<0.02	-	<0.02	<0.02	<0.02	-	0.02	<0.02	-	<0.02	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02
	Xylenes (Total)	**0.99**	**65**	-	-	-	-	-	<0.03	0.05	-	<0.03	<0.03	<0.03	-	-	-	<0.03	-	<0.03	<0.03	<0.03	-	0.14	<0.03	-	<0.03	<0.03	<0.03	-	<0.03	<0.03	<0.03	<0.03	<0.03
	F1 (C6-C10)-BTEX	**210**	**210**	-	-	-	-	-	<10	<10	-	<10	<10	<10	-	-	-	<10	-	<10	<10	<10	-	<10	<10	-	<10	<10	<10	-	<10	<10	<10	<10	<10
	F2 (C10-C16)	**150**	**150**	-	-	-	-	-	<25	<25	-	<25	<25	<25	-	-	-	<25	-	<25	<25	<25	-	**156**	<25	-	<25	<25	<25	-	<25	<25	<25	<25	<25
	F3 (C16-C34)	**1,300**	**1,300**	-	-	-	-	-	<50	<50	-	<50	<50	<50	-	-	-	<50	-	<50	<50	<50	-	831	64	-	<50	<50	<50	-	<50	<50	<50	<50	<50
	F4 (C34-C50)	**5,600**	**5,600**	-	-	-	-	-	<100	<100	-	<100	<100	<100	-	-	-	<100	-	<100	<100	<100	-	239	<100	-	<100	<100	<100	-	<100	<100	<100	<100	<100
PAHs	Acenaphthene	**0.33**	**21.50**	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-
	Anthracene	**1.3**	**2.5**	-	-	-	-	-	-	-	-	-	-	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	-	-	<0.003	-	-	-
	Benzo(a)anthracene	**6.2**	**6.2**	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	<0.01	-	-	-
	Benzo(a)pyrene	**0.60**	**0.60**	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-
	Benzo(b+j)fluoranthene	**6.2**	**3.0**	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-
	Benzo(k)fluoranthene	**6.2**	**0.64**	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-
	Benzo(g,h,i)perylene	**NG**	**NG**	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-
	Chrysene	**6.2**	**6.2**	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-
	Dibenzo(a,h)anthracene	**NG**	**4.4**	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-
	Fluoranthene	**15.4**	**15.4**	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	<0.01	-	-	-
	Fluorene	**0.40**	**15.4**	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-
	Indeno(1,2,3-cd)pyrene	**NG**	**51**	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	<0.05	-	-	-
	Naphthalene	**0.014**	**8.8**	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	<0.01	-	-	-
	Phenanthrene	**0.11**	**43**	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	<0.01	-	-	-
	Pyrene	**7.7**	**7.7**	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	<0.01	-	-	-
	IACR	**<1.0**	**<1.0**	-	-	-	-	-	<0.001	-	-	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	-	<0.001	-	-	-
Metals	pH (1:2 Soil:Water)	**6-8.5**	**6-8.5**	7.4	7.8	-	-	-	-	-	7.8	-	-	7.7	-	-	-	-	7.6	-	-	7.6	6.5	7.2	7.2	-	6.1	7.4	6.9	-	7.4	7.2	6.2	7.3	6.6
	Antimony	**20**	**20**	0.4	0.7	0.5	0.5	*	-	-	-	0.5	-	-	0.5	0.7	33%	0.5	-	-	0.4	-	-	0.6	0.5	-	0.5	0.5	0.9	-	0.6	0.6	0.5	0.7	0.2
	Arsenic	**17**	**17**	7.4	9.4	9.4	8.9	5%	-	-	-	9.4	-	-	9.2	11.5	22%	10.2	-	-	9.3	-	-	8.3	8.3	-	9.6	9.4	9.7	-	9.9	10.4	9.6	10.7	6.7
	Barium	**750**	**750**	182	335	218	218	*	-	-	-	197	-	-	218	336	43%	239	-	-	199	-	-	**1620**	383	-	243	248	248	-	310	301	215	257	284
	Barite-Ba (Hot Fusion)	**10,000**	**10,000**	-	-	-	-	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2770	-	-	-	-	-	-	-	-	-	-	-
	Ba ($CaCl_2$ Extractable)	**250**	**250**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	104	-	-	-	-	-	-	-	-	-	-	-
	Beryllium	**5**	**5**	0.4	0.6	0.6	0.6	*	-	-	-	0.4	-	-	0.5	0.4	22%	0.6	-	-	0.4	-	-	0.5	0.5	-	0.6	0.5	0.6	-	0.5	0.5	0.6	0.4	0.3
	Boron (mg/L)	**3.3**	**3.3**	<0.05	<0.05	<0.05	<0.05	*	-	-	-	0.06	-	-	<0.05	<0.05	*	<0.05	-	-	<0.05	-	-	0.11	0.05	-	<0.05	<0.05	<0.05	-	<0.05	<0.05	<0.05	<0.05	0.09
	Cadmium	**3.8**	**3.8**	0.36	0.58	0.37	0.37	*	-	-	-	0.39	-	-	0.35	0.21	50%	0.33	-	-	0.6	-	-	0.38	0.36	-	0.41	0.37	0.35	-	0.39	0.25	0.42	0.24	1.2
	Chromium (III+VI)	**64**	**64**	19.5	18.8	23.1	18.7	21%	-	-	-	18	-	-	24.9	18.8	28%	20.1	-	-	17.1	-	-	20	17	-	17.7	22.6	18.3	-	15.4	19.1	16.5	15.9	16.7
	Cobalt	**20**	**20**	8	8.5	9.4	9.7	*	-	-	-	9.1	-	-	8.7	10.1	15%	9.1	-	-	9.3	-	-	8.6	7.6	-	10.4	8.4	8.5	-	7.2	7.2	8.5	7.5	7.1
	Copper	**63**	**63**	11.4	21.7	22.5	22.4	*	-	-	-	20.2	-	-	21	28	29%	22.2	-	-	20	-	-	19.6	16.8	-	21.5	20.8	20.9	-	19.9	20.3	20.8	16.5	7.7
	Lead	**70**	**70**	8.7	10.1	10.8	10.2	6%	-	-	-	10.2	-	-	9.8	12.8	27%	10.7	-	-	10.9	-	-	10.5	11.6	-	11.3	10.4	10.7	-	10.4	10.7	10.1	10.8	8.4
	Mercury	**12**	**12**	<0.05	0.05	0.06	0.05	18%	-	-	-	0.05	-	-	0.05	0.06	18%	0.05	-	-	0.05	-	-	0.09	<0.05	-	0.06	<0.05	0.05	-	0.05	0.05	<0.05	<0.05	<0.05
	Molybdenum	**4**	**4**	1.1	1.7	2	1.9	5%	-	-	-	1.9	-	-	2	1.7	16%	1.9	-	-	2.1	-	-	1.6	1.5	-	2.1	1.8	1.8	-	2.8	1.6	2.2	1.5	1.2
	Nickel	**45**	**45**	20.4	28	32.1	30.8	*	-	-	-	29.1	-	-	33.1	32.2	*	28.6	-	-	26.5	-	-	22.6	22.2	-	26.5	27.9	26.8	-	24.7	28.1	25.7	23.5	14.4
	Selenium	**1**	**1**	0.5	0.5	0.4	0.4	*	-	-	-	0.4	-	-	0.4	0.4	*	0.6	-	-	0.6	-	-	0.5	0.4	-	0.4	0.4	0.4	-	0.5	0.4	0.5	0.5	0.3
	Silver	**20**	**20**	<0.10	0.2	0.1	0.1	*	-	-	-	0.1	-	-	0.1	<0.10	*	0.1	-	-	0.2	-	-	0.1	0.1	-	0.1	0.1	0.1	-	0.1	0.2	0.2	0.2	0.2
	Thallium	**1**	**1**	0.09	0.16	0.2	0.2	*	-	-	-	0.19	-	-	0.17	0.15	13%	0.15	-	-	0.22	-	-	0.12	0.14	-	0.19	0.16	0.15	-	0.12	0.11	0.17	0.09	0.05
	Tin	**5**	**5**	<1.0	<1.0	<1.0	<1.0	*	-	-	-	<1.0	-	-	<1.0	<1.0	*	<1.0	-	-	<1.0	-	-	<1.0	<1.0	-	<1.0	<1.0	<1.0	-	<1.0	<1.0	<1.0	<1.0	<1.0
	Uranium	**33**	**33**	0.6	0.9	1.1	1.1	*	-	-	-	1.2	-	-	1.3	0.9	36%	1	-	-	1.3	-	-	0.8	0.8	-	1.1	1	1	-	0.9	0.8	1.1	0.7	<0.5
	Vanadium	**130**	**130**	29.6	33.5	25.9	26.7	*	-	-	-	22.9	-	-	24.3	28	14%	24.9	-	-	22.7	-	-	27.8	25.2	-	25.3	25.7	25.9	-	24.1	25.1	23.8	24.5	28.4
	Zinc	**250**	**250**	75	88	87	83	*	-	-	-	81	-	-	80	95	17%	83	-	-	91	-	-	81	76	-	81	81	82	-	81	79	78	82	96
Detailed Salinity	EC (dS/m)	**<2/<3** [2]	**<2/<3** [2]	0.41	0.5	-	-	-	-	-	0.36	-	-	0.62	-	-	-	-	-	-	-	-	-	0.91	0.38	0.76	0.32	-	0.22	0.22	0.2	-	0.28	0.23	0.24	0.44	0.22
	EC Rating	**<2=Good/<3=Good**	**<2=Good/<3=Good**	Good	Good	-	-	-	-	-	Good	-	-	Good	-	-	-	-	-	-	-	-	-	Good	Good	Good	Good	-	Good	Good	Good	-	Good	Good	Good	Good	Good
	Sodium Adsorption Ratio	**<4** [3]	**<4** [3]	<0.1	0.2	-	-	-	-	-	0.3	-	-	0.1	-	-	-	-	-	-	-	-	-	0.1	0.7	0.5	0.1	-	0.2	0.2	0.1	-	0.2	0.1	0.1	0.1	0.3
	SAR Rating	**<4=Good**	**<4=Good**	Good	Good	-	-	-	-	-	Good	-	-	Good	-	-	-	-	-	-	-	-	-	Good	Good	Good	Good	-	Good	Good	Good	-	Good	Good	Good	Good	Good
	Calcium	**N/A**	**N/A**	59.2	74.6	-	-	-	-	-	27.4	-	-	64.6	-	-	-	-	-	-	-	-	-	102	35.2	76.9	28.1	-	22.5	22.5	18.8	-	21.8	18	19.5	28.9	26.8
	Magnesium	**N/A**	**N/A**	8.4	26.4	-	-	-	-	-	6.9	-	-	11.9	-	-	-	-	-	-	-	-	-	19.6	7	13.3	5.1	-	5.8	4.9	3.8	-	5.1	4.5	4.6	6.2	4.9
	Potassium	**N/A**	**N/A**	1	1	-	-	-	-	-	2	-	-	4	-	-	-	-	-	-	-	-	-	2	2	4	<1	-	1	1	1	-	<1	<1	<1	1	2
	Sodium	**N/A**	**N/A**	2	10	-	-	-	-	-	5	-	-	4	-	-	-	-	-	-	-	-	-	4	13	14	2	-	4	3	2	-	3	1	2	2	5
	Chloride	**100** [4]	**100** [4]	3	4	-	-	-	-	-	2	-	-	<1	-	-	-	-	-	-	-	-	-	2	6	10	5	-	5	6	4	-	7	3	3	2	7
	Sulphate	**N/A**	**N/A**	18	91.5	-	-	-	-	-	39.9	-	-	146	-	-	-	-	-	-	-	-	-	250	40.9	178	13	-	17	8.1	5.2	-	17.4	9.9	14	65.8	30.2
Alcohols	Methanol	**37**	**750**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	157	314	166	-	174	-	-	-	-	-
Glycols	Ethylene Glycol	**60**	**60**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-
	Diethylene Glycol	**10**	**10**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-
	Triethylene Glycol	**100**	**100**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-
	Tetraethylene Glycol	**NG**	**NG**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-
	Propylene Glycol	**NG**	**NG**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-
Moisture	Moisture Content (%)	**NG**	**NG**	-	-	-	-	-	11.90	10.80	-	17.80	18.00	16.90	-	-	-	16.20	-	16.50	18.00	20.00	-	32.80	32.50	15.30	17.20	17.40	14.30	15.50	16.50	15.60	16.10	16.80	16.90

Footnotes:

BOLD Concentration greater than least-stringent applicable Guideline

~ Alberta Environment and Parks (AEP). 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

[1] Soil Remediation Guidelines for Natural Area land use, Fine-grained surface soil. Surface soil guidelines for petroleum hydrocarbon fractions F1 to F4, benzene, toluene, ethylbenzene, and xylenes were applied to a minimum depth of 3 m. Subsoil guidelines for petroleum hydrocarbon fractions F1 to F4, benzene, toluene, ethylbenzene, and xylenes were applied to a depth of 3 m and greater.

[2] Electric Conductivity (EC) concentrations were compared to the "Good" rating for topsoil guideline (<2 dS/m) when present and subsoil guideline (<3 dS/m) for other samples. Other ratings include "Fair" (topsoil=2 to 4 dS/m and subsoil=3 to 5 dS/m), "Poor" (topsoil=4 to 8 dS/m and subsoil=5 to 10 dS/m) and "Unsuitable" (topsoil>8 dS/m and subsoil >10 dS/m).

[3] Sodium Adsorption Ratio (SAR) concentrations were compared to the "Good" rating for topsoil (<4) when present and subsoil (<4) for other remaining samples. Other ratings include "Fair" (topsoil/subsoil=4 to 8), "Poor" (topsoil/subsoil=8 to 12) and "Unsuitable" (topsoil/subsoil >12).

[4] Chloride concentrations greater than the reference value could indicate anthropogenic chloride impacts (>100 mg/kg) (Government of Alberta, 2020).

[9] Alberta Environment and Parks (AEP). 2019. Alberta Tier 2 Soil and Groundwater Remediation Guidelines. Protection of Aquatic Life pathway has been eliminated because there is no surface water body within 300m down gradient or 100m up gradient. Exclusion of the DUA pathway by geological barrier

APEC = Area of Potential Environmental Concern

DWDA = Drilling Waste Disposal Area

All units are in milligrams per kilogram (mg/kg) unless indicated in the Parameter Column

m = metres below grade/surface

HSVC = Parameter measured in parts per million (ppm) during field sample collection.

EC = Electrical conductivity. Parameter measured in milliSiemens/meter (mS/m) during field sample collection.

N/A = Not Applicable

"-" = Not analysed or no value

SynergyAspen ENVIRONMENTAL

TABLE 3: Summary of Soil Analytical Results of Subsurface Soils Greater than 1.5 metres Below Ground Surface

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TABLE 2: Summary of Soil Analytical Results of Surface Soils Less than 1.5 metres Below Ground Surface

APEC			Drilling Waste Disposal Area												Outside DWDA		
Test Pit ID			TP22-01a	TP22-02a	TP22-03a	TP22-04a	TP22-05a	TP22-06a	TP22-07	TP22-08	TP22-09	TP22-10	TP22-11	TP22-12	TP22-02b	TP22-04b	TP22-05b
Sample ID			**TP22-01a-01**	**TP22-02a-01**	**TP22-03a-01**	**TP22-04a-01**	**TP22-05a-01**	**TP22-06a-01**	**TP22-07-01**	**TP22-08-01**	**TP22-09-01**	**TP22-10-01**	**TP22-11-01**	**TP22-12-01**	**TP22-02b-01**	**TP22-04b-01**	**TP22-05b-01**
Sample Depth (m)			0.5-1.0	0.5-1.0	0.5-1.0	0.5-1.0	0.5-1.0	0.5-1.0	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5 - 1.0	0.5 - 1.0	0.5-1.0
Sample Date			8-Feb-22	8-Feb-22	8-Feb-22	8-Feb-22	9-Feb-22	9-Feb-22	10-Feb-22	10-Feb-22	10-Feb-22	10-Feb-22	10-Feb-22	10-Feb-22	8-Feb-22	8-Feb-22	9-Feb-22
Sample Type			Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Lab Name:			Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element
Lot ID:			1552450	1552450	1552450	1552450	1552709	1552709	1552710	1552710	1552710	1552710	1552710	1552710	1552450	1552450	1552709
Lithology			Dense clay, organic inclusions. Soft, medium plasticity, greyish-brown, wet (Fill)	Clay, trace sand, organic inclusions. Soft, medium plasticity, greyish-brown, moist (FILL)	Clay, trace sand, trace gravel, organic inclusions. Soft, medium plasticity, greyish-brown, damp (FILL)	Clay, trace sand, trace gravel, organic inclusions. Firm to soft, medium plasticity, greyish-brown, damp (Fill)	Clay, some sand. Organic inclusions. Firm, medium plasticity, greyish-brown, wet.	Clay, organic inclusions. Firm to soft, medium plasticity, greyish-brown, wet	Clay, organic inclusions. Firm to soft, medium plasticity, greyish-brown, moist (Fill)	Clay, organic inclusions. Firm to soft, medium plasticity, greyish-brown, moist (Fill)	Clay, some sand, organic inclusions. Firm, medium plasticity, greyish-brown, wet	Clay, some sand, organic inclusions. Firm, medium plasticity, greyish-brown, wet (Fill)	Clay, trace sand, trace gravel, organic inclusions. Soft, medium plasticity, greyish-brown, damp	Dense clay, organic inclusions. Soft, medium plasticity, greyish-brown, wet (Fill)	Clay, trace sand, trace gravel, compact, very stiff, high plasticity, brown, dry to damp	Clay, trace sand, trace gravel, compact, very stiff, high plasticity, brown, dry to damp	Clay, some sand, trace gravel, trace cobble. Firm to stiff, high plasticity, light brown, damp
HSVC (ppm)			20	20	15	25	25	20	20	0	10	15	20	5	15	10	15
EC (mS/m)			0.35	0.61	0.36	0.49	0.62	0.39	0.39	0.43	0.48	0.54	0.57	0.63	0.51	0.59	0.66
Chemical Group	**Parameter**	**Alberta Tier 1 Guideline ~,[1]**	**Alberta Tier 2 Guideline b**														
Hydrocarbons	Benzene	**0.046**	**60**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ethylbenzene	**0.073**	**110**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Toluene	**0.52**	**120**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Xylenes (Total)	**0.99**	**65**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	F1 (C6-C10)-BTEX	**210**	**210**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	F2 (C10-C16)	**150**	**150**	<25	<25	<25	**184**	<25	<25	<25	<25	<25	<25	<25	<25	-	-
	F3 (C16-C34)	**1,300**	**1,300**	<50	72	<50	658	<50	131	104	144	66	66	54	<50	<50	-	-
	F4 (C34-C50)	**5,600**	**5,600**	<100	<100	<100	210	<100	<100	<100	<100	<100	<100	<100	<100	<100	-	-
Metals	pH (1:2 Soil:Water)	**6-8.5**	**6-8.5**	-	-	-	-	-	-	-	-	-	-	-	-	-	7.6	7.4
	Barium	**750**	**750**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Barite-Ba (Hot Fusion)	**10,000**	**10,000**	770	846	858	-	790	929	837	853	882	962	1,140	1,030	-	-	-
	Ba ($CaCl_2$ Extractable)	**250**	**250**	56.8	35.7	61.2	83.5	67.9	81.8	56.5	56.5	59.7	59.6	65.5	71.4	-	-	-
Detailed Salinity	EC (dS/m)	**<2/<3 [2]**	**<2/<3 [2]**	-	-	-	-	-	-	-	-	-	-	-	-	-	0.46	0.28
	EC Rating	**<2=Good/<3=Good**	**<2=Good/<3=Good**	-	-	-	-	-	-	-	-	-	-	-	-	-	Good	Good
	Sodium Adsorption Ratio	**<4 [3]**	**<4 [3]**	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4	0.5
	SAR Rating	**<4=Good**	**<4=Good**	-	-	-	-	-	-	-	-	-	-	-	-	-	Good	Good
	Calcium	**N/A**	**N/A**	-	-	-	-	-	-	-	-	-	-	-	-	-	50	41.4
	Magnesium	**N/A**	**N/A**	-	-	-	-	-	-	-	-	-	-	-	-	-	9.1	8.6
	Potassium	**N/A**	**N/A**	-	-	-	-	-	-	-	-	-	-	-	-	-	5	5
	Sodium	**N/A**	**N/A**	-	-	-	-	-	-	-	-	-	-	-	-	-	10	15
	Chloride	**100 [4]**	**100 [4]**	-	-	-	-	-	-	-	-	-	-	-	-	-	6	5
	Sulphate	**N/A**	**N/A**	-	-	-	-	-	-	-	-	-	-	-	-	-	73	56.3
Moisture	Moisture Content (%)	**NG**	**NG**	28.50	22.50	24.90	29.40	25.70	24.60	23.70	25.60	28.20	28.50	25.60	22.80	18.20	-	-

Footnotes:

BOLD Concentration greater than least stringent applicable Guideline

~ Alberta Environment and Parks (AEP). 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

[1] Soil Remediation Guidelines for Natural Area land use, Fine-grained surface soil. Surface soil guidelines for petroleum hydrocarbon fractions F1 to F4, benzene, toluene, ethylbenzene, and xylenes were applied to a minimum depth of 3 m. Subsoil guidelines for petroleum hydrocarbon fractions F1 to F4, benzene, toluene, ethylbenzene, and xylenes were applied to a depth of 3 m and greater.

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[b] Alberta Environment and Parks (AEP). 2019. Alberta Tier 2 Soil and Groundwater Remediation Guidelines. Protection of Aquatic Life pathway has been eliminated because there is no surface water body within 300m down gradient or 100m up gradient. Exclusion of the DUA pathway by geological barrier

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m = metres below grade/surface

HSVC = Parameter measured in parts per million (ppm) during field sample collection.

EC = Electrical conductivity. Parameter measured in milliSiemens/meter (mS/m) during field sample collection.

N/A = Not Applicable

"-" = Not analysed or no value

TABLE 3: Summary of Soil Analytical Results of Subsurface Soils Greater than 1.5 metres Below Ground Surface

| APEC | | |

SynergyAspen ENVIRONMENTAL

TABLE 3: Summary of S

APEC																	Outside DWDA													
Test Pit ID	TP22-09			TP22-10			TP22-11			TP22-12							TP22-01b			TP22-02b-02		TP22-03b			TP22-04b		TP22-05b		TP22-06b		
Sample ID	**TP22-09-02**	**TP22-09-03**	**TP22-09-04**	**TP22-10-02**	**TP22-10-03**	**TP22-10-04**	**TP22-11-02**	**TP22-11-03**	**TP22-11-04**	**TP22-12-02**	**TP22-12-03**	**TP22-12-05**		**TP22-12-04**	**TP22-01b-02**	**TP22-01b-03**	**TP22-01b-04**	**TP22-02b-02**	**TP22-02b-03**	**TP22-03b-02**	**TP22-03b-03**	**TP22-03b-04**	**TP22-04b-03**	**TP22-04b-04**	**TP22-05b-03**	**TP22-05b-04**	**TP22-06b-02**	**TP22-06b-03**	**TP22-06b-04**
Sample Depth (m)	1.5-2	2.5-3	3.5-4.0	1.5-2	2.5-3	3.5-4.0	1.5-2	2.5-3	3.5-4.0	1.5-2	2.5-3			3.5-4.0	1.5 - 2.0	2.5 - 3.0	3.5 - 4.0	1.5 - 2.0	2.5 - 3.0	1.5 - 2.0	2.5 - 3.0	3.5 - 4.0	2.5 - 3.0	3.5 - 4.0	2.5-3.0	3.5-4.0	1.5-2.0	2.5-3.0	3.5-4.0
Sample Date	10-Feb-22	10-Feb-22	10-Feb-22	10-Feb-22	10-Feb-22	10-Feb-22	10-Feb-22	10-Feb-22	10-Feb-22	10-Feb-22	10-Feb-22			10-Feb-22	8-Feb-22	8-Feb-22	8-Feb-22	8-Feb-22	8-Feb-22	8-Feb-22	8-Feb-22	8-Feb-22	8-Feb-22	8-Feb-22	9-Feb-22	9-Feb-22	9-Feb-22	9-Feb-22	9-Feb-22
Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal			Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Lab Name:	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element			Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element
Lot ID:	1552710	1552710	1552710	1552710	1552710	1552710	1552710	1552710	1552710	1552710	1552710			1552710	1552450	1552450	1552450	1552450	1552450	1552450	1552450	1552450	1552450	1552450	1552709	1552709	1552709	1552709	1552709
Lithology	Clay, some sand, organic inclusions. Firm, medium plasticity, greyish-brown, wet	Clay. Soft, low plasticity, grey, some black streaks, wet (Fill)	Clay, some sand, trace gravel, trace cobble. Stiff, high plasticity, light brown, dry to damp	Clay, some sand, organic inclusions. Firm, medium plasticity, greyish-brown, wet (Fill)	Clay. Soft, low plasticity, grey, wet (Fill)	Clay, some sand, trace gravel, trace cobble. Stiff, high plasticity, light brown, dry to damp	Clay, trace sand, trace gravel, organic inclusions. Soft, medium plasticity, greyish-brown, damp	Clay. Very soft, low plasticity, grey, wet (Fill)	Clay, trace sand, trace gravel. Hard, high plasticity, brown, dry to damp	Dense clay, organic inclusions. Soft, medium plasticity, greyish-brown, wet (Fill)	Clay. Very soft, low plasticity, light grey, wet (Fill)	Duplicate	QA/QC RPD (%)	Clay, some sand, trace gravel, trace cobble. Stiff, high plasticity, light brown, dry to damp	Clay, trace sand, trace gravel, compact, very stiff, high plasticity, brown, dry to damp										Clay, some sand, trace gravel, trace cobble. Firm to stiff, high plasticity, light brown, damp		Clay, trace gravel, trace cobble. Stiff, high plasticity, light brown, dry to damp		
HSVC (ppm)	25	55	5	25	70	5	20	30	10	15	90			5	0	15	15	35	15	10	15	20	0	0	15	20	10	15	10
EC (mS/m)	0.34	0.73	0.55	0.59	0.71	0.53	0.43	1.07	0.52	0.66	1.19			0.53	0.42	0.35	0.45	0.49	0.51	0.56	0.39	0.42	0.39	0.42	0.61	0.55	0.58	0.52	0.64

Chemical Group	Parameter	Alberta Tier 1 Guideline [a] [1]	Alberta Tier 2 Guideline b	Remote Forested Green Area Guideline [c]																												
Hydrocarbons	Benzene	**0.046**	**15**	-	-	-	<0.005	-	-	<0.005	-	-	<0.005	-	-	-	-	<0.005	-	<0.005	-	<0.005	-	-	<0.005	-	<0.005	-	<0.005	-	-	<0.005	-
	Ethylbenzene	**0.073**	**240**	-	-	-	<0.005	-	-	<0.005	-	-	<0.005	-	-	-	-	<0.005	-	<0.005	-	<0.005	-	-	<0.005	-	<0.005	-	<0.005	-	-	<0.005	-
	Toluene	**0.52**	**220**	-	-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-	-	-	<0.02	-	<0.02	-	<0.02	-	-	<0.02	-	<0.02	-	<0.02	-	-	<0.02	-
	Xylenes (Total)	**0.99**	**130**	-	-	-	<0.03	-	-	<0.03	-	-	<0.03	-	-	-	-	<0.03	-	<0.03	-	<0.03	-	-	<0.03	-	<0.03	-	<0.03	-	-	<0.03	-
	F1 (C6-C10)-BTEX	**420**	**800**	**Tier 1**	-	-	<10	-	-	<10	-	-	<10	-	-	-	-	<10	-	<10	-	<10	-	-	<10	-	<10	-	<10	-	-	<10	-
	F2 (C10-C16)	**300**	**1000**	**10,000**	<25	32	<25	<25	1,400	<25	<25	104	<25	<25	1,720	2,630	42%	<25	<25	<25	26	<25	<25	-	<25	<25	<25	<25	<25	<25	<25	<25	-
	F3 (C16-C34)	**2,600**	**3,500**	**14,000**	<50	176	<50	58	5,610	68	63	429	<50	58	6,550	10,200	44%	<50	<50	50	142	<50	<50	-	55	<50	<50	<50	54	58	<50	<50	-
	F4 (C34-C50)	**10,000**	**10,000**	**Tier 1**	<100	<100	<100	<100	1730	<100	<100	136	<100	<100	2,200	3,450	44%	<100	<100	<100	<100	<100	<100	-	<100	<100	<100	<100	<100	<100	<100	<100	-
Metals	pH (1:2 Soil:Water)	**6-8.5**	**6-8.5**	-	7.1	7.1	7.1	8.1	7.2	7.3	6.8	7.6	7.6	7.4	8.7	8.4	4%	7.4	-	-	7.6	-	7.6	7.5	-	-	-	-	-	-	-	-	7.6
	Barium	**750**	**750**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Barite-Barium (Hot Fusion)	**10,000**	**10,000**	-	-	**21,800**	-	-	**94,000**	-	-	**19,600**	-	837	**111,000**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	$CaCl_2$ Extractable Barium	**250**	**250**	-	-	68.2	17.9	-	69.3	36	-	49.6	18.9	46.6	46.9	35.2	29%	26.2	-	18.2	-	-	26.6	-	-	25.7	-	24.3	-	29.1	-	-	34.2	-
Detailed Salinity	EC (dS/m)	**<2/<3** [2]	**<2/<3** [2]	-	0.48	0.78	0.87	0.33	1.26	0.43	0.48	1.36	0.79	0.38	1.12	1.3	15%	0.89	-	-	0.46	-	0.33	0.28	-	-	-	-	-	-	-	-	0.31
	EC Rating	**<2=Good/<3=Good**	**<2=Good/<3=Good**	-	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	-	Good	-	-	-	-	Good	Good	-	-	-	-	-	-	-	-	-
	Sodium Adsorption Ratio	**<4** [3]	**<4** [3]	-	1.2	**8.1**	**4.1**	0.5	**17.2**	1.5	3.3	**18.1**	**5**	2.5	**22**	**25**	13%	**6.1**	-	-	**6.4**	-	0.6	0.9	-	-	-	-	-	-	-	-	2.5
	SAR Rating	**<4=Good**	**<4=Good**	-	Good	**Poor**	**Fair**	Good	**Unsuitable**	Good	Good	**Unsuitable**	**Fair**	Good	**Unsuitable**	**Unsuitable**	-	**Fair**	-	-	**Fair**	-	Good	Good	-	-	-	-	-	-	-	-	Good
	Calcium	**N/A**	**N/A**	-	43.1	24.1	40.1	44.8	17.3	37.2	29.6	13.6	29.4	26.2	13	13	0%	21.8	-	-	13.2	-	38.6	32	-	-	-	-	-	-	-	-	20.6
	Magnesium	**N/A**	**N/A**	-	9.8	4.2	9.1	9.9	4	8.9	5.8	2.5	7.3	6.2	4	4.1	2%	5.7	-	-	2.9	-	9	7	-	-	-	-	-	-	-	-	4.6
	Potassium	**N/A**	**N/A**	-	4	4	4	5	6	5	3	4	4	3	11	11	0%	3	-	-	2	-	6	3	-	-	-	-	-	-	-	-	4
	Sodium	**N/A**	**N/A**	-	28	152	99	15	314	39	71	237	111	55	496	534	7%	100	-	-	113	-	15	21	-	-	-	-	-	-	-	-	52
	Chloride	**100** [4]	**100** [4]	-	10	24	17	6	56	13	11	33	13	10	69	55	23%	14	-	-	10	-	18	4	-	-	-	-	-	-	-	-	5
	Sulphate	**N/A**	**N/A**	-	16	47.6	203	14	203	77.9	18	155	200	21	377	461	20%	154	-	-	87.3	-	35	21	-	-	-	-	-	-	-	-	38.9
Moisture	Moisture Content (%)	**NG**	**NG**	-	18.40	24.60	18.80	57.60	37.30	16.70	23.70	25.80	20.80	22.70	39.00	38.20	2%	-	21.30	19.30	18.00	17.80	17.10	-	18.80	6.37	19.30	20.10	16.70	17.40	15.30	18.90	-

Footnotes:

BOLD Concentration greater than least stringent applicable Guideline

[a] Alberta Environment and Parks (AEP). 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

[1] Soil Remediation Guidelines for Natural Area land use, Fine-grained surface soil. Surface soil guidelines for petroleum hydrocarbon fractions F1 to F4, benzene, toluene, ethylbenzene, and xylenes were applied to a minimum depth of 3 m. Subsoil guidelines for petroleum hydrocarbon fractions F1 to F4, benzene, toluene, ethylbenzene, and xylenes were applied to a depth of 3 m and greater.

[2] Electric Conductivity (EC) concentrations were compared to the "Good" rating for topsoil guideline (<2 dS/m) when present and subsoil guideline (<3 dS/m) for other samples. Other ratings include "Fair" (topsoil=2 to 4 dS/m and subsoil=3 to 5 dS/m), "Poor" (topsoil=4 to 8 dS/m and subsoil=5 to 10 dS/m) and "Unsuitable" (topsoil>8 dS/m and subsoil >10 dS/m).

[3] Sodium Adsorption Ratio (SAR) concentrations were compared to the "Good" rating for topsoil (<4) when present and subsoil (<4) for other remaining samples. Other ratings include "Fair" (topsoil/subsoil=4 to 8), "Poor" (topsoil/subsoil=8 to 12) and "Unsuitable" (topsoil/subsoil >12).

[4] Chloride concentrations greater than the reference value could indicate anthropogenic chloride impacts (>100 mg/kg) (Government of Alberta, 2020).

b Alberta Environment and Parks (AEP). 2019. Alberta Tier 2 Soil and Groundwater Remediation Guidelines. Protection of Aquatic Life pathway has been eliminated because there is no surface water body within 300m down gradient or 100m up gradient. Exclusion of the DUA pathway by geological barrier

c Alberta Environment and Parks (AEP) September 2014. Subsoil Petroleum Hydrocarbon Guidelines for Remote Forested Sites in the Green Area

APEC = Area of Potential Environmental Concern

DWDA = Drilling Waste Disposal Area

All units are in milligrams per kilogram (mg/kg) unless indicated in the Parameter Column

m = metres below grade/surface

HSVC = Parameter measured in parts per million (ppm) during field sample collection.

EC = Electrical conductivity. Parameter measured in milliSiemens/meter (mS/m) during field sample collection.

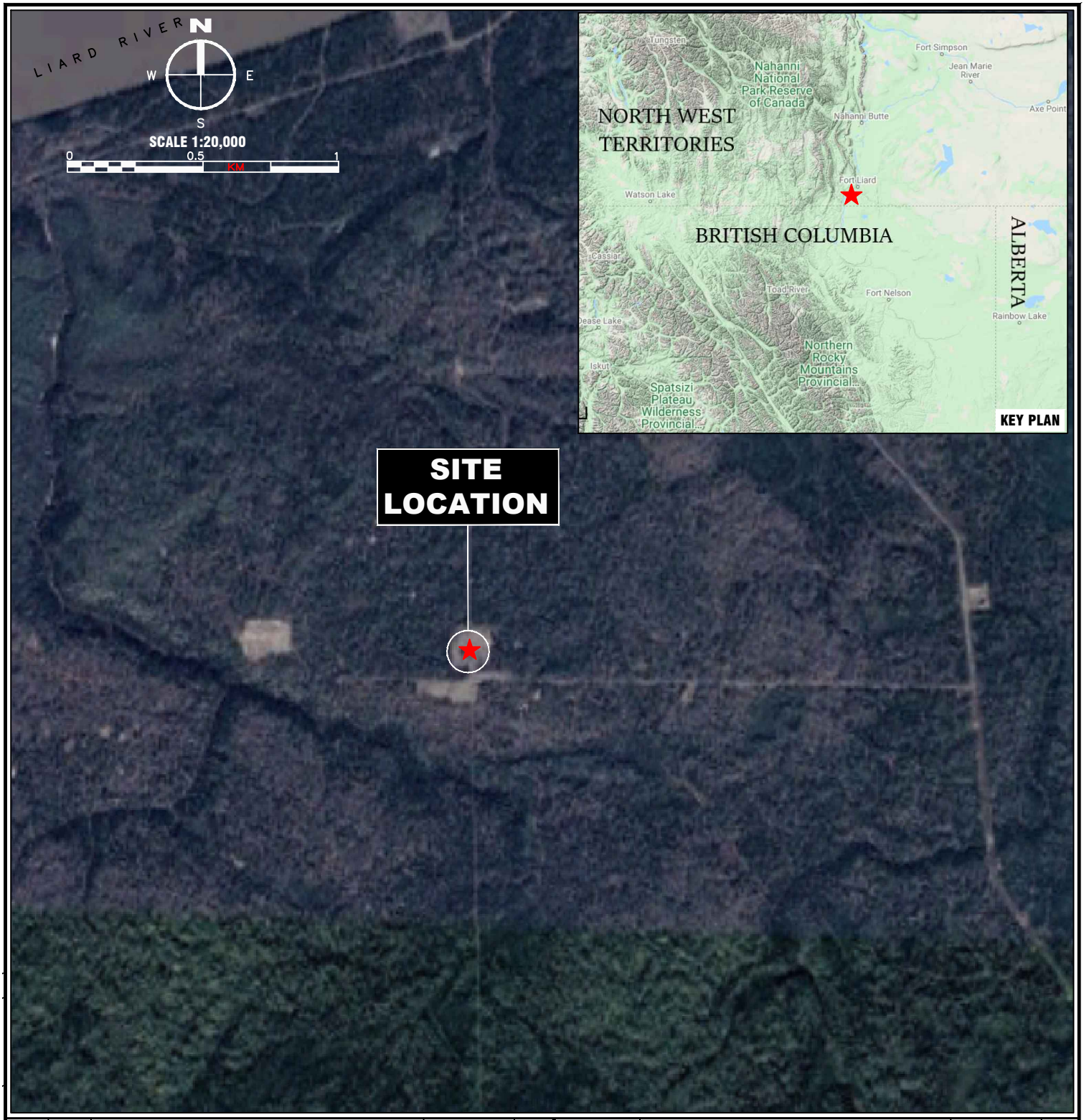
N/A = Not Applicable

"-" = Not analysed or no value

* = elative Percent Difference (RPD) are not calculated where concentrations are less than five times method detection limit (MDL).

DRAWINGS

- Drawing 001: Site Location Plan
- Drawing 002: Site Plan, Borehole and Test Pit Location, and APEC Locations
- Drawing 003a: Detailed Soil Analytical Results (Test Pits)
- Drawing 003b: Detailed Soil Analytical Results (Boreholes)
- Drawing 004: Geological Cross-Section A-A’
- Drawing 005: Geological Cross-Section B-B’



CHK	BY	REVISION DESCRIPTION	DATE	REV.
–	–	–	–	–
–	–	–	–	–

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
–	AERIAL GOOGLE EARTH	2020–05–14	–
–	–	–	–

LEGEND

★ Para et al Mount Coty I–02

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. DATA COMPILED BY SYNGIS: SYNERGYASPEN GEOGRAPHIC INFORMATION SYSTEM.
3. ORIGINAL DRAWING PAPER SIZE 8.5x11 INCHES.

SynergyAspen ENVIRONMENTAL

TITLE:

SITE LOCATION PLAN
(60° 11' 33.15" N, 123° 30' 27.70" W)

CLIENT NAME: Paramount Resources Ltd.			
SITE LOCATION:	DATE: 2021–11–19		PAR6206
I–02 Mount Coty	SCALE: 1:20,000	DWG No:	001
	DWN: TW CHK'D: MP		



CHK	BY	REVISION DESCRIPTION	DATE	REV.
MP	GIA	ISSUED TO CLIENT	–	0

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
–	AERIAL BY GOOGLE EARTH	2020-05-14	–
	SYNERGYASPEN TRIMBLE	2021-10-06	–

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM MEASUREMENTS TAKEN IN THE FIELD. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
3. ORIGINAL DRAWING PAPER SIZE 11x8.5 INCHES

LEGEND

- WELLBORE
- HAND AUGER BOREHOLE
- BOREHOLE LOCATION
- TESTPIT LOCATION
- APPROXIMATE LEASE BOUNDARY
- APEC
- SECTION LINES

SynergyAspen ENVIRONMENTAL

TITLE:

SITE PLAN

CLIENT NAME: Paramount Resources Ltd.

SITE LOCATION:	DATE: 2022-02-05	PAR6206
I-02 LIARD	SCALE: 1:1,000	DWG No: 002
	DWN: GA CHK'D: MP	

PATH: P:\PARAMOUNT RESOURCES\PAR6206 - I-02\DRAWINGS & SURVEY\2022\CROSS-SECTION\PAR6206-CROSS-SECTION

20220216.2343

TP22-11	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite-Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
TP22-11-01	10-Feb-22	0.5-1.0	-	-	-	-	-	<25	54	<100	-	-	<STD	<STD	-	-
TP22-11-02	10-Feb-22	1.5-2.0	-	-	-	-	-	<25	63	<100	-	-	-	-	<STD	0.5
TP22-11-03	10-Feb-22	2.5-3.0	-	-	-	-	-	104	429	136	-	-	Ba (19,600)	<STD	<STD	18.1
TP22-11-04	10-Feb-22	3.5-4.0	<0.005	<0.005	<0.02	<0.03	<10	<25	<50	<100	-	-	-	<STD	<STD	5

TP22-06a	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite-Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
TP22-06a-01	09-Feb-22	0.5-1.0	-	-	-	-	-	<25	131	<100	-	-	<STD	<STD	-	-
TP22-06a-02	09-Feb-22	1.5-2.0	-	-	-	-	-	1,300	5,500	1,700	-	-	<STD	<STD	-	-
TP22-06a-03	09-Feb-22	2.5-3.0	-	-	-	-	-	108	571	135	-	-	<STD	<STD	<STD	8.7
TP22-06a-04	09-Feb-22	3.5-4.0	<0.005	<0.005	<0.02	<0.03	<10	<25	<50	<100	-	-	-	<STD	<STD	4.5

TP22-09	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite-Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
TP22-09-01	10-Feb-22	0.5-1.0	-	-	-	-	-	<25	66	<100	-	-	<STD	<STD	-	-
TP22-09-02	10-Feb-22	1.5-2.0	-	-	-	-	-	<25	<50	<100	-	-	-	-	<STD	0.5
TP22-09-03	10-Feb-22	2.5-3.0	-	-	-	-	-	32	176	<100	-	-	Ba (21,800)	<STD	<STD	8.1
TP22-09-04	10-Feb-22	3.5-4.0	<0.005	<0.005	<0.02	<0.03	<10	<25	<50	<100	-	-	-	<STD	<STD	4.1

TP22-03a	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite-Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
TP22-03a-02	08-Feb-22	1.5-2.0	-	-	-	-	-	<25	51	<100	-	-	-	<STD	<STD	4.1
TP22-03a-03	08-Feb-22	2.5-3.0	-	-	-	-	-	1,770	6,490	2,300	-	-	Ba (97,600)	<STD	<STD	26
TP22-03a-05	DUPLICATE		-	-	-	-	-	1,860	7,080	2,490	-	-	Ba (103,000)	<STD	<STD	28
TP22-03a-04	08-Feb-22	3.5-4.0	0.202	<0.005	<0.02	<0.03	<10	<25	<50	<100	-	-	-	<STD	<STD	12.7

TP22-07	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite-Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
TP22-07-01	10-Feb-22	0.5-1.0	-	-	-	-	-	<25	104	<100	-	-	<STD	<STD	-	-
TP22-07-02	10-Feb-22	1.5-2.0	-	-	-	-	-	<25	71	<100	-	-	-	-	<STD	0.5
TP22-07-03	10-Feb-22	2.5-3.0	-	-	-	-	-	2,880	11,300	3,690	-	-	<STD	<STD	<STD	9.2
TP22-07-04	10-Feb-22	3.5-4.0	<0.005	<0.005	<0.02	<0.03	<10	<25	77	<100	-	-	-	<STD	<STD	5.4

TP22-08	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite-Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
TP22-08-01	10-Feb-22	0.5-1.0	-	-	-	-	-	<25	144	<100	-	-	<STD	<STD	-	-
TP22-08-02	10-Feb-22	1.5-2.0	-	-	-	-	-	<25	50	<100	-	-	-	-	<STD	0.7
TP22-08-03	10-Feb-22	2.5-3.0	-	-	-	-	-	165	715	107	-	-	<STD	<STD	<STD	7.5
TP22-08-05	DUPLICATE		-	-	-	-	-	790	3,310	1,000			<STD	<STD	<STD	8.4
TP22-08-04	10-Feb-22	3.5-4.0	<0.005	<0.005	<0.02	<0.03	<10	<25	64	<100	-	-	-	<STD	<STD	5.4

TP22-01b	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite-Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
TP22-01b-02	08-Feb-22	1.5-2.0	-	-	-	-	-	<25	<50	<100	-	-	-	-	-	-
TP22-01b-03	08-Feb-22	2.5-3.0	<0.005	<0.005	<0.02	<0.03	<10	<25	50	<100	-	-	-	<STD	-	-
TP22-01b-04	08-Feb-22	3.5-4.0	-	-	-	-	-	32	183	<100	-	-	-	-	<STD	6.4

TP22-01a	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite-Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
TP22-01a-03	08-Feb-22	2.5-3.0	-	-	-	-	-	2,040	8,440	2,690	-	-	Ba (54,200)	<STD	<STD	18
TP22-01a-04	08-Feb-22	3.5-4.0	<0.005	<0.005	<0.02	<0.03	<10	32	183	<100	-	-	-	<STD	<STD	6

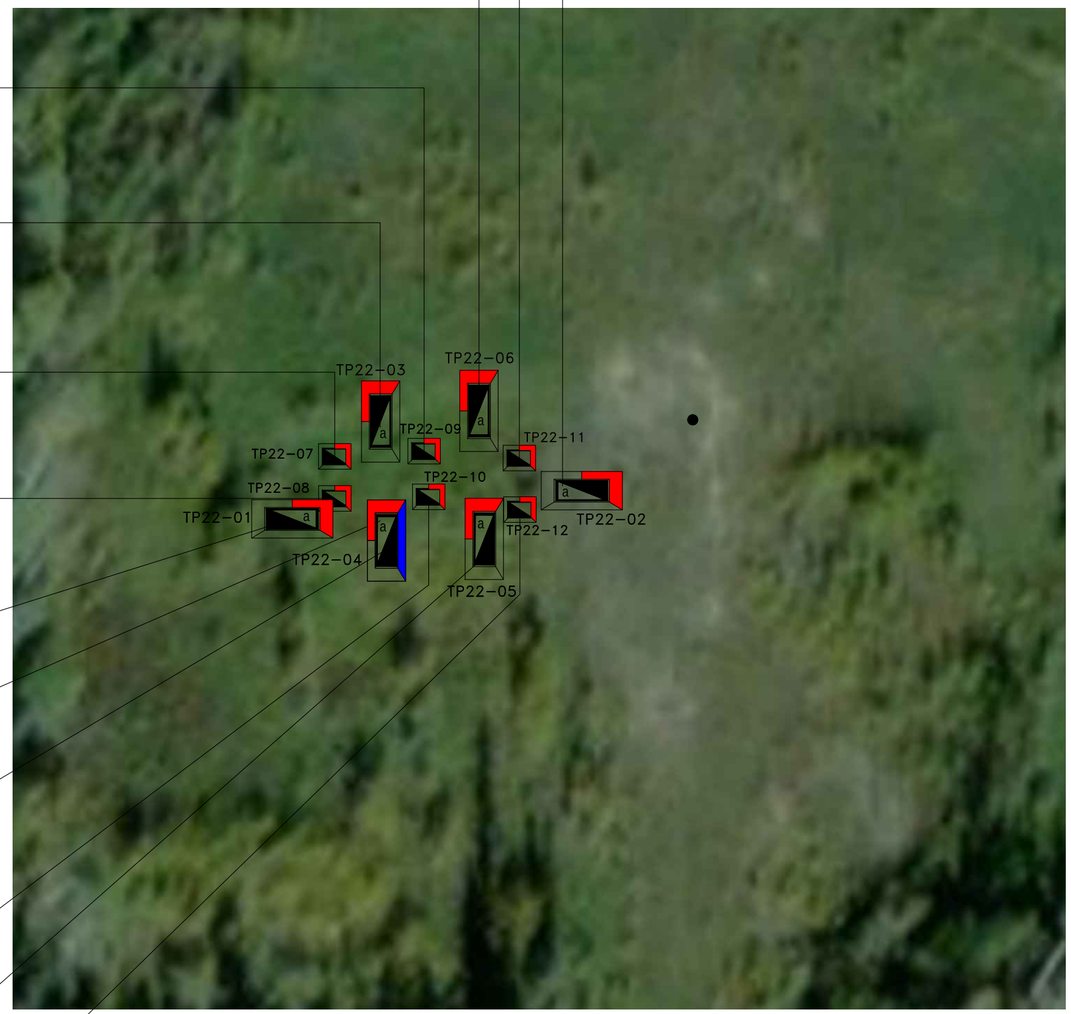
TP22-04a	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite-Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
TP22-04a-01	08-Feb-22	0.5-1.0	-	-	-	-	-	184	658	210	-	-	-	<STD	-	-
TP22-04a-02	08-Feb-22	1.5-2.0	-	-	-	-	-	<25	<50	<100	-	-	-	<STD	<STD	1.6
TP22-04a-03	08-Feb-22	2.5-3.0	-	-	-	-	-	2,330	10,700	2,790	-	-	Ba (27,500)	<STD	<STD	5.4
TP22-04a-05	DUPLICATE		-	-	-	-	-	1,240	5,230	1,570	-	-	-	<STD	<STD	6.3
TP22-04a-04	08-Feb-22	3.5-4.0	-	-	-	-	-	<25	<50	<100	-	-	-	<STD	<STD	0.7

TP22-10	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite-Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
TP22-10-01	10-Feb-22	0.5-1.0	-	-	-	-	-	<25	66	<100	-	-	<STD	<STD	-	-
TP22-10-02	10-Feb-22	1.5-2.0	-	-	-	-	-	<25	58	<100	-	-	-	-	<STD	0.5
TP22-10-03	10-Feb-22	2.5-3.0	-	-	-	-	-	1,400	5,610	1,730	-	-	Ba (94,000)	<STD	<STD	17.2
TP22-10-04	10-Feb-22	3.5-4.0	<0.005	<0.005	<0.02	<0.03	<10	<25	68	<100	-	-	-	<STD	<STD	1.5

TP22-05a	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite-Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
TP22-05a-02	09-Feb-22	1.5-2.0	-	-	-	-	-	148	800	138	-	-	-	-	<STD	4.7
TP22-05a-03	09-Feb-22	2.5-3.0	-	-	-	-	-	<25	93	<100	-	-	<STD	<STD	<STD	13.1
TP22-05a-05	DUPLICATE		-	-	-	-	-	70	295	102	-	-	<STD	<STD	<STD	13.7
TP22-05a-04	09-Feb-22	3.5-4.0	0.009	<0.005	<0.02	<0.03	<10	<25	65	<100	-	-	-	-	<STD	2.1

TP22-12	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite-Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
TP22-12-01	10-Feb-22	0.5-1.0	-	-	-	-	-	<25	<50	<100	-	-	<STD	<STD	-	-
TP22-12-02	10-Feb-22	1.5-2.0	-	-	-	-	-	<25	58	<100	-	-	-	-	<STD	2.5
TP22-12-03	10-Feb-22	2.5-3.0	-	-	-	-	-	1,720	6,550	2,200	-	-	Ba (111,000)	<STD	<STD	22
TP22-12-05	DUPLICATE		-	-	-	-	-	2,630	10,200	3,450				<STD	<STD	25
TP22-12-04	10-Feb-22	3.5-4.0	<0.005	<0.005	<0.02	<0.03	<10	<25	<50	<100	-	-	-	<STD	<STD	6.1

TP22-02a	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite-Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
TP22-02a-02	08-Feb-22	1.5-2.0	-	-	-	-	-	74	208	<100	-	-	-	<STD	<STD	15.8
TP22-02a-03	08-Feb-22	2.5-3.0	<0.005	<0.005	<0.02	<0.03	<10	<25	81	<100	-	-	-	<STD	<STD	2.3



SOIL ANALYTICAL RESULTS LEGEND

RED – CONCENTRATIONS GREATER THAN THE APPLICABLE AB-TIER 2 GUIDELINE (SUBSURFACE)

BLUE – CONCENTRATIONS GREATER THAN THE APPLICABLE AB-TIER 2 GUIDELINE (SURFACE)

GREEN – CONCENTRATION LESS THAN OR EQUAL TO THE APPLICABLE STANDARD

SOIL ANALYTICAL STANDARDS

	B	E	T	X	F1 (C6-C10) BTEX	F2 (C10-C16)	F3 (C16-C34)	F4 (C34-C50)	PAHs	METHANOL	METALS	SALINITY	SAR
AB-TIER 2 GUIDELINE-ABOVE 3m (mg/kg)	60	110	120	65	210	150	1,300	5,600	REFER TO REPORT TABLES FOR APPLICABLE STANDARDS				<4
AB-TIER 2 GUIDELINE-BELOW 3m (mg/kg)	15	240	220	130	800	1,000	3,500	10,000					<4

CHK	BY	REVISION DESCRIPTION	DATE	REV.
AB	GA	ISSUED TO CLIENT	-	0

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
3111-0728WS	SURVEY PLAN OF WELLSITE	1999-07-09	-
-	GOOGLE EARTH	2020	-
-	-	-	-

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM MEASUREMENTS TAKEN IN THE FIELD. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
3. ORIGINAL DRAWING PAPER SIZE 22x17 INCHES
4. PLEASE REFER TO ANALYTICAL TABLES FOR REFERENCE TO APPLICABLE SITE SPECIFIC FACTORS.

0 5 METRES 25

* ALBERTA ENVIRONMENT AND PARKS (AEP). 2019. ALBERTA TIER 1 SOIL AND GROUNDWATER REMEDIATION GUIDELINES.

1 SOIL REMEDIATION GUIDELINES FOR NATURAL AREA LAND USE, FINE-GRAINED SUBSOIL SOIL (<3 M). SUBSOIL GUIDELINES FOR PETROLEUM HYDROCARBON FRACTIONS F1 TO F4, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES WERE APPLIED TO DEPTHS GREATER THAN 3 M AS THIS SITE IS A REMOTE FORESTED SITE WITH FINE TEXTURED SOIL.

LEGEND

- WELLBORE
- TEST PIT LOCATION
- APPROXIMATE LEASE BOUNDARY

SynergyAspen ENVIRONMENTAL

TITLE:

DETAILED SOIL ANALYTICAL RESULTS - TEST PITS

CLIENT NAME: Paramount Resources Ltd.

SITE LOCATION: I-02 LIARD

DATE: 2022-04-07

SCALE: 1:500

DWN: GA CHK'D: AB

PAR6206

DWG No: 003A

PLOT: 20220407.1135

PATH: P:\PARAMOUNT RESOURCES\PAR6206 - I-02\DRAWINGS & SURVEY\2021\STAGE 2\PAR6206-ST2 TEST PIT

PLOT: 20220407.1253

BH21–03	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METHANOL	METALS	SALINITY	SAR
BH21–03–05	04–Oct–21	2.68–3.0	<0.005	<0.005	<0.02	<0.03	<10	<25	<50	<100	-	-	Se (1.1)	-	0.3

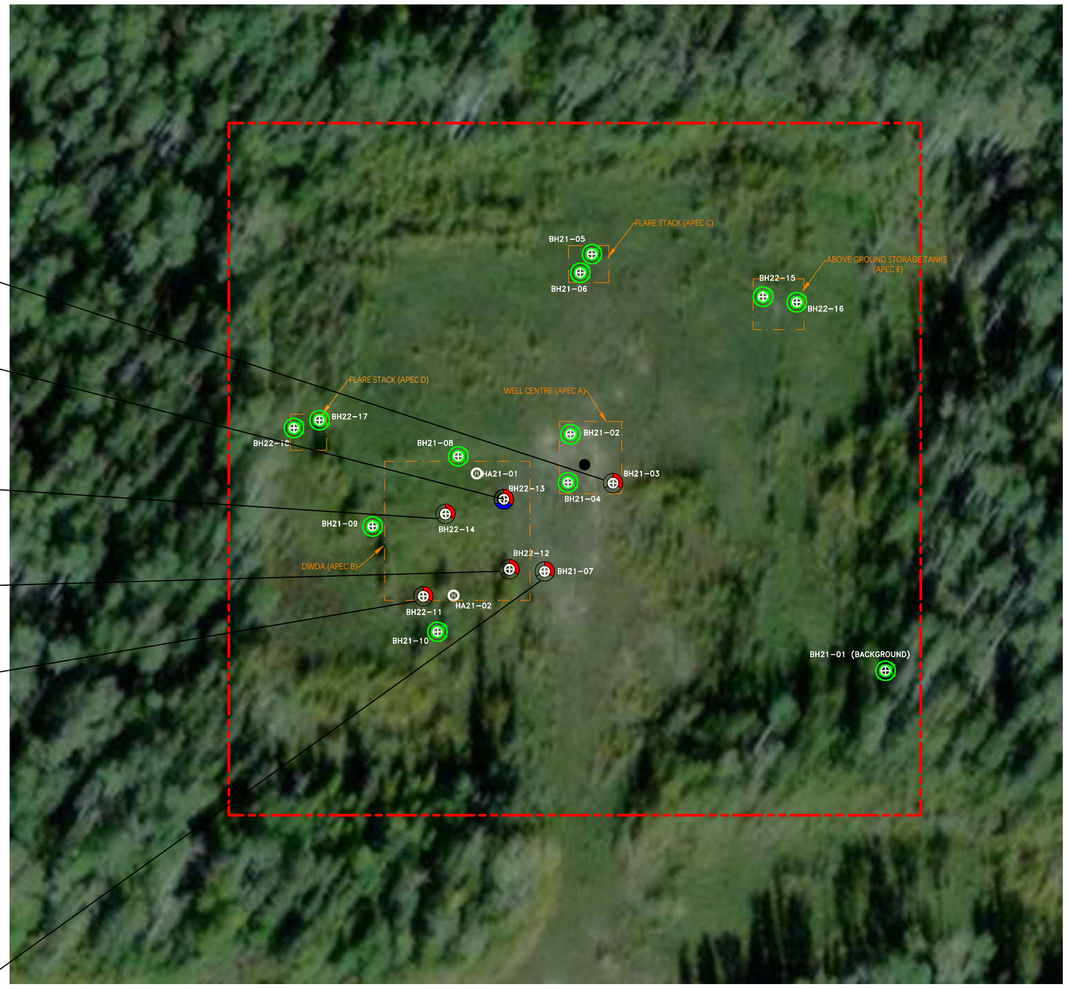
BH22–13	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite–Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
BH22–13–02	12–Jan–22	0.7–0.9	0.008	0.063	0.02	0.14	<10	156	831	239	-	Ba (1,620)	<STD	<STD	<STD	0.5
BH22–13–05	12–Jan–22	2.5–2.7	1	2.52	2.5	7.23	184	889	3,560	1210	<STD	Ba (1,940)	<STD	<STD	<STD	10
BH22–13–08 (DUP OF BH22–13–05)			0.98	2.09	2.7	5.59	151	622	2,690	963	<STD	Ba (2,020)	Ba (10,900)	<STD	<STD	10.4

BH22–14	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite–Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
BH22–14–06	12–Jan–22	3.1–3.3	0.918	2.72	2.66	5.32	156	981	3,960	1,300	<STD	Ba (1,000)	Ba (22,400)	<STD	<STD	15.3
BH22–14–07	12–Jan–22	4.1–4.3	0.025	0.008	<0.02	<0.03	<10	46	227	<100	-	-	<STD	<STD	<STD	11.4
BH22–14–08	12–Jan–22	5.1–5.3	<0.005	<0.005	<0.02	<0.03	<10	46	227	<100	-	-	-	-	-	-

BH22–12	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	SALINITY	SAR
BH22–12–06	12–Jan–22	3.1–3.3	0.013	0.011	<0.02	<0.03	<10	44	234	<100	-	Se (1.4)	<STD	4.3

BH22–11	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite–Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
BH22–11–08	12–Jan–22	5.1–5.3	0.061	0.428	0.2	1.14	<10	<25	<50	<100	-	Ba (831)	<STD	<STD	<STD	1.2

BH21–07	Date	Depth Range(m)	B	E	T	X	F1	F2	F3	F4	PAHs	METALS	Barite–Barium (Hot Fusion)	Ba ($CaCl_2$)	SALINITY	SAR
BH21–07–08	05–Oct–21	4.18–4.5	-	-	-	-	-	-	-	-	-	Se (1.3)	-	-	-	-



SOIL ANALYTICAL RESULTS LEGEND

RED – CONCENTRATIONS GREATER THAN THE APPLICABLE AB–TIER 2 GUIDELINE (SUBSURFACE)

BLUE – CONCENTRATIONS GREATER THAN THE APPLICABLE AB–TIER 2 GUIDELINE (SURFACE)

GREEN – CONCENTRATION LESS THAN OR EQUAL TO THE APPLICABLE STANDARD

SOIL ANALYTICAL STANDARDS

	B	E	T	X	F1 (C6–C10) BTEX	F2 (C10–C16)	F3 (C16–C34)	F4 (C34–C50)	PAHs	METHANOL	METALS	SALINITY	SAR
AB–TIER 2 GUIDELINE–ABOVE 3m (mg/kg)	60	110	120	65	210	150	1,300	5,600	REFER TO REPORT TABLES FOR APPLICABLE STANDARDS				<4
AB–TIER 2 GUIDELINE–BELOW 3m (mg/kg)	15	240	220	130	800	1,000	3,500	10,000					<4

CHK	BY	REVISION DESCRIPTION	DATE	REV.
SM	GA	ISSUED TO CLIENT	–	0

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
3111–0728WS	SURVEY PLAN OF WELLSITE	1999–07–09	–
–	GOOGLE EARTH	2020	–
–	–	–	–

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM MEASUREMENTS TAKEN IN THE FIELD. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
3. ORIGINAL DRAWING PAPER SIZE 22x17 INCHES
4. PLEASE REFER TO ANALYTICAL TABLES FOR REFERENCE TO APPLICABLE SITE SPECIFIC FACTORS.

0 5 10 METRES 50

FOOTNOTES

* ALBERTA ENVIRONMENT AND PARKS (AEP). 2019. ALBERTA TIER 1 SOIL AND GROUNDWATER REMEDIATION GUIDELINES.

1 SOIL REMEDIATION GUIDELINES FOR NATURAL AREA LAND USE, FINE–GRAINED SUBSOIL SOIL (<3 M). SUBSOIL GUIDELINES FOR PETROLEUM HYDROCARBON FRACTIONS F1 TO F4, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES WERE APPLIED TO DEPTHS GREATER THAN 3 M AS THIS SITE IS A REMOTE FORESTED SITE WITH FINE TEXTURED SOIL.

LEGEND

- WELLBORE
- HAND AUGER BOREHOLE
- BOREHOLE LOCATION
- APPROXIMATE LEASE BOUNDARY
- APEC

SynergyAspen ENVIRONMENTAL

TITLE:

DETAILED SOIL ANALYTICAL RESULTS -BOREHOLE

CLIENT NAME: Paramount Resources Ltd.

SITE LOCATION: I–02 LIARD

DATE: 2022–04–07

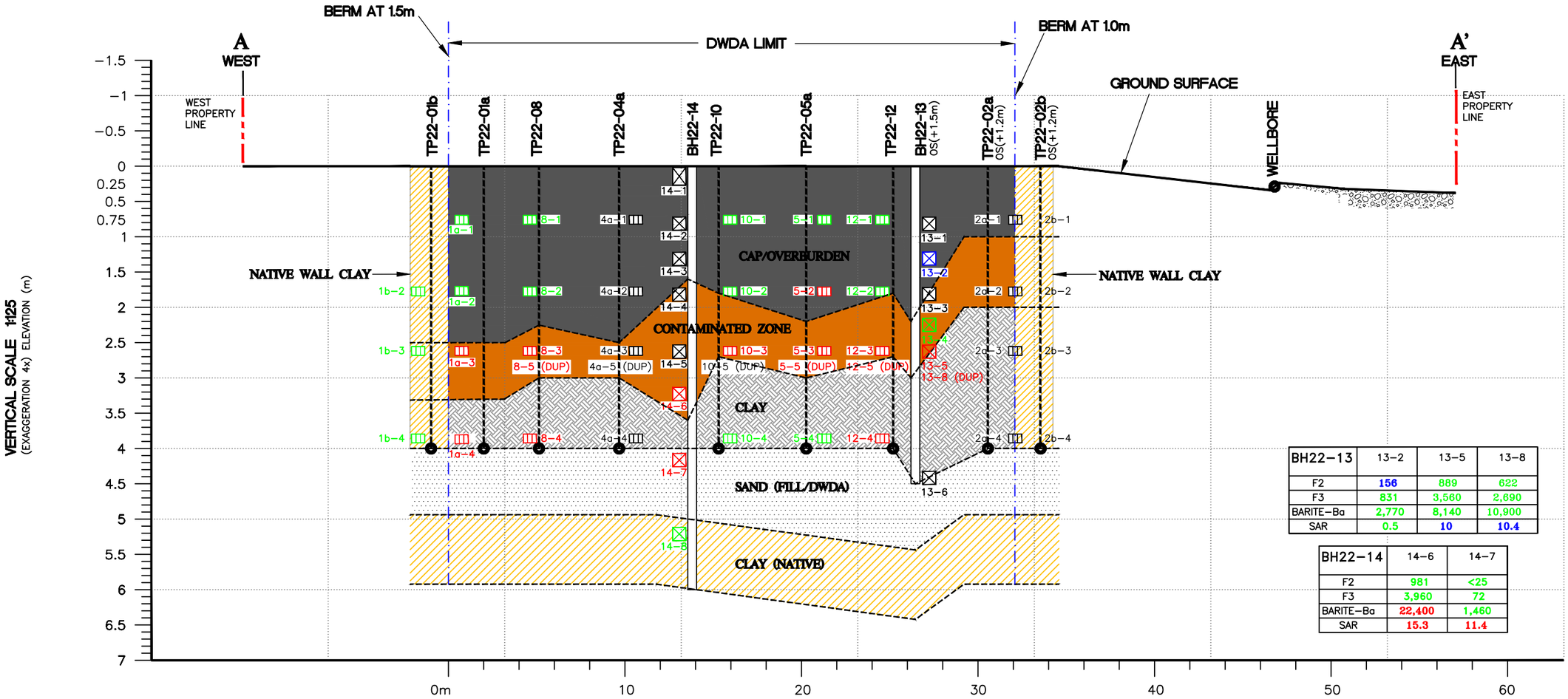
SCALE: 1:1,000

DWN: GA CHK'D: AB

DWG No: 003B

PAR6206

PATH: C:\USERS\GAQUILO\APPDATA\LOCAL\TEMP\ACPUBLISH_11684\PAR6206–ST2 TEST PIT



BH22-13	13-2	13-5	13-8
F2	156	889	622
F3	831	3,560	2,690
BARITE-Ba	2,770	8,140	10,900
SAR	0.5	10	10.4

BH22-14	14-6	14-7
F2	981	<25
F3	3,960	72
BARITE-Ba	22,400	1,460
SAR	15.3	11.4

"NATIVE WALL" CLAY SOFT, LOW PLASTICITY, GREY, WET.

CAP/OVERBURDEN CLEAN CLAY, (FIRM TO SOFT) MEDIUM PLASTICITY, GREYISH-BROWN, DAMP, TRACE SAND AND GRAVEL

CONTAMINATED ZONE CLAY (FILL) SOFT, LOW PLASTICITY, GREY, WET.

CLEAN BOTTOM LAYER CLAY, TRACE GRAVEL/COBBLES, STIFF, HIGH PLASTICITY, LIGHT BROWN, DAMP.

SAND (FILL) TRACE SILT, LOOSE, NON-PLASTIC, BROWN.

A-A' 003 SECTION
HORIZONTAL SCALE 1:250 (m)

NOTES

1. THE CROSS SECTION DEPICTED IS BASED ON INTERPRETATION OF LIMITED GEOLOGICAL DATA. ACTUAL GEOLOGICAL CONDITIONS MAY BE DIFFERENT FROM THOSE INTERPRETED.
2. REFER TO PLAN PAR6206-002 FOR LOCATION OF CROSS SECTION LINE.
3. INFORMATION PRESENTED IS WITHIN 1m OF SECTION LINE UNLESS INDICATED OTHERWISE ON DRAWING.
4. ORIGINAL DRAWING IN COLOUR.

LEGEND

- PROPERTY LINE
- DWDA LIMIT
- TEST PIT LIMIT
- INFERRED STRATIGRAPHIC BOUNDARY
- DIMENSION 27m X 14m
- GRAB SAMPLE (BOREHOLE)
- GRAB SAMPLE (TEST PIT)
- CONCENTRATION(S) LESS THAN OR EQUAL TO THE APPLICABLE STANDARDS
- CONCENTRATION(S) GREATER THAN THE APPLICABLE AB-TIER 2 GUIDELINE (SUBSURFACE)
- CONCENTRATION(S) GREATER THAN THE APPLICABLE AB-TIER 2 GUIDELINE (SURFACE)

BOREHOLE LEGEND

TEST PIT OFFSET FROM SECTION LINE — 00-1 OS(+1.5m) — BH OFFSET FROM SECTION LINE

TEST PIT — 50 mmø SOLID PVC PIPE

50 mmø SLOTTED PVC PIPE

END OF TEST PIT — END OF BOREHOLE

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK

SynergyAspen ENVIRONMENTAL

TITLE:

GEOLOGICAL CROSS SECTION A-A'

CLIENT NAME: Paramount Resources Ltd.

SITE LOCATION:

DATE: 2022-02-05

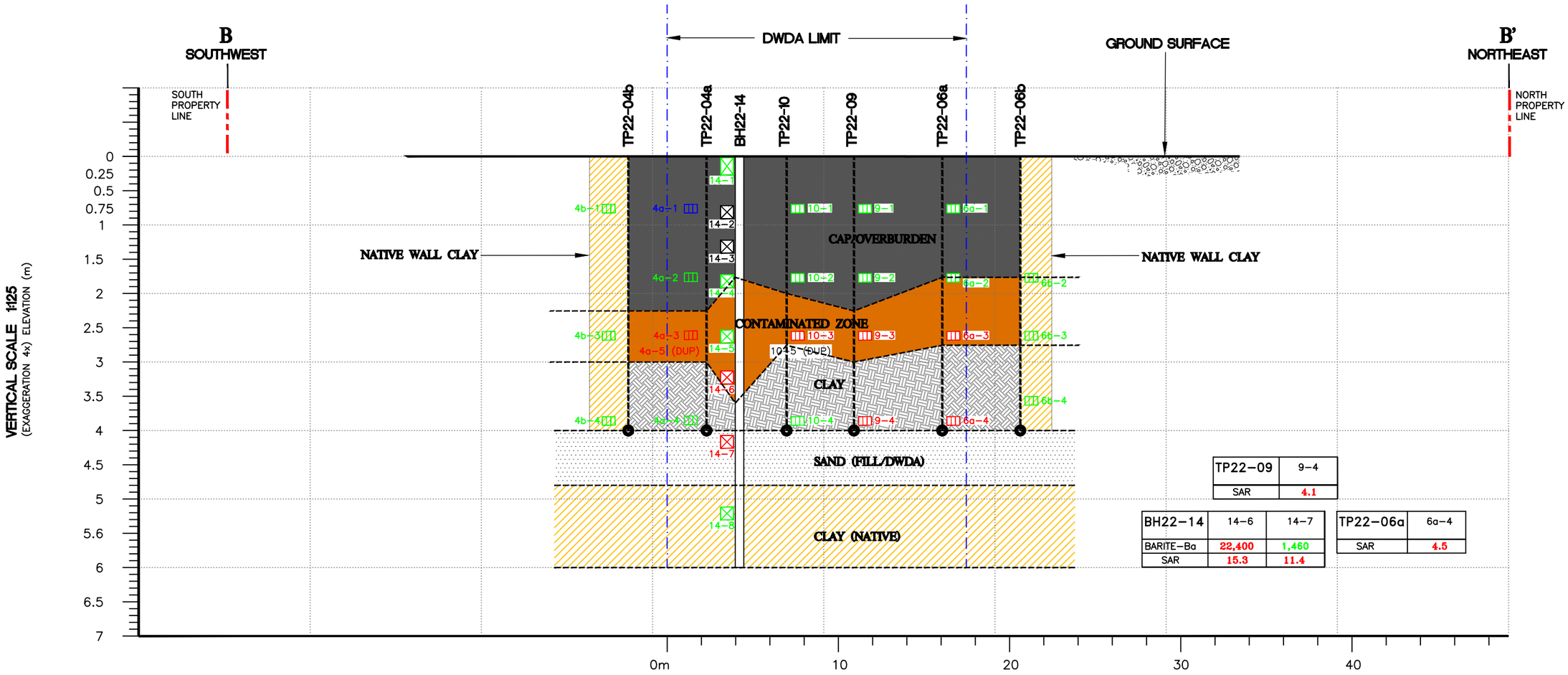
SCALE: AS NOTED

DWN: GA CHK'D: MP

I-02 LIARD

PAR6206

DWG No: 004



TP22-09	9-4
SAR	4.1

BH22-14	14-6	14-7
BARITE-Ba	22,400	1,460
SAR	15.3	11.4

TP22-06a	6a-4
SAR	4.5

"NATIVE WALL" CLAY SOFT, LOW PLASTICITY, GREY, WET.

CAP/OVERBURDEN CLEAN CLAY, (FIRM TO SOFT) MEDIUM PLASTICITY, GREYISH-BROWN, DAMP, TRACE SAND AND GRAVEL

CONTAMINATED ZONE CLAY (FILL) SOFT, LOW PLASTICITY, GREY, WET.

CLEAN BOTTOM LAYER CLAY, TRACE GRAVEL/COBBLES, STIFF, HIGH PLASTICITY, LIGHT BROWN, DAMP.

SAND (FILL) TRACE SILT, LOOSE, NON-PLASTIC, BROWN.

B-B' SECTION
004
HORIZONTAL SCALE
1:250 (m)

NOTES

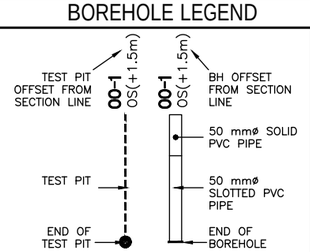
1. THE CROSS SECTION DEPICTED IS BASED ON INTERPRETATION OF LIMITED GEOLOGICAL DATA. ACTUAL GEOLOGICAL CONDITIONS MAY BE DIFFERENT FROM THOSE INTERPRETED.
2. REFER TO PLAN PAR6206-002 FOR LOCATION OF CROSS SECTION LINE.
3. INFORMATION PRESENTED IS WITHIN 1m OF SECTION LINE UNLESS INDICATED OTHERWISE ON DRAWING.
4. ORIGINAL DRAWING IN COLOUR.

LEGEND

- PROPERTY LINE
- DWDA LIMIT
- TEST PIT LIMIT
- INFERRED STRATIGRAPHIC BOUNDARY

- GRAB SAMPLE (BOREHOLE)
- GRAB SAMPLE (TEST PIT)
- CONCENTRATION(S) LESS THAN OR EQUAL TO THE APPLICABLE STANDARDS
- CONCENTRATION(S) GREATER THAN THE APPLICABLE AB-TIER 2 GUIDELINE (SUBSURFACE)
- CONCENTRATION(S) GREATER THAN THE APPLICABLE AB-TIER 2 GUIDELINE (SURFACE)

BOREHOLE LEGEND



REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK

SynergyAspen ENVIRONMENTAL

TITLE:

GEOLOGICAL CROSS SECTION B-B'

CLIENT NAME: Paramount Resources Ltd.

SITE LOCATION: I-02 LIARD

DATE: 2022-02-05 | SCALE: AS NOTED | DWN: GA | CHK'D: MP

PAR6206

DWG No: 005
4

APPENDIX I

Site Photographs

SynergyAspen ENVIRONMENTAL

Port Moody Office
2328 Clarke Street
Port Moody, BC
V3H 1Y8
PH: 604-931-1026
FX: 604-931-1046

Fort St. John Office
9904 106 Street
Fort St. John, BC
V1J 1V8
PH: 250-785-1030
FX: 250-785-1034

PHOTOGRAPH 1: Drilling of BH21-06, facing southwest (October 5, 2021).



PHOTOGRAPH 2: Drilling of BH21-07, facing southwest (October 5, 2021).



PHOTOGRAPH 3: Drilling of BH21-10, facing southwest (October 6, 2021).



PHOTOGRAPH 4: DWDA pits, facing southwest (October 5, 2021).



PHOTOGRAPH 5: DWDA pits, facing west (October 5, 2021).



PHOTOGRAPH 6: Log across access road, facing south (October 5, 2021).



PHOTOGRAPH 7: Aerial Photo of the Site (September 24, 2021).



PHOTOGRAPH 8: Aerial Photo of the Site (September 24, 2021).



APPENDIX II

Field Procedures

SynergyAspen ENVIRONMENTAL

Port Moody Office
2328 Clarke Street
Port Moody, BC
V3H 1Y8
PH: 604-931-1026
FX: 604-931-1046

Fort St. John Office
9904 106 Street
Fort St. John, BC
V1J 1V8
PH: 250-785-1030
FX: 250-785-1034

SYNERGYASPEN FIELD PROCEDURES

Soil Sampling Procedures

During all soil investigations detailed in the following sections, each soil sample was placed into Teflon-lidded sample jars and glass vials pre-charged with methanol, immediately upon collection. The samples collected into methanol-filled vials were required for volatile hydrocarbons analysis and the samples collected into jars were required for extractable hydrocarbons analysis. A portion of each sample was also placed into sealed bags for the analysis of inorganic parameters (metals and salinity).

All samples were immediately stored in ice-chilled coolers for transport to the laboratory for analytical testing.

Drilling Investigation Procedures

Prior to drilling, a line locate of the lease was completed to ensure that the drill rig and excavator would not intersect any buried utilities or structures. During borehole drilling and test pit excavation, soil conditions were systematically logged for soil type, colour, texture, moisture content, and apparent hydrocarbon effects.

Samples were collected from the boreholes and test pits by manually removing soil from the auger flytes or excavator bucket and placing it into the sample containers. To fill the methanol-filled vials, a dedicated, disposable Terra Core® sampler was used to collect an approximate 5 grams of soil; the Terra Core® was filled by pushing it into the soil on the auger flytes and discharged into the vials using the Terra Core® plunger.

Samples collected from the auger flytes and excavator bucket were trimmed to remove the outer approximate 5 mm of soil to minimize the potential for cross contamination. This was completed prior to the collection of the volatile hydrocarbons sample using the Terra Core® sampler.

Comprehensive borehole and test pit logs are included in Appendix IV.

APPENDIX III

Quality Assurance/Quality Control (QA/QC) Program

SynergyAspen ENVIRONMENTAL

Port Moody Office
2328 Clarke Street
Port Moody, BC
V3H 1Y8
PH: 604-931-1026
FX: 604-931-1046

Fort St. John Office
9904 106 Street
Fort St. John, BC
V1J 1V8
PH: 250-785-1030
FX: 250-785-1034

QUALITY ASSURANCE/QUALITY CONTROL

SynergyAspen follows strict QA/QC protocols for all sample collection, handling and analysis. The QA/QC program will generally include the following:

- management of field personnel by senior personnel;
- execution of SynergyAspen field protocols by trained field personnel;
- written field instructions provided to field personnel;
- careful and complete documentation of all field activities by field personnel;
- decontamination of sampling equipment (e.g. augers, split spoon, etc.) between samples:
  ⇒ samples are collected to avoid cross-contamination and other field sampling errors. Samples are placed in contaminant-free containers specifically for such use;
- chain-of-custody documentation for sample submission:
  ⇒ use of a coding system for sample submission to the laboratory so that information regarding site locales or anticipated analytical results is unavailable to the analyst(s);
- use of a Canadian Association for Environmental Analytical Laboratories accredited laboratory;
- adherence to laboratory sampling and analysis protocols (e.g., hold times, detection limits, approved methodology);
- procedures to confirm accurate transcription of laboratory data into tables;
- review of laboratory QC performance to ensure results are within acceptable limits as per the BC Environmental Laboratory Manual (2013):
  ⇒ Results of the laboratory's internal checks will be included in the analytical report;
- submission of field QC samples and implementation of corrective action plans, if deemed appropriate, when acceptable limits are exceeded:
  ⇒ To assess the QA/QC for the blind duplicate sets, SynergyAspen calculates the practical quantitation limits (PQL: defined as five times the method detection limit) and, if appropriate, the relative percent difference (RPD: defined as the absolute value of the difference between a sample set divided by the average of the two results). If sample concentrations are less than the PQL, RPDs are not considered meaningful and are not calculated. RPDs of less than 100% for hydrocarbons in soil and less than 70% for inorganics in soil, less than 30% for hydrocarbons in groundwater, and less than 20% for inorganics in groundwater are considered acceptable according to SynergyAspen's preferred operating procedures.

  ⇒ The above RPDs take into consideration the endorsements of the BC Field Sampling Manual (2013) where it states– 'It should be expected that the RPD is somewhat greater than that for laboratory duplicates. If one of a set of duplicate values at or greater than five times the MDL, then RPD values >20% indicate a possible problem, and > 50% indicate a definite problem, most likely either contamination or lack of sample representativeness.' The acceptable RPDs referenced above for groundwater are equivalent to the RPDs prescribed in the BC Environmental Laboratory Manual (2013) for laboratory duplicates. The above referenced SynergyAspen RPDs in soil are higher than the endorsed RPDs for field duplicates taking into consideration the 'lack of sample representativeness', i.e. normal heterogeneity.

  ⇒ Should there be an exceedance in the RPD, the higher of the two values is selected and compared to the applicable standard.

Calculated RPD values for the blind field duplicate samples are presented in the analytical data tables, included in the Tables Appendix of the report.

APPENDIX IV

Borehole Logs and Soil Sample Logs

Project No.: PAR6206 **Logged By:** JC

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: BACKGROUND

Borehole No.: BH21-01

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 10	0 – 3		**SILT,** some clay, trace sand, soft to stiff, low plasticity, brown, damp. between 0.56 - 2.4 m, brownish-grey. between 1.2 - 3.4 m, clayey. between 1.2 - 4.9 m, medium plasticity. between 2.4 - 4.9 m, light brown. between 3.0 - 4.9 m, hard. between 3.4 - 4.9 m, silt and clay.	
16	5		End of Borehole	

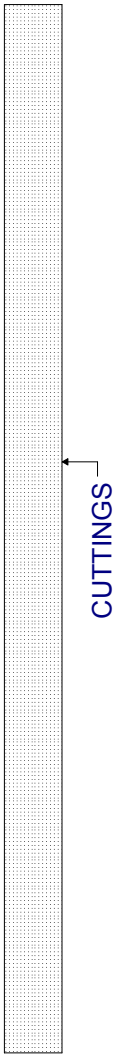
SAMPLE

Number	Type	Recovery	HV Concentration (ppm)	%LEL	
1-1			20		EC = 0.20 mS/m
1-2			30		EC = 0.28 mS/m
1-3			60		EC = 0.67 mS/m
1-4			45		EC = 0.56 mS/m
1-5			10		EC = 0.68 mS/m
1-6			5		EC = 0.86 mS/m
1-7			0		EC = 0.95 mS/m
1-8			25		EC = 1.19 mS/m

HV Concentration ppm: 125 250 375

%LEL: 20 40 60 80

Borehole Completion Details



Drill Method: SOLID STEM AUGER

Sample Type: GRAB

Hole Size: 3 1/4"

Drill Date: OCT. 04, 2021

Surface Elev. (m): N/A

Drilled By: CLEAN HARBORS

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** JC

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: WELLBORE AREA

Borehole No.: BH21-02

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 3	0 – 1		**SILT AND CLAY,** trace sand, trace gravel, stiff, medium plasticity, brown, damp. between 0.0 - 0.8 m, blebs. at 1.64 m, silt pocket, white. between 1.8 - 3.0 m, high plasticity.	
10	3		End of Borehole	

SAMPLE

Number	Type	Recovery
2-1		
2-6	(DUP)	
2-2		
2-3		
2-4		
2-5		

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

Number	HV (ppm)	Result
2-1 / 2-6	15	EC = 0.88 mS/m
2-2	10	EC = 0.85 mS/m
2-3	10	EC = 0.87 mS/m
2-4	20	EC = 1.02 mS/m
2-5	5	EC = 0.93 mS/m

Borehole Completion Details

No MW Installed

CUTTINGS

Drill Method: SOLID STEM AUGER
Sample Type: GRAB
Hole Size: 3 1/4"
Drill Date: OCT. 04, 2021

Surface Elev. (m): N/A
Drilled By: CLEAN HARBORS
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** JC

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: WELLBORE AREA

Borehole No.: BH21-03

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 10	0 – 3		**SILT AND CLAY,** trace sand, trace gravel, stiff, medium plasticity, brown, damp. between 0.0 - 1.2 m, blebs. between 1.8 - 2.4 m, blebs. between 2.04 - 2.2 m, charcoal. between 2.4 - 3.0 m, dark brown.	
10	3		End of Borehole	

SAMPLE

Number	Type	Recovery	HV Concentration ppm (125, 250, 375)	%LEL (20, 40, 60, 80)
3-1			30	EC = 0.82 mS/m
3-2			15	EC = 0.75 mS/m
3-3			5	EC = 0.65 mS/m
3-4			5	EC = 0.45 mS/m
3-5			10	EC = 0.91 mS/m

Borehole Completion Details

No MW Installed

CUTTINGS

Drill Method: SOLID STEM AUGER
Sample Type: GRAB
Hole Size: 3 1/4"
Drill Date: OCT. 04, 2021

Surface Elev. (m): N/A
Drilled By: CLEAN HARBORS
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** JC

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: WELLBORE AREA

Borehole No.: BH21-04

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 3	0 – 1		**SILT AND CLAY,** trace sand, trace gravel, hard, medium plasticity, brown, damp. between 0.0 - 1.2 m, blebs. at 1.2 m, high plasticity.	
10	3		End of Borehole	

SAMPLE

Number	Type	Recovery
4-1		
4-2		
4-3		
4-4		
4-5		

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

Number	HV Concentration (ppm)	%LEL	EC
4-1	0		EC = 0.37 mS/m
4-2	0		EC = 0.68 mS/m
4-3	0		EC = 0.86 mS/m
4-4	0		EC = 1.15 mS/m
4-5	0		EC = 1.05 mS/m

Borehole Completion Details

No MW Installed

CUTTINGS

Drill Method: SOLID STEM AUGER

Sample Type: GRAB

Hole Size: 3 1/4"

Drill Date: OCT. 05, 2021

Surface Elev. (m): N/A

Drilled By: CLEAN HARBORS

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** JC

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: FLARE AREA

Borehole No.: BH21-05

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

SAMPLE

Depth (ft / m)	Symbol	Description	Elev	Number	Type	Recovery	HV Concentration ppm (125 250 375) / %LEL (20 40 60 80)	Borehole Completion Details
0 / 0		Ground Surface						No MW Installed
0 – 10 / 0 – 3		**SILT AND CLAY,** trace sand, hard, medium plasticity, brown, damp. between 0.0 - 1.2 m, blebs. between 0.0 - 2.2 m, trace gravel. between 1.8 - 2.36 m, stiff. between 2.2 - 3.0 m, some clay, low plasticity, light brown. between 2.36 - 3.0 m, soft. between 2.84 - 3.0 m, moist.		5-1			0 EC = 0.38 mS/m	
				5-2			0 EC = 0.64 mS/m	
				5-3			0 EC = 0.84 mS/m	
				5-6	(DUP)			
				5-4			0 EC = 0.61 mS/m	
				5-5			0 EC = 0.27 mS/m	
10 / 3		End of Borehole						CUTTINGS

Drill Method: SOLID STEM AUGER
Sample Type: GRAB
Hole Size: 3 1/4"
Drill Date: OCT. 05, 2021

Surface Elev. (m): N/A
Drilled By: CLEAN HARBORS
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** JC

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: FLARE AREA

Borehole No.: BH21-06

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
			Ground Surface	
0	0		**SILT AND CLAY,** trace sand, stiff, high plasticity, brown, damp.	
3	1		between 0.0 - 1.2 m, blebs.	
			between 0.0 - 1.36 m, trace gravel.	
5			between 1.76 - 2.2 m, some clay, low plasticity, dark grey.	
7	2		**SILT,** sandy, trace clay, soft, non-plastic, light brown, moist.	
10	3		End of Borehole	
14	4			

SAMPLE

Number	Type	Recovery	HV Concentration ppm	%LEL
6-1			0	EC = 0.58 mS/m
6-2			0	EC = 0.73 mS/m
6-3			0	EC = 0.65 mS/m
6-4			0	EC = 0.36 mS/m
6-5			0	EC = 0.68 mS/m

HV Concentration ppm: 125 250 375

%LEL: 20 40 60 80

Borehole Completion Details

No MW Installed

CUTTINGS

Drill Method: SOLID STEM AUGER

Sample Type: GRAB

Hole Size: 3 1/4"

Drill Date: OCT. 05, 2021

Surface Elev. (m): N/A

Drilled By: CLEAN HARBORS

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** JC

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA (DWDA)

Borehole No.: BH21-07

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 3	0 – 1		**SILT AND CLAY,** trace sand, stiff, medium plasticity, brown, damp. between 0.0 - 0.48 m, trace gravel. between 0.88 - 1.2 m, soft. between 0.96 - 1.2 m, sandy, some clay. between 0.96 - 3.4 m, low plasticity. between 1.2 - 2.2 m, some sand. between 1.2 - 3.4 m, and clay, stiff. between 2.2 - 3.4 m, sandy, greyish-brown.	
11 – 15	3 – 4		**CLAY AND SILT,** trace sand, stiff, high plasticity, grey, damp.	
15	4		End of Borehole	

SAMPLE

Number	Type	Recovery	HV Concentration (ppm)	%LEL	
7-1			0		EC = 0.73 mS/m
7-2			0		EC = 0.74 mS/m
7-3			5		EC = 0.78 mS/m
7-4			0		EC = 0.92 mS/m
7-5			10		EC = 0.54 mS/m
7-6			0		EC = 0.55 mS/m
7-7			135		EC = 0.61 mS/m
7-9	(DUP)				
7-8			25		EC = 0.62 mS/m

HV Concentration ppm: 125, 250, 375

%LEL: 20, 40, 60, 80

Borehole Completion Details

No MW Installed

CUTTINGS

Drill Method: SOLID STEM AUGER

Sample Type: GRAB

Hole Size: 3 1/4"

Drill Date: OCT. 05, 2021

Surface Elev. (m): N/A

Drilled By: CLEAN HARBORS

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** JC

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA (DWDA)

Borehole No.: BH21-08

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 4.5	0 – 1.36		**SILT,** some clay, trace sand, soft, low plasticity, brown, damp. between 0.0 - 0.8 m, berm material. between 0.8 - 1.36 m, clayey. between 0.8 - 3.4 m, medium plasticity.	
4.5 – 14.8	1.36 – 4.5		**SILT AND CLAY,** hard, medium plasticity, brown, damp. between 3.4 - 4.5 m, high plasticity.	
14.8	4.5		End of Borehole	

SAMPLE

Number	Type	Recovery	HV Concentration ppm	%LEL	
8-1			0		EC = 0.24 mS/m
8-2			15		EC = 0.69 mS/m
8-3			25		EC = 1.02 mS/m
8-4			25		EC = 0.92 mS/m
8-5			15		EC = 0.95 mS/m
8-6			15		EC = 0.91 mS/m
8-7			25		EC = 0.99 mS/m
8-8			5		EC = 0.71 mS/m

HV Concentration ppm: 125 250 375

%LEL: 20 40 60 80

Borehole Completion Details

No MW Installed

CUTTINGS

Drill Method: SOLID STEM AUGER

Sample Type: GRAB

Hole Size: 3 1/4"

Drill Date: OCT. 05, 2021

Surface Elev. (m): N/A

Drilled By: CLEAN HARBORS

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** JC

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA (DWDA)

Borehole No.: BH21-09

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

SAMPLE

HV Concentration
ppm
125 250 375
%LEL
20 40 60 80

Depth (ft)	Depth (m)	Symbol	Description	Elev	Number	Type	Recovery	HV Concentration (ppm)	Borehole Completion Details
0	0		Ground Surface						No MW Installed
0–2	0–1		**SILT,** some clay, trace sand, stiff, low plasticity, brown, damp. between 0.0 - 1.2 m, blebs. between 0.4 - 0.56 m, clayey.		9-1			0 EC = 0.30 mS/m	
2–4	1–2				9-2			0 EC = 0.39 mS/m	
4–6	2		**SILT AND CLAY,** trace sand, medium plasticity, brown, damp. between 0.72 - 4.5 m, hard.		9-3			0 EC = 0.78 mS/m	
6–8	2				9-4			0 EC = 0.61 mS/m	
8–9	2–3				9-5 9-9 (DUP)			0 EC = 0.72 mS/m	
10–11	3				9-6			0 EC = 0.72 mS/m	
12–13	4				9-7			0 EC = 0.77 mS/m	
14	4				9-8			0 EC = 0.55 mS/m	
15			End of Borehole						CUTTINGS

Drill Method: SOLID STEM AUGER
Sample Type: GRAB
Hole Size: 3 1/4"
Drill Date: OCT. 05, 2021

Surface Elev. (m): N/A
Drilled By: CLEAN HARBORS
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** JC

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA (DWDA)

Borehole No.: BH21-10

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE				SAMPLE			HV Concentration ppm (125, 250, 375) / %LEL (20, 40, 60, 80)	Borehole Completion Details
Depth (ft / m)	Symbol	Description	Elev	Number	Type	Recovery		
0 / 0		Ground Surface						No MW Installed
0 – 3 / 0 – 1		**SILT,** clayey, trace sand, soft to stiff, medium plasticity, brown, damp.		10-1			0 — EC = 0.46 mS/m	
				10-2			0 — EC = 0.75 mS/m	
4 – 14 / 1 – 4		**SILT AND CLAY,** trace sand, high plasticity, brown, damp. between 1.68 - 2.0 m, clayey. between 1.68 - 3.6 m, medium plasticity. between 2.0 - 3.6 m, hard. between 2.84 - 3.6 m, blebs. between 3.0 - 4.5 m, trace gravel, greyish-brown. between 3.6 - 4.5 m, sitff, high plasticity.		10-3			0 — EC = 0.98 mS/m	
				10-4			0 — EC = 1.12 mS/m	CUTTINGS
				10-5			0 — EC = 0.95 mS/m	
				10-6			0 — EC = 0.81 mS/m	
				10-7			0 — EC = 0.76 mS/m	
				10-9	(DUP)			
				10-8			0 — EC = 0.81 mS/m	
15 / 4		End of Borehole						

Drill Method: SOLID STEM AUGER

Sample Type: GRAB

Hole Size: 3 1/4"

Drill Date: OCT. 06, 2021

Surface Elev. (m): N/A

Drilled By: CLEAN HARBORS

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** CB

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA (DWDA)

Borehole No.: BH22-11

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0–3	0–1		**ORGANICS,** some clay, some silt, fine grained gravel, soft, low plasticity, dark brown, frozen.	
3–5	1–1.5		**CLAY,** some silt, firm, medium plasticity, brown, frozen.	
5–8	1.5–2.5		**CLAY,** firm, high plasticity, brown, frozen. at 1.5 m, soft, wet. at 2.5 m, grey, black pockets, light grey pockets.	
8–13	2.5–4		at 3.6 m, very soft, gooey, greyish-black. at 4.0 m, stiff, grey.	
16–17	5		**SAND,** loose, brown.	
17–19	5–6		**CLAY,** firm, grey.	
20	6		End of Borehole	

SAMPLE

Number	Type	Recovery	HV Concentration (ppm)	%LEL	EC
11-1			25		EC = 0.68 mS/m
11-2			10		EC = 0.32 mS/m
11-3			15		EC = 1.14 mS/m
11-4			35		EC = 0.85 mS/m
11-5			35		EC = 0.68 mS/m
11-6			40		EC = 1.32 mS/m
11-7			30		EC = 1.24 mS/m
11-8			45		EC = 0.76 mS/m

HV Concentration ppm: 125, 250, 375

%LEL: 20, 40, 60, 80

Borehole Completion Details

No MW Installed

CUTTINGS

Drill Method: SOLID STEM AUGER

Sample Type: GRAB

Hole Size: 4"

Drill Date: JAN. 12, 2022

Surface Elev. (m): N/A

Drilled By: CLEAN HARBORS

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** CB

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA (DWDA)

Borehole No.: BH22-12

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 1	0 – 0.3		**ORGANICS,** some clay, some silt, soft, brownish-grey, wet.	
1 – 15	0.3 – 4.5		**CLAY,** trace sand, trace silt, firm, medium plasticity, dark grey, grey pockets, moist. betweem 0.2 - 0.5 m, brownish-grey. between 1.8 - 2.2 m, very soft, brownish-grey, black pockets. between 2.2 - 3.6 m, high plasticity, brownish-grey, damp. between 3.6 - 4.5 m, stiff, high plasticity, grey, damp.	
15	4.5		End of Borehole	

SAMPLE

Number	Type	Recovery	HV Concentration (ppm)	%LEL
12-1			20	EC = 0.42 mS/m
12-2			15	EC = 0.89 mS/m
12-3			10	EC = 0.96 mS/m
12-4			35	EC = 0.85 mS/m
12-5			15	EC = 0.78 mS/m
12-6			55	EC = 0.73 mS/m
12-7			40	EC = 0.76 mS/m

HV Concentration ppm: 125, 250, 375

%LEL: 20, 40, 60, 80

Borehole Completion Details

CUTTINGS

Drill Method: SOLID STEM AUGER

Sample Type: GRAB

Hole Size: 4"

Drill Date: JAN. 12, 2022

Surface Elev. (m): N/A

Drilled By: CLEAN HARBORS

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** CB

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA (DWDA)

Borehole No.: BH22-13

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0			**ICE,**	
1			**ORGAINCS,** some clay, soft, grey, wet.	
2			**CLAY,** some silt, soft, low plasticity, grey, light grey pockets, wet.	
3	1		between 0.9 - 1.7 m, trace silt, firm.	
4			between 1.7 - 2.2 m, firm, high plasticity.	
5			between 2.2 - 3.0 m, soft, gooey, black pockets.	
6	2		between 3.0 - 4.0 m, some silt, trace sand, stiff, medium plasticity, greyish-brown, moist.	
7			between 4.0 - 4.5 m, trace sand, stiff, medium plasticity, brownish-grey, damp.	
8				
9				
10	3			
11				
12				
13	4			
14				
15			End of Borehole	

SAMPLE

Number	Type	Recovery	HV Concentration (ppm)	%LEL	Borehole Completion Details
13-1			5	EC = 0.86 mS/m	No MW Installed
13-2			0	EC = 0.78 mS/m	
13-3			0	EC = 1.02 mS/m	
13-4			30	EC = 0.82 mS/m	
13-5			30	EC = 1.91 mS/m	CUTTINGS
13-6			35	EC = 1.08 mS/m	
13-7			30	EC = 0.73 mS/m	

HV Concentration ppm: 125, 250, 375

%LEL: 20, 40, 60, 80

Drill Method: SOLID STEM AUGER

Sample Type: GRAB

Hole Size: 4"

Drill Date: JAN. 12, 2022

Surface Elev. (m): N/A

Drilled By: CLEAN HARBORS

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** CB

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA (DWDA)

Borehole No.: BH22-14

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0	0		**ICE,**	
2	0		**ORGAINCS,** some clay, soft, low plasticity, grey, wet.	
3	1		**CLAY,** some silt, medium plasticity, grey, moist.	
4	1		between 1.6 - 2.4 m, soft, grey, black pockets, moist.	
6	2		between 2.4 - 3.1 m, trace silt, firm, low plasticity, grey.	
8	2		between 3.1 - 3.6 m, trace silt, trace sand, very soft, gooey, low plasticity, greyish-black.	
10	3		between 3.6 - 4.0 m, some sand, firm, brownish-grey, moist.	
13	4		**SAND,** trace silt, loose, non-plastic, brown.	
15	4		**CLAY,** firm, high plasticity, grey.	
16	5			
19	6		End of Borehole	

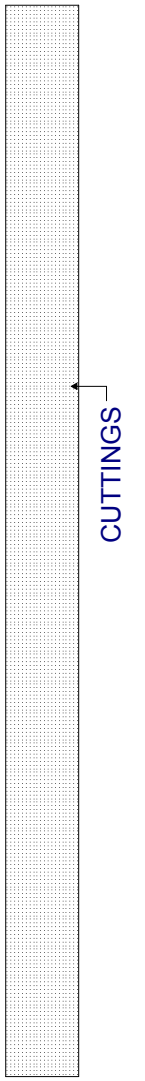
SAMPLE

Number	Type	Recovery	HV Concentration (ppm)	%LEL
14-1			70	EC = 0.61 mS/m
14-2			35	EC = 0.67 mS/m
14-3			25	EC = 0.77 mS/m
14-4			45	EC = 0.61 mS/m
14-5			55	EC = 0.63 mS/m
14-6			70	EC = 1.28 mS/m
14-7			85	EC = 0.76 mS/m
14-8			80	EC = 0.78 mS/m

HV Concentration ppm: 125, 250, 375

%LEL: 20, 40, 60, 80

Borehole Completion Details



Drill Method: SOLID STEM AUGER

Sample Type: GRAB

Hole Size: 4"

Drill Date: JAN. 13, 2022

Surface Elev. (m): N/A

Drilled By: CLEAN HARBORS

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** CB

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: AST

Borehole No.: BH22-15

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE				SAMPLE			HV Concentration ppm (125, 250, 375) / %LEL (20, 40, 60, 80)	Borehole Completion Details
Depth (ft / m)	Symbol	Description	Elev	Number	Type	Recovery		
0 ft / 0 m		Ground Surface						No MW Installed
0 – 5 ft / 0 – 1.5 m		**CLAY,** trace silt, fine grained gravel, firm, high plasticity, greyish-brown, damp.		15-1			40 ppm; EC = 0.59 mS/m	CUTTINGS
2.5 ft / 0.8 m				15-2			45 ppm; EC = 0.71 mS/m	
4 ft / 1.2 m				15-3			35 ppm; EC = 0.45 mS/m	
5 ft / 1.5 m		End of Borehole						

Drill Method: SOLID STEM AUGER
Sample Type: GRAB
Hole Size: 4"
Drill Date: JAN. 13, 2022

Surface Elev. (m): N/A
Drilled By: CLEAN HARBORS
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** CB

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: AST

Borehole No.: BH22-16

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 5	0 – 1.5		**CLAY,** trace silt, fine grained gravel, stiff, high plasticity, brownish-grey, damp.	
5	1.5		End of Borehole	

SAMPLE

Number	Type	Recovery
16-1		
16-2		
16-3		

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

55	EC = 0.20 mS/m	
35	EC = 0.25 mS/m	
40	EC = 0.56 mS/m	

Borehole Completion Details

No MW Installed

CUTTINGS

Drill Method: SOLID STEM AUGER

Sample Type: GRAB

Hole Size: 4"

Drill Date: JAN. 13, 2022

Surface Elev. (m): N/A

Drilled By: CLEAN HARBORS

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** CB

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: FLARE

Borehole No.: BH22-17

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0	0		**ORGANICS,** silt, trace sand, loose, non-plastic, brown, damp.	
1			**SILT,** loose, light brown, dry.	
2			**SAND,** trace silt, loose, brown.	
3	1		**CLAY,** trace silt, trace sand, fine grained gravel, firm, medium plasticity, greyish-brown.	
5			End of Borehole	

SAMPLE

Number	Type	Recovery
17-1		
17-2		
17-3		

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

60 — EC = 0.16 mS/m

85 — EC = 0.21 mS/m

0 — EC = 0.71 mS/m

Borehole Completion Details

No MW Installed

CUTTINGS

Drill Method: SOLID STEM AUGER
Sample Type: GRAB
Hole Size: 4"
Drill Date: JAN. 13, 2022

Surface Elev. (m): N/A
Drilled By: CLEAN HARBORS
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** CB

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: FLARE

Borehole No.: BH22-18

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0			**ORGANICS,** some silt, trace sand, loose, non-plastic, brown, damp.	
1			**SILT,** soft, light grey.	
2			**SAND,** trace silt, firm, brown.	
3	1			
4			**CLAY,** gravel, stiff, high plasticity, brownish-grey.	
5			End of Borehole	
6	2			
7				
8				
9				

SAMPLE

Number	Type	Recovery
18-1		
18-2		
18-3		

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

80	EC = 0.09 mS/m	
80	EC = 0.17 mS/m	
40	EC = 0.37 mS/m	

Borehole Completion Details

No MW Installed

CUTTINGS

Drill Method: SOLID STEM AUGER
Sample Type: GRAB
Hole Size: 4"
Drill Date: JAN. 13, 2022

Surface Elev. (m): N/A
Drilled By: CLEAN HARBORS
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** SC

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA (DWDA)

Borehole No.: HA21-01

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE				SAMPLE			HV Concentration ppm (125, 250, 375) / %LEL (20, 40, 60, 80)	Borehole Completion Details
Depth (ft / m)	Symbol	Description	Elev	Number	Type	Recovery		
0 / 0		Ground Surface						No MW Installed
0 – 1 / 0		**SILT,** clayey, trace sand, soft , low plasticity, grey, wet, organic inclusions.		1-1			10	CUTTINGS
1 / 0 – 1		End of Borehole					No EC Reading	
2 – 12 / 1 – 3								

Drill Method: HAND AUGER
Sample Type: GRAB
Hole Size: 2"
Drill Date: OCT. 05, 2021

Surface Elev. (m): N/A
Drilled By: SYNERGYASPEN
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** SC

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA (DWDA)

Borehole No.: HA21-02

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE				SAMPLE			HV Concentration ppm (125, 250, 375) / %LEL (20, 40, 60, 80)	Borehole Completion Details
Depth (ft / m)	Symbol	Description	Elev	Number	Type	Recovery		
0 / 0		Ground Surface						No MW Installed
0 – 1 / 0		**SILT,** clayey, trace sand, soft , low plasticity, brownish-grey, wet, organic inclusions (plant roots).		2-1			0	CUTTINGS
1 – 2 / 0 – 1		End of Borehole					No EC Reading	
2 – 3 / 1								
3 – 4 / 1								
4 – 5 / 1								
5 – 6 / 1								
6 – 7 / 2								
7 – 8 / 2								
8 – 9 / 2								
9 – 10 / 3								
10 – 11 / 3								
11 – 12 / 3								

Drill Method: HAND AUGER
Sample Type: GRAB
Hole Size: 2"
Drill Date: OCT. 05, 2021

Surface Elev. (m): N/A
Drilled By: SYNERGYASPEN
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-01a

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 13	0 – 4		**CLAY,** dense, soft, medium plasticity, greyish-brown, wet, (fill). between 0.0 - 2.5 m, massive organic inclusions. between 2.5 - 3.25 m, very soft, low plasticity, light grey. between 3.25 - 4.0 m, trace sand, trace gravel, very stiff, light brown, damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
1a-1		
1a-2		
1a-3		
1a-5	(DUP)	
1a-4		

HV Concentration ppm: 125, 250, 375

%LEL: 20, 40, 60, 80

20	EC = 0.35 mS/m
20	EC = 0.33 mS/m
75	EC = 1.27 mS/m
20	EC = 0.48 mS/m

Borehole Completion Details

No MW Installed

RETURNED SOIL

Drill Method: EXCAVATOR

Sample Type: GRAB

Hole Size:

Drill Date: FEB. 7, 2022

Surface Elev. (m): N/A

Drilled By: RADAR ROAD TRANSPORT LTD.

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-01b

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 13	0 – 4		**CLAY,** trace sand, trace gravel, compact, very stiff, high plasticity, brown, dry to damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
1b-1		
1b-2		
1b-3		
1b-4		

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

1b-1	0 ppm, EC = 0.23 mS/m
1b-2	0 ppm, EC = 0.42 mS/m
1b-3	15 ppm, EC = 0.35 mS/m
1b-4	15 ppm, EC = 0.45 mS/m

Borehole Completion Details

No MW Installed

RETURNED SOIL

Drill Method: EXCAVATOR
Sample Type: GRAB
Hole Size:
Drill Date: FEB. 7, 2022

Surface Elev. (m): N/A
Drilled By: RADAR ROAD TRANSPORT LTD.
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-02a

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0–3	0–1		**CLAY,** trace sand, soft, medium plasticity, greyish-brown, moist, organic inclusions (fill).	
3–6	1–2		**CLAY,** sandy, soft, low plasticity, light grey, wet, black sand inclusions (fill).	
6–13	2–4		**CLAY,** trace sand, trace gravel, very soft, brown, dry to damp.	
13	4		End of Borehole	

SAMPLE

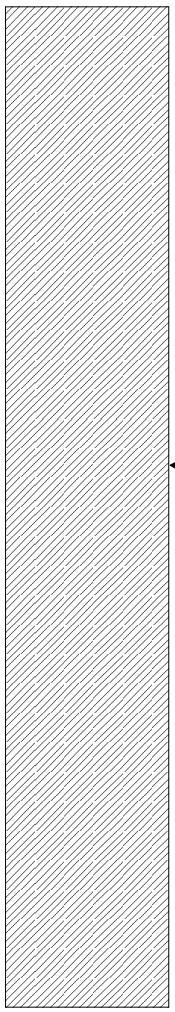
Number	Type	Recovery
2a-1		
2a-2		
2a-3		
2a-4		

HV Concentration ppm: 125 250 375

%LEL: 20 40 60 80

20	EC = 0.61 mS/m
240	EC = 0.74 mS/m
20	EC = 0.55 mS/m
0	EC = 0.35 mS/m

Borehole Completion Details



Drill Method: EXCAVATOR
Sample Type: GRAB
Hole Size:
Drill Date: FEB. 7, 2022

Surface Elev. (m): N/A
Drilled By: RADAR ROAD TRANSPORT LTD.
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-02b

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 13	0 – 4		**CLAY,** trace sand, compact, very stiff, high plasticity, brown, dry to damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
2b-1		
2b-2		
2b-3		
2b-4		

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

15	EC = 0.51 mS/m
35	EC = 0.49 mS/m
15	EC = 0.51 mS/m
0	EC = 0.31 mS/m

Borehole Completion Details

No MW Installed

RETURNED SOIL

Drill Method: EXCAVATOR

Sample Type: GRAB

Hole Size:

Drill Date: FEB. 8, 2022

Surface Elev. (m): N/A

Drilled By: RADAR ROAD TRANSPORT LTD.

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-03a

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 13	0 – 4		**CLAY,** trace sand, trace gravel, soft, medium plasticity, greyish-brown, damp, (fill). between 0.0 - 2.5 m, organic inclusions. between 2.5 - 3.25 m, very soft, low plasticity, grey, wet. between 3.25 - 4.0 m, hard, very stiff, high plasticity, brown, dry to damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
3a-1		
3a-2		
3a-3		
3a-5	(DUP)	
3a-4		

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

15	EC = 0.36 mS/m
35	EC = 0.33 mS/m
260	EC = 1.59 mS/m
30	EC = 0.69 mS/m

Borehole Completion Details

No MW Installed

RETURNED SOIL

Drill Method: EXCAVATOR
Sample Type: GRAB
Hole Size:
Drill Date: FEB. 8, 2022

Surface Elev. (m): N/A
Drilled By: RADAR ROAD TRANSPORT LTD.
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-03b

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0–13	0–4		**CLAY,** trace sand, trace gravel, compact, very stiff, high plasticity, brown, dry to damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
3b-1		
3b-2		
3b-3		
3b-4		

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

15	EC = 0.51 mS/m
10	EC = 0.56 mS/m
15	EC = 0.39 mS/m
20	EC = 0.42 mS/m

Borehole Completion Details

No MW Installed

RETURNED SOIL

Drill Method: EXCAVATOR
Sample Type: GRAB
Hole Size:
Drill Date: FEB. 8, 2022

Surface Elev. (m): N/A
Drilled By: RADAR ROAD TRANSPORT LTD.
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-04a

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 13	0 – 4		**CLAY,** trace sand, trace gravel, firm to soft, medium plasticity, greyish-brown, damp, (fill). between 0.0 - 2.5 m, organic inclusions. between 2.5 - 3.0 m, very soft, low plasticity, grey, wet, (fill). between 3.0 - 4.0 m, hard, very stiff, high plasticity, brown, dry to damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
4a-1		
4a-2		
4a-3		
4a-5	(DUP)	
4a-4		

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

25	EC = 0.49 mS/m
10	EC = 0.76 mS/m
250	EC = 0.95 mS/m
10	EC = 0.23 mS/m

Borehole Completion Details

No MW Installed

RETURNED SOIL

Drill Method: EXCAVATOR
Sample Type: GRAB
Hole Size:
Drill Date: FEB. 8, 2022

Surface Elev. (m): N/A
Drilled By: RADAR ROAD TRANSPORT LTD.
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-04b

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 13	0 – 4		**CLAY,** trace sand, trace gravel, compact, very stiff, high plasticity, brown, dry to damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
4b-1		
4b-2		
4b-3		
4b-4		

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

4b-1	10	EC = 0.59 mS/m
4b-2	5	EC = 0.22 mS/m
4b-3	0	EC = 0.39 mS/m
4b-4	0	EC = 0.42 mS/m

Borehole Completion Details

No MW Installed

RETURNED SOIL

Drill Method: EXCAVATOR
Sample Type: GRAB
Hole Size:
Drill Date: FEB. 8, 2022

Surface Elev. (m): N/A
Drilled By: RADAR ROAD TRANSPORT LTD.
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-05a

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 13	0 – 4		**CLAY,** some sand, firm, medium plasticity, greyish-brown, wet, (fill). between 0.0 - 2.25 m, organic inclusions. between 2.25 - 3.0 m, soft, low plasticity, grey, wet, some black streaks, (fill). between 3.0 - 4.0 m, some sand, trace gravel, trace cobble, stiff, high plasticity, light brown, dry to damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
5a-1		
5a-2		
5a-3		
5a-5	(DUP)	
5a-4		

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

5a-1	25	EC = 0.62 mS/m
5a-2	35	EC = 0.75 mS/m
5a-3	40	EC = 0.36 mS/m
5a-4	25	EC = 0.43 mS/m

Borehole Completion Details

No MW Installed

RETURNED SOIL

Drill Method: EXCAVATOR

Sample Type: GRAB

Hole Size:

Drill Date: FEB. 9, 2022

Surface Elev. (m): N/A

Drilled By: RADAR ROAD TRANSPORT LTD.

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-05b

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 13	0 – 4		**CLAY,** some sand, trace gravel, trace cobble, firm to stiff, high plasticity, light brown, damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
5b-1		
5b-2		
5b-3		
5b-4		

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

15	EC = 0.66 mS/m
15	EC = 0.56 mS/m
15	EC = 0.61 mS/m
20	EC = 0.55 mS/m

Borehole Completion Details

No MW Installed

RETURNED SOIL

Drill Method: EXCAVATOR
Sample Type: GRAB
Hole Size:
Drill Date: FEB. 9, 2022

Surface Elev. (m): N/A
Drilled By: RADAR ROAD TRANSPORT LTD.
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-06a

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 13	0 – 4		**CLAY,** firm to soft, medium plasticity, greyish-brown, moist. (fill). between 0.0 - 1.75 m, organic inclusions. between 1.75 - 2.75 m, soft, low plasticity, grey, wet, (fill). between 2.75 - 4.0 m, trace gravel, trace cobble, stiff, high plasticity, light brown, damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
6a-1		
6a-2		
6a-3		
6a-5	(DUP)	
6a-4		

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

20	EC = 0.39 mS/m
55	EC = 0.34 mS/m
75	EC = 0.52 mS/m
30	EC = 0.45 mS/m

Borehole Completion Details

No MW Installed

RETURNED SOIL

Drill Method: EXCAVATOR

Sample Type: GRAB

Hole Size:

Drill Date: FEB. 9, 2022

Surface Elev. (m): N/A

Drilled By: RADAR ROAD TRANSPORT LTD.

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-06b

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 13	0 – 4		**CLAY,** trace gravel, trace cobble, stiff, high plasticity, light brown, dry to damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
6b-1		
6b-2		
6b-3		
6b-4		

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

15	EC = 0.61 mS/m
10	EC = 0.58 mS/m
15	EC = 0.52 mS/m
10	EC = 0.64 mS/m

Borehole Completion Details

No MW Installed

RETURNED SOIL

Drill Method: EXCAVATOR

Sample Type: GRAB

Hole Size:

Drill Date: FEB. 9, 2022

Surface Elev. (m): N/A

Drilled By: RADAR ROAD TRANSPORT LTD.

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-07

SynergyAspen ENVIRONMENTAL

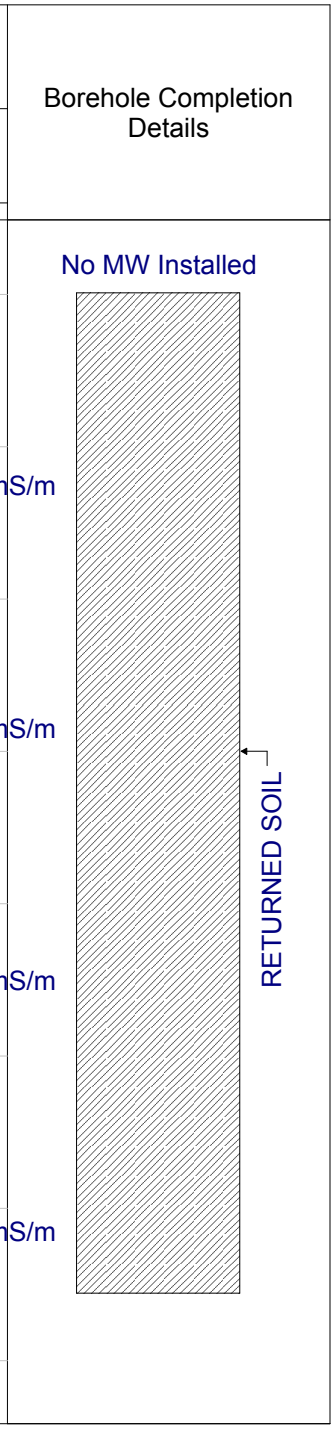
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 13	0 – 4		**CLAY,** firm to soft, medium plasticity, greyish-brown, moist. (fill). between 0.0 - 2.25 m, organic inclusions. between 2.25 - 3.0 m, soft, low plasticity, grey, wet, (fill). between 3.0 - 4.0 m, trace gravel, trace cobble, stiff, high plasticity, light brown, damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
7-1		
7-2		
7-3		
7-4		





Drill Method: EXCAVATOR
Sample Type: GRAB
Hole Size:
Drill Date: FEB.10, 2022

Surface Elev. (m): N/A
Drilled By: RADAR ROAD TRANSPORT LTD.
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-08

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 13	0 – 4		**CLAY,** firm to soft, medium plasticity, greyish-brown, moist. (fill). between 0.0 - 2.25 m, organic inclusions. between 2.25 - 3.0 m, soft, low plasticity, grey, wet, (fill). between 3.0 - 4.0 m, trace gravel, trace cobble, stiff, high plasticity, light brown, dry to damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
8-1		
8-2		
8-3		
8-5	(DUP)	
8-4		

HV Concentration ppm: 125 250 375

%LEL: 20 40 60 80

8-1	0	EC = 0.43 mS/m
8-2	10	EC = 0.47 mS/m
8-3	30	EC = 0.57 mS/m
8-4	0	EC = 0.28 mS/m

Borehole Completion Details

No MW Installed

RETURNED SOIL

Drill Method: EXCAVATOR
Sample Type: GRAB
Hole Size:
Drill Date: FEB.10, 2022

Surface Elev. (m): N/A
Drilled By: RADAR ROAD TRANSPORT LTD.
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-09

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 13	0 – 4		**CLAY,** some sand, firm, medium plasticity, greyish-brown, wet. (fill). between 0.0 - 2.25 m, organic inclusions. between 2.25 - 3.0 m, soft, low plasticity, grey, wet, some black streaks, (fill). between 3.0 - 4.0 m, some sand, trace gravel, trace cobble, stiff, high plasticity, light brown, dry to damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery	HV Concentration (ppm)	%LEL
9-1			10	EC = 0.48 mS/m
9-2			25	EC = 0.34 mS/m
9-3			55	EC = 0.73 mS/m
9-4			5	EC = 0.34 mS/m

HV Concentration ppm: 125 250 375

%LEL: 20 40 60 80

Borehole Completion Details

No MW Installed

RETURNED SOIL

Drill Method: EXCAVATOR

Sample Type: GRAB

Hole Size:

Drill Date: FEB.10, 2022

Surface Elev. (m): N/A

Drilled By: RADAR ROAD TRANSPORT LTD.

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-10

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 13	0 – 4		**CLAY,** some sand, firm, medium plasticity, greyish-brown, wet. (fill). between 0.0 - 2.0 m, organic inclusions. between 2.0 - 2.75 m, soft, low plasticity, grey, wet, (fill). between 2.75 - 4.0 m, some sand, trace gravel, trace cobble, stiff, high plasticity, light brown, dry to damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
10-1		
10-2		
10-3		
10-5	(DUP)	
10-4		

HV Concentration ppm: 125, 250, 375

%LEL: 20, 40, 60, 80

15	EC = 0.54 mS/m
25	EC = 0.59 mS/m
70	EC = 0.71 mS/m
5	EC = 0.53 mS/m

Borehole Completion Details

No MW Installed

RETURNED SOIL

Drill Method: EXCAVATOR
Sample Type: GRAB
Hole Size:
Drill Date: FEB.10, 2022

Surface Elev. (m): N/A
Drilled By: RADAR ROAD TRANSPORT LTD.
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-11

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 13	0 – 4		**CLAY,** trace sand, trace gravel, soft, medium plasticity, greyish-brown, damp. (fill). between 0.0 - 2.0 m, organic inclusions. between 2.0 - 3.25 m, very soft, low plasticity, grey, wet, (fill). between 3.25 - 4.0 m, some sand, trace gravel, stiff, high plasticity, light brown, dry to damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
11-1		
11-2		
11-3		
11-4		

HV Concentration ppm: 125 250 375

%LEL: 20 40 60 80

20	EC = 0.57 mS/m
20	EC = 0.43 mS/m
30	EC = 1.07 mS/m
10	EC = 0.52 mS/m

Borehole Completion Details

No MW Installed

RETURNED SOIL

Drill Method: EXCAVATOR

Sample Type: GRAB

Hole Size:

Drill Date: FEB.10, 2022

Surface Elev. (m): N/A

Drilled By: RADAR ROAD TRANSPORT LTD.

Checked By: MP

Sheet: 1 of 1

Project No.: PAR6206 **Logged By:** RP

Location: I-02, LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: DRILLING WASTE DISPOSAL AREA

Borehole No.: TP22-12

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 13	0 – 4		**CLAY,** dense, soft, medium plasticity, greyish-brown, wet. (fill). between 0.0 - 1.75 m, organic inclusions. between 1.75 - 2.75 m, very soft, low plasticity, light grey, wet, (fill). between 2.75 - 4.0 m, trace sand, trace gravel, very stiff, light brown, damp.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
12-1		
12-2		
12-3		
12-5	(DUP)	
12-4		

HV Concentration ppm: 125 250 375

%LEL: 20 40 60 80

5	EC = 0.63 mS/m
15	EC = 0.66 mS/m
90	EC = 1.19 mS/m
15	EC = 0.82 mS/m

Borehole Completion Details

No MW Installed

RETURNED SOIL

Drill Method: EXCAVATOR
Sample Type: GRAB
Hole Size:
Drill Date: FEB.10, 2022

Surface Elev. (m): N/A
Drilled By: RADAR ROAD TRANSPORT LTD.
Checked By: MP
Sheet: 1 of 1

APPENDIX V

Laboratory Analytical Reports

Element
#1 8822-100 Street
Fort St. John, British Columbia
V1J 3W9, Canada

T: +1 (250) 785-2731
F: +1 (250) 785-7092
E: info.FortStJohn@element.com
W: www.element.com

Report Transmission Cover Page

Bill To: Paramount Resources Ltd.
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Contact	Company	Address
Element Invoicing	**Paramount Resources Ltd.**	7217 Roper Road Edmonton, AB T6B 3J4 Phone: (780) 438-5522 Fax: Email: invoicing.edmonton@element.com

Delivery	Format	Deliverables
Post	PDF	COC / Invoice

Contact	Company	Address
Patricia Stebbing	**SynergyAspen Environmental**	Fort St John, BC null Phone: (250) 785-1030 Fax: Email: pstebbing@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR
Email - Zip Multiple Formats By Report	Generic ESDAT Chemistry File	Test Report
Email - Zip Multiple Formats By Report	Generic ESDAT Sample File	Test Report

Contact	Company	Address
Project Coordinator	**SynergyAspen Environmental**	2328 Clarke St. Port Moody, BC V3H 1Y8 Phone: (604) 931-1026 Fax: (604) 931-1046 Email: projectcoordinator@synergyaspen.ca

Delivery	Format	Deliverables
Email - Multiple Reports By Lot	PDF	COC / Invoice
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COC / COA
Email - Single Report	PDF	COC / Test Report
Email - Single Report	PDF	COR

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Analytical Report

Bill To: Paramount Resources Ltd.
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Reference Number	1525982-2	1525982-3	1525982-7
Sample Date	Oct 05, 2021	Oct 05, 2021	Oct 05, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH21-04-02 / 0.64 - 0.96	PAR6206 / BH21-04-03 / 1.2 - 1.52	PAR6206 / BH21-05-02 / 0.64 - 0.96
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		14-Oct-21	14-Oct-21	14-Oct-21	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	17.80	18.00	16.90	

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Analytical Report

Bill To: Paramount Resources Ltd.
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Reference Number	1525982-2	1525982-4	1525982-7
Sample Date	Oct 05, 2021	Oct 05, 2021	Oct 05, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH21-04-02 / 0.64 - 0.96	PAR6206 / BH21-04-04 / 1.88 - 2.2	PAR6206 / BH21-05-02 / 0.64 - 0.96
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m		0.28	0.62	0.01
SAR	Saturated Paste			0.4	0.1	
% Saturation		%	61	58	65	
Calcium	Saturated Paste	mg/kg		20.8	64.6	
Magnesium	Saturated Paste	mg/kg		4.9	11.9	
Sodium	Saturated Paste	mg/kg		5	4	
Potassium	Saturated Paste	mg/kg		3	4	
Chloride	Saturated Paste	mg/L		<2	<2	2
Chloride	Saturated Paste	mg/kg		<1	<1	
Sulfate (SO4)	Saturated Paste	mg/kg		20.9	146	
TGR	Saturated Paste	T/ac		<0.1	<0.1	

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2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Reference Number	1525982-2	1525982-8	1525982-11
Sample Date	Oct 05, 2021	Oct 05, 2021	Oct 05, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH21-04-02 / 0.64 - 0.96	PAR6206 / BH21-05-03 / 1.2 - 1.52	PAR6206 / BH21-05-06 / 1.2 - 1.52
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	0.06	<0.05	<0.05	0.05
Antimony	Strong Acid Extractable	mg/kg	0.5	0.5	0.7	0.2
Arsenic	Strong Acid Extractable	mg/kg	9.4	9.2	11.5	0.2
Barium	Strong Acid Extractable	mg/kg	197	218	336	1
Beryllium	Strong Acid Extractable	mg/kg	0.4	0.5	0.4	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.39	0.35	0.21	0.01
Chromium	Strong Acid Extractable	mg/kg	18.0	24.9	18.8	0.5
Cobalt	Strong Acid Extractable	mg/kg	9.1	8.7	10.1	0.1
Copper	Strong Acid Extractable	mg/kg	20.2	21.0	28.0	1
Lead	Strong Acid Extractable	mg/kg	10.2	9.8	12.8	0.1
Mercury	Strong Acid Extractable	mg/kg	0.05	0.05	0.06	0.05
Molybdenum	Strong Acid Extractable	mg/kg	1.9	2.0	1.7	1
Nickel	Strong Acid Extractable	mg/kg	29.1	33.1	32.2	0.5
Selenium	Strong Acid Extractable	mg/kg	0.4	0.4	0.4	0.3
Silver	Strong Acid Extractable	mg/kg	0.1	0.1	<0.10	0.1
Thallium	Strong Acid Extractable	mg/kg	0.19	0.17	0.15	0.05
Tin	Strong Acid Extractable	mg/kg	<1.0	<1.0	<1.0	1
Uranium	Strong Acid Extractable	mg/kg	1.2	1.3	0.9	0.5
Vanadium	Strong Acid Extractable	mg/kg	22.9	24.3	28.0	0.1
Zinc	Strong Acid Extractable	mg/kg	81	80	95	1

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Analytical Report

Bill To: Paramount Resources Ltd.
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Reference Number	1525982-4	1525982-7	1525982-16
Sample Date	Oct 05, 2021	Oct 05, 2021	Oct 05, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH21-04-04 / 1.88 - 2.2	PAR6206 / BH21-05-02 / 0.64 - 0.96	PAR6206 / BH21-06-05 / 2.68 - 3.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.7	7.7	7.7	

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2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Reference Number	1525982-7	1525982-29
Sample Date	Oct 05, 2021	Oct 05, 2021
Sample Time	NA	NA
Sample Location		
Sample Description	PAR6206 / BH21-05-02 / 0.64 - 0.96	PAR6206 / BH21-08-04 / 1.88 - 2.2
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Soil						
Naphthalene	Dry Weight	mg/kg	<0.01	<0.01		0.010
Acenaphthylene	Dry Weight	mg/kg	<0.05	<0.05		0.05
Acenaphthene	Dry Weight	mg/kg	<0.05	<0.05		0.05
Fluorene	Dry Weight	mg/kg	<0.05	<0.05		0.05
Phenanthrene	Dry Weight	mg/kg	<0.01	<0.01		0.01
Anthracene	Dry Weight	mg/kg	<0.003	<0.003		0.003
Fluoranthene	Dry Weight	mg/kg	<0.01	<0.01		0.010
Pyrene	Dry Weight	mg/kg	<0.01	<0.01		0.010
Benzo(a)anthracene	Dry Weight	mg/kg	<0.01	<0.01		0.01
Chrysene	Dry Weight	mg/kg	<0.05	<0.05		0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	<0.05	<0.05		0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05	<0.05		0.05
Benzo(a)pyrene	Dry Weight	mg/kg	<0.05	<0.05		0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05	<0.05		0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05	<0.05		0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	<0.05	<0.05		0.05
CB(a)P	B(a)P Total Potency Equivalents	mg/kg	<0.001	<0.001		0.001
IACR_Coarse	Index of Additive Cancer Risk		<0.001	<0.001		0.001
IACR_Fine	Index of Additive Cancer Risk		<0.001	<0.001		0.001
PAH - Soil - Surrogate Recovery						
Nitrobenzene-d5	PAH - Surrogate	%	109	106		50-140
2-Fluorobiphenyl	PAH - Surrogate	%	110	106		50-140
p-Terphenyl-d14	PAH - Surrogate	%	97	94		50-140

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Analytical Report

Bill To: Paramount Resources Ltd.
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Reference Number	1525982-8	1525982-11	1525982-12
Sample Date	Oct 05, 2021	Oct 05, 2021	Oct 05, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH21-05-03 / 1.2 - 1.52	PAR6206 / BH21-05-06 / 1.2 - 1.52	PAR6206 / BH21-06-01 / 0.0 - 0.32
Matrix	Soil	Soil	Soil

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Salinity					
% Saturation	%	63	51	57	

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Analytical Report

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Port Moody, BC, Canada
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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Reference Number	1525982-9	1525982-12	1525982-16
Sample Date	Oct 05, 2021	Oct 05, 2021	Oct 05, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH21-05-04 / 1.88 - 2.2	PAR6206 / BH21-06-01 / 0.0 - 0.32	PAR6206 / BH21-06-05 / 2.68 - 3.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		14-Oct-21	14-Oct-21	14-Oct-21	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	17.90	16.20	19.50	

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Analytical Report

Bill To: Paramount Resources Ltd.
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Reference Number	1525982-12	1525982-24	1525982-30
Sample Date	Oct 05, 2021	Oct 05, 2021	Oct 05, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH21-06-01 / 0.0 - 0.32	PAR6206 / BH21-07-08 / 4.18 - 4.5	PAR6206 / BH21-08-05 / 2.52 - 2.84
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	<0.05	0.05	<0.05	0.05
Antimony	Strong Acid Extractable	mg/kg	0.5	0.4	0.5	0.2
Arsenic	Strong Acid Extractable	mg/kg	10.2	9.6	9.6	0.2
Barium	Strong Acid Extractable	mg/kg	239	158	235	1
Beryllium	Strong Acid Extractable	mg/kg	0.6	0.5	0.5	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.33	0.64	0.45	0.01
Chromium	Strong Acid Extractable	mg/kg	20.1	14.1	15.0	0.5
Cobalt	Strong Acid Extractable	mg/kg	9.1	8.8	9.4	0.1
Copper	Strong Acid Extractable	mg/kg	22.2	23.8	21.8	1
Lead	Strong Acid Extractable	mg/kg	10.7	10.9	10.9	0.1
Mercury	Strong Acid Extractable	mg/kg	0.05	0.05	0.06	0.05
Molybdenum	Strong Acid Extractable	mg/kg	1.9	2.7	2.1	1
Nickel	Strong Acid Extractable	mg/kg	28.6	26.0	29.2	0.5
Selenium	Strong Acid Extractable	mg/kg	0.6	1.3	0.4	0.3
Silver	Strong Acid Extractable	mg/kg	0.1	0.2	0.1	0.1
Thallium	Strong Acid Extractable	mg/kg	0.15	0.18	0.17	0.05
Tin	Strong Acid Extractable	mg/kg	<1.0	<1.0	<1.0	1
Uranium	Strong Acid Extractable	mg/kg	1.0	1.6	1.0	0.5
Vanadium	Strong Acid Extractable	mg/kg	24.9	20.2	22.9	0.1
Zinc	Strong Acid Extractable	mg/kg	83	102	88	1

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Analytical Report

Bill To: Paramount Resources Ltd.
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Reference Number	1525982-16	1525982-20	1525982-24
Sample Date	Oct 05, 2021	Oct 05, 2021	Oct 05, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH21-06-05 / 2.68 - 3.0	PAR6206 / BH21-07-04 / 1.88 - 2.2	PAR6206 / BH21-07-08 / 4.18 - 4.5
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.41	0.30		0.01
SAR	Saturated Paste		0.1	0.2		
% Saturation		%	40	62	69	
Calcium	Saturated Paste	mg/kg	23.5	26.1		
Magnesium	Saturated Paste	mg/kg	6.8	5.7		
Sodium	Saturated Paste	mg/kg	2	3		
Potassium	Saturated Paste	mg/kg	<1	2		
Chloride	Saturated Paste	mg/L	4	<2		2
Chloride	Saturated Paste	mg/kg	2	<1		
Sulfate (SO4)	Saturated Paste	mg/kg	48.0	33.9		
TGR	Saturated Paste	T/ac	<0.1	<0.1		

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V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Reference Number	1525982-20	1525982-26	1525982-38
Sample Date	Oct 05, 2021	Oct 05, 2021	Oct 05, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH21-07-04 / 1.88 - 2.2	PAR6206 / BH21-08-01 / 0.0 - 0.32	PAR6206 / BH21-09-05 / 2.52 - 2.84
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.8	7.6	7.7	

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Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Reference Number	1525982-21	1525982-23	1525982-25
Sample Date	Oct 05, 2021	Oct 05, 2021	Oct 05, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH21-07-05 / 2.52 - 2.84	PAR6206 / BH21-07-07 / 3.72 - 4.04	PAR6206 / BH21-07-09 / 3.72 - 4.04
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		14-Oct-21	14-Oct-21	14-Oct-21	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	52	56	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	19.00	17.10	16.60	

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Analytical Report

Bill To: Paramount Resources Ltd.
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Reference Number	1525982-26	1525982-30	1525982-34
Sample Date	Oct 05, 2021	Oct 05, 2021	Oct 05, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH21-08-01 / 0.0 - 0.32	PAR6206 / BH21-08-05 / 2.52 - 2.84	PAR6206 / BH21-09-01 / 0.0 - 0.32
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.35			0.01
SAR	Saturated Paste		0.1			
% Saturation		%	52	55	50	
Calcium	Saturated Paste	mg/kg	33.4			
Magnesium	Saturated Paste	mg/kg	5.7			
Sodium	Saturated Paste	mg/kg	2			
Potassium	Saturated Paste	mg/kg	<1			
Chloride	Saturated Paste	mg/L	4			2
Chloride	Saturated Paste	mg/kg	2			
Sulfate (SO4)	Saturated Paste	mg/kg	24.5			
TGR	Saturated Paste	T/ac	<0.1			

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Port Moody, BC, Canada
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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Reference Number	1525982-27	1525982-29	1525982-34
Sample Date	Oct 05, 2021	Oct 05, 2021	Oct 05, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH21-08-02 / 0.64 - 0.96	PAR6206 / BH21-08-04 / 1.88 - 2.2	PAR6206 / BH21-09-01 / 0.0 - 0.32
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		14-Oct-21	14-Oct-21	14-Oct-21	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	16.50	17.20	18.00	

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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Reference Number	1525982-34
Sample Date	Oct 05, 2021
Sample Time	NA
Sample Location	
Sample Description	PAR6206 / BH21-09-01 / 0.0 - 0.32
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	<0.05			0.05
Antimony	Strong Acid Extractable	mg/kg	0.4			0.2
Arsenic	Strong Acid Extractable	mg/kg	9.3			0.2
Barium	Strong Acid Extractable	mg/kg	199			1
Beryllium	Strong Acid Extractable	mg/kg	0.4			0.1
Cadmium	Strong Acid Extractable	mg/kg	0.60			0.01
Chromium	Strong Acid Extractable	mg/kg	17.1			0.5
Cobalt	Strong Acid Extractable	mg/kg	9.3			0.1
Copper	Strong Acid Extractable	mg/kg	20.0			1
Lead	Strong Acid Extractable	mg/kg	10.9			0.1
Mercury	Strong Acid Extractable	mg/kg	0.05			0.05
Molybdenum	Strong Acid Extractable	mg/kg	2.1			1
Nickel	Strong Acid Extractable	mg/kg	26.5			0.5
Selenium	Strong Acid Extractable	mg/kg	0.6			0.3
Silver	Strong Acid Extractable	mg/kg	0.2			0.1
Thallium	Strong Acid Extractable	mg/kg	0.22			0.05
Tin	Strong Acid Extractable	mg/kg	<1.0			1
Uranium	Strong Acid Extractable	mg/kg	1.3			0.5
Vanadium	Strong Acid Extractable	mg/kg	22.7			0.1
Zinc	Strong Acid Extractable	mg/kg	91			1

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Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Reference Number	1525982-38
Sample Date	Oct 05, 2021
Sample Time	NA
Sample Location	
Sample Description	PAR6206 / BH21-09-05 / 2.52 - 2.84
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.23			0.01
SAR	Saturated Paste		0.1			
% Saturation		%	74			
Calcium	Saturated Paste	mg/kg	24.8			
Magnesium	Saturated Paste	mg/kg	5.3			
Sodium	Saturated Paste	mg/kg	2			
Potassium	Saturated Paste	mg/kg	3			
Chloride	Saturated Paste	mg/L	<2			2
Chloride	Saturated Paste	mg/kg	<1			
Sulfate (SO4)	Saturated Paste	mg/kg	13			
TGR	Saturated Paste	T/ac	<0.1			

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Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Reference Number	1525982-39
Sample Date	Oct 05, 2021
Sample Time	NA
Sample Location	
Sample Description	PAR6206 / BH21-09-06 / 3.08 - 3.4
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005			0.005
Toluene	Dry Weight	mg/kg	<0.02			0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005			0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03			0.03
Methanol Field Preservation			Yes			
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10			10
F1 -BTEX	Dry Weight	mg/kg	<10			10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		14-Oct-21			
F2c C10-C16	Dry Weight	mg/kg	<25			25
F3c C16-C34	Dry Weight	mg/kg	<50			50
F4c C34-C50	Dry Weight	mg/kg	<100			100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100			100
% C50+		%	<5			
Silica Gel Cleanup						
Silica Gel Cleanup			Done			
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	18.80			

Approved by:

Max Hewitt
Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
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Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
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Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Extractable Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	0	-10	10	yes
F3c C16-C34	µg/mL	0	-30	30	yes
F4c C34-C50	µg/mL	0	-20	20	yes
F4HTGCc C34-C50+	µg/mL	0	-20	20	yes

Date Acquired: October 13, 2021

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	91.54	80	120	yes
F3c C16-C34	µg/mL	91.64	80	120	yes
F4c C34-C50	µg/mL	90.07	80	120	yes
F4HTGCc C34-C50+	µg/mL	94.11	80	120	yes

Date Acquired: October 13, 2021

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F2c C10-C16	mg/kg	<25	<25	50	10	yes
F3c C16-C34	mg/kg	<50	<50	50	10	yes
F4c C34-C50	mg/kg	<100	<100	50	10	yes
F4HTGCc C34-C50+	mg/kg	<100	<100	50	10	yes

Date Acquired: October 13, 2021

Metals Strong Acid Digestion

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Boron	mg/L	5.82635e-005	-0.05	0.07	yes
Antimony	µg/L	-0.0348938	-0.1	0.2	yes
Arsenic	µg/L	-0.0913948	-0.2	0.2	yes
Barium	µg/L	-0.527282	-1	1	yes
Beryllium	µg/L	-0.0244752	-0.1	0.1	yes
Cadmium	µg/L	-0.00353515	-0.01	0.01	yes
Chromium	µg/L	-0.141403	-0.5	0.5	yes
Cobalt	µg/L	-0.0497432	-0.1	0.1	yes
Copper	µg/L	-0.218353	-0.6	1.2	yes
Lead	µg/L	-0.0149287	-5.0	5.0	yes
Mercury	µg/L	-0.00569221	-0.04	0.04	yes
Molybdenum	µg/L	-0.254196	-1.0	1.0	yes
Nickel	µg/L	-0.214481	-0.4	0.7	yes
Selenium	µg/L	0.00621819	-0.30	0.30	yes
Silver	µg/L	-0.0231658	-0.09	0.14	yes
Thallium	µg/L	-0.0156446	-0.04	0.04	yes
Tin	µg/L	-0.0576748	-0.4	0.4	yes
Uranium	µg/L	-0.0648565	-0.5	0.5	yes
Vanadium	µg/L	-0.0093207	-0.1	0.1	yes
Zinc	µg/L	-0.29206	-1	1	yes

Date Acquired: October 12, 2021

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Antimony	mg/kg	0.2	0.2	20	0.4	yes

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Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Metals Strong Acid Digestion - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Arsenic	mg/kg	4.0	4.8	20	0.4	yes
Barium	mg/kg	66	73	20	2	yes
Beryllium	mg/kg	0.2	0.2	20	0.2	yes
Cadmium	mg/kg	0.15	0.17	20	0.02	yes
Chromium	mg/kg	4.3	4.9	20	1.1	yes
Cobalt	mg/kg	2.2	2.6	20	0.2	yes
Copper	mg/kg	3.2	3.8	20	2.2	yes
Lead	mg/kg	3.0	3.5	20	0.2	yes
Mercury	mg/kg	<0.05	<0.05	20	0.05	yes
Molybdenum	mg/kg	<1.0	<1.0	20	2.2	yes
Nickel	mg/kg	6.8	8.1	20	1.1	yes
Selenium	mg/kg	<0.3	<0.3	20	0.66	yes
Silver	mg/kg	<0.10	<0.10	20	0.22	yes
Thallium	mg/kg	0.05	0.06	20	0.11	yes
Tin	mg/kg	<1.0	<1.0	20	2.2	yes
Uranium	mg/kg	<0.5	<0.5	20	1.1	yes
Vanadium	mg/kg	8.3	9.8	20	0.2	yes
Zinc	mg/kg	25	28	20	2	yes
Date Acquired:	October 12, 2021					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Antimony	mg/kg	39.7	37.6	42.4	yes
Arsenic	mg/kg	38.2	36.3	43.9	yes
Barium	mg/kg	194	188	212	yes
Beryllium	mg/kg	18.4	17.4	22.2	yes
Cadmium	mg/kg	2.04	1.88	2.28	yes
Chromium	mg/kg	97.0	93.2	107.0	yes
Cobalt	mg/kg	19.2	18.2	21.2	yes
Copper	mg/kg	192	183.1	212.7	yes
Lead	mg/kg	19.3	18.3	21.3	yes
Mercury	mg/kg	3.06	2.64	3.36	yes
Molybdenum	mg/kg	195	185.1	222.3	yes
Nickel	mg/kg	93.8	92.4	106.2	yes
Selenium	mg/kg	38.8	35.20	44.20	yes
Silver	mg/kg	19.7	18.20	22.40	yes
Thallium	mg/kg	9.47	9.02	10.82	yes
Tin	mg/kg	198	191.2	215.2	yes
Uranium	mg/kg	99.2	86.0	116.0	yes
Vanadium	mg/kg	18.6	18.0	21.6	yes
Zinc	mg/kg	193	186	210	yes
Date Acquired:	October 12, 2021				
Antimony	mg/kg	3.3	3.2	4.7	yes
Arsenic	mg/kg	3.6	3.1	5.5	yes
Barium	mg/kg	93	82	124	yes
Beryllium	mg/kg	0.3	0.2	0.5	yes

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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Metals Strong Acid Digestion - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Cadmium	mg/kg	0.96	0.77	1.13	yes
Chromium	mg/kg	74.4	64.7	97.1	yes
Cobalt	mg/kg	5.9	5.4	7.8	yes
Copper	mg/kg	120	101.9	152.9	yes
Lead	mg/kg	250	200.6	318.8	yes
Mercury	mg/kg	0.06	0.05	0.09	yes
Molybdenum	mg/kg	<1.0	0.9	1.4	yes
Nickel	mg/kg	23.9	21.3	32.1	yes
Selenium	mg/kg	<0.3	0.26	0.32	yes
Silver	mg/kg	3.2	2.28	6.00	yes
Thallium	mg/kg	0.06	0.05	0.10	yes
Tin	mg/kg	8.8	7.9	12.1	yes
Uranium	mg/kg	<0.5	0.3	0.7	yes
Vanadium	mg/kg	26.2	17.8	46.9	yes
Zinc	mg/kg	304	283	390	yes

Date Acquired: October 12, 2021

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.005	0.005	yes
Toluene	ng	0	-0.06	0.06	yes
Ethylbenzene	ng	0	-0.030	0.030	yes
Total Xylenes (m,p,o)	ng	0	-0.09	0.09	yes
Styrene	ng	0	-0.030	0.030	yes

Date Acquired: October 13, 2021

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	96.97	80	120	yes
Toluene	ng	88.59	80	120	yes
Ethylbenzene	ng	84.50	80	120	yes
m,p-Xylene	ng	103.92	80	120	yes
Total Xylenes (m,p,o)	ng	101.89	80	120	yes
Styrene	ng	87.65	80	120	yes

Date Acquired: October 13, 2021

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Benzene	mg/kg	<0.005	<0.005	50	0.010	yes
Toluene	mg/kg	<0.02	<0.02	50	0.04	yes
Ethylbenzene	mg/kg	<0.005	<0.005	50	0.020	yes
m,p-Xylene	mg/kg	<0.02	<0.02	50	0.04	yes
o-Xylene	mg/kg	<0.02	<0.02	50	0.04	yes
Total Xylenes (m,p,o)	mg/kg	<0.03	<0.03	50	0.06	yes
Styrene	mg/kg	<0.01	<0.01	50	0.020	yes

Date Acquired: October 13, 2021

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	mg/kg	87	70	130	yes

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
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Report Number: 2670979

Mono-Aromatic Hydrocarbons - Soil - Continued

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Toluene	mg/kg	97	70	130	yes
Ethylbenzene	mg/kg	83	70	130	yes
m,p-Xylene	mg/kg	77	70	130	yes
o-Xylene	mg/kg	80	70	130	yes
Styrene	mg/kg	102	70	130	yes

Date Acquired: October 13, 2021

PAH - Soil - Surrogate Recovery

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Nitrobenzene-d5	%	102.775	50	140	yes
2-Fluorobiphenyl	%	105.812	50	140	yes
p-Terphenyl-d14	%	87.8733	50	140	yes

Date Acquired: October 16, 2021

Polycyclic Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Naphthalene	ng/mL	0	-0.010	0.010	yes
Acenaphthylene	ng/mL	0	-0.05	0.05	yes
Acenaphthene	ng/mL	0	-0.05	0.05	yes
Fluorene	ng/mL	0	-0.05	0.05	yes
Phenanthrene	ng/mL	0	-0.01	0.01	yes
Anthracene	ng/mL	0	-0.003	0.003	yes
Fluoranthene	ng/mL	0	-0.010	0.010	yes
Pyrene	ng/mL	0	-0.010	0.010	yes
Benzo(a)anthracene	ng/mL	0	-0.01	0.01	yes
Chrysene	ng/mL	0	-0.05	0.05	yes
Benzo(b)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(b+j)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(k)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(a)pyrene	ng/mL	0	-0.05	0.05	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	0	-0.05	0.05	yes
Dibenzo(a,h)anthracene	ng/mL	0	-0.05	0.05	yes
Benzo(g,h,i)perylene	ng/mL	0	-0.05	0.05	yes

Date Acquired: October 16, 2021

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Naphthalene	ng/mL	100.80	80	120	yes
Acenaphthylene	ng/mL	101.20	80	120	yes
Acenaphthene	ng/mL	102.20	80	120	yes
Fluorene	ng/mL	103.20	80	120	yes
Phenanthrene	ng/mL	100.40	80	120	yes
Anthracene	ng/mL	101.40	80	120	yes
Fluoranthene	ng/mL	102.80	80	120	yes
Pyrene	ng/mL	100.00	80	120	yes
Benzo(a)anthracene	ng/mL	103.00	80	120	yes

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Quality Control

Bill To: Paramount Resources Ltd.
2328 Clarke St.
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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Polycyclic Aromatic Hydrocarbons - Soil - Continued

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Chrysene	ng/mL	100.20	80	120	yes
Benzo(b)fluoranthene	ng/mL	92.60	80	120	yes
Benzo(k)fluoranthene	ng/mL	82.20	80	120	yes
Benzo(a)pyrene	ng/mL	105.20	80	120	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	94.40	80	120	yes
Dibenzo(a,h)anthracene	ng/mL	96.20	80	120	yes
Benzo(g,h,i)perylene	ng/mL	92.00	80	120	yes

Date Acquired: October 16, 2021

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Naphthalene	mg/kg	<0.01	<0.01	50	0.020	yes
Acenaphthylene	mg/kg	<0.05	<0.05	50	0.10	yes
Acenaphthene	mg/kg	<0.05	<0.05	50	0.10	yes
Fluorene	mg/kg	<0.05	<0.05	50	0.10	yes
Phenanthrene	mg/kg	<0.01	<0.01	50	0.02	yes
Anthracene	mg/kg	<0.003	<0.003	50	0.006	yes
Fluoranthene	mg/kg	<0.01	<0.01	50	0.020	yes
Pyrene	mg/kg	<0.01	<0.01	50	0.020	yes
Benzo(a)anthracene	mg/kg	<0.01	<0.01	50	0.02	yes
Chrysene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(b)fluoranthene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(k)fluoranthene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(a)pyrene	mg/kg	<0.05	<0.05	50	0.10	yes
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.05	<0.05	50	0.10	yes
Dibenzo(a,h)anthracene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(g,h,i)perylene	mg/kg	<0.05	<0.05	50	0.10	yes

Date Acquired: October 16, 2021

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Naphthalene	mg/kg	114	50	140	yes
Acenaphthylene	mg/kg	103	50	140	yes
Acenaphthene	mg/kg	110	50	140	yes
Fluorene	mg/kg	107	50	140	yes
Phenanthrene	mg/kg	109	50	140	yes
Anthracene	mg/kg	105	50	140	yes
Fluoranthene	mg/kg	106	50	140	yes
Pyrene	mg/kg	102	50	140	yes
Benzo(a)anthracene	mg/kg	109	50	140	yes
Chrysene	mg/kg	107	50	140	yes
Benzo(b)fluoranthene	mg/kg	83	50	140	yes
Benzo(k)fluoranthene	mg/kg	73	50	140	yes
Benzo(a)pyrene	mg/kg	94	50	140	yes
Indeno(1,2,3-c,d)pyrene	mg/kg	80	50	140	yes
Dibenzo(a,h)anthracene	mg/kg	79	50	140	yes
Benzo(g,h,i)perylene	mg/kg	84	50	140	yes

Date Acquired: October 16, 2021

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Quality Control

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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
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Polycyclic Aromatic Hydrocarbons - Soil - Continued

Salinity

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Calcium	mg/L	0.161273	-0.4	0.5	yes
Magnesium	mg/L	0.0299186	-0.1	0.1	yes
Sodium	mg/L	0.0351086	-0	2	yes
Potassium	mg/L	0.0288461	-0.5	0.7	yes
Chloride	mg/L	0.2269	0	5	yes
Sulfate-S	mg/L	0.106188	-0	1	yes
Date Acquired:	October 12, 2021				

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Electrical Conductivity	dS/m	1.60	1.31	1.79	yes
% Saturation	%	59	55	67	yes
Calcium	mg/L	308	231.4	347.2	yes
Magnesium	mg/L	56.0	40.3	60.7	yes
Sodium	mg/L	23	20	26	yes
Potassium	mg/L	11.2	9.6	13.2	yes
Chloride	mg/L	30	24	33	yes
Sulfate-S	mg/L	216	175	242	yes
Date Acquired:	October 12, 2021				
Electrical Conductivity	dS/m	32.3	26.80	35.20	yes
Calcium	mg/L	243	226.9	261.1	yes
Magnesium	mg/L	98.8	91.0	104.8	yes
Sodium	mg/L	247	229	264	yes
Potassium	mg/L	248	230.7	265.5	yes
Chloride	mg/L	2070	1852	2229	yes
Sulfate-S	mg/L	148	137	158	yes
Date Acquired:	October 12, 2021				

Soil Acidity

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
pH	pH	7.9	7.9	10	0.3	yes
Date Acquired:	October 12, 2021					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
pH	pH	6.5	6.3	6.9	yes
Date Acquired:	October 12, 2021				

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	ng	0	-10	10	yes
Date Acquired:	October 13, 2021				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F1 C6-C10	mg/kg	<10	<10	50	0	yes
F1 -BTEX	mg/kg	<10	<10	50	0	yes

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Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1525982**
Control Number:
Date Received: Oct 7, 2021
Date Reported: Oct 18, 2021
Report Number: 2670979

Volatile Petroleum Hydrocarbons - Soil - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Date Acquired: October 13, 2021						
Matrix Spike	**Units**	**% Recovery**	**Lower Limit**	**Upper Limit**		**Passed QC**
F1 C6-C10	mg/kg	116	70	130		yes
Date Acquired: October 13, 2021						

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Methodology and Notes

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Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Oct 13, 2021	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Oct 13, 2021	Element Calgary
Metals ICP (Hot Block) in soil	EPA	*	Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements, October 1999, 200.2	Oct 12, 2021	Element Edmonton - Roper Road
Metals ICP (Hot Block) in soil	EPA	*	Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements, October 1999, 200.2	Oct 13, 2021	Element Edmonton - Roper Road
Metals ICP (Hot Block) in soil	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Oct 12, 2021	Element Edmonton - Roper Road
Metals ICP (Hot Block) in soil	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Oct 13, 2021	Element Edmonton - Roper Road
PAH - Soil	AEP		Index of Additive Cancer Risk (IACR), IACR	Oct 16, 2021	Element Calgary
PAH - Soil	US EPA	*	Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, 8270	Oct 16, 2021	Element Calgary
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Oct 12, 2021	Element Edmonton - Roper Road
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Oct 12, 2021	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Oct 12, 2021	Element Edmonton - Roper Road
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Oct 13, 2021	Element Calgary

** Reference Method Modified*

References

AEP	Alberta Tier 1 Soil and Groundwater Remediation Guidelines
APHA	Standard Methods for the Examination of Water and Wastewater
Carter	Soil Sampling and Methods of Analysis.
CCME	Canadian Council of Ministers of the Environment
EPA	Environmental Protection Agency Test Methods - US
McKeague	Manual on Soil Sampling and Methods of Analysis
US EPA	US Environmental Protection Agency Test Methods

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Company:	SynergyAspen Environmental

Project ID:	PAR6206
Project Name:	Stage 2 PSI
Project Location:	I-02
LSD:	I-02
P.O.:	
Proj. Acct. code:	

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Report Transmission Cover Page

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Attn: Patricia Stebbing
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1526364**
Control Number:
Date Received: Oct 8, 2021
Date Reported: Oct 18, 2021
Report Number: 2671686

Contact	Company	Address
Element Invoicing	**Paramount Resources Ltd.**	7217 Roper Road Edmonton, AB T6B 3J4 Phone: (780) 438-5522 Fax: Email: invoicing.edmonton@element.com

Delivery	Format	Deliverables
Post	PDF	COC / Invoice

Contact	Company	Address
Patricia Stebbing	**SynergyAspen Environmental**	Fort St John, BC null Phone: (250) 785-1030 Fax: Email: pstebbing@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR
Email - Zip Multiple Formats By Report	Generic ESDAT Chemistry File	Test Report
Email - Zip Multiple Formats By Report	Generic ESDAT Sample File	Test Report

Contact	Company	Address
Project Coordinator	**SynergyAspen Environmental**	2328 Clarke St. Port Moody, BC V3H 1Y8 Phone: (604) 931-1026 Fax: (604) 931-1046 Email: projectcoordinator@synergyaspen.ca

Delivery	Format	Deliverables
Email - Multiple Reports By Lot	PDF	COC / Invoice
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COC / COA
Email - Single Report	PDF	COC / Test Report
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Analytical Report

Bill To: Paramount Resources Ltd.
Fort St John, BC, Canada
Attn: Patricia Stebbing
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1526364**
Control Number:
Date Received: Oct 8, 2021
Date Reported: Oct 18, 2021
Report Number: 2671686

Reference Number	1526364-2
Sample Date	Oct 06, 2021
Sample Time	NA
Sample Location	
Sample Description	PAR6206 / BH21-10-02 / 0.64 - 0.96
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.6			

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1526364**
Control Number:
Date Received: Oct 8, 2021
Date Reported: Oct 18, 2021
Report Number: 2671686

Reference Number	1526364-2	1526364-4
Sample Date	Oct 06, 2021	Oct 06, 2021
Sample Time	NA	NA
Sample Location		
Sample Description	PAR6206 / BH21-10-02 / 0.64 - 0.96	PAR6206 / BH21-10-04 / 2.0 - 2.32
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.91			0.01
SAR	Saturated Paste		0.1			
% Saturation		%	64	72		
Calcium	Saturated Paste	mg/kg	102			
Magnesium	Saturated Paste	mg/kg	19.6			
Sodium	Saturated Paste	mg/kg	4			
Potassium	Saturated Paste	mg/kg	2			
Chloride	Saturated Paste	mg/L	3			2
Chloride	Saturated Paste	mg/kg	2			
Sulfate (SO4)	Saturated Paste	mg/kg	250			
TGR	Saturated Paste	T/ac	<0.1			
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005		0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02		0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005		0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03		0.03
Methanol Field Preservation			Yes	Yes		
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10		10
F1 -BTEX	Dry Weight	mg/kg	<10	<10		10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		14-Oct-21	14-Oct-21		
F2c C10-C16	Dry Weight	mg/kg	<25	<25		25
F3c C16-C34	Dry Weight	mg/kg	<50	<50		50
F4c C34-C50	Dry Weight	mg/kg	<100	<100		100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100		100
% C50+		%	<5	<5		
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done		
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	20.00	18.70		

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Analytical Report

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Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1526364**
Control Number:
Date Received: Oct 8, 2021
Date Reported: Oct 18, 2021
Report Number: 2671686

Reference Number	1526364-4
Sample Date	Oct 06, 2021
Sample Time	NA
Sample Location	
Sample Description	PAR6206 / BH21-10-04 / 2.0 - 2.32
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	<0.05			0.05
Antimony	Strong Acid Extractable	mg/kg	0.8			0.2
Arsenic	Strong Acid Extractable	mg/kg	9.1			0.2
Barium	Strong Acid Extractable	mg/kg	241			1
Beryllium	Strong Acid Extractable	mg/kg	0.5			0.1
Cadmium	Strong Acid Extractable	mg/kg	0.70			0.01
Chromium	Strong Acid Extractable	mg/kg	18.4			0.5
Cobalt	Strong Acid Extractable	mg/kg	11.6			0.1
Copper	Strong Acid Extractable	mg/kg	21.9			1
Lead	Strong Acid Extractable	mg/kg	10.8			0.1
Mercury	Strong Acid Extractable	mg/kg	<0.05			0.05
Molybdenum	Strong Acid Extractable	mg/kg	3.6			1
Nickel	Strong Acid Extractable	mg/kg	35.6			0.5
Selenium	Strong Acid Extractable	mg/kg	0.5			0.3
Silver	Strong Acid Extractable	mg/kg	0.1			0.1
Thallium	Strong Acid Extractable	mg/kg	0.27			0.05
Tin	Strong Acid Extractable	mg/kg	<1.0			1
Uranium	Strong Acid Extractable	mg/kg	1.3			0.5
Vanadium	Strong Acid Extractable	mg/kg	27.1			0.1
Zinc	Strong Acid Extractable	mg/kg	96			1

Approved by:

Max Hewitt
Operations Manager

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Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1526364**
Control Number:
Date Received: Oct 8, 2021
Date Reported: Oct 18, 2021
Report Number: 2671686

Extractable Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	0	-10	10	yes
F3c C16-C34	µg/mL	0	-30	30	yes
F4c C34-C50	µg/mL	0	-20	20	yes
F4HTGCc C34-C50+	µg/mL	0	-20	20	yes

Date Acquired: October 13, 2021

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	91.54	80	120	yes
F3c C16-C34	µg/mL	91.64	80	120	yes
F4c C34-C50	µg/mL	90.07	80	120	yes
F4HTGCc C34-C50+	µg/mL	94.11	80	120	yes

Date Acquired: October 13, 2021

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F2c C10-C16	mg/kg	<25	<25	50	10	yes
F3c C16-C34	mg/kg	<50	<50	50	10	yes
F4c C34-C50	mg/kg	<100	<100	50	10	yes
F4HTGCc C34-C50+	mg/kg	<100	<100	50	10	yes

Date Acquired: October 13, 2021

Metals Strong Acid Digestion

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Boron	mg/L	0.000573098	-0.05	0.07	yes
Antimony	µg/L	0.00179462	-0.1	0.2	yes
Arsenic	µg/L	-0.00605034	-0.2	0.2	yes
Barium	µg/L	0.109346	-1	1	yes
Beryllium	µg/L	-0.0463293	-0.1	0.1	yes
Cadmium	µg/L	0.00178872	-0.01	0.01	yes
Chromium	µg/L	0.111929	-0.5	0.5	yes
Cobalt	µg/L	0.00487719	-0.1	0.1	yes
Copper	µg/L	0.0195886	-0.6	1.2	yes
Lead	µg/L	0.0124653	-5.0	5.0	yes
Mercury	µg/L	0.00128415	-0.04	0.04	yes
Molybdenum	µg/L	0.012254	-1.0	1.0	yes
Nickel	µg/L	0.017344	-0.4	0.7	yes
Selenium	µg/L	0.00166444	-0.30	0.30	yes
Silver	µg/L	0.000345669	-0.09	0.14	yes
Thallium	µg/L	0.00322328	-0.04	0.04	yes
Tin	µg/L	0.0126825	-0.4	0.4	yes
Uranium	µg/L	0.00148615	-0.5	0.5	yes
Vanadium	µg/L	-0.0337279	-0.1	0.1	yes
Zinc	µg/L	0.22028	-1	1	yes

Date Acquired: October 13, 2021

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Antimony	mg/kg	0.4	0.5	20	0.4	yes
Arsenic	mg/kg	9.3	9.8	20	0.4	yes

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Quality Control

Bill To: Paramount Resources Ltd.
Fort St John, BC, Canada
Attn: Patricia Stebbing
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1526364**
Control Number:
Date Received: Oct 8, 2021
Date Reported: Oct 18, 2021
Report Number: 2671686

Metals Strong Acid Digestion - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Barium	mg/kg	199	211	20	2	yes
Beryllium	mg/kg	0.4	0.5	20	0.2	yes
Cadmium	mg/kg	0.60	0.60	20	0.02	yes
Chromium	mg/kg	17.1	16.9	20	1.1	yes
Cobalt	mg/kg	9.3	10.6	20	0.2	yes
Copper	mg/kg	20.0	21.0	20	2.2	yes
Lead	mg/kg	10.9	12.4	20	0.2	yes
Mercury	mg/kg	0.05	<0.05	20	0.05	yes
Molybdenum	mg/kg	2.1	2.1	20	2.2	yes
Nickel	mg/kg	26.5	27.6	20	1.1	yes
Selenium	mg/kg	0.6	0.6	20	0.66	yes
Silver	mg/kg	0.2	0.2	20	0.22	yes
Thallium	mg/kg	0.22	0.22	20	0.11	yes
Tin	mg/kg	<1.0	<1.0	20	2.2	yes
Uranium	mg/kg	1.3	1.3	20	1.1	yes
Vanadium	mg/kg	22.7	23.3	20	0.2	yes
Zinc	mg/kg	91	93	20	2	yes

Date Acquired: October 13, 2021

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Antimony	mg/kg	39.9	37.6	42.4	yes
Arsenic	mg/kg	39.9	36.3	43.9	yes
Barium	mg/kg	203	188	212	yes
Beryllium	mg/kg	19.0	17.4	22.2	yes
Cadmium	mg/kg	2.07	1.88	2.28	yes
Chromium	mg/kg	99.4	93.2	107.0	yes
Cobalt	mg/kg	20.3	18.2	21.2	yes
Copper	mg/kg	203	183.1	212.7	yes
Lead	mg/kg	19.4	18.3	21.3	yes
Mercury	mg/kg	3.14	2.64	3.36	yes
Molybdenum	mg/kg	198	185.1	222.3	yes
Nickel	mg/kg	99.6	92.4	106.2	yes
Selenium	mg/kg	42.0	35.20	44.20	yes
Silver	mg/kg	20.0	18.20	22.40	yes
Thallium	mg/kg	9.78	9.02	10.82	yes
Tin	mg/kg	201	191.2	215.2	yes
Uranium	mg/kg	101	86.0	116.0	yes
Vanadium	mg/kg	19.6	18.0	21.6	yes
Zinc	mg/kg	199	186	210	yes
Date Acquired:	October 13, 2021				
Antimony	mg/kg	3.8	3.2	4.7	yes
Arsenic	mg/kg	3.5	3.1	5.5	yes
Barium	mg/kg	106	82	124	yes
Beryllium	mg/kg	0.3	0.2	0.5	yes
Cadmium	mg/kg	1.06	0.77	1.13	yes
Chromium	mg/kg	77.4	64.7	97.1	yes

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Quality Control

Bill To: Paramount Resources Ltd.
Fort St John, BC, Canada
Attn: Patricia Stebbing
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1526364**
Control Number:
Date Received: Oct 8, 2021
Date Reported: Oct 18, 2021
Report Number: 2671686

Metals Strong Acid Digestion - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Cobalt	mg/kg	6.3	5.4	7.8	yes
Copper	mg/kg	123	101.9	152.9	yes
Lead	mg/kg	275	200.6	318.8	yes
Mercury	mg/kg	0.06	0.05	0.09	yes
Molybdenum	mg/kg	1.0	0.9	1.4	yes
Nickel	mg/kg	25.1	21.3	32.1	yes
Selenium	mg/kg	<0.3	0.26	0.32	yes
Silver	mg/kg	3.6	2.28	6.00	yes
Thallium	mg/kg	0.07	0.05	0.10	yes
Tin	mg/kg	10.6	7.9	12.1	yes
Uranium	mg/kg	<0.5	0.3	0.7	yes
Vanadium	mg/kg	27.5	17.8	46.9	yes
Zinc	mg/kg	312	283	390	yes

Date Acquired: October 13, 2021

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.005	0.005	yes
Toluene	ng	0	-0.06	0.06	yes
Ethylbenzene	ng	0	-0.030	0.030	yes
Total Xylenes (m,p,o)	ng	0	-0.09	0.09	yes
Styrene	ng	0	-0.030	0.030	yes

Date Acquired: October 13, 2021

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	96.97	80	120	yes
Toluene	ng	88.59	80	120	yes
Ethylbenzene	ng	84.50	80	120	yes
m,p-Xylene	ng	103.92	80	120	yes
Total Xylenes (m,p,o)	ng	101.89	80	120	yes
Styrene	ng	87.65	80	120	yes

Date Acquired: October 13, 2021

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Benzene	mg/kg	<0.005	<0.005	50	0.010	yes
Toluene	mg/kg	<0.02	<0.02	50	0.04	yes
Ethylbenzene	mg/kg	<0.005	<0.005	50	0.020	yes
m,p-Xylene	mg/kg	<0.02	<0.02	50	0.04	yes
o-Xylene	mg/kg	<0.02	<0.02	50	0.04	yes
Total Xylenes (m,p,o)	mg/kg	<0.03	<0.03	50	0.06	yes
Styrene	mg/kg	<0.01	<0.01	50	0.020	yes

Date Acquired: October 13, 2021

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	mg/kg	87	70	130	yes
Toluene	mg/kg	97	70	130	yes
Ethylbenzene	mg/kg	83	70	130	yes
m,p-Xylene	mg/kg	77	70	130	yes

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Quality Control

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Fort St John, BC, Canada
Attn: Patricia Stebbing
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1526364**
Control Number:
Date Received: Oct 8, 2021
Date Reported: Oct 18, 2021
Report Number: 2671686

Mono-Aromatic Hydrocarbons - Soil - Continued

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
o-Xylene	mg/kg	80	70	130	yes
Styrene	mg/kg	102	70	130	yes
Date Acquired:	October 13, 2021				

Salinity

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Calcium	mg/L	0.206893	-0.4	0.5	yes
Magnesium	mg/L	0.0437309	-0.1	0.1	yes
Sodium	mg/L	0.0276274	-0	2	yes
Potassium	mg/L	0.0169953	-0.5	0.7	yes
Chloride	mg/L	1.4639	0	5	yes
Sulfate-S	mg/L	0.125045	-0	1	yes
Date Acquired:	October 12, 2021				

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Electrical Conductivity	dS/m	1.52	1.31	1.79	yes
% Saturation	%	61	55	67	yes
Calcium	mg/L	291	231.4	347.2	yes
Magnesium	mg/L	51.9	40.3	60.7	yes
Sodium	mg/L	23	20	26	yes
Potassium	mg/L	10.6	9.6	13.2	yes
Chloride	mg/L	28	24	33	yes
Sulfate-S	mg/L	213	175	242	yes
Date Acquired:	October 12, 2021				
Electrical Conductivity	dS/m	32.0	26.80	35.20	yes
Calcium	mg/L	240	226.9	261.1	yes
Magnesium	mg/L	98.3	91.0	104.8	yes
Sodium	mg/L	240	229	264	yes
Potassium	mg/L	249	230.7	265.5	yes
Chloride	mg/L	2150	1852	2229	yes
Sulfate-S	mg/L	146	137	158	yes
Date Acquired:	October 12, 2021				

Soil Acidity

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
pH	pH	7.9	7.9	10	0.3	yes
Date Acquired:	October 12, 2021					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
pH	pH	6.5	6.3	6.9	yes
Date Acquired:	October 12, 2021				

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	ng	0	-10	10	yes
Date Acquired:	October 13, 2021				

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Quality Control

Bill To: Paramount Resources Ltd.
Fort St John, BC, Canada
Attn: Patricia Stebbing
Sampled By: Jack Common
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:

Lot ID: **1526364**
Control Number:
Date Received: Oct 8, 2021
Date Reported: Oct 18, 2021
Report Number: 2671686

Volatile Petroleum Hydrocarbons - Soil - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F1 C6-C10	mg/kg	<10	<10	50	0	yes
F1 -BTEX	mg/kg	<10	<10	50	0	yes
Date Acquired:	October 13, 2021					

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit		Passed QC
F1 C6-C10	mg/kg	116	70	130		yes
Date Acquired:	October 13, 2021					

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Methodology and Notes

Bill To:	Paramount Resources Ltd. Fort St John, BC, Canada	Project ID:	PAR6206
Attn:	Patricia Stebbing	Project Name:	Stage 2 PSI
Sampled By:	Jack Common	Project Location:	I-02
Company:	SynergyAspen Environmental	LSD:	I-02
		P.O.:	
		Proj. Acct. code:	

Lot ID:	**1526364**
Control Number:	
Date Received:	Oct 8, 2021
Date Reported:	Oct 18, 2021
Report Number:	2671686

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Oct 13, 2021	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Oct 13, 2021	Element Calgary
Metals ICP (Hot Block) in soil	EPA	*	Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements, October 1999, 200.2	Oct 13, 2021	Element Edmonton - Roper Road
Metals ICP (Hot Block) in soil	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Oct 13, 2021	Element Edmonton - Roper Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Oct 12, 2021	Element Edmonton - Roper Road
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Oct 12, 2021	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Oct 12, 2021	Element Edmonton - Roper Road
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Oct 13, 2021	Element Calgary

** Reference Method Modified*

References

APHA	Standard Methods for the Examination of Water and Wastewater
Carter	Soil Sampling and Methods of Analysis.
CCME	Canadian Council of Ministers of the Environment
EPA	Environmental Protection Agency Test Methods - US
McKeague	Manual on Soil Sampling and Methods of Analysis
US EPA	US Environmental Protection Agency Test Methods

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Report Transmission Cover Page

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
AFE: 21SR0061
OI Customer PR210-Drilling and
GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Contact	Company	Address
Element Invoicing	**Paramount Resources Ltd**	7217 Roper Road Edmonton, AB T6B 3J4 Phone: (780) 438-5522 Fax: Email: invoicing.edmonton@element.com

Delivery	Format	Deliverables
Post	PDF	COC / Invoice

Contact	Company	Address
Patricia Stebbing	**SynergyAspen Environmental**	Fort St John, BC null Phone: (250) 785-1030 Fax: Email: pstebbing@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR
Email - Zip Multiple Formats By Report	Generic ESDAT Chemistry File	Test Report
Email - Zip Multiple Formats By Report	Generic ESDAT Sample File	Test Report

Contact	Company	Address
Project Coordinator	**SynergyAspen Environmental**	2328 Clarke St. Port Moody, BC V3H 1Y8 Phone: (604) 931-1026 Fax: (604) 931-1046 Email: projectcoordinator@synergyaspen.ca

Delivery	Format	Deliverables
Email - Multiple Reports By Lot	PDF	COC / Invoice
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COC / COA
Email - Single Report	PDF	COC / Test Report
Email - Single Report	PDF	COR

Notes To Clients:

- Nov 10, 2021 - Sample 19 was received in a plastic bag which does not meet the sample requirements for F2-F4 hydrocarbon as specified by the reference method.
- Dec 01, 2021 - Report was issued to include changes to the legal location and project ID as requested by Patricia Stebbing on December 01, 2021. Previous report 2682177.

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
AFE: 21SR0061
OI Customer PR210-Drilling and
GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Reference Number	1525504-1	1525504-3	1525504-5
Sample Date	Oct 04, 2021	Oct 04, 2021	Oct 04, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	BH21-01-01 / 0-0.32 / 6.8 °C	BH21-01-03 / 1.2-1.52 / 6.8 °C	BH21-01-05 / 2.48-2.8 / 6.8 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	<0.05	<0.05	0.05	0.05
Antimony	Strong Acid Extractable	mg/kg	0.4	0.7	0.5	0.2
Arsenic	Strong Acid Extractable	mg/kg	7.4	9.4	11.2	0.2
Barium	Strong Acid Extractable	mg/kg	182	335	195	1
Beryllium	Strong Acid Extractable	mg/kg	0.4	0.6	0.5	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.36	0.58	0.69	0.01
Chromium	Strong Acid Extractable	mg/kg	19.5	18.8	14.3	0.5
Cobalt	Strong Acid Extractable	mg/kg	8.0	8.5	9.5	0.1
Copper	Strong Acid Extractable	mg/kg	11.4	21.7	24.1	1
Lead	Strong Acid Extractable	mg/kg	8.7	10.1	11.1	0.1
Mercury	Strong Acid Extractable	mg/kg	<0.05	0.05	0.05	0.05
Molybdenum	Strong Acid Extractable	mg/kg	1.1	1.7	2.8	1
Nickel	Strong Acid Extractable	mg/kg	20.4	28.0	27.1	0.5
Selenium	Strong Acid Extractable	mg/kg	0.5	0.5	0.6	0.3
Silver	Strong Acid Extractable	mg/kg	<0.10	0.2	0.2	0.1
Thallium	Strong Acid Extractable	mg/kg	0.09	0.16	0.23	0.05
Tin	Strong Acid Extractable	mg/kg	<1.0	<1.0	<1.0	1
Uranium	Strong Acid Extractable	mg/kg	0.6	0.9	1.5	0.5
Vanadium	Strong Acid Extractable	mg/kg	29.6	33.5	23.8	0.1
Zinc	Strong Acid Extractable	mg/kg	75	88	105	1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.41	0.50	0.35	0.01
SAR	Saturated Paste		<0.1	0.2	0.4	
% Saturation		%	70	103	80	
Calcium	Saturated Paste	mg/kg	59.2	74.6	30.3	
Magnesium	Saturated Paste	mg/kg	8.4	26.4	13.1	
Sodium	Saturated Paste	mg/kg	2	10	9	
Potassium	Saturated Paste	mg/kg	1	1	2	
Chloride	Saturated Paste	mg/L	5	4	5	2
Chloride	Saturated Paste	mg/kg	3	4	4	
Sulfate (SO4)	Saturated Paste	mg/kg	18	91.5	21	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.4	7.8	7.8	

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Analytical Report

Bill To: Paramount Resources Ltd
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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
AFE: 21SR0061
OI Customer PR210-Drilling and
GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Reference Number	1525504-1	1525504-3	1525504-6
Sample Date	Oct 04, 2021	Oct 04, 2021	Oct 04, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	BH21-01-01 / 0-0.32 / 6.8 °C	BH21-01-03 / 1.2-1.52 / 6.8 °C	BH21-01-06 / 3.08-3.62 / 6.8 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Silt Loam	Clay Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	23	20	33	0.1
Silt	2 µm - 50 µm	% by weight	61	47	33	0.1
Clay	<2 µm	% by weight	16	32	34	0.1

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GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Reference Number	1525504-8
Sample Date	Oct 04, 2021
Sample Time	NA
Sample Location	
Sample Description	BH21-01-08 / 4.85 / 6.8 °C
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay Loam			
Sand	50 µm - 2 mm	% by weight	30			0.1
Silt	2 µm - 50 µm	% by weight	30			0.1
Clay	<2 µm	% by weight	40			0.1

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
AFE: 21SR0061
OI Customer PR210-Drilling and
GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Reference Number	1525504-9	1525504-12	1525504-14
Sample Date	Oct 04, 2021	Oct 04, 2021	Oct 04, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	BH21-02-01 / 0-0.32 / 6.8 °C	BH21-02-04 / 1.96-2.28 / 6.8 °C	BH21-02-06 / 0-0.32 / 6.8 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m		0.37		0.01
SAR	Saturated Paste			0.3		
% Saturation		%	83	57	80	
Calcium	Saturated Paste	mg/kg		26.9		
Magnesium	Saturated Paste	mg/kg		6.6		
Sodium	Saturated Paste	mg/kg		5		
Potassium	Saturated Paste	mg/kg		3		
Chloride	Saturated Paste	mg/L		4		2
Chloride	Saturated Paste	mg/kg		2		
Sulfate (SO4)	Saturated Paste	mg/kg		43.1		
TGR	Saturated Paste	T/ac		<0.1		

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V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
AFE: 21SR0061
OI Customer PR210-Drilling and
GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Reference Number	1525504-9	1525504-14	1525504-19
Sample Date	Oct 04, 2021	Oct 04, 2021	Oct 04, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	BH21-02-01 / 0-0.32 / 6.8 °C	BH21-02-06 / 0-0.32 / 6.8 °C	BH21-03-05 / 2.68-3 / 6.8 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	<0.05	<0.05	0.08	0.05
Antimony	Strong Acid Extractable	mg/kg	0.5	0.5	0.4	0.2
Arsenic	Strong Acid Extractable	mg/kg	9.4	8.9	9.2	0.2
Barium	Strong Acid Extractable	mg/kg	218	218	175	1
Beryllium	Strong Acid Extractable	mg/kg	0.6	0.6	0.5	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.37	0.37	0.31	0.01
Chromium	Strong Acid Extractable	mg/kg	23.1	18.7	16.0	0.5
Cobalt	Strong Acid Extractable	mg/kg	9.4	9.7	7.1	0.1
Copper	Strong Acid Extractable	mg/kg	22.5	22.4	20.8	1
Lead	Strong Acid Extractable	mg/kg	10.8	10.2	10.1	0.1
Mercury	Strong Acid Extractable	mg/kg	0.06	0.05	0.05	0.05
Molybdenum	Strong Acid Extractable	mg/kg	2.0	1.9	1.8	1
Nickel	Strong Acid Extractable	mg/kg	32.1	30.8	23.3	0.5
Selenium	Strong Acid Extractable	mg/kg	0.4	0.4	1.1	0.3
Silver	Strong Acid Extractable	mg/kg	0.1	0.1	0.1	0.1
Thallium	Strong Acid Extractable	mg/kg	0.20	0.20	0.22	0.05
Tin	Strong Acid Extractable	mg/kg	<1.0	<1.0	<1.0	1
Uranium	Strong Acid Extractable	mg/kg	1.1	1.1	1.5	0.5
Vanadium	Strong Acid Extractable	mg/kg	25.9	26.7	23.1	0.1
Zinc	Strong Acid Extractable	mg/kg	87	83	83	1

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
AFE: 21SR0061
OI Customer PR210-Drilling and
GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Reference Number	1525504-10	1525504-12	1525504-15
Sample Date	Oct 04, 2021	Oct 04, 2021	Oct 04, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	BH21-02-02 / 0.64-0.96 / 6.8 °C	BH21-02-04 / 1.96-2.28 / 6.8 °C	BH21-03-01 / 0-0.32 / 6.8 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	0.011	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	0.05	0.03
Methanol Field Preservation			Yes	Yes	No	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		19-Oct-21	19-Oct-21	28-Oct-21	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	11.90	12.60	10.80	

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
AFE: 21SR0061
OI Customer PR210-Drilling and
GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Reference Number	1525504-12	1525504-16
Sample Date	Oct 04, 2021	Oct 04, 2021
Sample Time	NA	NA
Sample Location		
Sample Description	BH21-02-04 / 1.96-2.28 / 6.8 °C	BH21-03-02 / 0.64-0.96 / 6.8 °C
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.7	7.8		

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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
AFE: 21SR0061
OI Customer PR210-Drilling and
GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Reference Number	1525504-15
Sample Date	Oct 04, 2021
Sample Time	NA
Sample Location	
Sample Description	BH21-03-01 / 0-0.32 / 6.8 °C
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Soil						
Naphthalene	Dry Weight	mg/kg	<0.01			0.010
Acenaphthylene	Dry Weight	mg/kg	<0.05			0.05
Acenaphthene	Dry Weight	mg/kg	<0.05			0.05
Fluorene	Dry Weight	mg/kg	<0.05			0.05
Phenanthrene	Dry Weight	mg/kg	<0.01			0.01
Anthracene	Dry Weight	mg/kg	<0.003			0.003
Fluoranthene	Dry Weight	mg/kg	<0.01			0.010
Pyrene	Dry Weight	mg/kg	0.015			0.010
Benzo(a)anthracene	Dry Weight	mg/kg	<0.01			0.01
Chrysene	Dry Weight	mg/kg	<0.05			0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	<0.05			0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05			0.05
Benzo(a)pyrene	Dry Weight	mg/kg	<0.05			0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05			0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05			0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	<0.05			0.05
CB(a)P	B(a)P Total Potency Equivalents	mg/kg	0.006			0.001
IACR_Coarse	Index of Additive Cancer Risk		<0.001			0.001
IACR_Fine	Index of Additive Cancer Risk		<0.001			0.001
PAH - Soil - Surrogate Recovery						
Nitrobenzene-d5	PAH - Surrogate	%	97			50-140
2-Fluorobiphenyl	PAH - Surrogate	%	102			50-140
p-Terphenyl-d14	PAH - Surrogate	%	97			50-140

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Analytical Report

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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
AFE: 21SR0061
OI Customer PR210-Drilling and
GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Reference Number	1525504-16	1525504-19
Sample Date	Oct 04, 2021	Oct 04, 2021
Sample Time	NA	NA
Sample Location		
Sample Description	BH21-03-02 / 0.64-0.96 / 6.8 °C	BH21-03-05 / 2.68-3 / 6.8 °C
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.36			0.01
SAR	Saturated Paste		0.3			
% Saturation		%	57	60		
Calcium	Saturated Paste	mg/kg	27.4			
Magnesium	Saturated Paste	mg/kg	6.9			
Sodium	Saturated Paste	mg/kg	5			
Potassium	Saturated Paste	mg/kg	2			
Chloride	Saturated Paste	mg/L	4			2
Chloride	Saturated Paste	mg/kg	2			
Sulfate (SO4)	Saturated Paste	mg/kg	39.9			
TGR	Saturated Paste	T/ac	<0.1			

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V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
AFE: 21SR0061
OI Customer PR210-Drilling and
GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Reference Number	1525504-19
Sample Date	Oct 04, 2021
Sample Time	NA
Sample Location	
Sample Description	BH21-03-05 / 2.68-3 / 6.8 °C
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005			0.005
Toluene	Dry Weight	mg/kg	<0.02			0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005			0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03			0.03
Methanol Field Preservation			Yes			
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10			10
F1 -BTEX	Dry Weight	mg/kg	<10			10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		10-Nov-21			
F2c C10-C16	Dry Weight	mg/kg	<25			25
F3c C16-C34	Dry Weight	mg/kg	<50			50
F4c C34-C50	Dry Weight	mg/kg	<100			100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100			100
% C50+		%	<5			
Silica Gel Cleanup						
Silica Gel Cleanup			Done			
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	17.40			

Approved by:

Randy Neumann, BSc
Division Director

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Quality Control

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Sampled By: Jack Common
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Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
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Proj. Acct. code:
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GL Account: 9235.10
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Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Extractable Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	0	-10	10	yes
F3c C16-C34	µg/mL	0	-30	30	yes
F4c C34-C50	µg/mL	0	-20	20	yes
F4HTGCc C34-C50+	µg/mL	0	-20	20	yes

Date Acquired: October 15, 2021

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	103.74	80	120	yes
F3c C16-C34	µg/mL	105.55	80	120	yes
F4c C34-C50	µg/mL	94.93	80	120	yes
F4HTGCc C34-C50+	µg/mL	91.10	80	120	yes

Date Acquired: October 15, 2021

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	mg/kg	90	70	130	yes
F3c C16-C34	mg/kg	101	70	130	yes
F4c C34-C50	mg/kg	110	70	130	yes
F4HTGCc C34-C50+	mg/kg	113	70	130	yes

Date Acquired: October 27, 2021

Metals Strong Acid Digestion

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Boron	mg/L	0.00242347	-0.05	0.07	yes
Antimony	µg/L	0.00532749	-0.1	0.2	yes
Arsenic	µg/L	0.00623878	-0.2	0.2	yes
Barium	µg/L	0.12652	-1	1	yes
Beryllium	µg/L	-1.12965e-005	-0.1	0.1	yes
Cadmium	µg/L	0.00110679	-0.01	0.01	yes
Chromium	µg/L	0.245151	-0.5	0.5	yes
Cobalt	µg/L	0.00261757	-0.1	0.1	yes
Copper	µg/L	0.0377192	-0.6	1.2	yes
Lead	µg/L	0.0179085	-5.0	5.0	yes
Mercury	µg/L	0.00195854	-0.04	0.04	yes
Molybdenum	µg/L	-0.00616385	-1.0	1.0	yes
Nickel	µg/L	0.112032	-0.4	0.7	yes
Selenium	µg/L	0.00203015	-0.30	0.30	yes
Silver	µg/L	0.00069243	-0.09	0.14	yes
Thallium	µg/L	0.0189308	-0.04	0.04	yes
Tin	µg/L	0.000749515	-0.4	0.4	yes
Uranium	µg/L	0.00232769	-0.5	0.5	yes
Vanadium	µg/L	-0.0339885	-0.1	0.1	yes
Zinc	µg/L	0.233071	-1	1	yes

Date Acquired: October 27, 2021

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Quality Control

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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
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Proj. Acct. code:
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Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Metals Strong Acid Digestion - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Antimony	mg/kg	0.4	0.4	20	0.4	yes
Arsenic	mg/kg	7.4	7.4	20	0.4	yes
Barium	mg/kg	182	186	20	2	yes
Beryllium	mg/kg	0.4	0.4	20	0.2	yes
Cadmium	mg/kg	0.36	0.36	20	0.02	yes
Chromium	mg/kg	19.5	19.1	20	1.1	yes
Cobalt	mg/kg	8.0	7.7	20	0.2	yes
Copper	mg/kg	11.4	11.2	20	2.2	yes
Lead	mg/kg	8.7	9.8	20	0.2	yes
Mercury	mg/kg	<0.05	<0.05	20	0.05	yes
Molybdenum	mg/kg	1.1	1.0	20	2.2	yes
Nickel	mg/kg	20.4	19.2	20	1.1	yes
Selenium	mg/kg	0.5	0.5	20	0.66	yes
Silver	mg/kg	<0.10	<0.10	20	0.22	yes
Thallium	mg/kg	0.09	0.09	20	0.11	yes
Tin	mg/kg	<1.0	<1.0	20	2.2	yes
Uranium	mg/kg	0.6	0.6	20	1.1	yes
Vanadium	mg/kg	29.6	29.0	20	0.2	yes
Zinc	mg/kg	75	74	20	2	yes

Date Acquired: October 27, 2021

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Antimony	mg/kg	38.1	37.6	42.4	yes
Arsenic	mg/kg	37.6	36.3	43.9	yes
Barium	mg/kg	195	188	212	yes
Beryllium	mg/kg	18.6	17.4	22.2	yes
Cadmium	mg/kg	2.01	1.88	2.28	yes
Chromium	mg/kg	97.9	93.2	107.0	yes
Cobalt	mg/kg	19.5	18.2	21.2	yes
Copper	mg/kg	195	186.6	216.6	yes
Lead	mg/kg	18.4	18.3	21.3	yes
Mercury	mg/kg	3.02	2.64	3.36	yes
Molybdenum	mg/kg	190	185.1	222.3	yes
Nickel	mg/kg	97.0	92.4	106.2	yes
Selenium	mg/kg	39.9	35.20	44.20	yes
Silver	mg/kg	19.4	18.20	22.40	yes
Thallium	mg/kg	9.76	9.02	10.82	yes
Tin	mg/kg	196	191.2	215.2	yes
Uranium	mg/kg	96.5	86.0	116.0	yes
Vanadium	mg/kg	19.4	18.0	21.6	yes
Zinc	mg/kg	195	186	210	yes

Date Acquired: October 27, 2021

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Quality Control

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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
AFE: 21SR0061
OI Customer PR210-Drilling and
GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Metals Strong Acid Digestion - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Antimony	mg/kg	3.5	3.1	4.6	yes
Arsenic	mg/kg	4.0	3.1	4.7	yes
Barium	mg/kg	98	81	121	yes
Beryllium	mg/kg	0.3	0.2	0.4	yes
Cadmium	mg/kg	0.95	0.71	1.13	yes
Chromium	mg/kg	76.3	64.7	97.1	yes
Cobalt	mg/kg	6.5	5.4	7.8	yes
Copper	mg/kg	124	101.9	152.9	yes
Lead	mg/kg	257	200.6	318.8	yes
Mercury	mg/kg	0.07	0.05	0.08	yes
Molybdenum	mg/kg	<1.0	0.9	1.2	yes
Nickel	mg/kg	25.2	21.3	32.1	yes
Selenium	mg/kg	<0.3	0.26	0.32	yes
Silver	mg/kg	3.9	2.30	5.30	yes
Thallium	mg/kg	0.08	0.06	0.09	yes
Tin	mg/kg	10.1	7.9	12.1	yes
Uranium	mg/kg	<0.5	0.4	0.6	yes
Vanadium	mg/kg	28.6	23.8	33.8	yes
Zinc	mg/kg	332	261	391	yes

Date Acquired: October 27, 2021

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.005	0.005	yes
Toluene	ng	0	-0.06	0.06	yes
Ethylbenzene	ng	0	-0.030	0.030	yes
Total Xylenes (m,p,o)	ng	0	-0.09	0.09	yes
Styrene	ng	0	-0.030	0.030	yes

Date Acquired: October 15, 2021

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	96.86	80	120	yes
Toluene	ng	92.09	80	120	yes
Ethylbenzene	ng	86.76	80	120	yes
m,p-Xylene	ng	92.93	80	120	yes
Total Xylenes (m,p,o)	ng	91.65	80	120	yes
Styrene	ng	91.73	80	120	yes

Date Acquired: October 15, 2021

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	mg/kg	109	70	130	yes
Toluene	mg/kg	108	70	130	yes
Ethylbenzene	mg/kg	102	70	130	yes

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Quality Control

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
AFE: 21SR0061
OI Customer PR210-Drilling and
GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Mono-Aromatic Hydrocarbons - Soil - Continued

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
m,p-Xylene	mg/kg	93	70	130	yes
o-Xylene	mg/kg	95	70	130	yes
Styrene	mg/kg	109	70	130	yes

Date Acquired: October 27, 2021

PAH - Soil - Surrogate Recovery

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Nitrobenzene-d5	%	95.3343	50	140	yes
2-Fluorobiphenyl	%	100.995	50	140	yes
p-Terphenyl-d14	%	89.0498	50	140	yes

Date Acquired: October 29, 2021

Physical and Aggregate Properties

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Sand	% by weight	24	20	32	yes
Clay	% by weight	32	27	36	yes
<50 um	% by weight	76.4	67.500	82.500	yes

Date Acquired: November 01, 2021

Polycyclic Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Naphthalene	ng/mL	0	-0.010	0.010	yes
Acenaphthylene	ng/mL	0	-0.05	0.05	yes
Acenaphthene	ng/mL	0	-0.05	0.05	yes
Fluorene	ng/mL	0	-0.05	0.05	yes
Phenanthrene	ng/mL	0	-0.01	0.01	yes
Anthracene	ng/mL	0	-0.003	0.003	yes
Fluoranthene	ng/mL	0	-0.010	0.010	yes
Pyrene	ng/mL	0	-0.010	0.010	yes
Benzo(a)anthracene	ng/mL	0	-0.01	0.01	yes
Chrysene	ng/mL	0	-0.05	0.05	yes
Benzo(b)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(b+j)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(k)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(a)pyrene	ng/mL	0	-0.05	0.05	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	0	-0.05	0.05	yes
Dibenzo(a,h)anthracene	ng/mL	0	-0.05	0.05	yes
Benzo(g,h,i)perylene	ng/mL	0	-0.05	0.05	yes

Date Acquired: October 29, 2021

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Naphthalene	ng/mL	99.80	80	120	yes

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Quality Control

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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
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OI Customer PR210-Drilling and
GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
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Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
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Polycyclic Aromatic Hydrocarbons - Soil - Continued

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Acenaphthylene	ng/mL	89.20	80	120	yes
Acenaphthene	ng/mL	103.00	80	120	yes
Fluorene	ng/mL	105.20	80	120	yes
Phenanthrene	ng/mL	102.40	80	120	yes
Anthracene	ng/mL	107.80	80	120	yes
Fluoranthene	ng/mL	108.80	80	120	yes
Pyrene	ng/mL	107.40	80	120	yes
Benzo(a)anthracene	ng/mL	99.80	80	120	yes
Chrysene	ng/mL	104.40	80	120	yes
Benzo(b)fluoranthene	ng/mL	98.40	80	120	yes
Benzo(k)fluoranthene	ng/mL	94.00	80	120	yes
Benzo(a)pyrene	ng/mL	99.20	80	120	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	103.00	80	120	yes
Dibenzo(a,h)anthracene	ng/mL	101.80	80	120	yes
Benzo(g,h,i)perylene	ng/mL	103.80	80	120	yes

Date Acquired: October 29, 2021

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Naphthalene	mg/kg	<0.01	<0.01	50	0.020	yes
Acenaphthylene	mg/kg	<0.05	<0.05	50	0.10	yes
Acenaphthene	mg/kg	<0.05	<0.05	50	0.10	yes
Fluorene	mg/kg	<0.05	<0.05	50	0.10	yes
Phenanthrene	mg/kg	0.02	0.02	50	0.02	yes
Anthracene	mg/kg	<0.003	<0.003	50	0.006	yes
Fluoranthene	mg/kg	0.011	0.011	50	0.020	yes
Pyrene	mg/kg	0.080	0.099	50	0.020	yes
Benzo(a)anthracene	mg/kg	<0.01	<0.01	50	0.02	yes
Chrysene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(b)fluoranthene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(k)fluoranthene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(a)pyrene	mg/kg	<0.05	<0.05	50	0.10	yes
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.05	<0.05	50	0.10	yes
Dibenzo(a,h)anthracene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(g,h,i)perylene	mg/kg	<0.05	<0.05	50	0.10	yes

Date Acquired: October 29, 2021

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Naphthalene	mg/kg	116	50	140	yes
Acenaphthylene	mg/kg	100	50	140	yes
Acenaphthene	mg/kg	118	50	140	yes
Fluorene	mg/kg	116	50	140	yes
Phenanthrene	mg/kg	118	50	140	yes
Anthracene	mg/kg	118	50	140	yes

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Quality Control

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V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
AFE: 21SR0061
OI Customer PR210-Drilling and
GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Polycyclic Aromatic Hydrocarbons - Soil - Continued

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Fluoranthene	mg/kg	121	50	140	yes
Pyrene	mg/kg	120	50	140	yes
Benzo(a)anthracene	mg/kg	113	50	140	yes
Chrysene	mg/kg	121	50	140	yes
Benzo(b)fluoranthene	mg/kg	101	50	140	yes
Benzo(k)fluoranthene	mg/kg	119	50	140	yes
Benzo(a)pyrene	mg/kg	102	50	140	yes
Indeno(1,2,3-c,d)pyrene	mg/kg	117	50	140	yes
Dibenzo(a,h)anthracene	mg/kg	97	50	140	yes
Benzo(g,h,i)perylene	mg/kg	108	50	140	yes

Date Acquired: October 29, 2021

Salinity

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Calcium	mg/L	0.079805	-0.4	0.5	yes
Magnesium	mg/L	-0.0151732	-0.1	0.1	yes
Sodium	mg/L	-0.0165171	-0	2	yes
Potassium	mg/L	-0.00357528	-0.5	0.7	yes
Chloride	mg/L	2.3634	0	5	yes
Sulfate-S	mg/L	0.0974775	-0	1	yes

Date Acquired: October 26, 2021

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Electrical Conductivity	dS/m	1.65	1.31	1.79	yes
% Saturation	%	59	55	67	yes
Calcium	mg/L	321	231.4	347.2	yes
Magnesium	mg/L	57.4	40.3	60.7	yes
Sodium	mg/L	24	20	26	yes
Potassium	mg/L	11.0	9.6	13.2	yes
Chloride	mg/L	30	24	33	yes
Sulfate-S	mg/L	224	175	242	yes

Date Acquired: October 26, 2021

Electrical Conductivity	dS/m	32.0	26.80	35.20	yes
Calcium	mg/L	246	226.9	261.1	yes
Magnesium	mg/L	101	91.0	104.8	yes
Sodium	mg/L	255	229	264	yes
Potassium	mg/L	252	230.7	265.5	yes
Chloride	mg/L	2150	1852	2229	yes
Sulfate-S	mg/L	149	137	158	yes

Date Acquired: October 26, 2021

Soil Acidity

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Quality Control

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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6206
Project Name: Stage 2 PSI
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
AFE: 21SR0061
OI Customer PR210-Drilling and
GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Soil Acidity

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
pH	pH	6.5	6.3	6.9	yes
Date Acquired:	October 28, 2021				

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	ng	0	-10	10	yes
Date Acquired:	October 15, 2021				

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	mg/kg	92	70	130	yes
Date Acquired:	October 27, 2021				

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Methodology and Notes

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Attn: Project Coordinator
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Company: SynergyAspen

Project ID: PAR6206
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Proj. Acct. code:
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GL Account: 9235.10
Approver Code: W09484

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Dec 1, 2021
Report Number: 2699293

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Oct 15, 2021	Element Calgary
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Oct 27, 2021	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Oct 15, 2021	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Oct 27, 2021	Element Calgary
Metals ICP (Hot Block) in soil	EPA	*	Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements, October 1999, 200.2	Oct 27, 2021	Element Edmonton - Roper Road
Metals ICP (Hot Block) in soil	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Oct 27, 2021	Element Edmonton - Roper Road
PAH - Soil	AEP		Index of Additive Cancer Risk (IACR), IACR	Oct 29, 2021	Element Calgary
PAH - Soil	US EPA	*	Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, 8270	Oct 29, 2021	Element Calgary
Particle Size Analysis - GS	Carter	*	Hydrometer Method, 55.3	Nov 1, 2021	Element Edmonton - Roper Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Oct 28, 2021	Element Edmonton - Roper Road
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Oct 26, 2021	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Oct 26, 2021	Element Edmonton - Roper Road
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Oct 15, 2021	Element Calgary
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Oct 27, 2021	Element Calgary

** Reference Method Modified*

References

AEP	Alberta Tier 1 Soil and Groundwater Remediation Guidelines
APHA	Standard Methods for the Examination of Water and Wastewater

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Methodology and Notes

Bill To:	Paramount Resources Ltd 2328 Clarke St. Port Moody, BC, Canada V3H 1Y8	Project ID:	PAR6206	Lot ID:	**1525504**
		Project Name:	Stage 2 PSI	Control Number:	
		Project Location:	I-02	Date Received:	Oct 6, 2021
		LSD:	I-02	Date Reported:	Dec 1, 2021
		P.O.:		Report Number:	2699293
Attn:	Project Coordinator	Proj. Acct. code:			
Sampled By:	Jack Common	AFE:	21SR0061		
Company:	SynergyAspen	OI Customer	PR210-Drilling and		
		GL Account:	9235.10		
		Approver Code:	W09484		

Carter	Soil Sampling and Methods of Analysis.
CCME	Canadian Council of Ministers of the Environment
EPA	Environmental Protection Agency Test Methods - US
McKeague	Manual on Soil Sampling and Methods of Analysis
US EPA	US Environmental Protection Agency Test Methods

Comments:

- Nov 10, 2021 - Sample 19 was received in a plastic bag which does not meet the sample requirements for F2-F4 hydrocarbon as specified by the reference method.
- Dec 01, 2021 - Report was issued to include changes to the legal location and project ID as requested by Patricia Stebbing on December 01, 2021. Previous report 2682177.

Please direct any inquiries regarding this report to our Client Services group.
Results relate only to samples as submitted.
The test report shall not be reproduced except in full, without the written approval of the laboratory.

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Report Transmission Cover Page

Bill To: Paramount Resources Ltd
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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Contact	Company	Address
Andrew Bergen	**SynergyAspen Environmental**	9904 106 Street Fort St. John, BC null Phone: (111) 222-3333 Fax: Email: abergen@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COA
Email - Merge Reports	PDF	COC / COA
Email - Merge Reports	PDF	COC / Test Report
Email - Single Report	SynergyAspen Custom Excel	Test Report

Contact	Company	Address
Element Invoicing	**Paramount Resources Ltd**	7217 Roper Road Edmonton, AB T6B 3J4 Phone: (780) 438-5522 Fax: Email: invoicing.edmonton@element.com

Delivery	Format	Deliverables
Post	PDF	COC / Invoice

Contact	Company	Address
Lori Johnson	**SynergyAspen Environmental**	9904 106 Street Fort St John, BC V1J 1V8 Phone: (250) 785-1030 Fax: (250) 785-1034 Email: ljohnson@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COA
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR

Contact	Company	Address
Marsha Pereira	**SynergyAspen Environmental**	9904 106 Street Fort St. John, BC null Phone: (250) 785-1030 Fax: Email: mpereira@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COA
Email - Merge Reports	PDF	COC / COA
Email - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR

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Report Transmission Cover Page

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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

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OI Customer PR210-Drilling and

Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
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Contact	Company	Address
Project Coordinator	**SynergyAspen Environmental**	2328 Clarke St. Port Moody, BC V3H 1Y8 Phone: (604) 931-1026 Fax: (604) 931-1046 Email: projectcoordinator@synergyaspen.ca

Delivery	Format	Deliverables
Email - Multiple Reports By Lot	PDF	COC / Invoice
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COA
Email - Single Report	PDF	COC / COA
Email - Single Report	PDF	COC / Test Report
Email - Single Report	PDF	COR

Contact	Company	Address
Tanya Allen	**SynergyAspen Environmental**	2328 Clarke St. Port Moody, BC V3H 1Y8 Phone: (604) 931-1026 Fax: (604) 931-1046 Email: tallen@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COA
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report

Notes To Clients:

- Jan 19, 2022 - Sample 21, 24: Surrogate Nitrobenzene-d5 assigned to PAH method does not meet acceptance criteria (50-140 %) due to possible matrix interference. This interference may affect Naphthalene due to non-target compound interference. Data for Naphthalene should be qualified.
- Jan 26, 2022 - Report was issued to include additional services requested by Marsha Pereira of SynergyAspen on January 25, 2022:
  ABT1SAL-S service requested on sample(s) 14, 20.
  AL01S service requested on sample(s) 18.
  FUSBa service requested on sample(s) 8, 18, 21, 24.
  CCMEC service requested on sample(s) 7, 14, 20.
  Previous report 2710757.
- Jan 27, 2022 - 1548366-1: the repeated result for toluene analysis did not differ significantly from the original; it is within expected precision of the test.
- Feb 01, 2022 - Sample 18: the repeated result for BTEX, F1 analysis did not differ significantly from the original; it is within expected precision of the test.
- Feb 06, 2022 - Report was reissued to include additional analysis requested by Marsha Pereira of SynergyAspen Environmental on February 6, 2022:
  EXBA service requested on sample(s) 8, 18, 21, 24.
  Previous report 2713623.

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Analytical Report

Bill To: Paramount Resources Ltd
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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
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Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Reference Number	1547090-3	1547090-6	1547090-8
Sample Date	Jan 12, 2022	Jan 12, 2022	Jan 12, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-11-03 / 1.2 - 1.4	PAR6206 / BH22-11-06 / 3.1 - 3.3	PAR6206 / BH22-11-08 / 5.1 - 5.3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.38	0.31	0.86	0.01
SAR	Saturated Paste		0.7	0.8	1.2	
% Saturation		%	58	119	62	
Calcium	Saturated Paste	mg/kg	35.2	43.3	65.9	
Magnesium	Saturated Paste	mg/kg	7.0	9.7	14.8	
Sodium	Saturated Paste	mg/kg	13	26	32	
Potassium	Saturated Paste	mg/kg	2	5	6	
Chloride	Saturated Paste	mg/L	11	9	30	3
Chloride	Saturated Paste	mg/kg	6	10	18	
Sulfate (SO4)	Saturated Paste	mg/kg	40.9	65.0	238	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	6.5	7.1	7.4	

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Reference Number	1547090-6	1547090-7	1547090-8
Sample Date	Jan 12, 2022	Jan 12, 2022	Jan 12, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-11-06 / 3.1 - 3.3	PAR6206 / BH22-11-07 / 4.1 - 4.3	PAR6206 / BH22-11-08 / 5.1 - 5.3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	0.008	0.572	0.061	0.005
Toluene	Dry Weight	mg/kg	<0.02	1.02	0.20	0.02
Ethylbenzene	Dry Weight	mg/kg	0.008	2.17	0.428	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	5.15	1.14	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	87	37	10
F1 -BTEX	Dry Weight	mg/kg	<10	78	35	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		18-Jan-22	26-Jan-22	18-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	337	42	25
F3c C16-C34	Dry Weight	mg/kg	58	1440	214	50
F4c C34-C50	Dry Weight	mg/kg	<100	413	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	698	<100	100
% C50+		%	<5	7.3	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	22.80	24.40	18.60	

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Analytical Report

Bill To: Paramount Resources Ltd
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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Reference Number	1547090-6	1547090-8	1547090-9
Sample Date	Jan 12, 2022	Jan 12, 2022	Jan 12, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-11-06 / 3.1 - 3.3	PAR6206 / BH22-11-08 / 5.1 - 5.3	PAR6206 / BH22-11-09 / 3.1-3.3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	<0.05	0.06	<0.05	0.05
Antimony	Strong Acid Extractable	mg/kg	0.6	0.4	0.5	0.2
Arsenic	Strong Acid Extractable	mg/kg	10.6	14.7	9.6	0.2
Barium	Strong Acid Extractable	mg/kg	249	831	232	1
Beryllium	Strong Acid Extractable	mg/kg	0.5	0.4	0.5	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.51	0.46	0.47	0.01
Chromium	Strong Acid Extractable	mg/kg	21.5	13.6	16.9	0.5
Cobalt	Strong Acid Extractable	mg/kg	9.5	10.8	8.6	0.1
Copper	Strong Acid Extractable	mg/kg	22.3	22.0	22.3	1
Lead	Strong Acid Extractable	mg/kg	11.2	10.3	10.6	0.1
Mercury	Strong Acid Extractable	mg/kg	0.06	0.07	0.06	0.05
Molybdenum	Strong Acid Extractable	mg/kg	2.6	2.7	2.2	1
Nickel	Strong Acid Extractable	mg/kg	29.3	24.7	26.4	0.5
Selenium	Strong Acid Extractable	mg/kg	0.6	0.9	0.6	0.3
Silver	Strong Acid Extractable	mg/kg	0.2	0.2	0.2	0.1
Thallium	Strong Acid Extractable	mg/kg	0.21	0.16	0.19	0.05
Tin	Strong Acid Extractable	mg/kg	<1.0	<1.0	<1.0	1
Uranium	Strong Acid Extractable	mg/kg	1.2	1.6	1.1	0.5
Vanadium	Strong Acid Extractable	mg/kg	27.5	19.3	24.1	0.1
Zinc	Strong Acid Extractable	mg/kg	95	103	93	1

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Analytical Report

Bill To: Paramount Resources Ltd
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Port Moody, BC, Canada
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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Reference Number	1547090-8	1547090-18	1547090-21
Sample Date	Jan 12, 2022	Jan 12, 2022	Jan 12, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-11-08 / 5.1 - 5.3	PAR6206 / BH22-13-02 / 0.7 - 0.9	PAR6206 / BH22-13-05 / 2.5 - 2.7
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	16.2	104	32.1	0.2
Barium	Fusion	mg/kg	2580	2770	8140	40

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Bill To: Paramount Resources Ltd
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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Reference Number	1547090-9	1547090-13	1547090-14
Sample Date	Jan 12, 2022	Jan 12, 2022	Jan 12, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-11-09 / 3.1-3.3	PAR6206 / BH22-12-04 / 1.7 - 1.9	PAR6206 / BH22-12-05 / 2.5 - 2.7
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.41	0.61	0.64	0.01
SAR	Saturated Paste		1.1	0.3	1.2	
% Saturation		%	67	71	64	
Calcium	Saturated Paste	mg/kg	33.8	64.6	50.3	
Magnesium	Saturated Paste	mg/kg	7.6	13.9	10.5	
Sodium	Saturated Paste	mg/kg	23	9	28	
Potassium	Saturated Paste	mg/kg	3	4	3	
Chloride	Saturated Paste	mg/L	12	8	7	3
Chloride	Saturated Paste	mg/kg	8	6	4	
Sulfate (SO4)	Saturated Paste	mg/kg	55.7	157	173	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.5	7.4	7.8	
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	0.011	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	0.016	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		18-Jan-22	18-Jan-22	26-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	69	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	22.70	20.30	20.70	

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Analytical Report

Bill To: Paramount Resources Ltd
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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Reference Number	1547090-13	1547090-15	1547090-18
Sample Date	Jan 12, 2022	Jan 12, 2022	Jan 12, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-12-04 / 1.7 - 1.9	PAR6206 / BH22-12-06 / 3.1 - 3.3	PAR6206 / BH22-13-02 / 0.7 - 0.9
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	<0.05	0.07	0.11	0.05
Antimony	Strong Acid Extractable	mg/kg	0.5	0.5	0.6	0.2
Arsenic	Strong Acid Extractable	mg/kg	10.7	12.5	8.3	0.2
Barium	Strong Acid Extractable	mg/kg	291	267	1620	1
Beryllium	Strong Acid Extractable	mg/kg	0.5	0.5	0.5	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.49	0.77	0.38	0.01
Chromium	Strong Acid Extractable	mg/kg	16.9	14.6	20.0	0.5
Cobalt	Strong Acid Extractable	mg/kg	8.7	10.9	8.6	0.1
Copper	Strong Acid Extractable	mg/kg	23.3	26.7	19.6	1
Lead	Strong Acid Extractable	mg/kg	11.3	13.0	10.5	0.1
Mercury	Strong Acid Extractable	mg/kg	0.06	0.07	0.09	0.05
Molybdenum	Strong Acid Extractable	mg/kg	2.5	3.4	1.6	1
Nickel	Strong Acid Extractable	mg/kg	26.7	29.9	22.6	0.5
Selenium	Strong Acid Extractable	mg/kg	0.8	1.4	0.5	0.3
Silver	Strong Acid Extractable	mg/kg	0.2	0.3	0.1	0.1
Thallium	Strong Acid Extractable	mg/kg	0.21	0.20	0.12	0.05
Tin	Strong Acid Extractable	mg/kg	<1.0	<1.0	<1.0	1
Uranium	Strong Acid Extractable	mg/kg	1.3	1.9	0.8	0.5
Vanadium	Strong Acid Extractable	mg/kg	23.3	22.5	27.8	0.1
Zinc	Strong Acid Extractable	mg/kg	92	114	81	1

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Analytical Report

Bill To: Paramount Resources Ltd
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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Reference Number	1547090-15	1547090-18	1547090-20
Sample Date	Jan 12, 2022	Jan 12, 2022	Jan 12, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-12-06 / 3.1 - 3.3	PAR6206 / BH22-13-02 / 0.7 - 0.9	PAR6206 / BH22-13-04 / 1.7 - 1.9
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	1.43	0.76	0.62	0.01
SAR	Saturated Paste		4.3	0.5	3.3	
% Saturation		%	63	64	54	
Calcium	Saturated Paste	mg/kg	64.2	76.9	22.5	
Magnesium	Saturated Paste	mg/kg	16.2	13.3	4.8	
Sodium	Saturated Paste	mg/kg	119	14	49	
Potassium	Saturated Paste	mg/kg	7	4	2	
Chloride	Saturated Paste	mg/L	<20	15	17	3
Chloride	Saturated Paste	mg/kg	<13	10	9	
Sulfate (SO4)	Saturated Paste	mg/kg	345	178	85.5	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.6	7.2	7.6	
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	0.013	0.008	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	0.011	0.063	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	0.14	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		18-Jan-22	18-Jan-22	26-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	44	156	<25	25
F3c C16-C34	Dry Weight	mg/kg	234	831	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	239	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	309	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	20.30	32.80	23.30	

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Analytical Report

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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Reference Number	1547090-16
Sample Date	Jan 12, 2022
Sample Time	NA
Sample Location	
Sample Description	PAR6206 / BH22-12-07 / 4.1 - 4.3
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay Loam			
Sand	50 µm - 2 mm	% by weight	20			0.1
Silt	2 µm - 50 µm	% by weight	50			0.1
Clay	<2 µm	% by weight	30			0.1

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Analytical Report

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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Reference Number	1547090-21	1547090-22	1547090-24
Sample Date	Jan 12, 2022	Jan 12, 2022	Jan 12, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-13-05 / 2.5 - 2.7	PAR6206 / BH22-13-06 / 3.1 - 3.3	PAR6206 / BH22-13-08 / 2.5-2.7
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	1.40	2.94	1.10	0.01
SAR	Saturated Paste		10.0	2.4	10.4	
% Saturation		%	55	81	62	
Calcium	Saturated Paste	mg/kg	24.8	402	16.4	
Magnesium	Saturated Paste	mg/kg	5.4	81.5	3.6	
Sodium	Saturated Paste	mg/kg	157	183	141	
Potassium	Saturated Paste	mg/kg	3	13	2	
Chloride	Saturated Paste	mg/L	24	19	26	3
Chloride	Saturated Paste	mg/kg	13	15	16	
Sulfate (SO4)	Saturated Paste	mg/kg	277	1520	179	
TGR	Saturated Paste	T/ac	0.2	<0.1	0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.8	7.6	7.7	
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	1.00	<0.005	0.980	0.005
Toluene	Dry Weight	mg/kg	2.50	<0.02	2.70	0.02
Ethylbenzene	Dry Weight	mg/kg	2.52	0.006	2.09	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	7.23	<0.03	5.59	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	184	<10	151	10
F1 -BTEX	Dry Weight	mg/kg	171	<10	140	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		18-Jan-22	18-Jan-22	18-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	889	<25	622	25
F3c C16-C34	Dry Weight	mg/kg	3560	123	2690	50
F4c C34-C50	Dry Weight	mg/kg	1210	<100	963	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	1850	<100	1460	100
% C50+		%	6.5	<5	6.7	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	33.10	18.00	32.40	

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Analytical Report

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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Reference Number	1547090-21	1547090-24
Sample Date	Jan 12, 2022	Jan 12, 2022
Sample Time	NA	NA
Sample Location		
Sample Description	PAR6206 / BH22-13-05 / 2.5 - 2.7	PAR6206 / BH22-13-08 / 2.5-2.7
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	0.07	0.08		0.05
Antimony	Strong Acid Extractable	mg/kg	0.6	0.6		0.2
Arsenic	Strong Acid Extractable	mg/kg	10.6	10.7		0.2
Barium	Strong Acid Extractable	mg/kg	1940	2020		1
Beryllium	Strong Acid Extractable	mg/kg	0.5	0.5		0.1
Cadmium	Strong Acid Extractable	mg/kg	0.47	0.48		0.01
Chromium	Strong Acid Extractable	mg/kg	23.7	21.0		0.5
Cobalt	Strong Acid Extractable	mg/kg	10.1	16.9		0.1
Copper	Strong Acid Extractable	mg/kg	27.1	28.5		1
Lead	Strong Acid Extractable	mg/kg	13.8	13.3		0.1
Mercury	Strong Acid Extractable	mg/kg	0.13	0.12		0.05
Molybdenum	Strong Acid Extractable	mg/kg	3.1	3.4		1
Nickel	Strong Acid Extractable	mg/kg	31.2	28.5		0.5
Selenium	Strong Acid Extractable	mg/kg	0.6	0.7		0.3
Silver	Strong Acid Extractable	mg/kg	0.2	0.2		0.1
Thallium	Strong Acid Extractable	mg/kg	0.19	0.19		0.05
Tin	Strong Acid Extractable	mg/kg	<1.0	<1.0		1
Uranium	Strong Acid Extractable	mg/kg	1.2	1.2		0.5
Vanadium	Strong Acid Extractable	mg/kg	25.4	25.6		0.1
Zinc	Strong Acid Extractable	mg/kg	94	96		1
Polycyclic Aromatic Hydrocarbons - Soil						
Naphthalene	Dry Weight	mg/kg	0.300	0.489		0.010
Acenaphthylene	Dry Weight	mg/kg	<0.05	<0.05		0.05
Acenaphthene	Dry Weight	mg/kg	<0.05	<0.05		0.05
Fluorene	Dry Weight	mg/kg	0.43	0.65		0.05
Phenanthrene	Dry Weight	mg/kg	0.77	1.15		0.01
Anthracene	Dry Weight	mg/kg	<0.003	<0.003		0.003
Fluoranthene	Dry Weight	mg/kg	0.034	0.052		0.010
Pyrene	Dry Weight	mg/kg	0.072	0.102		0.010
Benzo(a)anthracene	Dry Weight	mg/kg	<0.01	0.01		0.01
Chrysene	Dry Weight	mg/kg	0.06	0.09		0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	0.07	0.09		0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05	<0.05		0.05
Benzo(a)pyrene	Dry Weight	mg/kg	<0.05	<0.05		0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05	<0.05		0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05	<0.05		0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	0.10	0.15		0.05
CB(a)P	B(a)P Total Potency	mg/kg	0.024	0.040		0.001

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Analytical Report

Bill To: Paramount Resources Ltd
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Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Reference Number	1547090-21	1547090-24
Sample Date	Jan 12, 2022	Jan 12, 2022
Sample Time	NA	NA
Sample Location		
Sample Description	PAR6206 / BH22-13-05 / 2.5 - 2.7	PAR6206 / BH22-13-08 / 2.5-2.7
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Soil - Continued						
	Equivalents					
IACR_Coarse	Index of Additive Cancer Risk		0.012	0.019		0.001
IACR_Fine	Index of Additive Cancer Risk		0.024	0.038		0.001
PAH - Soil - Surrogate Recovery						
Nitrobenzene-d5	PAH - Surrogate	%	>190	>190		50-140
2-Fluorobiphenyl	PAH - Surrogate	%	87	88		50-140
p-Terphenyl-d14	PAH - Surrogate	%	130	128		50-140

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Reference Number	1547090-24
Sample Date	Jan 12, 2022
Sample Time	NA
Sample Location	
Sample Description	PAR6206 / BH22-13-08 / 2.5-2.7
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	35.6			0.2
Barium	Fusion	mg/kg	10900			40

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Date Received: Jan 15, 2022
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Reference Number	1547090-25
Sample Date	Jan 12, 2022
Sample Time	NA
Sample Location	
Sample Description	PAR6206 / BH22-13-02(2) / 0.7-0.9
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	0.008			0.005
Toluene	Dry Weight	mg/kg	0.02			0.02
Ethylbenzene	Dry Weight	mg/kg	0.064			0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	0.15			0.03
Methanol Field Preservation			Yes			
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	10			10
F1 -BTEX	Dry Weight	mg/kg	<10			10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		08-Feb-22			
F2c C10-C16	Dry Weight	mg/kg	251			25
F3c C16-C34	Dry Weight	mg/kg	1330			50
F4c C34-C50	Dry Weight	mg/kg	330			100
F4HTGCc C34-C50+	Dry Weight	mg/kg	571			100
% C50+		%	6.9			
Silica Gel Cleanup						
Silica Gel Cleanup			Done			
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	32.80			

Approved by:

Anthony Neumann, MSc
General Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
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Barite Soil Analysis

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
Barium	mg/L	0.00159866	-0	0		yes
Date Acquired:	January 27, 2022					
Client Sample Replicates	**Units**	**Replicate 1**	**Replicate 2**	**% RSD Criteria**	**Absolute Criteria**	**Passed QC**
Barium	mg/kg	2580	2830	10	5	yes
Date Acquired:	January 27, 2022					
Control Sample	**Units**	**Measured**	**Lower Limit**	**Upper Limit**		**Passed QC**
Barium	mg/kg	7.27	5.10	8.70		yes
Date Acquired:	February 07, 2022					
Barium	mg/kg	0.10	0.09	0.11		yes
Date Acquired:	February 07, 2022					
Barium	mg/kg	10400	7573	12007		yes
Date Acquired:	January 27, 2022					

Extractable Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
F2c C10-C16	µg/mL	0	-10	10		yes
F3c C16-C34	µg/mL	0	-30	30		yes
F4c C34-C50	µg/mL	0	-20	20		yes
F4HTGCc C34-C50+	µg/mL	0	-20	20		yes
Date Acquired:	January 18, 2022					
Calibration Check	**Units**	**% Recovery**	**Lower Limit**	**Upper Limit**		**Passed QC**
F2c C10-C16	µg/mL	107.08	80	120		yes
F3c C16-C34	µg/mL	107.34	80	120		yes
F4c C34-C50	µg/mL	102.00	80	120		yes
F4HTGCc C34-C50+	µg/mL	95.80	80	120		yes
Date Acquired:	January 18, 2022					
Client Sample Replicates	**Units**	**Replicate 1**	**Replicate 2**	**% RSD Criteria**	**Absolute Criteria**	**Passed QC**
F2c C10-C16	mg/kg	889	577	50	10	yes
F3c C16-C34	mg/kg	3560	2280	50	10	yes
F4c C34-C50	mg/kg	1210	777	50	10	yes
F4HTGCc C34-C50+	mg/kg	1850	1200	50	10	yes
Date Acquired:	January 18, 2022					
Matrix Spike	**Units**	**% Recovery**	**Lower Limit**	**Upper Limit**		**Passed QC**
F2c C10-C16	mg/kg	104	70	130		yes
F3c C16-C34	mg/kg	108	70	130		yes
F4c C34-C50	mg/kg	100	70	130		yes
F4HTGCc C34-C50+	mg/kg	98	70	130		yes
Date Acquired:	January 18, 2022					

Metals Strong Acid Digestion

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC

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Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Metals Strong Acid Digestion

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Boron	mg/L	-4.57538e-005	-0.05	0.05	yes
Antimony	µg/L	0.00599648	-0.1	0.2	yes
Arsenic	µg/L	0.000203733	-0.2	0.2	yes
Barium	µg/L	0.0986263	-1	1	yes
Beryllium	µg/L	-0.012029	-0.1	0.1	yes
Cadmium	µg/L	0.00049666	-0.01	0.01	yes
Chromium	µg/L	0.0297112	-0.5	0.5	yes
Cobalt	µg/L	0.00514194	-0.1	0.1	yes
Copper	µg/L	0.0344382	-0.6	1.2	yes
Lead	µg/L	0.00593149	-5.0	5.0	yes
Mercury	µg/L	0.000922514	-0.04	0.04	yes
Molybdenum	µg/L	-0.0023545	-1.0	1.0	yes
Nickel	µg/L	0.00189342	-0.4	0.7	yes
Selenium	µg/L	0.00694937	-0.30	0.30	yes
Silver	µg/L	0.0033645	-0.09	0.14	yes
Thallium	µg/L	-0.00572306	-0.04	0.04	yes
Tin	µg/L	-0.0322041	-0.4	0.4	yes
Uranium	µg/L	0.00869109	-0.5	0.5	yes
Vanadium	µg/L	-0.0289533	-0.1	0.1	yes
Zinc	µg/L	-0.0131582	-1	1	yes

Date Acquired: January 19, 2022

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Antimony	mg/kg	2.4	2.5	20	0.4	yes
Arsenic	mg/kg	74.6	71.2	20	0.4	yes
Barium	mg/kg	508	502	20	2	yes
Beryllium	mg/kg	2.3	2.2	20	0.2	yes
Cadmium	mg/kg	0.11	0.10	20	0.02	yes
Chromium	mg/kg	98.0	96.3	20	1.1	yes
Cobalt	mg/kg	40.8	38.3	20	0.2	yes
Copper	mg/kg	12.3	12.4	20	2.2	yes
Lead	mg/kg	37.2	40.1	20	0.2	yes
Mercury	mg/kg	0.05	0.05	20	0.05	yes
Molybdenum	mg/kg	9.8	9.9	20	2.2	yes
Nickel	mg/kg	69.8	65.3	20	1.1	yes
Selenium	mg/kg	0.9	0.8	20	0.66	yes
Silver	mg/kg	<0.10	<0.10	20	0.22	yes
Thallium	mg/kg	0.08	0.08	20	0.11	yes
Tin	mg/kg	<1.0	<1.0	20	2.2	yes
Uranium	mg/kg	2.4	2.4	20	1.1	yes
Vanadium	mg/kg	673	651	20	0.2	yes
Zinc	mg/kg	370	357	20	2	yes

Date Acquired: January 19, 2022

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Antimony	mg/kg	39.4	37.6	42.4	yes

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Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

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Project Location: I-02
LSD: I-02
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Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
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Metals Strong Acid Digestion - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Arsenic	mg/kg	38.0	36.3	43.9	yes
Barium	mg/kg	194	188	212	yes
Beryllium	mg/kg	19.0	17.4	22.2	yes
Cadmium	mg/kg	2.02	1.88	2.28	yes
Chromium	mg/kg	97.8	93.2	107.0	yes
Cobalt	mg/kg	19.5	18.4	21.4	yes
Copper	mg/kg	200	186.6	216.6	yes
Lead	mg/kg	19.1	18.3	21.3	yes
Mercury	mg/kg	2.89	2.64	3.36	yes
Molybdenum	mg/kg	191	185.1	222.3	yes
Nickel	mg/kg	98.0	92.4	106.2	yes
Selenium	mg/kg	40.7	35.20	44.20	yes
Silver	mg/kg	19.4	18.20	22.40	yes
Thallium	mg/kg	9.66	9.02	10.82	yes
Tin	mg/kg	194	191.2	215.2	yes
Uranium	mg/kg	99.2	86.0	116.0	yes
Vanadium	mg/kg	19.5	18.0	21.6	yes
Zinc	mg/kg	196	186	212	yes
Date Acquired:	January 19, 2022				
Antimony	mg/kg	3.5	2.8	4.3	yes
Arsenic	mg/kg	4.1	3.1	4.7	yes
Barium	mg/kg	95	81	121	yes
Beryllium	mg/kg	0.3	0.2	0.4	yes
Cadmium	mg/kg	0.87	0.71	1.13	yes
Chromium	mg/kg	75.9	62.1	93.3	yes
Cobalt	mg/kg	6.0	5.1	7.5	yes
Copper	mg/kg	115	96.6	144.6	yes
Lead	mg/kg	260	200.6	318.8	yes
Mercury	mg/kg	0.06	0.05	0.08	yes
Molybdenum	mg/kg	<1.0	0.9	1.2	yes
Nickel	mg/kg	24.3	21.3	29.1	yes
Selenium	mg/kg	<0.3	0.26	0.32	yes
Silver	mg/kg	4.0	2.30	5.30	yes
Thallium	mg/kg	0.05	0.05	0.09	yes
Tin	mg/kg	10.1	7.9	12.1	yes
Uranium	mg/kg	<0.5	0.4	0.6	yes
Vanadium	mg/kg	27.3	21.9	33.9	yes
Zinc	mg/kg	302	261	391	yes
Date Acquired:	January 19, 2022				

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.005	0.005	yes
Toluene	ng	0	-0.06	0.06	yes

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Mono-Aromatic Hydrocarbons - Soil - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Ethylbenzene	ng	0	-0.030	0.030	yes
Total Xylenes (m,p,o)	ng	0	-0.09	0.09	yes
Styrene	ng	0	-0.030	0.030	yes
Date Acquired:	January 18, 2022				

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	93.62	80	120	yes
Toluene	ng	102.67	80	120	yes
Ethylbenzene	ng	96.01	80	120	yes
m,p-Xylene	ng	95.00	80	120	yes
Total Xylenes (m,p,o)	ng	96.68	80	120	yes
Styrene	ng	104.02	80	120	yes
Date Acquired:	January 18, 2022				

PAH - Soil - Surrogate Recovery

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Nitrobenzene-d5	%	119.809	50	140	yes
2-Fluorobiphenyl	%	108.195	50	140	yes
p-Terphenyl-d14	%	82.2524	50	140	yes
Date Acquired:	January 19, 2022				

Physical and Aggregate Properties

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Sand	% by weight	20	19	10	0	yes
Silt	% by weight	50	50	10	0	yes
Clay	% by weight	30	31	10	0	yes
Date Acquired:	January 19, 2022					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Sand	% by weight	27	15	35	yes
Silt	% by weight	41	32	54	yes
Clay	% by weight	32	24	40	yes
Date Acquired:	January 19, 2022				

Polycyclic Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Naphthalene	ng/mL	0	-0.010	0.010	yes
Acenaphthylene	ng/mL	0	-0.05	0.05	yes
Acenaphthene	ng/mL	0	-0.05	0.05	yes
Fluorene	ng/mL	0	-0.05	0.05	yes
Phenanthrene	ng/mL	0	-0.01	0.01	yes
Anthracene	ng/mL	0	-0.003	0.003	yes
Fluoranthene	ng/mL	0	-0.010	0.010	yes
Pyrene	ng/mL	0	-0.010	0.010	yes
Benzo(a)anthracene	ng/mL	0	-0.01	0.01	yes

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Polycyclic Aromatic Hydrocarbons - Soil - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chrysene	ng/mL	0	-0.05	0.05	yes
Benzo(b)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(b+j)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(k)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(a)pyrene	ng/mL	0	-0.05	0.05	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	0	-0.05	0.05	yes
Dibenzo(a,h)anthracene	ng/mL	0	-0.05	0.05	yes
Benzo(g,h,i)perylene	ng/mL	0	-0.05	0.05	yes
Date Acquired: January 19, 2022					

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Naphthalene	ng/mL	102.80	80	120	yes
Acenaphthylene	ng/mL	101.00	80	120	yes
Acenaphthene	ng/mL	101.20	80	120	yes
Fluorene	ng/mL	98.20	80	120	yes
Phenanthrene	ng/mL	96.80	80	120	yes
Anthracene	ng/mL	98.60	80	120	yes
Fluoranthene	ng/mL	99.60	80	120	yes
Pyrene	ng/mL	95.80	80	120	yes
Benzo(a)anthracene	ng/mL	102.40	80	120	yes
Chrysene	ng/mL	103.00	80	120	yes
Benzo(b)fluoranthene	ng/mL	101.40	80	120	yes
Benzo(k)fluoranthene	ng/mL	95.80	80	120	yes
Benzo(a)pyrene	ng/mL	98.40	80	120	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	96.20	80	120	yes
Dibenzo(a,h)anthracene	ng/mL	92.20	80	120	yes
Benzo(g,h,i)perylene	ng/mL	100.80	80	120	yes
Date Acquired: January 19, 2022					

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Naphthalene	mg/kg	<0.01	<0.01	50	0.020	yes
Acenaphthylene	mg/kg	<0.05	<0.05	50	0.10	yes
Acenaphthene	mg/kg	<0.05	<0.05	50	0.10	yes
Fluorene	mg/kg	<0.05	<0.05	50	0.10	yes
Phenanthrene	mg/kg	<0.01	<0.01	50	0.02	yes
Anthracene	mg/kg	<0.003	<0.003	50	0.006	yes
Fluoranthene	mg/kg	<0.01	<0.01	50	0.020	yes
Pyrene	mg/kg	<0.01	<0.01	50	0.020	yes
Benzo(a)anthracene	mg/kg	<0.01	<0.01	50	0.02	yes
Chrysene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(b)fluoranthene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(k)fluoranthene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(a)pyrene	mg/kg	<0.05	<0.05	50	0.10	yes
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.05	<0.05	50	0.10	yes
Dibenzo(a,h)anthracene	mg/kg	<0.05	<0.05	50	0.10	yes

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Quality Control

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Polycyclic Aromatic Hydrocarbons - Soil - Continued

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Benzo(g,h,i)perylene	mg/kg	<0.05	<0.05	50	0.10	yes
Date Acquired: January 19, 2022						

Salinity

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Calcium	mg/L	0.363078	-0.5	0.7	yes
Magnesium	mg/L	0.0813077	-0.2	0.2	yes
Sodium	mg/L	0.344452	-1	1	yes
Potassium	mg/L	0.0719893	-1.0	1.0	yes
Chloride	mg/L	2.6005	0	5	yes
Sulfate-S	mg/L	0.228233	-1	1	yes
Date Acquired: January 19, 2022					

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Electrical Conductivity	dS/m	5.12	5.09	20	0.03	yes
Calcium	mg/kg	364	358	20	0.6	yes
Magnesium	mg/kg	111	107	20	0.6	yes
Sodium	mg/kg	729	710	20	1	yes
Potassium	mg/kg	<8	7	20	1	yes
Chloride	mg/kg	7	8	15	3	yes
Sulfate-S	mg/kg	899	865	20	1.2	yes
Date Acquired: January 27, 2022						

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Electrical Conductivity	dS/m	3.00	2.20	4.00	yes
% Saturation	%	62	53	72	yes
Calcium	mg/L	705	534.6	888.6	yes
Magnesium	mg/L	106	82.9	138.1	yes
Sodium	mg/L	37	26	45	yes
Potassium	mg/L	14	10.0	16.0	yes
Chloride	mg/L	32	23	39	yes
Sulfate-S	mg/L	533	410	684	yes
Date Acquired: January 19, 2022					
Electrical Conductivity	dS/m	32.6	26.80	35.20	yes
Calcium	mg/L	248	226.9	261.1	yes
Magnesium	mg/L	99.9	91.0	104.8	yes
Sodium	mg/L	250	229	264	yes
Potassium	mg/L	250	230.7	265.5	yes
Chloride	mg/L	2060	1852	2229	yes
Sulfate-S	mg/L	152	137	158	yes
Date Acquired: January 19, 2022					

Soil Acidity

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC

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Quality Control

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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Soil Acidity

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
pH	pH	7.6	7.7	10	0.3	yes
Date Acquired:	January 19, 2022					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
pH	pH	6.8	6.5	7.1	yes
Date Acquired:	January 19, 2022				

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	ng	0	-10	10	yes
Date Acquired:	January 18, 2022				

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Methodology and Notes

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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Barium (Extractable) in soil (0.1 M CaCl2)	AENV		Analytical Method for Extractable Barium, FEB 2009	Feb 7, 2022	Element Edmonton - Roper Road
Barium (Fusion) in soil	ASTM	*	Standard Practice for Dissolution of Solid Waste by Lithium Metaborate Fusion, 2008., D 4503-08	Jan 27, 2022	Element Edmonton - Roper Road
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 18, 2022	Element Calgary
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 27, 2022	Element Calgary
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 28, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Jan 18, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Jan 27, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Jan 28, 2022	Element Calgary
Metals ICP (Hot Block) in soil	EPA	*	Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements, October 1999, 200.2	Jan 19, 2022	Element Edmonton - Roper Road
Metals ICP (Hot Block) in soil	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Jan 19, 2022	Element Edmonton - Roper Road
PAH - Soil	AEP		Index of Additive Cancer Risk (IACR), IACR	Jan 19, 2022	Element Calgary
PAH - Soil	US EPA	*	Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, 8270	Jan 19, 2022	Element Calgary
Particle Size Analysis - GS	Carter	*	Hydrometer Method, 55.3	Jan 19, 2022	Element Edmonton - Roper Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Jan 19, 2022	Element Edmonton - Roper Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Jan 27, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Jan 19, 2022	Element Edmonton - Roper Road

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Methodology and Notes

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Attn: Project Coordinator
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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
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Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547090**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 8, 2022
Report Number: 2717013

Method Name	Reference		Method	Date Analysis Started	Location
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Jan 27, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Jan 19, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Jan 27, 2022	Element Edmonton - Roper Road
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 18, 2022	Element Calgary
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 27, 2022	Element Calgary

** Reference Method Modified*

References

AENV	Alberta Environment, Soil Quality Guidelines for Barite
AEP	Alberta Tier 1 Soil and Groundwater Remediation Guidelines
APHA	Standard Methods for the Examination of Water and Wastewater
ASTM	Annual Book of ASTM Standards
Carter	Soil Sampling and Methods of Analysis.
CCME	Canadian Council of Ministers of the Environment
EPA	Environmental Protection Agency Test Methods - US
McKeague	Manual on Soil Sampling and Methods of Analysis
US EPA	US Environmental Protection Agency Test Methods

Comments:

- Jan 19, 2022 - Sample 21, 24: Surrogate Nitrobenzene-d5 assigned to PAH method does not meet acceptance criteria (50-140 %) due to possible matrix interference. This interference may affect Naphthalene due to non-target compound interference. Data for Naphthalene should be qualified.
- Jan 26, 2022 - Report was issued to include additional services requested by Marsha Pereira of SynergyAspen on January 25, 2022:
  ABT1SAL-S service requested on sample(s) 14, 20.
  AL01S service requested on sample(s) 18.
  FUSBa service requested on sample(s) 8, 18, 21, 24.
  CCMEC service requested on sample(s) 7, 14, 20.
  Previous report 2710757.
- Jan 27, 2022 - 1548366-1: the repeated result for toluene analysis did not differ significantly from the original; it is within expected precision of the test.
- Feb 01, 2022 - Sample 18: the repeated result for BTEX, F1 analysis did not differ significantly from the original; it is within expected precision of the test.
- Feb 06, 2022 - Report was reissued to include additional analysis requested by Marsha Pereira of SynergyAspen Environmental on February 6, 2022:
  EXBA service requested on sample(s) 8, 18, 21, 24.
  Previous report 2713623.

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Methodology and Notes

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Attn:	Project Coordinator
Sampled By:	Collin Batchelor
Company:	SynergyAspen Environmental

Project ID:	PAR6206
Project Name:	Stage 2 PSI-Supplemental
Project Location:	I-02
LSD:	I-02
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Lot ID:	**1547090**
Control Number:	
Date Received:	Jan 15, 2022
Date Reported:	Feb 8, 2022
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Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
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Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Contact	Company	Address
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Delivery	Format	Deliverables
Email - Merge Reports	PDF	COA
Email - Merge Reports	PDF	COC / COA
Email - Merge Reports	PDF	COC / Test Report
Email - Single Report	SynergyAspen Custom Excel	Test Report

Contact	Company	Address
Element Invoicing	**Paramount Resources Ltd**	7217 Roper Road Edmonton, AB T6B 3J4 Phone: (780) 438-5522 Fax: Email: invoicing.edmonton@element.com

Delivery	Format	Deliverables
Post	PDF	COC / Invoice

Contact	Company	Address
Lori Johnson	**SynergyAspen Environmental**	9904 106 Street Fort St John, BC V1J 1V8 Phone: (250) 785-1030 Fax: (250) 785-1034 Email: ljohnson@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COA
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR

Contact	Company	Address
Marsha Pereira	**SynergyAspen Environmental**	9904 106 Street Fort St. John, BC null Phone: (250) 785-1030 Fax: Email: mpereira@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COA
Email - Merge Reports	PDF	COC / COA
Email - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR

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Report Transmission Cover Page

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Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Contact	Company	Address
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Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
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Email - Single Report	PDF	COR

Contact	Company	Address
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Notes To Clients:

- Jan 19, 2022 - Sample 6: Surrogate Nitrobenzene-d5 assigned to PAH method does not meet acceptance criteria (50-140 %) due to possible matrix interference. This interference may affect Naphthalene due to non-target compound interference. Data for Naphthalene should be qualified.
- Jan 26, 2022 - Report was issued to include additional services requested by Marsha Pereria of SynergyAspen on January 25, 2022:
  ABT1SAL-S service requested on sample(s) 4, 5, 7.
  AL01S service requested on sample(s) 9, 11, 13, 23.
  FUSBa service requested on sample(s) 6.
  CCMEC service requested on sample(s) 4, 5, 8.
  Previous report 2710755.
- Feb 06, 2022 - Report was issued to include additional services requested by Marsha Pereira of SynergyAspen on February 6, 2022:
  EXBA service requested on sample(s) 6.
  Previous report 2713601.
- Feb 16, 2022 - Report was issued to include additional barium analysis on sample 7 as requested by Marsha Pereira of SynergyAspen on Feb.15, 2022/

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Analytical Report

Bill To: Paramount Resources Ltd
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Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
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Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-1	1547091-4	1547091-5
Sample Date	Jan 13, 2022	Jan 13, 2022	Jan 13, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-14-01 / 0.0 - 0.3	PAR6206 / BH22-14-04 / 1.7 - 1.9	PAR6206 / BH22-14-05 / 2.1 - 2.3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.32	0.43	0.65	0.01
SAR	Saturated Paste		0.1	0.4	3.4	
% Saturation		%	56	56	75	
Calcium	Saturated Paste	mg/kg	28.1	38.6	36.9	
Magnesium	Saturated Paste	mg/kg	5.1	8.0	6.2	
Sodium	Saturated Paste	mg/kg	2	7	74	
Potassium	Saturated Paste	mg/kg	<1	2	3	
Chloride	Saturated Paste	mg/L	10	14	22	3
Chloride	Saturated Paste	mg/kg	5	8	16	
Sulfate (SO4)	Saturated Paste	mg/kg	13	42.6	116	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.2	7.4	7.2	
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	0.012	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	0.010	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		18-Jan-22	26-Jan-22	26-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	64	61	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	7.6	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	32.50	24.00	23.70	

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Analytical Report

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Port Moody, BC, Canada
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Attn: Project Coordinator
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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-1	1547091-6	1547091-10
Sample Date	Jan 13, 2022	Jan 13, 2022	Jan 13, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-14-01 / 0.0 - 0.3	PAR6206 / BH22-14-06 / 2.7 - 2.9	PAR6206 / BH22-15-02 / 0.7 - 0.9
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	0.05	0.20	<0.05	0.05
Antimony	Strong Acid Extractable	mg/kg	0.5	0.8	0.5	0.2
Arsenic	Strong Acid Extractable	mg/kg	8.3	9.4	9.6	0.2
Barium	Strong Acid Extractable	mg/kg	383	1000	243	1
Beryllium	Strong Acid Extractable	mg/kg	0.5	0.5	0.6	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.36	0.47	0.41	0.01
Chromium	Strong Acid Extractable	mg/kg	17.0	25.9	17.7	0.5
Cobalt	Strong Acid Extractable	mg/kg	7.6	10.3	10.4	0.1
Copper	Strong Acid Extractable	mg/kg	16.8	42.0	21.5	1
Lead	Strong Acid Extractable	mg/kg	11.6	14.9	11.3	0.1
Mercury	Strong Acid Extractable	mg/kg	<0.05	0.20	0.06	0.05
Molybdenum	Strong Acid Extractable	mg/kg	1.5	2.3	2.1	1
Nickel	Strong Acid Extractable	mg/kg	22.2	26.1	26.5	0.5
Selenium	Strong Acid Extractable	mg/kg	0.4	0.8	0.4	0.3
Silver	Strong Acid Extractable	mg/kg	0.1	0.2	0.1	0.1
Thallium	Strong Acid Extractable	mg/kg	0.14	0.15	0.19	0.05
Tin	Strong Acid Extractable	mg/kg	<1.0	<1.0	<1.0	1
Uranium	Strong Acid Extractable	mg/kg	0.8	1.1	1.1	0.5
Vanadium	Strong Acid Extractable	mg/kg	25.2	28.1	25.3	0.1
Zinc	Strong Acid Extractable	mg/kg	76	93	81	1

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-6	1547091-7
Sample Date	Jan 13, 2022	Jan 13, 2022
Sample Time	NA	NA
Sample Location		
Sample Description	PAR6206 / BH22-14-06 / 2.7 - 2.9	PAR6206 / BH22-14-07 / 3.1 - 3.3
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	43.5	16.6		0.2
Barium	Fusion	mg/kg	22400	1460		40

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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-6	1547091-7	1547091-8
Sample Date	Jan 13, 2022	Jan 13, 2022	Jan 13, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-14-06 / 2.7 - 2.9	PAR6206 / BH22-14-07 / 3.1 - 3.3	PAR6206 / BH22-14-08 / 4.1 - 4.3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	0.918	0.025	<0.005	0.005
Toluene	Dry Weight	mg/kg	2.66	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	2.72	0.008	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	5.32	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	168	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	156	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		18-Jan-22	18-Jan-22	26-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	981	<25	46	25
F3c C16-C34	Dry Weight	mg/kg	3960	72	227	50
F4c C34-C50	Dry Weight	mg/kg	1300	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	2100	<100	<100	100
% C50+		%	7.3	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	33.20	20.60	19.70	

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V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-6	1547091-7	1547091-10
Sample Date	Jan 13, 2022	Jan 13, 2022	Jan 13, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-14-06 / 2.7 - 2.9	PAR6206 / BH22-14-07 / 3.1 - 3.3	PAR6206 / BH22-15-02 / 0.7 - 0.9
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	1.28	1.08	0.22	0.01
SAR	Saturated Paste		15.3	11.4	0.2	
% Saturation		%	74	48	79	
Calcium	Saturated Paste	mg/kg	15.5	15.3	22.5	
Magnesium	Saturated Paste	mg/kg	2.8	2.5	5.8	
Sodium	Saturated Paste	mg/kg	215	128	4	
Potassium	Saturated Paste	mg/kg	3	1	1	
Chloride	Saturated Paste	mg/L	43	34	7	3
Chloride	Saturated Paste	mg/kg	32	17	5	
Sulfate (SO4)	Saturated Paste	mg/kg	111	149	17	
TGR	Saturated Paste	T/ac	0.3	0.2	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.5	7.8	6.1	

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Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-6	1547091-12	1547091-17
Sample Date	Jan 13, 2022	Jan 13, 2022	Jan 13, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-14-06 / 2.7 - 2.9	PAR6206 / BH22-16-01 / 0.0 - 0.3	PAR6206 / BH22-17-02 / 0.7 - 0.9
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Soil						
Naphthalene	Dry Weight	mg/kg	0.548	<0.01	<0.01	0.010
Acenaphthylene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Acenaphthene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Fluorene	Dry Weight	mg/kg	1.03	<0.05	<0.05	0.05
Phenanthrene	Dry Weight	mg/kg	2.04	<0.01	<0.01	0.01
Anthracene	Dry Weight	mg/kg	<0.003	<0.003	<0.003	0.003
Fluoranthene	Dry Weight	mg/kg	0.074	<0.01	<0.01	0.010
Pyrene	Dry Weight	mg/kg	0.160	<0.01	<0.01	0.010
Benzo(a)anthracene	Dry Weight	mg/kg	0.02	<0.01	<0.01	0.01
Chrysene	Dry Weight	mg/kg	0.13	<0.05	<0.05	0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	0.11	<0.05	<0.05	0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(a)pyrene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05	<0.05	<0.05	0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	0.11	<0.05	<0.05	0.05
CB(a)P	B(a)P Total Potency Equivalents	mg/kg	0.041	<0.001	<0.001	0.001
IACR_Coarse	Index of Additive Cancer Risk		0.023	<0.001	<0.001	0.001
IACR_Fine	Index of Additive Cancer Risk		0.045	<0.001	<0.001	0.001
PAH - Soil - Surrogate Recovery						
Nitrobenzene-d5	PAH - Surrogate	%	>190	127	125	50-140
2-Fluorobiphenyl	PAH - Surrogate	%	73	102	100	50-140
p-Terphenyl-d14	PAH - Surrogate	%	121	122	116	50-140

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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-9	1547091-10	1547091-11
Sample Date	Jan 13, 2022	Jan 13, 2022	Jan 13, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-15-01 / 0.0 - 0.3	PAR6206 / BH22-15-02 / 0.7 - 0.9	PAR6206 / BH22-15-03 / 1.2 - 1.4
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Alcohol Screen - Soil						
Methanol	Dry Mass	µg/g	157	314	166	1.0
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	15.30	17.20	17.40	

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-10
Sample Date	Jan 13, 2022
Sample Time	NA
Sample Location	
Sample Description	PAR6206 / BH22-15-02 / 0.7 - 0.9
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Glycol Screen - Soil						
Ethylene Glycol	Dry Weight	mg/kg	<1			1
Propylene Glycol	Dry Weight	mg/kg	<1			1
Diethylene Glycol	Dry Weight	mg/kg	<1			1
Triethylene Glycol	Dry Weight	mg/kg	<1			1
Tetraethylene Glycol	Dry Weight	mg/kg	<1			1

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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-10	1547091-11	1547091-12
Sample Date	Jan 13, 2022	Jan 13, 2022	Jan 13, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-15-02 / 0.7 - 0.9	PAR6206 / BH22-15-03 / 1.2 - 1.4	PAR6206 / BH22-16-01 / 0.0 - 0.3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		18-Jan-22	18-Jan-22	18-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-11	1547091-12	1547091-14
Sample Date	Jan 13, 2022	Jan 13, 2022	Jan 13, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-15-03 / 1.2 - 1.4	PAR6206 / BH22-16-01 / 0.0 - 0.3	PAR6206 / BH22-16-03 / 1.2 - 1.4
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	<0.05	<0.05	<0.05	0.05
Antimony	Strong Acid Extractable	mg/kg	0.5	0.9	0.6	0.2
Arsenic	Strong Acid Extractable	mg/kg	9.4	9.7	9.9	0.2
Barium	Strong Acid Extractable	mg/kg	248	248	310	1
Beryllium	Strong Acid Extractable	mg/kg	0.5	0.6	0.5	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.37	0.35	0.39	0.01
Chromium	Strong Acid Extractable	mg/kg	22.6	18.3	15.4	0.5
Cobalt	Strong Acid Extractable	mg/kg	8.4	8.5	7.2	0.1
Copper	Strong Acid Extractable	mg/kg	20.8	20.9	19.9	1
Lead	Strong Acid Extractable	mg/kg	10.4	10.7	10.4	0.1
Mercury	Strong Acid Extractable	mg/kg	<0.05	0.05	0.05	0.05
Molybdenum	Strong Acid Extractable	mg/kg	1.8	1.8	2.8	1
Nickel	Strong Acid Extractable	mg/kg	27.9	26.8	24.7	0.5
Selenium	Strong Acid Extractable	mg/kg	0.4	0.4	0.5	0.3
Silver	Strong Acid Extractable	mg/kg	0.1	0.1	0.1	0.1
Thallium	Strong Acid Extractable	mg/kg	0.16	0.15	0.12	0.05
Tin	Strong Acid Extractable	mg/kg	<1.0	<1.0	<1.0	1
Uranium	Strong Acid Extractable	mg/kg	1.0	1.0	0.9	0.5
Vanadium	Strong Acid Extractable	mg/kg	25.7	25.9	24.1	0.1
Zinc	Strong Acid Extractable	mg/kg	81	82	81	1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.22	0.20	0.28	0.01
SAR	Saturated Paste		0.2	0.1	0.2	
% Saturation		%	71	60	54	
Calcium	Saturated Paste	mg/kg	22.5	18.8	21.8	
Magnesium	Saturated Paste	mg/kg	4.9	3.8	5.1	
Sodium	Saturated Paste	mg/kg	3	2	3	
Potassium	Saturated Paste	mg/kg	1	1	<1	
Chloride	Saturated Paste	mg/L	9	7	14	3
Chloride	Saturated Paste	mg/kg	6	4	7	
Sulfate (SO4)	Saturated Paste	mg/kg	8.1	5.2	17.4	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.4	6.9	7.4	

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Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-12	1547091-13	1547091-14
Sample Date	Jan 13, 2022	Jan 13, 2022	Jan 13, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-16-01 / 0.0 - 0.3	PAR6206 / BH22-16-02 / 0.7 - 0.9	PAR6206 / BH22-16-03 / 1.2 - 1.4
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	14.30	15.50	16.50	

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-13	1547091-23
Sample Date	Jan 13, 2022	Jan 13, 2022
Sample Time	NA	NA
Sample Location		
Sample Description	PAR6206 / BH22-16-02 / 0.7 - 0.9	PAR6206 / BH22-15-02(2) / 0.7 - 0.9
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Alcohol Screen - Soil						
Methanol	Dry Mass	µg/g	174	104		1.0

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Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
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Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-14	1547091-17	1547091-18
Sample Date	Jan 13, 2022	Jan 13, 2022	Jan 13, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-16-03 / 1.2 - 1.4	PAR6206 / BH22-17-02 / 0.7 - 0.9	PAR6206 / BH22-17-03 / 1.2 - 1.4
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		18-Jan-22	18-Jan-22	18-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-17	1547091-18	1547091-20
Sample Date	Jan 13, 2022	Jan 13, 2022	Jan 13, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / BH22-17-02 / 0.7 - 0.9	PAR6206 / BH22-17-03 / 1.2 - 1.4	PAR6206 / BH22-18-02 / 0.7 - 0.9
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	<0.05	<0.05	<0.05	0.05
Antimony	Strong Acid Extractable	mg/kg	0.6	0.5	0.7	0.2
Arsenic	Strong Acid Extractable	mg/kg	10.4	9.6	10.7	0.2
Barium	Strong Acid Extractable	mg/kg	301	215	257	1
Beryllium	Strong Acid Extractable	mg/kg	0.5	0.6	0.4	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.25	0.42	0.24	0.01
Chromium	Strong Acid Extractable	mg/kg	19.1	16.5	15.9	0.5
Cobalt	Strong Acid Extractable	mg/kg	7.2	8.5	7.5	0.1
Copper	Strong Acid Extractable	mg/kg	20.3	20.8	16.5	1
Lead	Strong Acid Extractable	mg/kg	10.7	10.1	10.8	0.1
Mercury	Strong Acid Extractable	mg/kg	0.05	<0.05	<0.05	0.05
Molybdenum	Strong Acid Extractable	mg/kg	1.6	2.2	1.5	1
Nickel	Strong Acid Extractable	mg/kg	28.1	25.7	23.5	0.5
Selenium	Strong Acid Extractable	mg/kg	0.4	0.5	0.5	0.3
Silver	Strong Acid Extractable	mg/kg	0.2	0.2	0.2	0.1
Thallium	Strong Acid Extractable	mg/kg	0.11	0.17	0.09	0.05
Tin	Strong Acid Extractable	mg/kg	<1.0	<1.0	<1.0	1
Uranium	Strong Acid Extractable	mg/kg	0.8	1.1	0.7	0.5
Vanadium	Strong Acid Extractable	mg/kg	25.1	23.8	24.5	0.1
Zinc	Strong Acid Extractable	mg/kg	79	78	82	1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.23	0.24	0.44	0.01
SAR	Saturated Paste		0.1	0.1	0.1	
% Saturation		%	50	54	47	
Calcium	Saturated Paste	mg/kg	18.0	19.5	28.9	
Magnesium	Saturated Paste	mg/kg	4.5	4.6	6.2	
Sodium	Saturated Paste	mg/kg	1	2	2	
Potassium	Saturated Paste	mg/kg	<1	<1	1	
Chloride	Saturated Paste	mg/L	6	5	5	3
Chloride	Saturated Paste	mg/kg	3	3	2	
Sulfate (SO4)	Saturated Paste	mg/kg	9.9	14	65.8	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.2	6.2	7.3	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	15.60	16.10	16.80	

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-20	1547091-21
Sample Date	Jan 13, 2022	Jan 13, 2022
Sample Time	NA	NA
Sample Location		
Sample Description	PAR6206 / BH22-18-02 / 0.7 - 0.9	PAR6206 / BH22-18-03 / 1.2 - 1.4
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005		0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02		0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005		0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03		0.03
Methanol Field Preservation			Yes	Yes		
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10		10
F1 -BTEX	Dry Weight	mg/kg	<10	<10		10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		18-Jan-22	18-Jan-22		
F2c C10-C16	Dry Weight	mg/kg	<25	<25		25
F3c C16-C34	Dry Weight	mg/kg	<50	<50		50
F4c C34-C50	Dry Weight	mg/kg	<100	<100		100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100		100
% C50+		%	<5	<5		
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done		

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-21
Sample Date	Jan 13, 2022
Sample Time	NA
Sample Location	
Sample Description	PAR6206 / BH22-18-03 / 1.2 - 1.4
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	0.09			0.05
Antimony	Strong Acid Extractable	mg/kg	0.2			0.2
Arsenic	Strong Acid Extractable	mg/kg	6.7			0.2
Barium	Strong Acid Extractable	mg/kg	284			1
Beryllium	Strong Acid Extractable	mg/kg	0.3			0.1
Cadmium	Strong Acid Extractable	mg/kg	1.20			0.01
Chromium	Strong Acid Extractable	mg/kg	16.7			0.5
Cobalt	Strong Acid Extractable	mg/kg	7.1			0.1
Copper	Strong Acid Extractable	mg/kg	7.7			1
Lead	Strong Acid Extractable	mg/kg	8.4			0.1
Mercury	Strong Acid Extractable	mg/kg	<0.05			0.05
Molybdenum	Strong Acid Extractable	mg/kg	1.2			1
Nickel	Strong Acid Extractable	mg/kg	14.4			0.5
Selenium	Strong Acid Extractable	mg/kg	0.3			0.3
Silver	Strong Acid Extractable	mg/kg	0.2			0.1
Thallium	Strong Acid Extractable	mg/kg	0.05			0.05
Tin	Strong Acid Extractable	mg/kg	<1.0			1
Uranium	Strong Acid Extractable	mg/kg	<0.5			0.5
Vanadium	Strong Acid Extractable	mg/kg	28.4			0.1
Zinc	Strong Acid Extractable	mg/kg	96			1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.22			0.01
SAR	Saturated Paste		0.3			
% Saturation		%	74			
Calcium	Saturated Paste	mg/kg	26.8			
Magnesium	Saturated Paste	mg/kg	4.9			
Sodium	Saturated Paste	mg/kg	5			
Potassium	Saturated Paste	mg/kg	2			
Chloride	Saturated Paste	mg/L	10			3
Chloride	Saturated Paste	mg/kg	7			
Sulfate (SO4)	Saturated Paste	mg/kg	30.2			
TGR	Saturated Paste	T/ac	<0.1			
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	6.6			

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number	1547091-21	1547091-23
Sample Date	Jan 13, 2022	Jan 13, 2022
Sample Time	NA	NA
Sample Location		
Sample Description	PAR6206 / BH22-18-03 / 1.2 - 1.4	PAR6206 / BH22-15-02(2) / 0.7 - 0.9
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	16.90	17.20		

Approved by:

Jimmy Tran
Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

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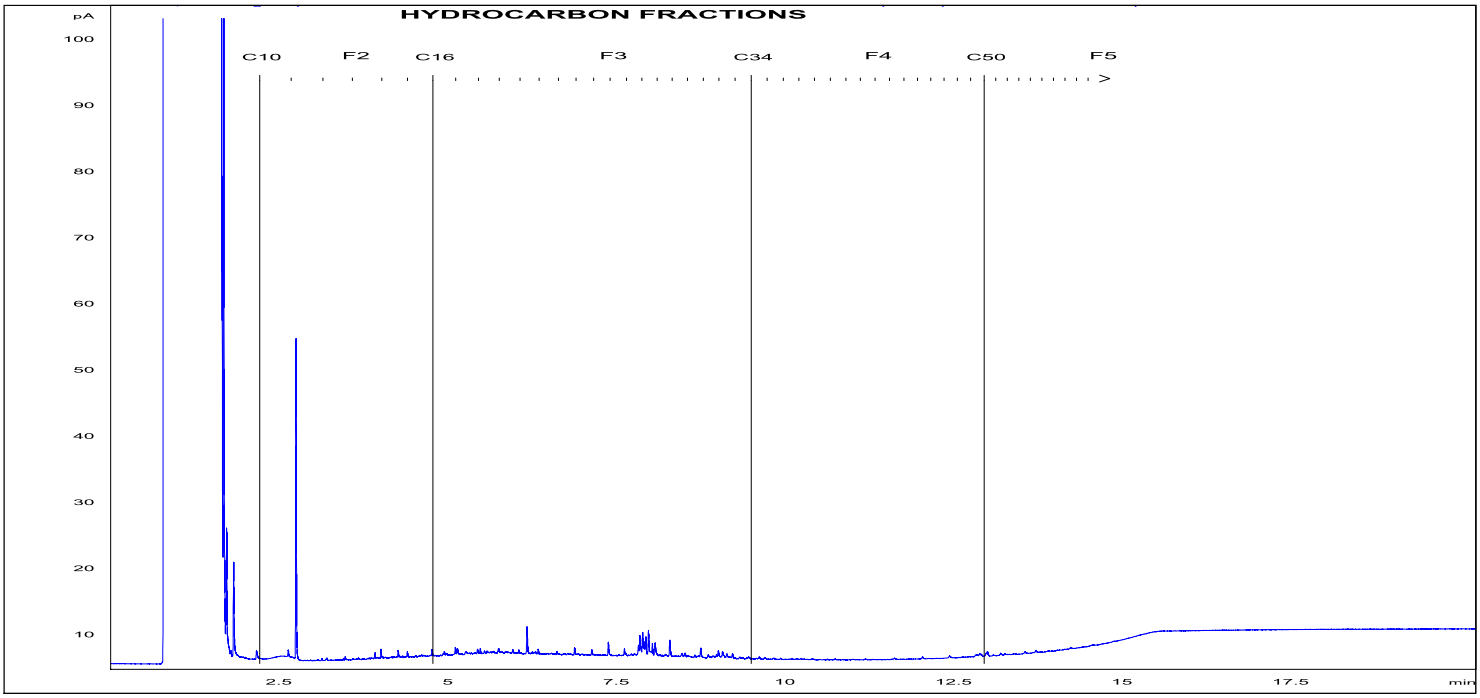
Chromatograms Results

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

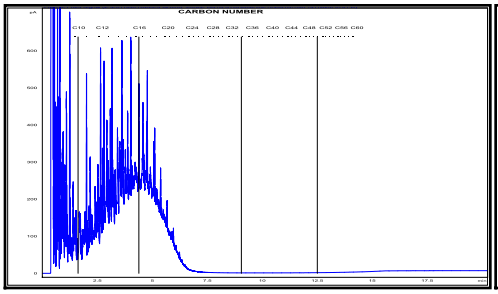
Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number: 1547091-1
Sample Description: PAR6206 / BH22-14-01 / 0.0 - 0.3
Sample Date: January 13, 2022
Location:
Matrix: Soil

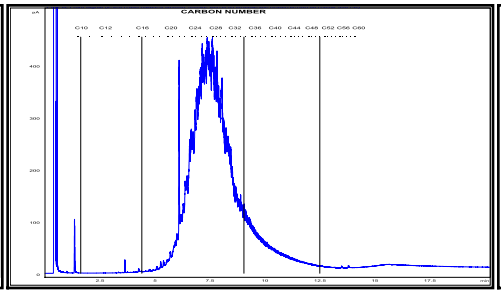


TYPICAL PRODUCT CHROMATOGRAMS

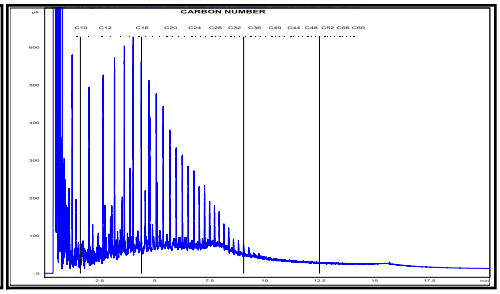
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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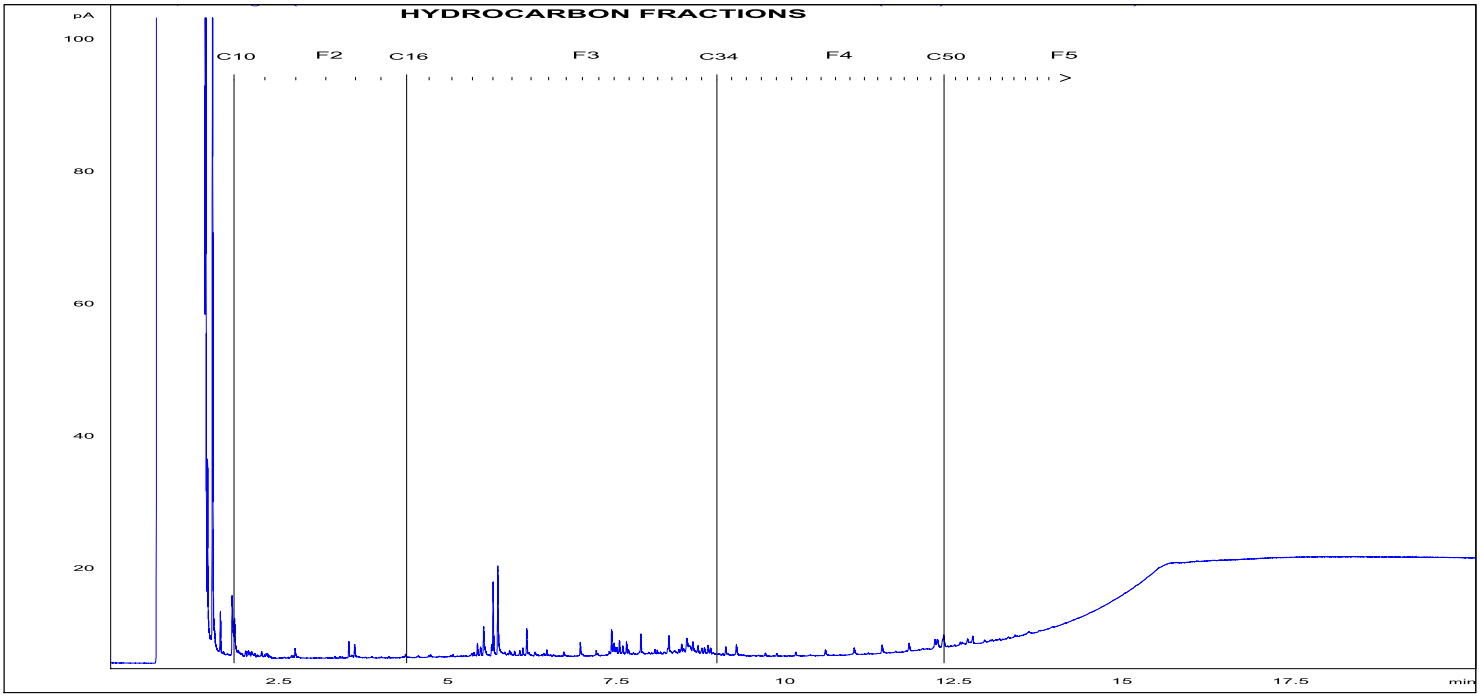
Chromatograms Results

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

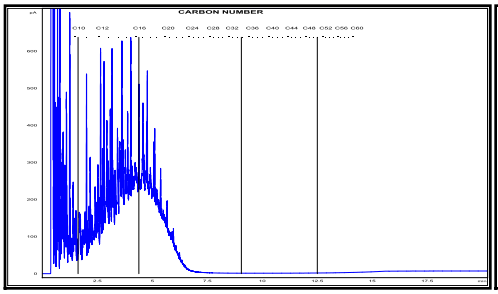
Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number: 1547091-4
Sample Description: PAR6206 / BH22-14-04 / 1.7 - 1.9
Sample Date: January 13, 2022
Location:
Matrix: Soil

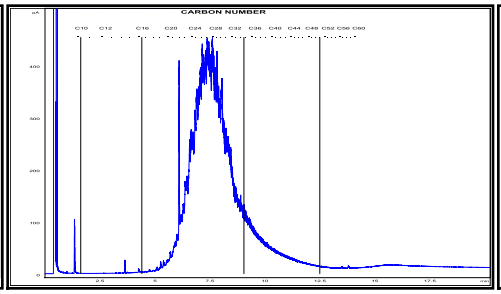


TYPICAL PRODUCT CHROMATOGRAMS

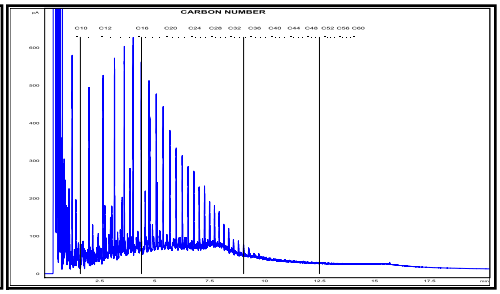
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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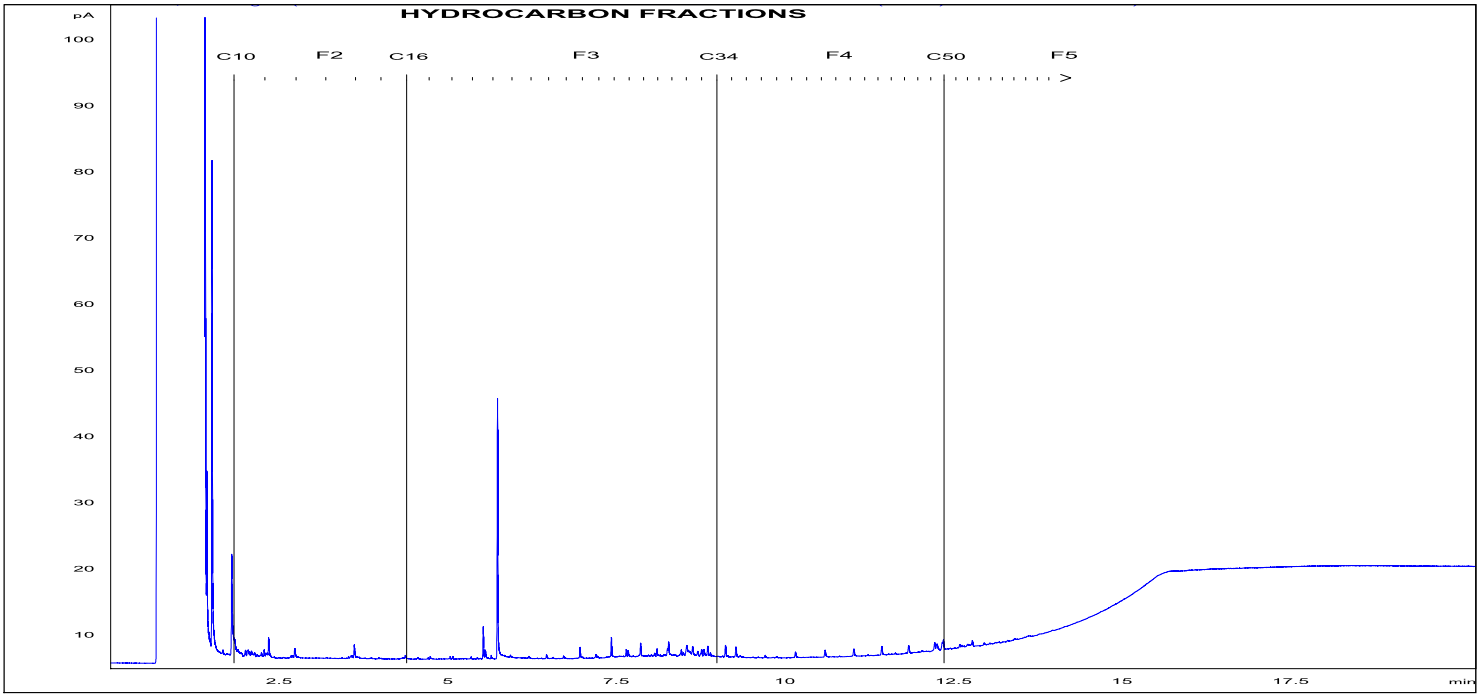
Chromatograms Results

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

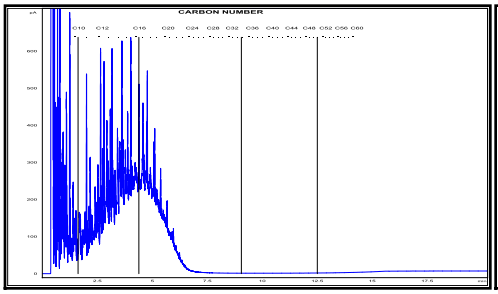
Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number: 1547091-5
Sample Description: PAR6206 / BH22-14-05 / 2.1 - 2.3
Sample Date: January 13, 2022
Location:
Matrix: Soil

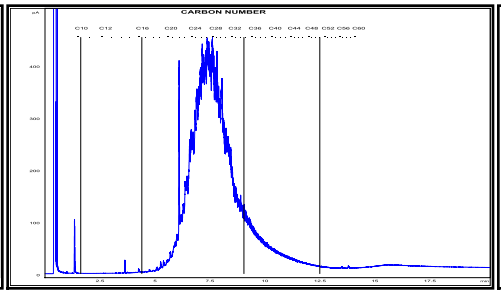


TYPICAL PRODUCT CHROMATOGRAMS

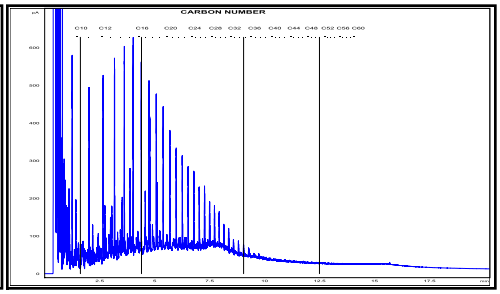
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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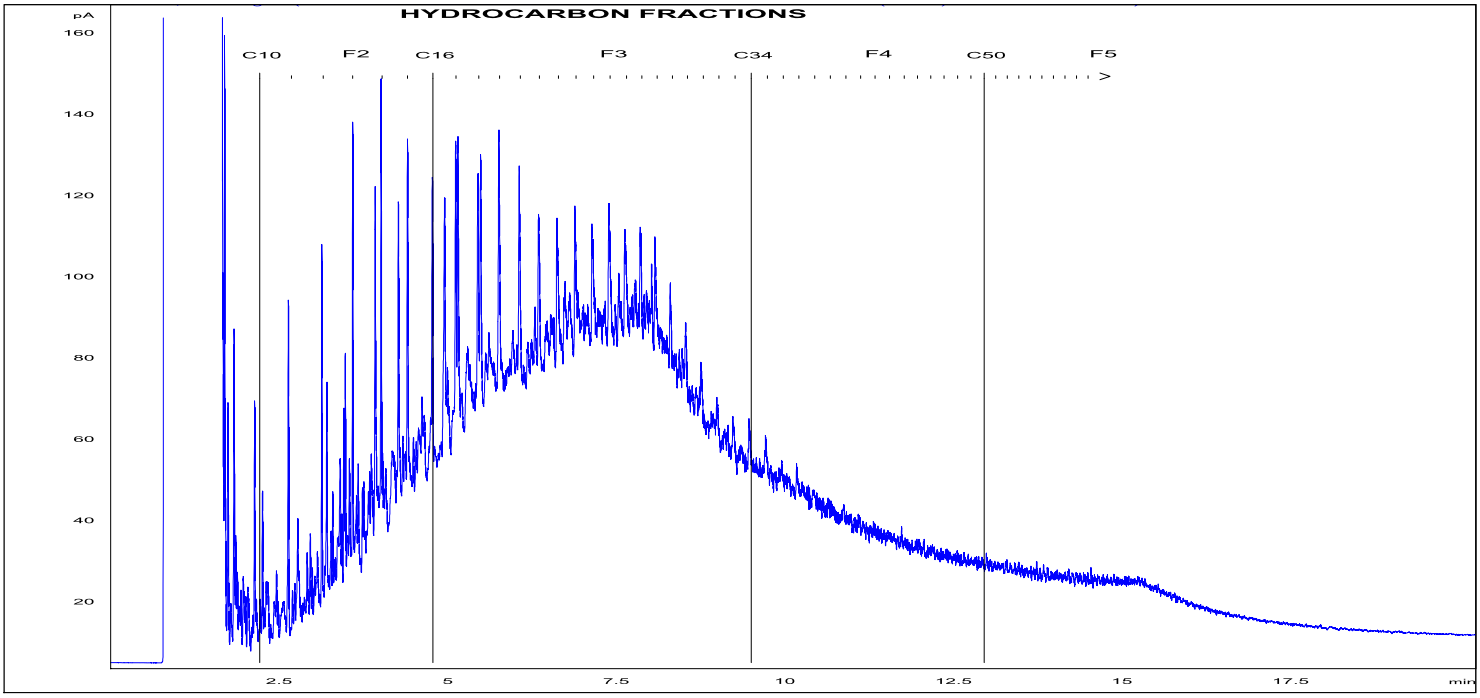
Chromatograms Results

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

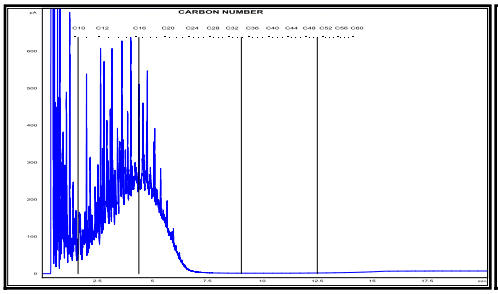
Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number: 1547091-6
Sample Description: PAR6206 / BH22-14-06 / 2.7 - 2.9
Sample Date: January 13, 2022
Location:
Matrix: Soil

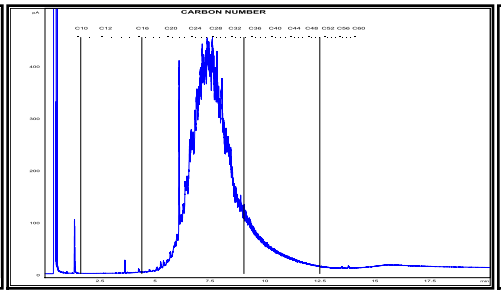


TYPICAL PRODUCT CHROMATOGRAMS

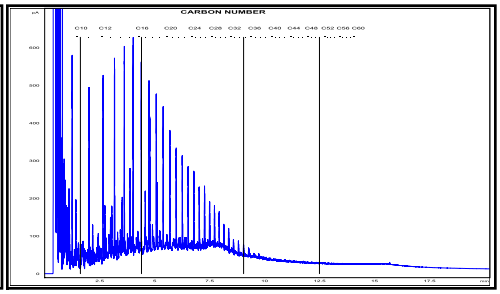
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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W: www.element.com

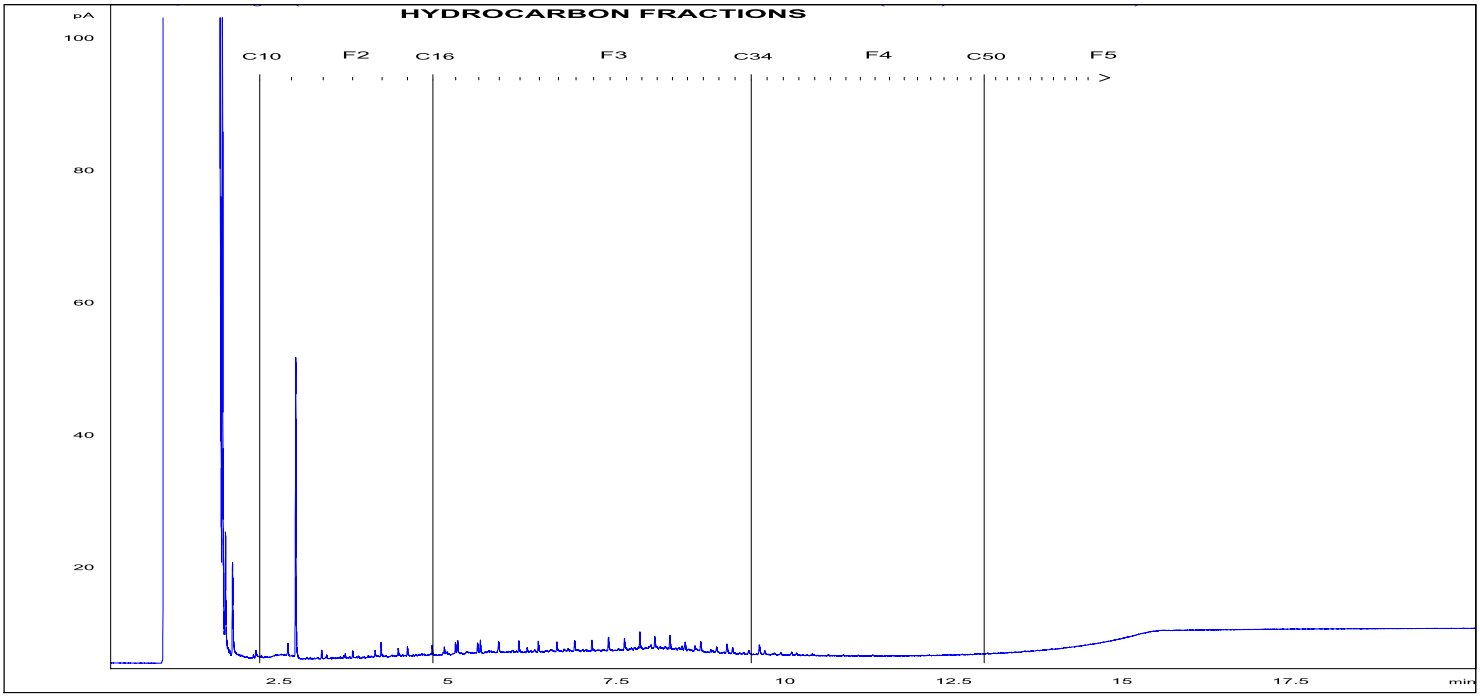
Chromatograms Results

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

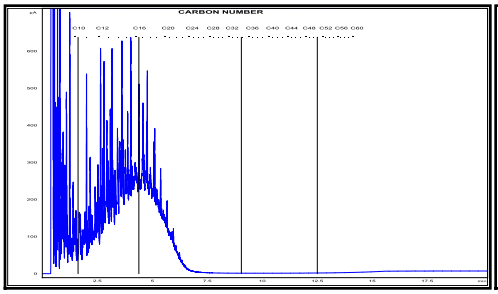
Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number: 1547091-7
Sample Description: PAR6206 / BH22-14-07 / 3.1 - 3.3
Sample Date: January 13, 2022
Location:
Matrix: Soil

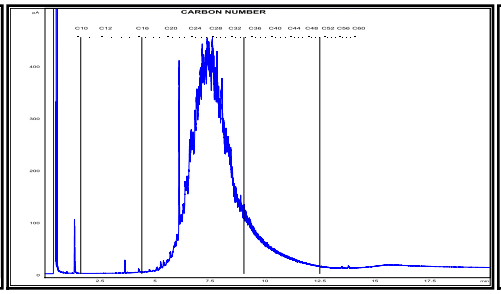


TYPICAL PRODUCT CHROMATOGRAMS

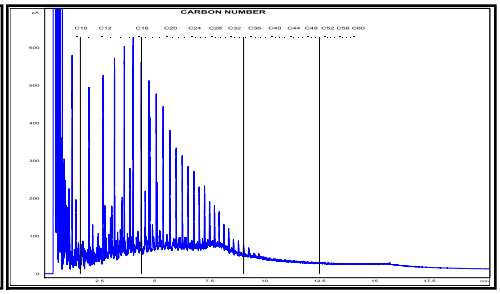
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

Element
#1 8822-100 Street
Fort St. John, British Columbia
V1J 3W9, Canada

T: +1 (250) 785-2731
F: +1 (250) 785-7092
E: info.FortStJohn@element.com
W: www.element.com

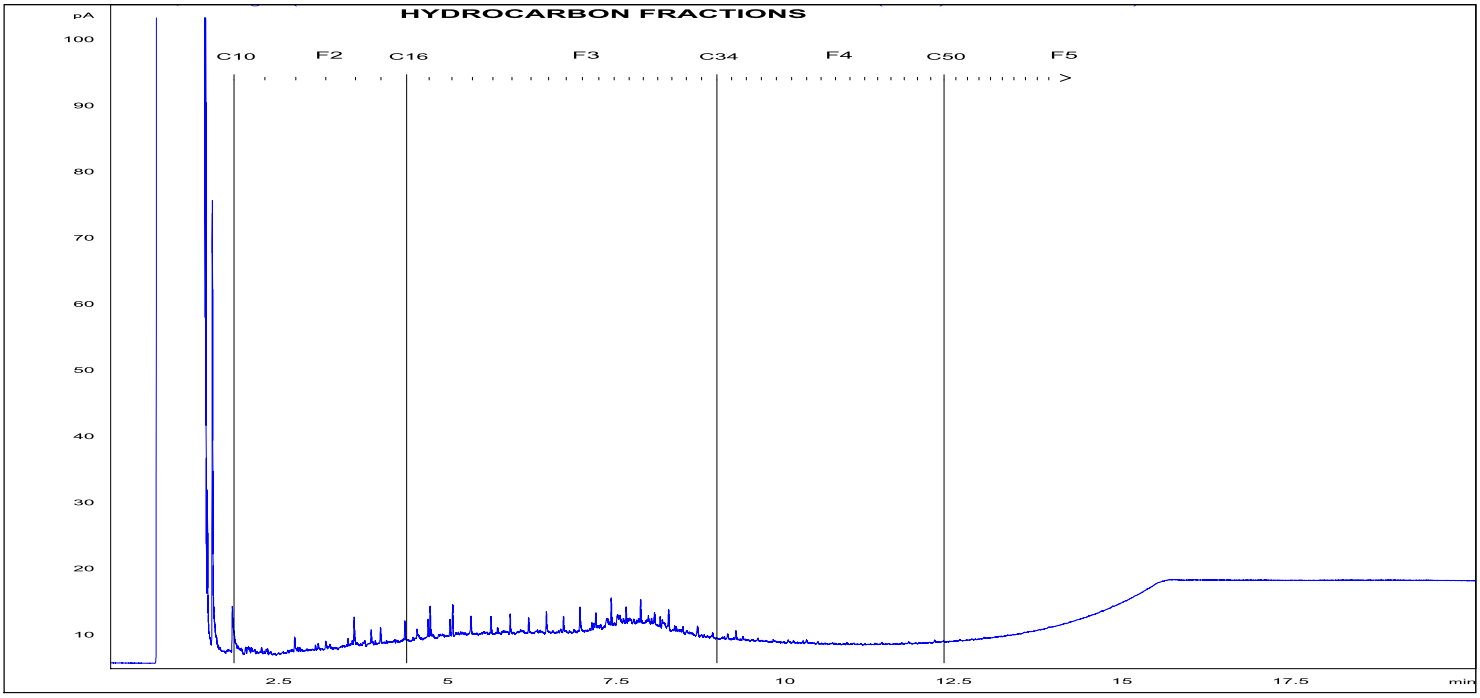
Chromatograms Results

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

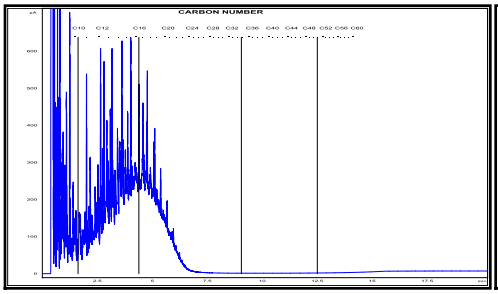
Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number: 1547091-8
Sample Date: January 13, 2022
Sample Description: PAR6206 / BH22-14-08 / 4.1 - 4.3
Location:
Matrix: Soil

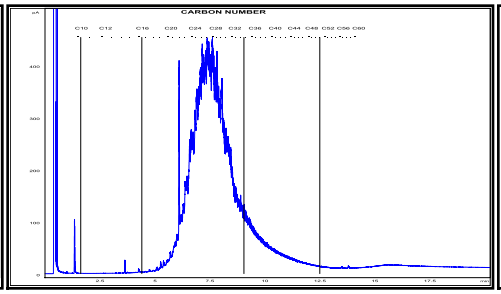


TYPICAL PRODUCT CHROMATOGRAMS

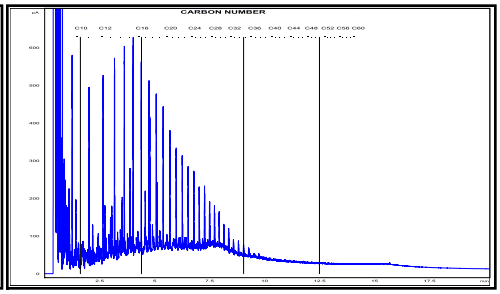
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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#1 8822-100 Street
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V1J 3W9, Canada

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E: info.FortStJohn@element.com
W: www.element.com

Chromatograms Results

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

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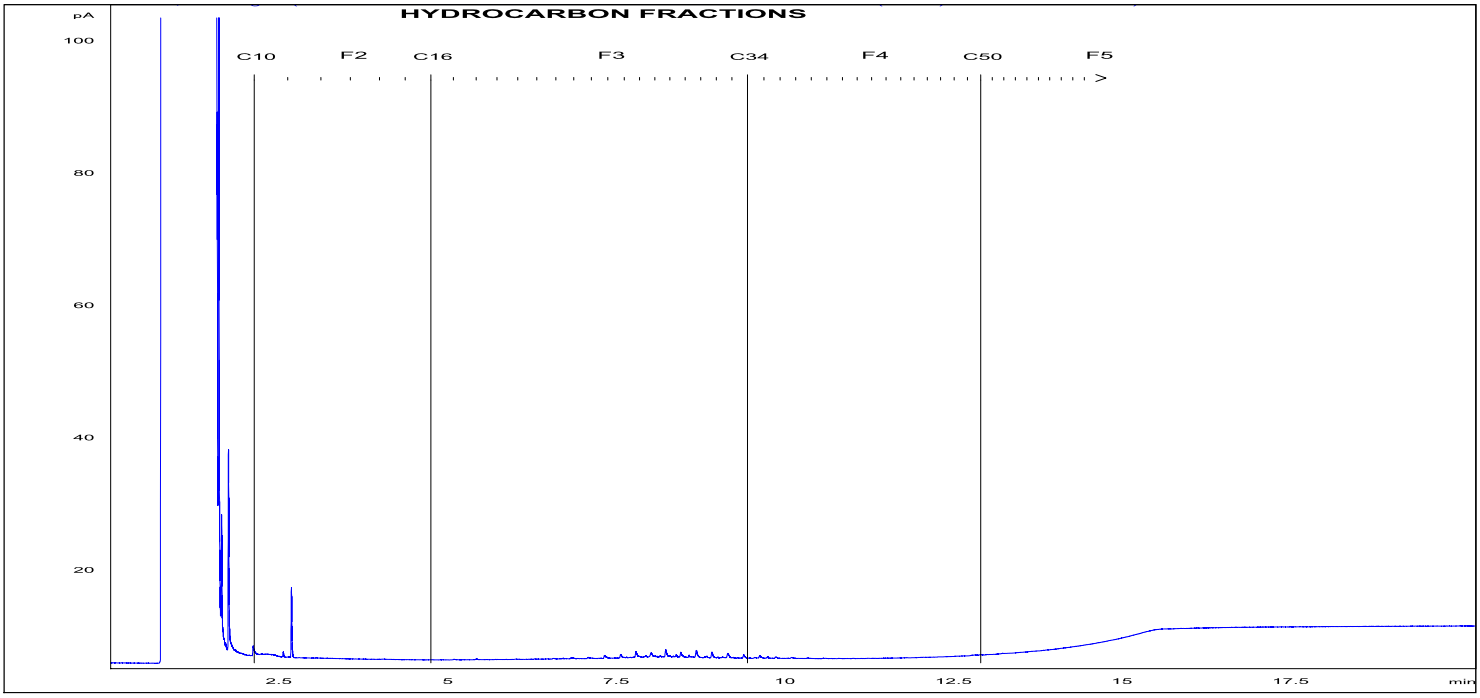
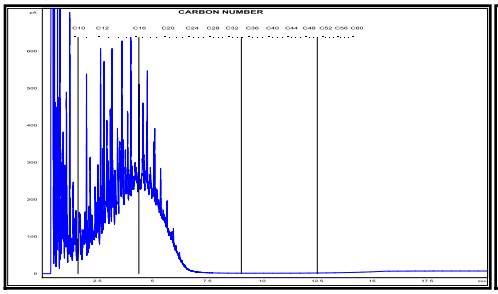
Sample Description: PAR6206 / BH22-15-02 / 0.7 - 0.9
Location:
Matrix: Soil

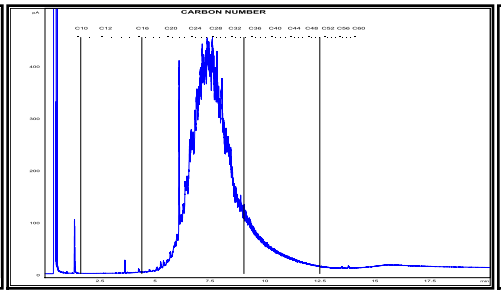


TYPICAL PRODUCT CHROMATOGRAMS

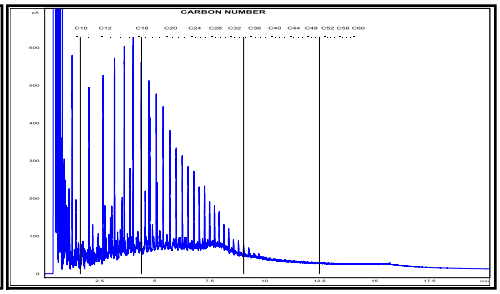
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges					
Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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W: www.element.com

Chromatograms Results

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

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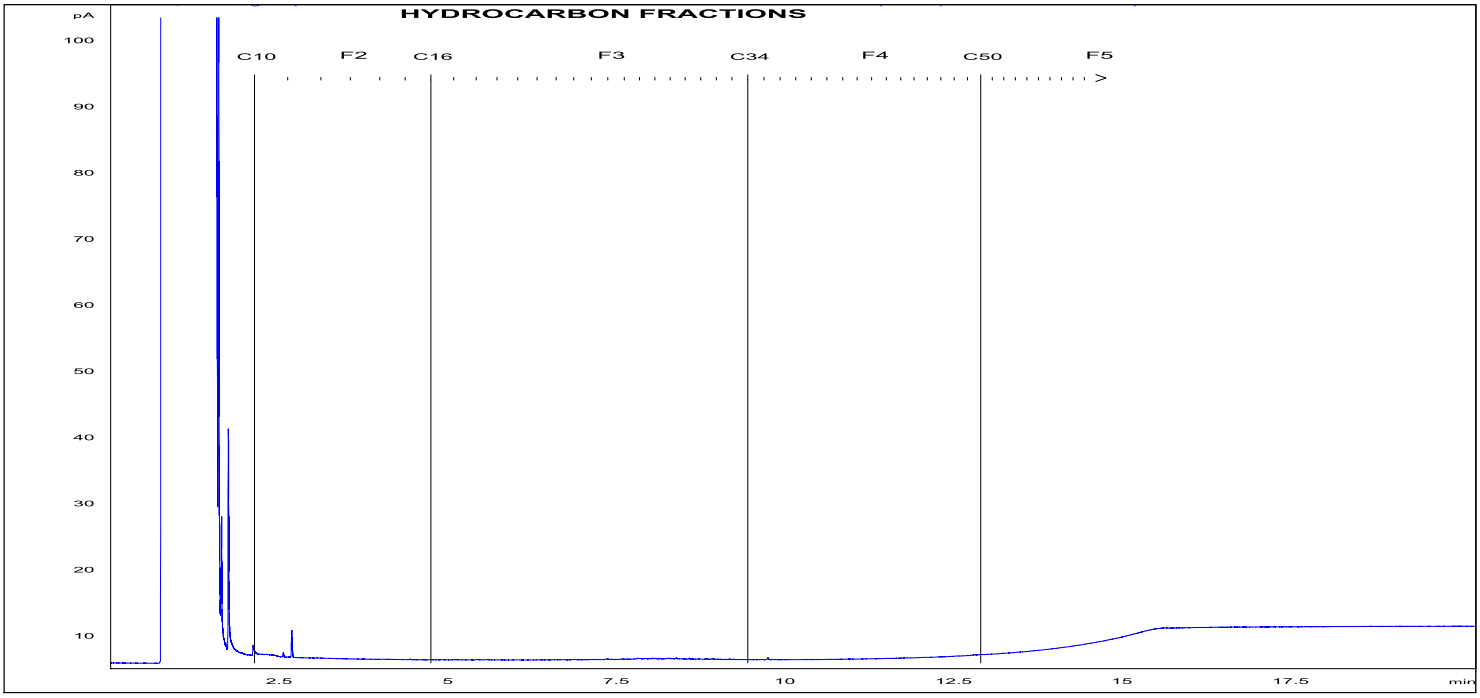
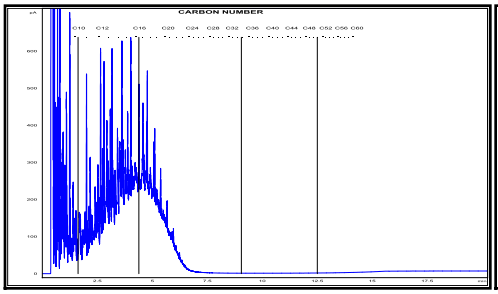
Sample Date: January 13, 2022
Sample Description: PAR6206 / BH22-15-03 / 1.2 - 1.4
Location:
Matrix: Soil

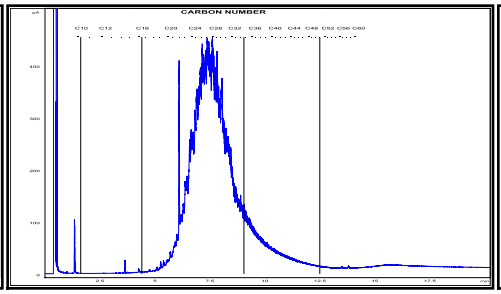


TYPICAL PRODUCT CHROMATOGRAMS

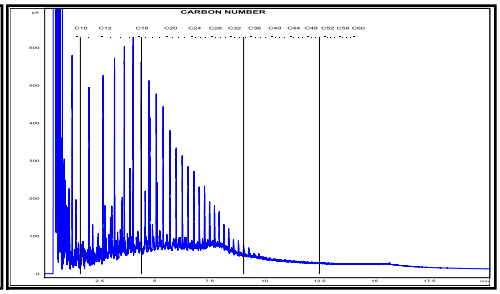
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges					
Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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#1 8822-100 Street
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V1J 3W9, Canada

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E: info.FortStJohn@element.com
W: www.element.com

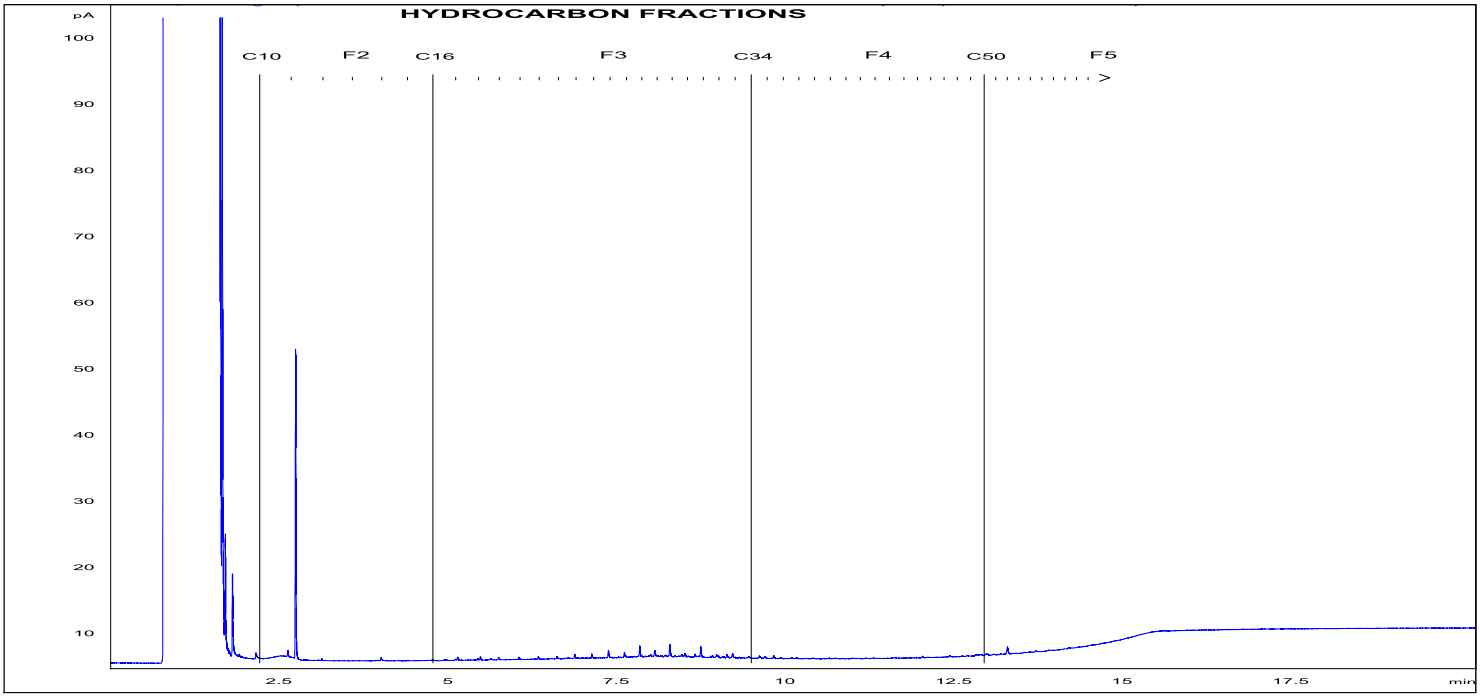
Chromatograms Results

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

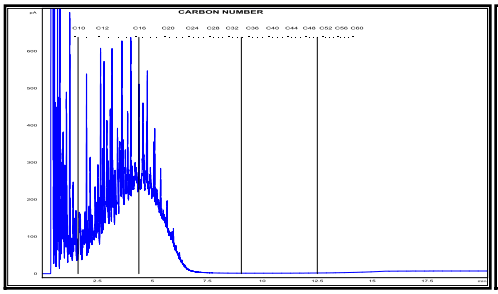
Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number: 1547091-12
Sample Date: January 13, 2022
Sample Description: PAR6206 / BH22-16-01 / 0.0 - 0.3
Location:
Matrix: Soil

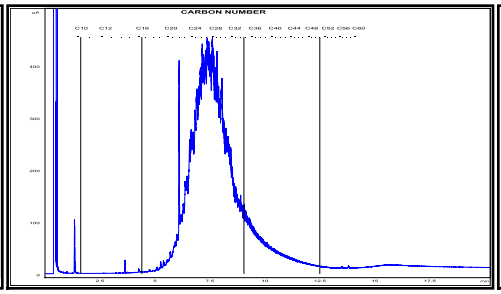


TYPICAL PRODUCT CHROMATOGRAMS

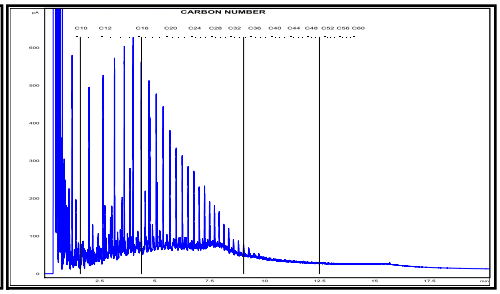
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges					
Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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W: www.element.com

Chromatograms Results

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number: 1547091-14
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Sample Description: PAR6206 / BH22-16-03 / 1.2 - 1.4
Location:
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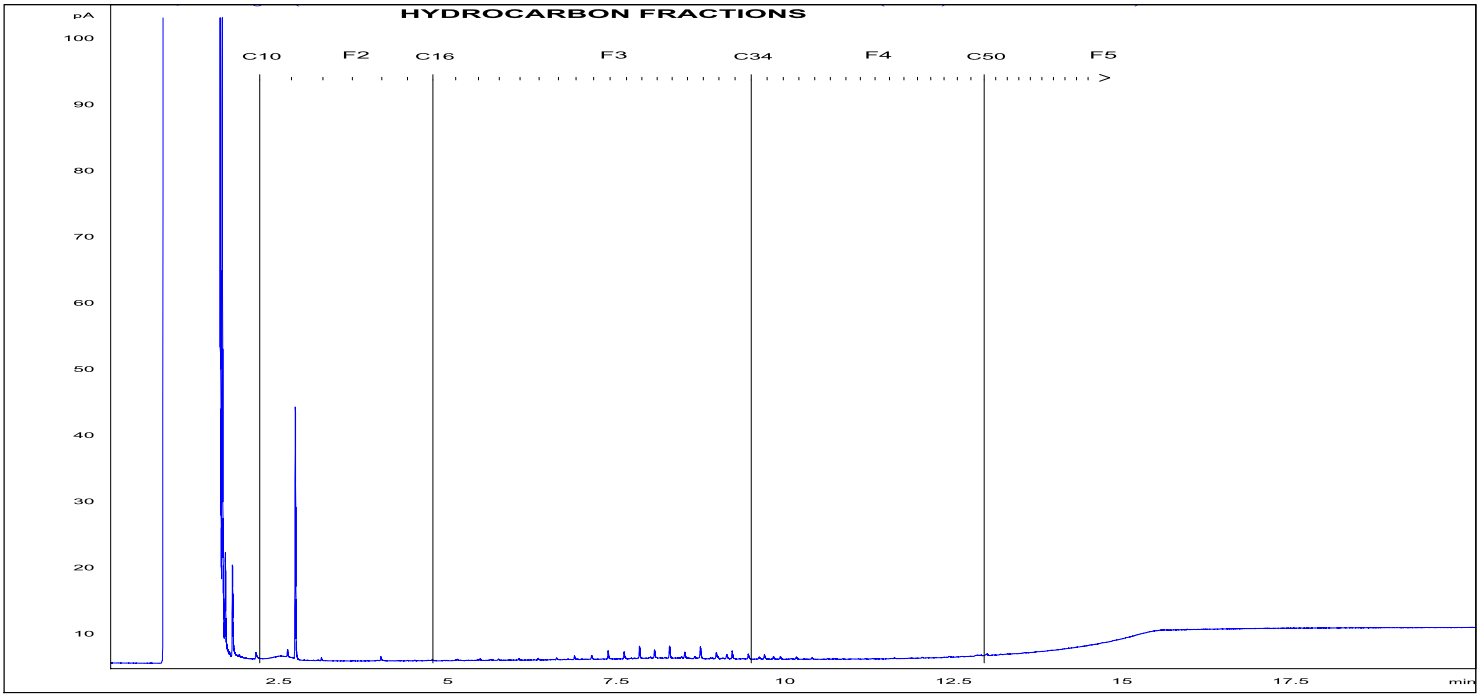
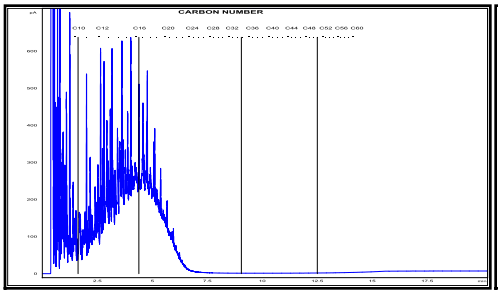
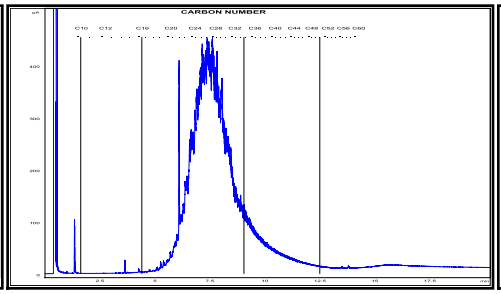


TYPICAL PRODUCT CHROMATOGRAMS

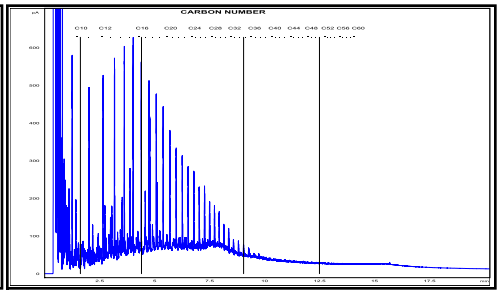
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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V1J 3W9, Canada

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E: info.FortStJohn@element.com
W: www.element.com

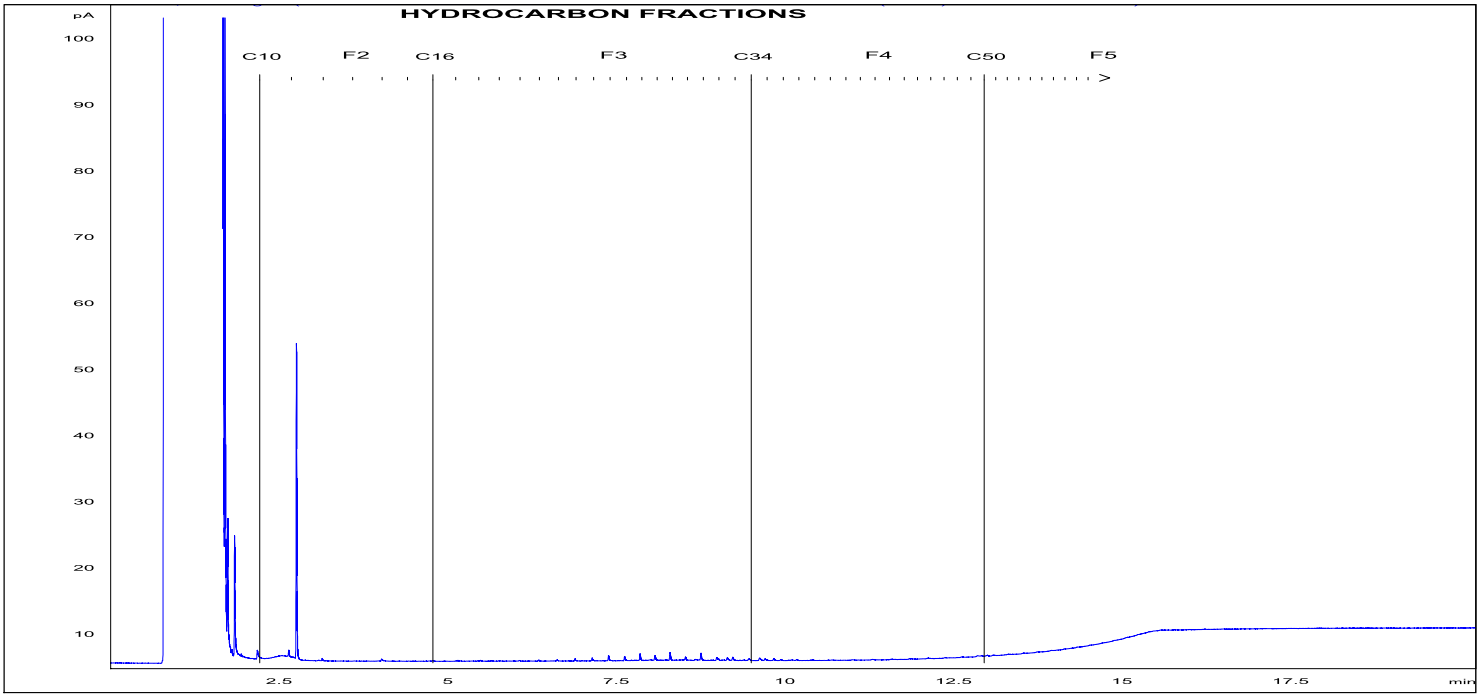
Chromatograms Results

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

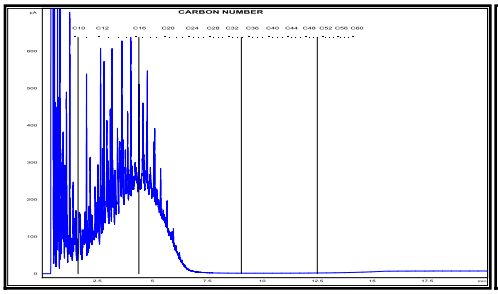
Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number: 1547091-17
Sample Date: January 13, 2022
Sample Description: PAR6206 / BH22-17-02 / 0.7 - 0.9
Location:
Matrix: Soil

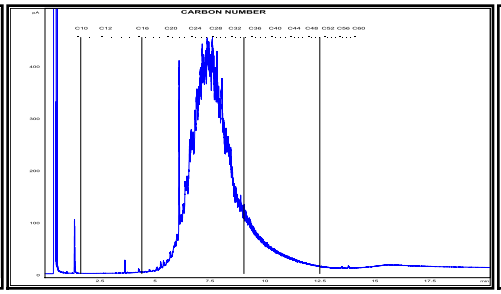


TYPICAL PRODUCT CHROMATOGRAMS

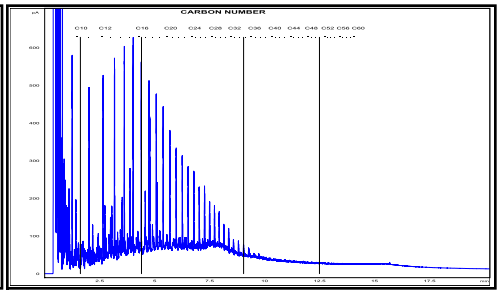
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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E: info.FortStJohn@element.com
W: www.element.com

Chromatograms Results

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number: 1547091-18
Sample Date: January 13, 2022
Sample Description: PAR6206 / BH22-17-03 / 1.2 - 1.4
Location:
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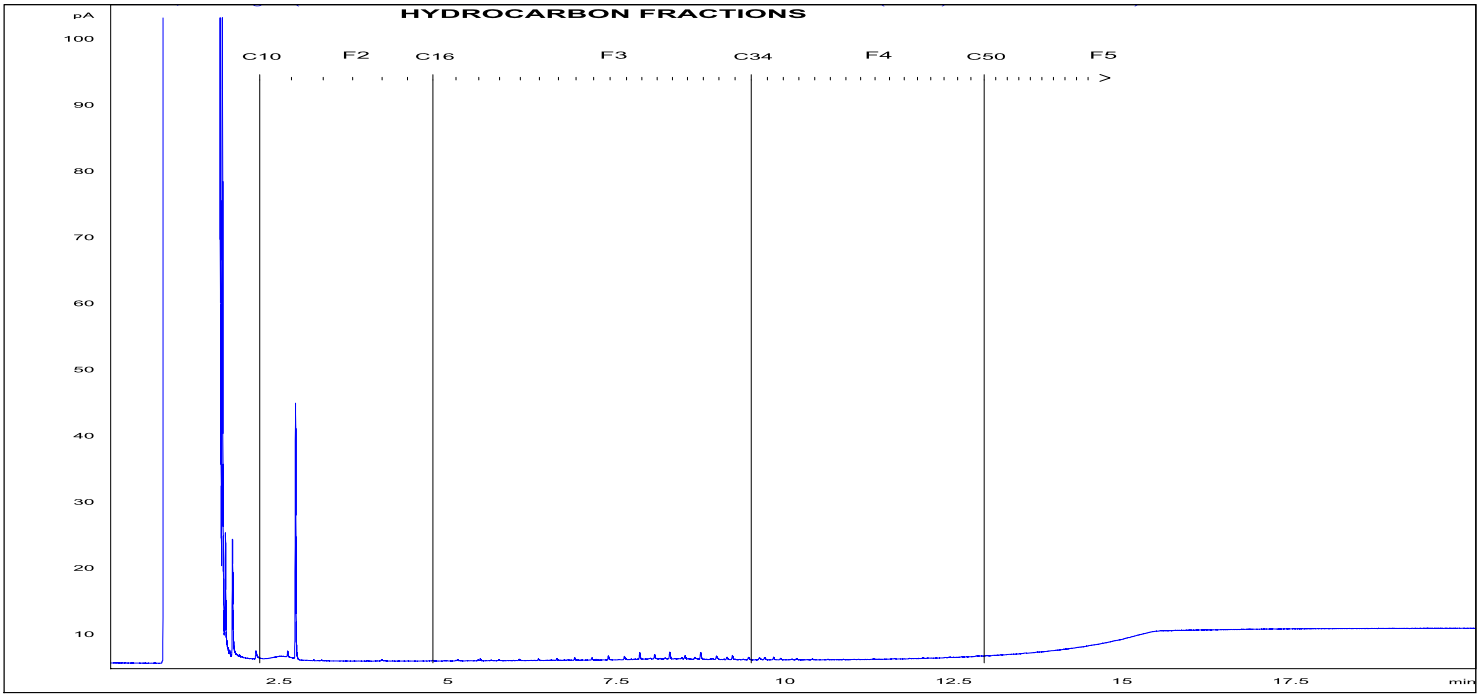
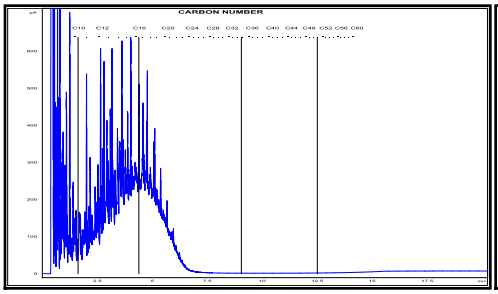
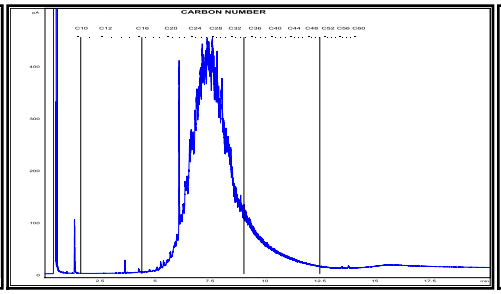


TYPICAL PRODUCT CHROMATOGRAMS

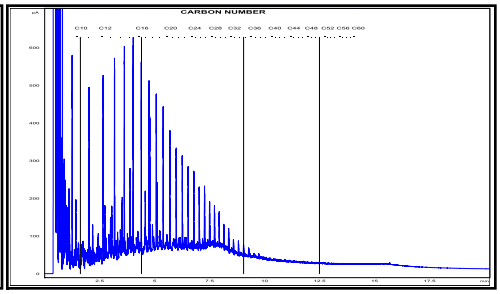
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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F: +1 (250) 785-7092
E: info.FortStJohn@element.com
W: www.element.com

Chromatograms Results

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number: 1547091-20
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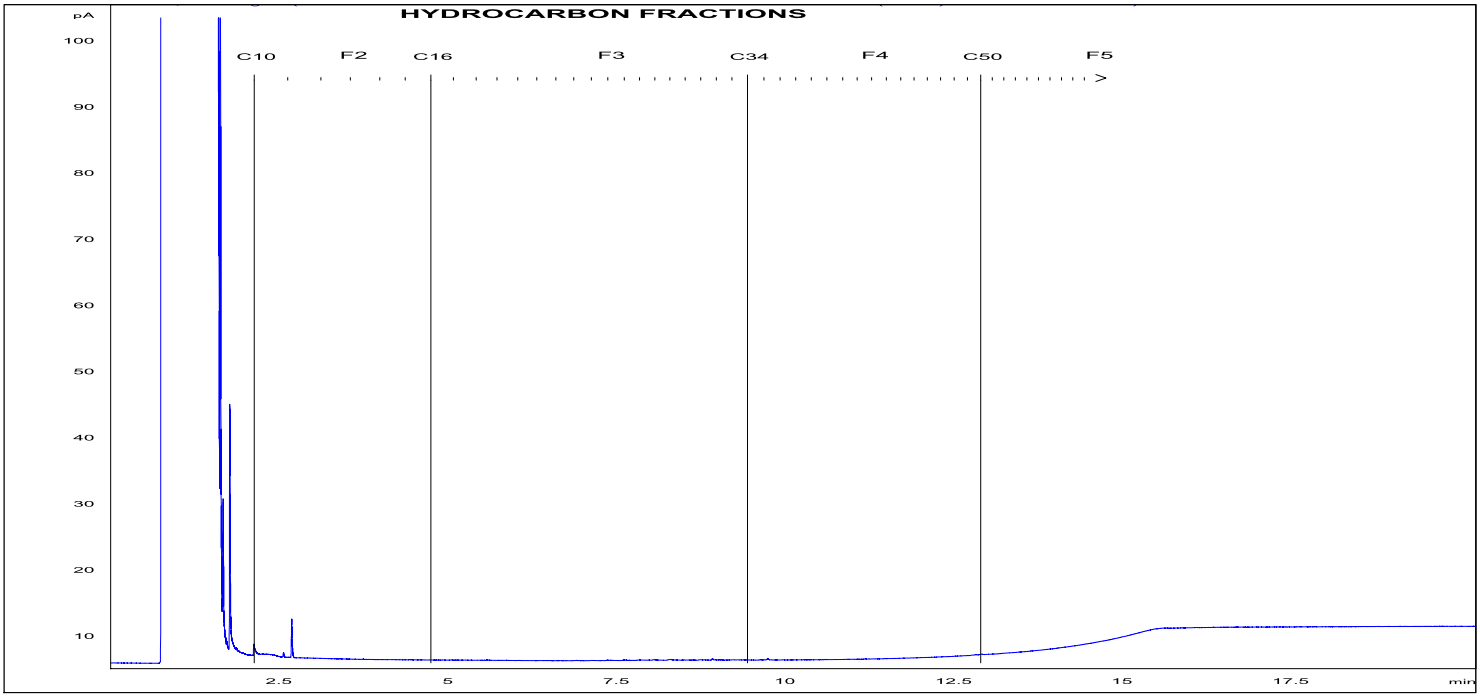
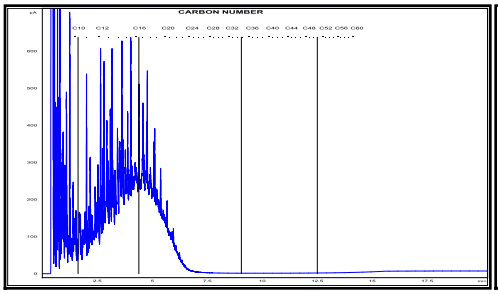
Location:
Matrix: Soil

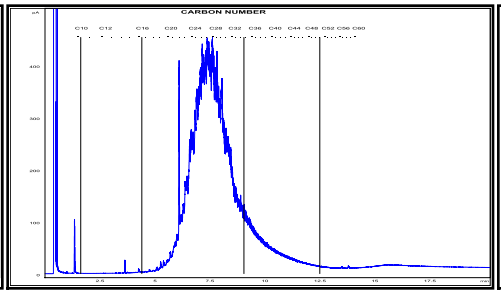


TYPICAL PRODUCT CHROMATOGRAMS

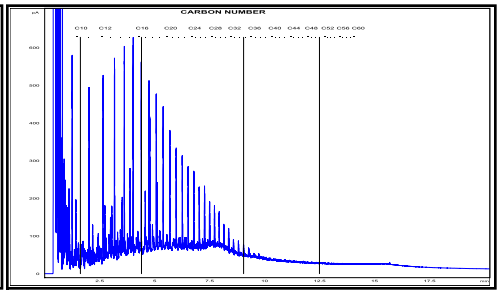
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges					
Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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Chromatograms Results

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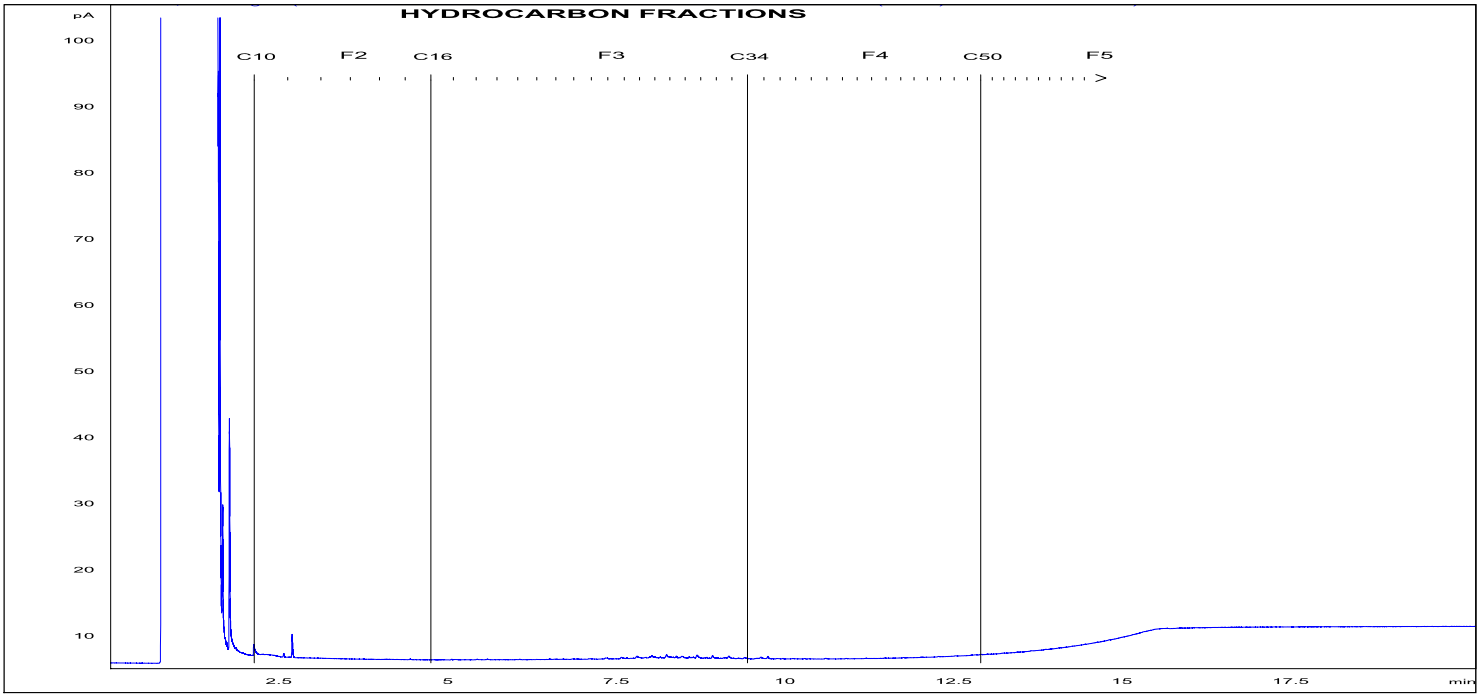
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

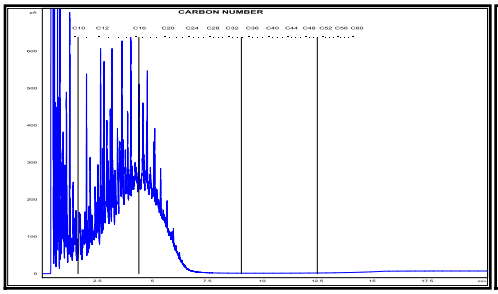
Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Reference Number: 1547091-21
Sample Date: January 13, 2022
Sample Description: PAR6206 / BH22-18-03 / 1.2 - 1.4
Location:
Matrix: Soil

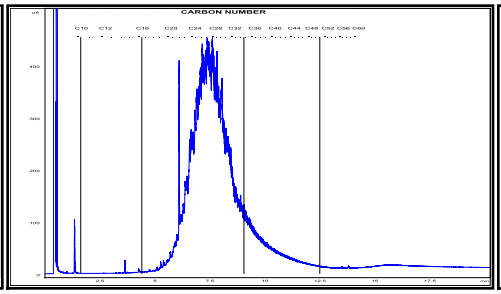


TYPICAL PRODUCT CHROMATOGRAMS

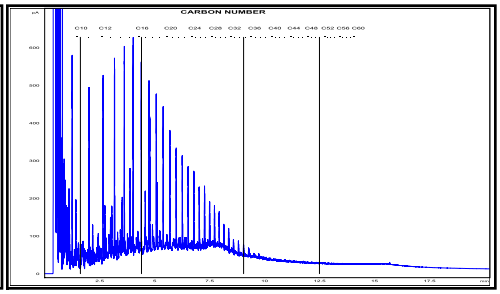
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges					
Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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Quality Control

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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Alcohol Screen - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Methanol	µg/mL	0	-0.5	0.5	yes
Ethanol	µg/mL	0	-0.5	0.5	yes
2-Propanol	µg/mL	0	-0.5	0.5	yes
1-Propanol	µg/mL	0	-0.5	0.5	yes
Date Acquired:	January 19, 2022				

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Methanol	µg/mL	97.52	80	120	yes
Ethanol	µg/mL	106.04	80	120	yes
2-Propanol	µg/mL	104.95	80	120	yes
1-Propanol	µg/mL	102.68	80	120	yes
Date Acquired:	January 19, 2022				

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Methanol	mg/kg	1.5	1.5	50	1.0	yes
Ethanol	mg/kg	<1.0	<1.0	50	1.0	yes
2-Propanol	mg/kg	<1.0	<1.0	50	1.0	yes
1-Propanol	mg/kg	<1.0	<1.0	50	1.0	yes
Date Acquired:	January 19, 2022					

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Methanol	mg/kg	100	70	130	yes
Ethanol	mg/kg	103	70	130	yes
2-Propanol	mg/kg	103	70	130	yes
1-Propanol	mg/kg	100	70	130	yes
Date Acquired:	January 19, 2022				

Barite Soil Analysis

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Barium	mg/L	0.00159866	-0	0	yes
Date Acquired:	January 27, 2022				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Barium	mg/kg	2580	2830	10	5	yes
Date Acquired:	January 27, 2022					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Barium	mg/kg	7.27	5.10	8.70	yes
Date Acquired:	February 07, 2022				
Barium	mg/kg	0.10	0.09	0.11	yes
Date Acquired:	February 07, 2022				
Barium	mg/kg	10400	7573	12007	yes
Date Acquired:	January 27, 2022				

Extractable Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC

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Quality Control

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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Extractable Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	0	-10	10	yes
F3c C16-C34	µg/mL	0	-30	30	yes
F4c C34-C50	µg/mL	0	-20	20	yes
F4HTGCc C34-C50+	µg/mL	0	-20	20	yes

Date Acquired: January 18, 2022

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	95.46	80	120	yes
F3c C16-C34	µg/mL	97.20	80	120	yes
F4c C34-C50	µg/mL	97.47	80	120	yes
F4HTGCc C34-C50+	µg/mL	99.75	80	120	yes

Date Acquired: January 18, 2022

Glycol Screen - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Ethylene Glycol	µg/mL	0	-10	10	yes
Propylene Glycol	µg/mL	0	-10	10	yes
Diethylene Glycol	µg/mL	0	-10	10	yes
Triethylene Glycol	µg/mL	0	-10	10	yes
Tetraethylene Glycol	µg/mL	0	-10	10	yes

Date Acquired: January 18, 2022

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Ethylene Glycol	µg/mL	104.38	80	120	yes
Propylene Glycol	µg/mL	97.80	80	120	yes
Diethylene Glycol	µg/mL	97.80	80	120	yes
Triethylene Glycol	µg/mL	97.70	80	120	yes
Tetraethylene Glycol	µg/mL	100.20	80	120	yes

Date Acquired: January 18, 2022

Metals Strong Acid Digestion

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Boron	mg/L	-0.00644278	-0.05	0.05	yes
Antimony	µg/L	-0.00371856	-0.1	0.2	yes
Arsenic	µg/L	-0.00518455	-0.2	0.2	yes
Barium	µg/L	0.0338941	-1	1	yes
Beryllium	µg/L	-0.000707123	-0.1	0.1	yes
Cadmium	µg/L	0.000296208	-0.01	0.01	yes
Chromium	µg/L	-0.0152289	-0.5	0.5	yes
Cobalt	µg/L	0.000720722	-0.1	0.1	yes
Copper	µg/L	0.00414133	-0.6	1.2	yes
Lead	µg/L	0.00491384	-5.0	5.0	yes
Mercury	µg/L	0.00193272	-0.04	0.04	yes
Molybdenum	µg/L	-0.0256791	-1.0	1.0	yes
Nickel	µg/L	0.0284091	-0.4	0.7	yes

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Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
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Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Metals Strong Acid Digestion - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
Selenium	µg/L	0.00292422	-0.30	0.30		yes
Silver	µg/L	0.000170504	-0.09	0.14		yes
Thallium	µg/L	0.0100245	-0.04	0.04		yes
Tin	µg/L	-0.0299091	-0.4	0.4		yes
Uranium	µg/L	-0.000719194	-0.5	0.5		yes
Vanadium	µg/L	-0.0531896	-0.1	0.1		yes
Zinc	µg/L	0.0553069	-1	1		yes
Date Acquired:	January 21, 2022					
Client Sample Replicates	**Units**	**Replicate 1**	**Replicate 2**	**% RSD Criteria**	**Absolute Criteria**	**Passed QC**
Molybdenum	mg/kg	<1.0	<1.0	20	2.2	yes
Selenium	mg/kg	<0.3	<0.3	20	0.66	yes
Date Acquired:	January 21, 2022					
Control Sample	**Units**	**Measured**	**Lower Limit**	**Upper Limit**		**Passed QC**
Antimony	mg/kg	39.5	37.6	42.4		yes
Arsenic	mg/kg	40.2	36.3	43.9		yes
Barium	mg/kg	195	188	212		yes
Beryllium	mg/kg	18.7	17.4	22.2		yes
Cadmium	mg/kg	2.05	1.88	2.28		yes
Chromium	mg/kg	96.4	93.2	107.0		yes
Cobalt	mg/kg	19.4	18.4	21.4		yes
Copper	mg/kg	196	186.6	216.6		yes
Lead	mg/kg	19.5	18.3	21.3		yes
Mercury	mg/kg	2.83	2.64	3.36		yes
Molybdenum	mg/kg	195	185.1	222.3		yes
Nickel	mg/kg	96.1	92.4	106.2		yes
Selenium	mg/kg	39.0	35.20	44.20		yes
Silver	mg/kg	19.5	18.20	22.40		yes
Thallium	mg/kg	9.74	9.02	10.82		yes
Tin	mg/kg	197	191.2	215.2		yes
Uranium	mg/kg	96.6	86.0	116.0		yes
Vanadium	mg/kg	18.9	18.0	21.6		yes
Zinc	mg/kg	197	186	212		yes
Date Acquired:	January 21, 2022					
Antimony	mg/kg	3.3	2.8	4.3		yes
Arsenic	mg/kg	3.8	3.1	4.7		yes
Barium	mg/kg	95	81	121		yes
Beryllium	mg/kg	0.3	0.2	0.4		yes
Cadmium	mg/kg	0.87	0.71	1.13		yes
Chromium	mg/kg	70.0	62.1	93.3		yes
Cobalt	mg/kg	6.0	5.1	7.5		yes
Copper	mg/kg	112	96.6	144.6		yes
Lead	mg/kg	253	200.6	318.8		yes
Mercury	mg/kg	0.06	0.05	0.08		yes
Molybdenum	mg/kg	<1.0	0.9	1.2		yes

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Quality Control

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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Metals Strong Acid Digestion - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Nickel	mg/kg	23.0	19.4	29.0	yes
Selenium	mg/kg	<0.3	0.26	0.32	yes
Silver	mg/kg	3.5	2.30	5.30	yes
Thallium	mg/kg	0.06	0.05	0.09	yes
Tin	mg/kg	9.0	7.9	12.1	yes
Uranium	mg/kg	<0.5	0.4	0.6	yes
Vanadium	mg/kg	25.5	21.9	33.9	yes
Zinc	mg/kg	298	261	391	yes

Date Acquired: January 21, 2022

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.005	0.005	yes
Toluene	ng	0	-0.06	0.06	yes
Ethylbenzene	ng	0	-0.030	0.030	yes
Total Xylenes (m,p,o)	ng	0	-0.09	0.09	yes
Styrene	ng	0	-0.030	0.030	yes

Date Acquired: January 18, 2022

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	93.62	80	120	yes
Toluene	ng	102.36	80	120	yes
Ethylbenzene	ng	95.99	80	120	yes
m,p-Xylene	ng	94.97	80	120	yes
Total Xylenes (m,p,o)	ng	96.64	80	120	yes
Styrene	ng	104.02	80	120	yes

Date Acquired: January 18, 2022

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Benzene	mg/kg	<0.005	<0.005	50	0.010	yes
Toluene	mg/kg	<0.02	<0.02	50	0.04	yes
Ethylbenzene	mg/kg	<0.005	<0.005	50	0.020	yes
m,p-Xylene	mg/kg	<0.02	<0.02	50	0.04	yes
o-Xylene	mg/kg	<0.02	<0.02	50	0.04	yes
Total Xylenes (m,p,o)	mg/kg	<0.03	<0.03	50	0.06	yes
Styrene	mg/kg	<0.01	<0.01	50	0.020	yes

Date Acquired: January 18, 2022

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	mg/kg	90	70	130	yes
Toluene	mg/kg	98	70	130	yes
Ethylbenzene	mg/kg	101	70	130	yes
m,p-Xylene	mg/kg	104	70	130	yes
o-Xylene	mg/kg	109	70	130	yes
Styrene	mg/kg	110	70	130	yes

Date Acquired: January 18, 2022

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PAH - Soil - Surrogate Recovery

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Nitrobenzene-d5	%	119.809	50	140	yes
2-Fluorobiphenyl	%	108.195	50	140	yes
p-Terphenyl-d14	%	82.2524	50	140	yes

Date Acquired: January 19, 2022

Polycyclic Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Naphthalene	ng/mL	0	-0.010	0.010	yes
Acenaphthylene	ng/mL	0	-0.05	0.05	yes
Acenaphthene	ng/mL	0	-0.05	0.05	yes
Fluorene	ng/mL	0	-0.05	0.05	yes
Phenanthrene	ng/mL	0	-0.01	0.01	yes
Anthracene	ng/mL	0	-0.003	0.003	yes
Fluoranthene	ng/mL	0	-0.010	0.010	yes
Pyrene	ng/mL	0	-0.010	0.010	yes
Benzo(a)anthracene	ng/mL	0	-0.01	0.01	yes
Chrysene	ng/mL	0	-0.05	0.05	yes
Benzo(b)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(b+j)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(k)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(a)pyrene	ng/mL	0	-0.05	0.05	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	0	-0.05	0.05	yes
Dibenzo(a,h)anthracene	ng/mL	0	-0.05	0.05	yes
Benzo(g,h,i)perylene	ng/mL	0	-0.05	0.05	yes

Date Acquired: January 19, 2022

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Naphthalene	ng/mL	102.80	80	120	yes
Acenaphthylene	ng/mL	101.00	80	120	yes
Acenaphthene	ng/mL	101.20	80	120	yes
Fluorene	ng/mL	98.20	80	120	yes
Phenanthrene	ng/mL	96.80	80	120	yes
Anthracene	ng/mL	98.60	80	120	yes
Fluoranthene	ng/mL	99.60	80	120	yes
Pyrene	ng/mL	95.80	80	120	yes
Benzo(a)anthracene	ng/mL	102.40	80	120	yes
Chrysene	ng/mL	103.00	80	120	yes
Benzo(b)fluoranthene	ng/mL	101.40	80	120	yes
Benzo(k)fluoranthene	ng/mL	95.80	80	120	yes
Benzo(a)pyrene	ng/mL	98.40	80	120	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	96.20	80	120	yes
Dibenzo(a,h)anthracene	ng/mL	92.20	80	120	yes
Benzo(g,h,i)perylene	ng/mL	100.80	80	120	yes

Date Acquired: January 19, 2022

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC

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Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
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Polycyclic Aromatic Hydrocarbons - Soil - Continued

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Naphthalene	mg/kg	<0.01	<0.01	50	0.020	yes
Acenaphthylene	mg/kg	<0.05	<0.05	50	0.10	yes
Acenaphthene	mg/kg	<0.05	<0.05	50	0.10	yes
Fluorene	mg/kg	<0.05	<0.05	50	0.10	yes
Phenanthrene	mg/kg	<0.01	<0.01	50	0.02	yes
Anthracene	mg/kg	<0.003	<0.003	50	0.006	yes
Fluoranthene	mg/kg	<0.01	<0.01	50	0.020	yes
Pyrene	mg/kg	<0.01	<0.01	50	0.020	yes
Benzo(a)anthracene	mg/kg	<0.01	<0.01	50	0.02	yes
Chrysene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(b)fluoranthene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(k)fluoranthene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(a)pyrene	mg/kg	<0.05	<0.05	50	0.10	yes
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.05	<0.05	50	0.10	yes
Dibenzo(a,h)anthracene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(g,h,i)perylene	mg/kg	<0.05	<0.05	50	0.10	yes

Date Acquired: January 19, 2022

Salinity

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Calcium	mg/L	0.881603	-2.0	2.0	yes
Magnesium	mg/L	0.25233	-0.3	0.3	yes
Sodium	mg/L	0.409016	-1	1	yes
Potassium	mg/L	0.0643937	-1.0	1.0	yes
Chloride	mg/L	2.9654	0	5	yes
Sulfate-S	mg/L	0.45621	-2	2	yes

Date Acquired: January 21, 2022

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Electrical Conductivity	dS/m	5.12	5.09	20	0.03	yes
Calcium	mg/kg	364	358	20	0.6	yes
Magnesium	mg/kg	111	107	20	0.6	yes
Sodium	mg/kg	729	710	20	1	yes
Potassium	mg/kg	<8	7	20	1	yes
Chloride	mg/kg	7	8	15	3	yes
Sulfate-S	mg/kg	899	865	20	1.2	yes

Date Acquired: January 27, 2022

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Electrical Conductivity	dS/m	2.90	2.20	4.00	yes
% Saturation	%	63	50	74	yes
Calcium	mg/L	713	534.6	888.6	yes
Magnesium	mg/L	106	82.9	138.1	yes
Sodium	mg/L	36	25	46	yes
Potassium	mg/L	14	10.0	16.0	yes

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Quality Control

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Salinity - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chloride	mg/L	37	22	40	yes
Sulfate-S	mg/L	548	410	684	yes
Date Acquired: January 21, 2022					
Electrical Conductivity	dS/m	30.7	26.80	35.20	yes
Calcium	mg/L	249	226.9	261.1	yes
Magnesium	mg/L	100	91.0	104.8	yes
Sodium	mg/L	251	229	264	yes
Potassium	mg/L	247	230.7	265.5	yes
Chloride	mg/L	2100	1852	2229	yes
Sulfate-S	mg/L	151	137	158	yes
Date Acquired: January 21, 2022					

Soil Acidity

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
pH	pH	7.0	7.1	10	0.3	yes
Date Acquired: January 21, 2022						

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
pH	pH	7.1	6.5	7.1	yes
Date Acquired: January 21, 2022					

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	ng	0	-10	10	yes
Date Acquired: January 18, 2022					

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F1 C6-C10	mg/kg	<10	<10	50	0	yes
F1 -BTEX	mg/kg	<10	<10	50	0	yes
Date Acquired: January 18, 2022						

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	mg/kg	122	70	130	yes
Date Acquired: January 18, 2022					

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Methodology and Notes

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Alcohols - Soil - Low	US EPA	*	Nohalogenated Organics Using GC/FID. Revision 4, June 2003, 8015D	Jan 19, 2022	Element Calgary
Alcohols - Soil - Low	US EPA	*	Nohalogenated Organics Using GC/FID. Revision 4, June 2003, 8015D	Jan 27, 2022	Element Calgary
Barium (Extractable) in soil (0.1 M CaCl2)	AENV		Analytical Method for Extractable Barium, FEB 2009	Feb 7, 2022	Element Edmonton - Roper Road
Barium (Extractable) in soil (0.1 M CaCl2)	AENV		Analytical Method for Extractable Barium, FEB 2009	Feb 16, 2022	Element Edmonton - Roper Road
Barium (Fusion) in soil	ASTM	*	Standard Practice for Dissolution of Solid Waste by Lithium Metaborate Fusion, 2008., D 4503-08	Jan 27, 2022	Element Edmonton - Roper Road
Barium (Fusion) in soil	ASTM	*	Standard Practice for Dissolution of Solid Waste by Lithium Metaborate Fusion, 2008., D 4503-08	Feb 16, 2022	Element Edmonton - Roper Road
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 18, 2022	Element Calgary
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 26, 2022	Element Calgary
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 26, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Jan 18, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Jan 26, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Jan 26, 2022	Element Calgary
Glycols - Soil	US EPA	*	Solvent Extractable Nonvolatile Compounds by High Performance Liquid Chromatography/Thermospray/Mass Spectrometry (HPLC/TS/MS) or Ultraviolet (UV) Detection, EPA 8321	Jan 18, 2022	Element Calgary
Metals ICP (Hot Block) in soil	EPA	*	Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements, October 1999, 200.2	Jan 21, 2022	Element Edmonton - Roper Road
Metals ICP (Hot Block) in soil	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Jan 21, 2022	Element Edmonton - Roper Road

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Methodology and Notes

Bill To: Paramount Resources Ltd
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Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Stage 2 PSI-Supplemental
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547091**
Control Number:
Date Received: Jan 15, 2022
Date Reported: Feb 16, 2022
Report Number: 2720260

Method Name	Reference		Method	Date Analysis Started	Location
Metals ICP (Hot Block) in soil	US EPA				
PAH - Soil	AEP		Index of Additive Cancer Risk (IACR), IACR	Jan 19, 2022	Element Calgary
PAH - Soil	US EPA	*	Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, 8270	Jan 19, 2022	Element Calgary
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Jan 21, 2022	Element Edmonton - Roper Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Jan 27, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Jan 21, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Jan 27, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Jan 21, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Jan 27, 2022	Element Edmonton - Roper Road
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 18, 2022	Element Calgary
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 26, 2022	Element Calgary
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 26, 2022	Element Calgary

** Reference Method Modified*

References

AENV	Alberta Environment, Soil Quality Guidelines for Barite
AEP	Alberta Tier 1 Soil and Groundwater Remediation Guidelines
APHA	Standard Methods for the Examination of Water and Wastewater
ASTM	Annual Book of ASTM Standards
Carter	Soil Sampling and Methods of Analysis.
CCME	Canadian Council of Ministers of the Environment
EPA	Environmental Protection Agency Test Methods - US
McKeague	Manual on Soil Sampling and Methods of Analysis
US EPA	US Environmental Protection Agency Test Methods

Comments:

- Jan 19, 2022 - Sample 6: Surrogate Nitrobenzene-d5 assigned to PAH method does not meet acceptance criteria (50-140 %) due to possible matrix interference. This interference may affect Naphthalene due to non-target compound interference. Data for Naphthalene should be qualified.
- Jan 26, 2022 - Report was issued to include additional services requested by Marsha Pereria of SynergyAspen on January 25, 2022:
  ABT1SAL-S service requested on sample(s) 4, 5, 7.
  AL01S service requested on sample(s) 9, 11, 13, 23.
  FUSBa service requested on sample(s) 6.

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Methodology and Notes

Bill To:	Paramount Resources Ltd 2328 Clarke St. Port Moody, BC, Canada V3H 1Y8	Project ID:	PAR6206	Lot ID:	**1547091**
		Project Name:	Stage 2 PSI-Supplemental	Control Number:	
		Project Location:	I-02	Date Received:	Jan 15, 2022
		LSD:	I-02	Date Reported:	Feb 16, 2022
		P.O.:		Report Number:	2720260
Attn:	Project Coordinator	Proj. Acct. code:			
Sampled By:	Collin Batchelor	OI Customer	PR210-Drilling and		
Company:	SynergyAspen Environmental				

CCMEC service requested on sample(s) 4, 5, 8.
Previous report 2710755.

- Feb 06, 2022 - Report was issued to include additional services requested by Marsha Pereira of SynergyAspen on February 6, 2022:
  EXBA service requested on sample(s) 6.
  Previous report 2713601.
- Feb 16, 2022 - Report was issued to include additional barium analysis on sample 7 as requested by Marsha Pereira of SynergyAspen on Feb.15, 2022/

Please direct any inquiries regarding this report to our Client Services group.
Results relate only to samples as submitted.
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Report Transmission Cover Page

Bill To: Paramount Resources Ltd
9904 106 Street
Fort St. John, BC, Canada
Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Contact	Company	Address
Andrew Bergen	**SynergyAspen Environmental**	9904 106 Street Fort St. John, BC null Phone: (111) 222-3333 Fax: Email: abergen@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COA
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report

Contact	Company	Address
Element Invoicing	**Paramount Resources Ltd**	7217 Roper Road Edmonton, AB T6B 3J4 Phone: (780) 438-5522 Fax: Email: invoicing.edmonton@element.com

Delivery	Format	Deliverables
Post	PDF	COC / Invoice

Contact	Company	Address
Lori Johnson	**SynergyAspen Environmental**	9904 106 Street Fort St John, BC V1J 1V8 Phone: (250) 785-1030 Fax: (250) 785-1034 Email: ljohnson@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COA
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR

Contact	Company	Address
Marsha Pereira	**SynergyAspen Environmental**	9904 106 Street Fort St. John, BC null Phone: (250) 785-1030 Fax: Email: mpereira@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COA
Email - Merge Reports	PDF	COC / COA
Email - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR

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Report Transmission Cover Page

Bill To: Paramount Resources Ltd
9904 106 Street
Fort St. John, BC, Canada
Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Contact	Company	Address
Project Coordinator	**SynergyAspen Environmental**	2328 Clarke St. Port Moody, BC V3H 1Y8 Phone: (604) 931-1026 Fax: (604) 931-1046 Email: projectcoordinator@synergyaspen.ca

Delivery	Format	Deliverables
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Email - Merge Reports	PDF	COC / Invoice
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
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Contact	Company	Address
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Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR

Notes To Clients:

- Mar 02, 2022 - Report was issued to include additional services requested by Marsha Pereira of SynergyAspen on March 2.

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Analytical Report

Bill To: Paramount Resources Ltd
9904 106 Street
Fort St. John, BC, Canada
Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-1	1552450-2	1552450-3
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-01a-01 / 0.5 - 1.0	PAR6206 / TP22-01a-02 / 1.5 - 2.0	PAR6206 / TP22-01a-03 / 2.5 - 3.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		11-Feb-22	11-Feb-22	11-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	2040	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	8440	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	2690	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	3820	100
% C50+		%	9.5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	28.50	24.10	57.20	

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Bill To: Paramount Resources Ltd
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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-1	1552450-3	1552450-4
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-01a-01 / 0.5 - 1.0	PAR6206 / TP22-01a-03 / 2.5 - 3.0	PAR6206 / TP22-01a-04 / 3.5 - 4.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	56.8	83.5	25.9	0.2
Barium	Fusion	mg/kg	770	54200		40

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-2	1552450-3	1552450-4
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-01a-02 / 1.5 - 2.0	PAR6206 / TP22-01a-03 / 2.5 - 3.0	PAR6206 / TP22-01a-04 / 3.5 - 4.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.64	1.04	0.60	0.01
SAR	Saturated Paste		0.6	18	6.0	
% Saturation		%	114	175	137	
Calcium	Saturated Paste	mg/kg	94.4	17	23.6	
Magnesium	Saturated Paste	mg/kg	19.8	3.9	5.5	
Sodium	Saturated Paste	mg/kg	25	420	147	
Potassium	Saturated Paste	mg/kg	10	7	5	
Chloride	Saturated Paste	mg/L	9	48	13	3
Chloride	Saturated Paste	mg/kg	10	85	18	
Sulfate (SO4)	Saturated Paste	mg/kg	178	408	161	
TGR	Saturated Paste	T/ac	<0.1	0.2	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.0	8.0	7.6	

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-4	1552450-7	1552450-8
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-01a-04 / 3.5 - 4.0	PAR6206 / TP22-01b-02 / 1.5 - 2.0	PAR6206 / TP22-01b-03 / 2.5 - 3.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		11-Feb-22	11-Feb-22	11-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	32	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	183	<50	50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	116	<100	<100	100
% C50+		%	8.7	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	19.50	21.30	19.30	

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Analytical Report

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-4	1552450-8	1552450-12
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-01a-04 / 3.5 - 4.0	PAR6206 / TP22-01b-03 / 2.5 - 3.0	PAR6206 / TP22-02a-03 / 2.5 - 3.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10

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Analytical Report

Bill To: Paramount Resources Ltd
9904 106 Street
Fort St. John, BC, Canada
Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-8	1552450-10	1552450-11
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-01b-03 / 2.5 - 3.0	PAR6206 / TP22-02a-01 / 0.5 - 1.0	PAR6206 / TP22-02a-02 / 1.5 - 2.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	18.2	35.7	71.1	0.2
Barium	Fusion	mg/kg		846	864	40

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-9	1552450-10	1552450-11
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-01b-04 / 3.5 - 4.0	PAR6206 / TP22-02a-01 / 0.5 - 1.0	PAR6206 / TP22-02a-02 / 1.5 - 2.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		11-Feb-22	11-Feb-22	11-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	26	<25	74	25
F3c C16-C34	Dry Weight	mg/kg	142	72	208	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	109	100
% C50+		%	6.1	<5	5.4	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	18.00	22.50	27.00	

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-9	1552450-11	1552450-12
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-01b-04 / 3.5 - 4.0	PAR6206 / TP22-02a-02 / 1.5 - 2.0	PAR6206 / TP22-02a-03 / 2.5 - 3.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.46	1.12	0.63	0.01
SAR	Saturated Paste		6.4	15.8	2.3	
% Saturation		%	129	84	77	
Calcium	Saturated Paste	mg/kg	13.2	12.9	35.3	
Magnesium	Saturated Paste	mg/kg	2.9	3.3	9.0	
Sodium	Saturated Paste	mg/kg	113	226	51	
Potassium	Saturated Paste	mg/kg	2	5	4	
Chloride	Saturated Paste	mg/L	8	61	20	3
Chloride	Saturated Paste	mg/kg	10	52	15	
Sulfate (SO4)	Saturated Paste	mg/kg	87.3	145	102	
TGR	Saturated Paste	T/ac	<0.1	0.2	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.6	8.6	7.5	

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-12	1552450-14	1552450-15
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-02a-03 / 2.5 - 3.0	PAR6206 / TP22-02b-01 / 0.5 - 1.0	PAR6206 / TP22-02b-02 / 1.5 - 2.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		11-Feb-22	11-Feb-22	11-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	81	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	23.40	18.20	17.80	

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-12	1552450-15	1552450-18
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-02a-03 / 2.5 - 3.0	PAR6206 / TP22-02b-02 / 1.5 - 2.0	PAR6206 / TP22-03a-01 / 0.5 - 1.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	19.9	26.6	61.2	0.2
Barium	Fusion	mg/kg			858	40

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Project Name: Remediation
Project Location: I-02
LSD: I-02
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Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-15	1552450-21	1552450-25
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-02b-02 / 1.5 - 2.0	PAR6206 / TP22-03a-04 / 3.5 - 4.0	PAR6206 / TP22-03b-03 / 2.5 - 3.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	0.202	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10

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Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
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Reference Number	1552450-16	1552450-18	1552450-19
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-02b-03 / 2.5 - 3.0	PAR6206 / TP22-03a-01 / 0.5 - 1.0	PAR6206 / TP22-03a-02 / 1.5 - 2.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		11-Feb-22	11-Feb-22	11-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	51	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	17.10	24.90	24.40	

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Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-16	1552450-19	1552450-20
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-02b-03 / 2.5 - 3.0	PAR6206 / TP22-03a-02 / 1.5 - 2.0	PAR6206 / TP22-03a-03 / 2.5 - 3.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.33	0.62	1.44	0.01
SAR	Saturated Paste		0.6	4.1	26	
% Saturation		%	104	91	205	
Calcium	Saturated Paste	mg/kg	38.6	32.5	17	
Magnesium	Saturated Paste	mg/kg	9.0	6.6	5.8	
Sodium	Saturated Paste	mg/kg	15	94	692	
Potassium	Saturated Paste	mg/kg	6	3	13	
Chloride	Saturated Paste	mg/L	17	19	24	3
Chloride	Saturated Paste	mg/kg	18	18	49	
Sulfate (SO4)	Saturated Paste	mg/kg	35.0	38.3	391	
Specific Gravity	As Received				1.636	
TGR	Saturated Paste	T/ac	<0.1	<0.1	0.4	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.6	7.2	9.1	

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-20	1552450-21	1552450-22
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-03a-03 / 2.5 - 3.0	PAR6206 / TP22-03a-04 / 3.5 - 4.0	PAR6206 / TP22-03a-05 / 2.5 - 3.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	33.3	18.8	28.7	0.2
Barium	Fusion	mg/kg	97600		103000	40
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		11-Feb-22	11-Feb-22	11-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	1770	<25	1860	25
F3c C16-C34	Dry Weight	mg/kg	6490	<50	7080	50
F4c C34-C50	Dry Weight	mg/kg	2300	<100	2490	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	3490	<100	3890	100
% C50+		%	6.5	<5	7.0	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	41.90	21.70	42.40	

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-20	1552450-29	1552450-37
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-03a-03 / 2.5 - 3.0	PAR6206 / TP22-04a-03 / 2.5 - 3.0	COMP Sample TP22-03a-01(-18), TP22-03a-02(-19) TP22-03a-04(-21)
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Food Chemistry						
Specific Gravity	As Received		1.636	1.833	1.783	

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Project ID: PAR6206
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Project Location: I-02
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Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-21	1552450-22	1552450-24
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-03a-04 / 3.5 - 4.0	PAR6206 / TP22-03a-05 / 2.5 - 3.0	PAR6206 / TP22-03b-02 / 1.5 - 2.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.94	1.51	0.28	0.01
SAR	Saturated Paste		12.7	28	0.9	
% Saturation		%	84	223	106	
Calcium	Saturated Paste	mg/kg	13.1	18	32.0	
Magnesium	Saturated Paste	mg/kg	2.5	5.9	7.0	
Sodium	Saturated Paste	mg/kg	175	792	21	
Potassium	Saturated Paste	mg/kg	2	15	3	
Chloride	Saturated Paste	mg/L	16	25	4	3
Chloride	Saturated Paste	mg/kg	14	55	4	
Sulfate (SO4)	Saturated Paste	mg/kg	133	478	21	
TGR	Saturated Paste	T/ac	0.1	0.5	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.8	8.9	7.5	

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Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-25	1552450-26	1552450-27
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-03b-03 / 2.5 - 3.0	PAR6206 / TP22-03b-04 / 3.5 - 4.0	PAR6206 / TP22-04a-01 / 0.5 - 1.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		11-Feb-22	11-Feb-22	11-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	184	25
F3c C16-C34	Dry Weight	mg/kg	55	<50	658	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	210	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	333	100
% C50+		%	<5	<5	6.7	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	18.80	6.37	29.40	

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Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
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Reference Number	1552450-25	1552450-27	1552450-29
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-03b-03 / 2.5 - 3.0	PAR6206 / TP22-04a-01 / 0.5 - 1.0	PAR6206 / TP22-04a-03 / 2.5 - 3.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	25.7	83.5	64.5	0.2
Barium	Fusion	mg/kg			27500	40

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Control Number:
Date Received: Feb 10, 2022
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Reference Number	1552450-28	1552450-29	1552450-30
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-04a-02 / 1.5 - 2.0	PAR6206 / TP22-04a-03 / 2.5 - 3.0	PAR6206 / TP22-04a-04 / 3.5 - 4.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.41	0.56	0.32	0.01
SAR	Saturated Paste		1.6	5.4	0.7	
% Saturation		%	67	112	71	
Calcium	Saturated Paste	mg/kg	26.8	21.7	27.3	
Magnesium	Saturated Paste	mg/kg	6.1	5.7	5.4	
Sodium	Saturated Paste	mg/kg	29	117	12	
Potassium	Saturated Paste	mg/kg	3	5	3	
Chloride	Saturated Paste	mg/L	9	20	4	3
Chloride	Saturated Paste	mg/kg	6	22	3	
Sulfate (SO4)	Saturated Paste	mg/kg	14	103	31.1	
Specific Gravity	As Received			1.833		
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.4	7.9	7.0	
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		11-Feb-22	11-Feb-22	11-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	<25	2330	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	10700	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	2790	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	4190	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	22.40	27.20	20.70	

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Analytical Report

Bill To: Paramount Resources Ltd
9904 106 Street
Fort St. John, BC, Canada
Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-30	1552450-31	1552450-34
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-04a-04 / 3.5 - 4.0	PAR6206 / TP22-04a-05 / 2.5 - 3.0	PAR6206 / TP22-04b-03 / 2.5 - 3.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	30.1	78.7	24.3	0.2

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Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-30	1552450-34	1552450-36
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-04a-04 / 3.5 - 4.0	PAR6206 / TP22-04b-03 / 2.5 - 3.0	3:1 MIXR COMP Sample (-37):TP22-03a-03(-20)
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	0.023	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	0.11	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	0.210	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	0.61	0.03
Methanol Field Preservation			Yes	Yes	No	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	28	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	27	10

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-31	1552450-32	1552450-36
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-04a-05 / 2.5 - 3.0	PAR6206 / TP22-04b-01 / 0.5 - 1.0	3:1 MIXR COMP Sample (-37):TP22-03a-03(-20)
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.45	0.46	1.12	0.01
SAR	Saturated Paste		6.3	0.4	10.9	
% Saturation		%	125	84	76	
Calcium	Saturated Paste	mg/kg	14.3	50.0	18.9	
Magnesium	Saturated Paste	mg/kg	3.8	9.1	3.8	
Sodium	Saturated Paste	mg/kg	116	10	173	
Potassium	Saturated Paste	mg/kg	5	5	3	
Chloride	Saturated Paste	mg/L	18	7	32	3
Chloride	Saturated Paste	mg/kg	22	6	24	
Sulfate (SO4)	Saturated Paste	mg/kg	78.7	73.0	172	
TGR	Saturated Paste	T/ac	<0.1	<0.1	0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.8	7.6	7.6	

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-31	1552450-34	1552450-35
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-04a-05 / 2.5 - 3.0	PAR6206 / TP22-04b-03 / 2.5 - 3.0	PAR6206 / TP22-04b-04 / 3.5 - 4.0
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		11-Feb-22	11-Feb-22	11-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	1240	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	5230	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	1570	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	2150	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	28.40	19.30	20.10	

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-36	1552450-38
Sample Date	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA
Sample Location		
Sample Description	3:1 MIXR COMP Sample (-37):TP22-03a-03(-20)	3:1 MIXR COMP Sample (-39):TP22-04a-03 (-29)
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	0.10	0.06		0.05
Antimony	Strong Acid Extractable	mg/kg	0.6	0.7		0.2
Arsenic	Strong Acid Extractable	mg/kg	10.5	11.1		0.2
Barium	Strong Acid Extractable	mg/kg	2370	2320		1
Beryllium	Strong Acid Extractable	mg/kg	0.5	0.6		0.1
Cadmium	Strong Acid Extractable	mg/kg	0.43	0.47		0.01
Chromium	Strong Acid Extractable	mg/kg	25.5	23.3		0.5
Cobalt	Strong Acid Extractable	mg/kg	10.3	10.0		0.1
Copper	Strong Acid Extractable	mg/kg	31.2	42.2		1
Lead	Strong Acid Extractable	mg/kg	13.6	12.9		0.1
Mercury	Strong Acid Extractable	mg/kg	0.22	0.22		0.05
Molybdenum	Strong Acid Extractable	mg/kg	2.3	2.6		1
Nickel	Strong Acid Extractable	mg/kg	26.6	27.5		0.5
Selenium	Strong Acid Extractable	mg/kg	0.6	0.6		0.3
Silver	Strong Acid Extractable	mg/kg	0.2	0.2		0.1
Thallium	Strong Acid Extractable	mg/kg	0.16	0.18		0.05
Tin	Strong Acid Extractable	mg/kg	<1.0	<1.0		1
Uranium	Strong Acid Extractable	mg/kg	1.1	1.2		0.5
Vanadium	Strong Acid Extractable	mg/kg	26.1	27.7		0.1
Zinc	Strong Acid Extractable	mg/kg	98	97		1
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		10-Mar-22	11-Mar-22		
F2c C10-C16	Dry Weight	mg/kg	327	163		25
F3c C16-C34	Dry Weight	mg/kg	1280	722		50
F4c C34-C50	Dry Weight	mg/kg	445	193		100
F4HTGCc C34-C50+	Dry Weight	mg/kg	594	278		100
% C50+		%	<5	<5		
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done		
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	24.50	21.50		

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Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-37	1552450-38	1552450-39
Sample Date	Feb 06, 2022	Feb 06, 2022	Feb 06, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	COMP Sample TP22-03a-01(-18), TP22-03a-02(-19) TP22-03a-04(-21)	3:1 MIXR COMP Sample (-39):TP22-04a-03 (-29)	COMP Sample TP22-04a-01(-27), TP22-04a-02 x 2 (-28)
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m		0.62		0.01
SAR	Saturated Paste			2.6		
% Saturation		%		84		
Calcium	Saturated Paste	mg/kg		38.1		
Magnesium	Saturated Paste	mg/kg		8.2		
Sodium	Saturated Paste	mg/kg		61		
Potassium	Saturated Paste	mg/kg		4		
Chloride	Saturated Paste	mg/L		15		3
Chloride	Saturated Paste	mg/kg		13		
Sulfate (SO4)	Saturated Paste	mg/kg		98.7		
Specific Gravity	As Received		1.783		1.935	
TGR	Saturated Paste	T/ac		<0.1		

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Analytical Report

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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Reference Number	1552450-38
Sample Date	Feb 06, 2022
Sample Time	NA
Sample Location	
Sample Description	3:1 MIXR COMP Sample (-39):TP22-04a-03 (-29)
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.3			
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005			0.005
Toluene	Dry Weight	mg/kg	<0.02			0.02
Ethylbenzene	Dry Weight	mg/kg	0.036			0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	0.03			0.03
Methanol Field Preservation			No			
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10			10
F1 -BTEX	Dry Weight	mg/kg	<10			10

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Analytical Report

Bill To:	Paramount Resources Ltd 9904 106 Street Fort St. John, BC, Canada	Project ID:	PAR6206	Lot ID:	**1552450**
		Project Name:	Remediation	Control Number:	
		Project Location:	I-02	Date Received:	Feb 10, 2022
Attn:	Marsha Pereira	LSD:	I-02	Date Reported:	Mar 13, 2022
Sampled By:	Ross Pasmans	P.O.:		Report Number:	2724645
Company:	SynergyAspen Environmental	Proj. Acct. code:			
		OI Customer	PR210-Drilling and		

Reference Number	1552450-39
Sample Date	Feb 06, 2022
Sample Time	NA
Sample Location	
Sample Description	COMP Sample TP22-04a-01(-27), TP22-04a-02 x 2 (-28)
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Food Chemistry						
Specific Gravity	As Received		1.935			

Approved by:



Benjamin Morris, B.Sc
Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

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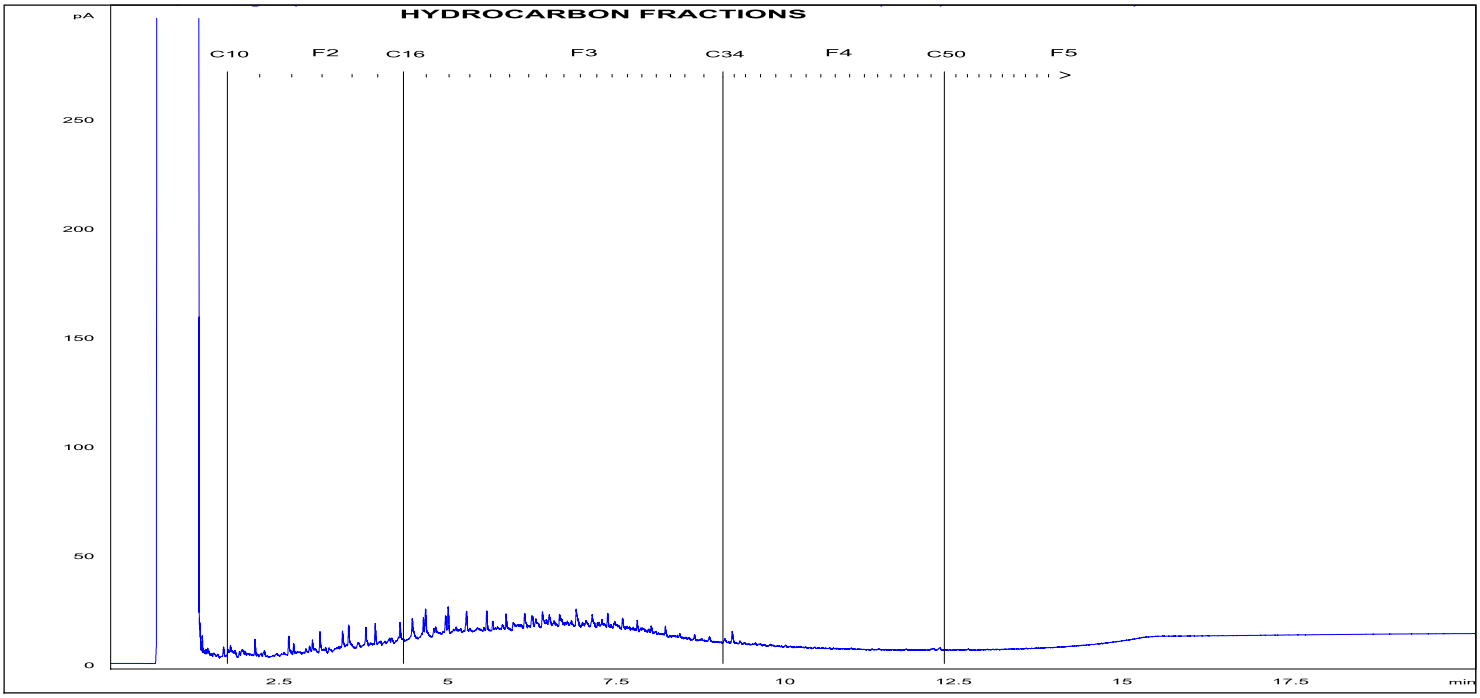
Chromatograms Results

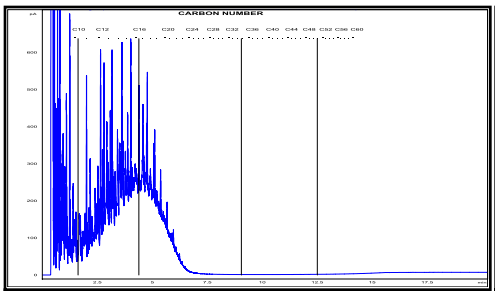
Bill To:	Paramount Resources Ltd 9904 106 Street Fort St. John, BC, Canada	Project ID:	PAR6206	Lot ID:	**1552450**
		Project Name:	Remediation	Control Number:	
		Project Location:	I-02	Date Received:	Feb 10, 2022
Attn:	Marsha Pereira	LSD:	I-02	Date Reported:	Mar 13, 2022
Sampled By:	Ross Pasmans	P.O.:		Report Number:	2724645
Company:	SynergyAspen Environmental	Proj. Acct. code:			
		OI Customer	PR210-Drilling and		

Reference Number: 1552450-38 Sample Description: 3:1 MIXR COMP Sample (-39):TP22-04a-03 (-29)
Sample Date: February 6, 2022 Location: Matrix: Soil

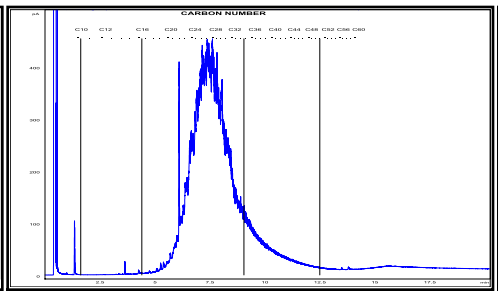


TYPICAL PRODUCT CHROMATOGRAMS

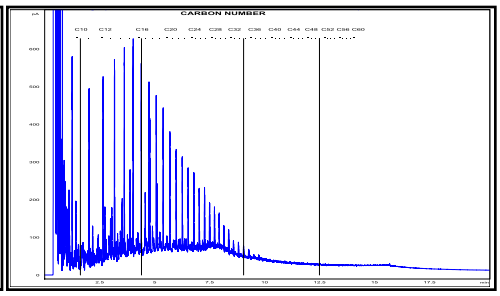
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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Quality Control

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9904 106 Street
Fort St. John, BC, Canada
Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Barite Soil Analysis

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
Barium	mg/L	0.0240033	-0.20	0.20		yes
Date Acquired:	February 11, 2022					
Client Sample Replicates	**Units**	**Replicate 1**	**Replicate 2**	**% RSD Criteria**	**Absolute Criteria**	**Passed QC**
Barium	mg/kg	56.8	56.8	10	5.00	yes
Date Acquired:	February 11, 2022					
Control Sample	**Units**	**Measured**	**Lower Limit**	**Upper Limit**		**Passed QC**
Barium	mg/kg	7.07	5.10	8.70		yes
Date Acquired:	February 11, 2022					
Barium	mg/kg	0.10	0.09	0.11		yes
Date Acquired:	February 11, 2022					
Barium	mg/kg	10200	7573	12007		yes
Date Acquired:	February 14, 2022					

Extractable Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
F2c C10-C16	µg/mL	0	-10	10		yes
F3c C16-C34	µg/mL	0	-30	30		yes
F4c C34-C50	µg/mL	0	-20	20		yes
F4HTGCc C34-C50+	µg/mL	0	-20	20		yes
Date Acquired:	February 11, 2022					
Calibration Check	**Units**	**% Recovery**	**Lower Limit**	**Upper Limit**		**Passed QC**
F2c C10-C16	µg/mL	102.98	80	120		yes
F3c C16-C34	µg/mL	104.69	80	120		yes
F4c C34-C50	µg/mL	97.14	80	120		yes
F4HTGCc C34-C50+	µg/mL	93.48	80	120		yes
Date Acquired:	February 11, 2022					
Client Sample Replicates	**Units**	**Replicate 1**	**Replicate 2**	**% RSD Criteria**	**Absolute Criteria**	**Passed QC**
F2c C10-C16	mg/kg	<25	<25	50	10	yes
F3c C16-C34	mg/kg	51	<50	50	10	yes
F4c C34-C50	mg/kg	<100	<100	50	10	yes
F4HTGCc C34-C50+	mg/kg	<100	<100	50	10	yes
Date Acquired:	February 11, 2022					
Matrix Spike	**Units**	**% Recovery**	**Lower Limit**	**Upper Limit**		**Passed QC**
F2c C10-C16	mg/kg	89	70	130		yes
F3c C16-C34	mg/kg	106	70	130		yes
F4c C34-C50	mg/kg	107	70	130		yes
F4HTGCc C34-C50+	mg/kg	107	70	130		yes
Date Acquired:	February 11, 2022					

Food Chemistry

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Specific Gravity		1.935	1.934	10	0.001	yes
Date Acquired:	March 06, 2022					

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Quality Control

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Company: SynergyAspen Environmental

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Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
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OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Food Chemistry - Continued

Metals Strong Acid Digestion

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Boron	mg/L	-0.0041495	-0.05	0.05	yes
Antimony	µg/L	0.000163277	-0.1	0.2	yes
Arsenic	µg/L	-0.0171737	-0.2	0.2	yes
Barium	µg/L	0.0827781	-1	1	yes
Beryllium	µg/L	-0.000206031	-0.1	0.1	yes
Cadmium	µg/L	0.000486048	-0.01	0.01	yes
Chromium	µg/L	0.0106113	-0.5	0.5	yes
Cobalt	µg/L	0.00161375	-0.1	0.1	yes
Copper	µg/L	0.014295	-0.6	1.2	yes
Lead	µg/L	0.00463087	-5.0	5.0	yes
Mercury	µg/L	0.00789308	-0.04	0.04	yes
Molybdenum	µg/L	-0.00624616	-1.0	1.0	yes
Nickel	µg/L	0.00525835	-0.4	0.7	yes
Selenium	µg/L	0.000724198	-0.30	0.30	yes
Silver	µg/L	0.000141193	-0.09	0.14	yes
Thallium	µg/L	-0.000479988	-0.04	0.04	yes
Tin	µg/L	0.0443882	-0.4	0.4	yes
Uranium	µg/L	-2.23396e-005	-0.5	0.5	yes
Vanadium	µg/L	-0.0114368	-0.1	0.1	yes
Zinc	µg/L	0.238706	-1	1	yes
Date Acquired:	March 09, 2022				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Antimony	mg/kg	0.4	0.4	20	0.4	yes
Arsenic	mg/kg	6.0	6.3	20	0.4	yes
Barium	mg/kg	138	149	20	2	yes
Beryllium	mg/kg	0.4	0.5	20	0.2	yes
Cadmium	mg/kg	0.24	0.22	20	0.02	yes
Chromium	mg/kg	14.1	13.6	20	1.1	yes
Cobalt	mg/kg	6.8	6.7	20	0.2	yes
Copper	mg/kg	13.3	11.9	20	2.2	yes
Lead	mg/kg	20.9	18.1	20	0.2	yes
Mercury	mg/kg	0.06	0.05	20	0.05	yes
Molybdenum	mg/kg	<1.0	<1.0	20	2.2	yes
Nickel	mg/kg	19.8	19.0	20	1.1	yes
Selenium	mg/kg	0.4	0.3	20	0.66	yes
Silver	mg/kg	<0.10	<0.10	20	0.22	yes
Thallium	mg/kg	0.13	0.13	20	0.11	yes
Tin	mg/kg	<1.0	<1.0	20	2.2	yes
Uranium	mg/kg	0.8	0.8	20	1.1	yes
Vanadium	mg/kg	18.1	17.9	20	0.2	yes
Zinc	mg/kg	54	51	20	2	yes
Date Acquired:	March 09, 2022					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC

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Quality Control

Bill To: Paramount Resources Ltd
9904 106 Street
Fort St. John, BC, Canada
Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Metals Strong Acid Digestion - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Antimony	mg/kg	41.5	37.6	42.4	yes
Arsenic	mg/kg	41.1	36.3	43.9	yes
Barium	mg/kg	203	188	212	yes
Beryllium	mg/kg	20.8	17.4	22.2	yes
Cadmium	mg/kg	2.10	1.88	2.28	yes
Chromium	mg/kg	104	93.2	107.0	yes
Cobalt	mg/kg	20.8	18.4	21.4	yes
Copper	mg/kg	207	186.6	216.6	yes
Lead	mg/kg	19.7	18.3	21.3	yes
Mercury	mg/kg	3.17	2.64	3.36	yes
Molybdenum	mg/kg	212	185.1	222.3	yes
Nickel	mg/kg	105	92.4	106.2	yes
Selenium	mg/kg	41.7	35.20	44.20	yes
Silver	mg/kg	20.2	18.20	22.40	yes
Thallium	mg/kg	9.95	9.02	10.82	yes
Tin	mg/kg	209	191.2	215.2	yes
Uranium	mg/kg	98.3	86.0	116.0	yes
Vanadium	mg/kg	20.8	18.0	21.6	yes
Zinc	mg/kg	207	186	212	yes
Date Acquired:	March 09, 2022				
Antimony	mg/kg	3.8	2.7	4.5	yes
Arsenic	mg/kg	4.2	2.9	4.9	yes
Barium	mg/kg	104	76	126	yes
Beryllium	mg/kg	0.3	0.2	0.4	yes
Cadmium	mg/kg	1.04	0.68	1.16	yes
Chromium	mg/kg	81.5	58.2	97.2	yes
Cobalt	mg/kg	6.6	4.7	7.9	yes
Copper	mg/kg	121	90.6	150.6	yes
Lead	mg/kg	270	185.9	333.5	yes
Mercury	mg/kg	0.07	0.05	0.09	yes
Molybdenum	mg/kg	1.1	0.8	1.3	yes
Nickel	mg/kg	25.4	18.2	30.8	yes
Selenium	mg/kg	<0.3	0.23	0.35	yes
Silver	mg/kg	4.5	2.30	5.30	yes
Thallium	mg/kg	0.07	0.05	0.09	yes
Tin	mg/kg	10.0	7.6	12.4	yes
Uranium	mg/kg	0.5	0.4	0.6	yes
Vanadium	mg/kg	29.1	20.4	34.2	yes
Zinc	mg/kg	328	244	408	yes
Date Acquired:	March 09, 2022				

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.005	0.005	yes
Toluene	ng	0	-0.06	0.06	yes

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Quality Control

Bill To: Paramount Resources Ltd
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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
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OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
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Date Reported: Mar 13, 2022
Report Number: 2724645

Mono-Aromatic Hydrocarbons - Soil - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Ethylbenzene	ng	0	-0.030	0.030	yes
Total Xylenes (m,p,o)	ng	0	-0.09	0.09	yes
Styrene	ng	0	-0.030	0.030	yes
Date Acquired: February 11, 2022					

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	112.70	80	120	yes
Toluene	ng	109.50	80	120	yes
Ethylbenzene	ng	108.08	80	120	yes
m,p-Xylene	ng	111.22	80	120	yes
Total Xylenes (m,p,o)	ng	111.59	80	120	yes
Styrene	ng	111.15	80	120	yes
Date Acquired: February 11, 2022					

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Benzene	mg/kg	<0.005	<0.005	50	0.010	yes
Toluene	mg/kg	<0.02	<0.02	50	0.04	yes
Ethylbenzene	mg/kg	0.018	0.011	50	0.020	yes
m,p-Xylene	mg/kg	<0.02	<0.02	50	0.04	yes
o-Xylene	mg/kg	<0.02	<0.02	50	0.04	yes
Total Xylenes (m,p,o)	mg/kg	<0.03	<0.03	50	0.06	yes
Styrene	mg/kg	<0.01	<0.01	50	0.020	yes
Date Acquired: March 07, 2022						

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	mg/kg	106	70	130	yes
Toluene	mg/kg	117	70	130	yes
Ethylbenzene	mg/kg	124	70	130	yes
m,p-Xylene	mg/kg	119	70	130	yes
o-Xylene	mg/kg	129	70	130	yes
Styrene	mg/kg	129	70	130	yes
Date Acquired: February 11, 2022					

Salinity

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Calcium	mg/L	0.0964963	-2.0	2.0	yes
Magnesium	mg/L	0.0232949	-0.3	0.3	yes
Sodium	mg/L	0.130081	-1	1	yes
Potassium	mg/L	0.00454181	-1.0	1.0	yes
Chloride	mg/L	1.5418	-3	3	yes
Sulfate-S	mg/L	0.0291639	-2	2	yes
Date Acquired: February 11, 2022					

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Electrical Conductivity	dS/m	1.56	1.56	20	0.03	yes
Calcium	mg/kg	162	158	20	0.6	yes
Magnesium	mg/kg	41.7	41.8	20	0.6	yes

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Quality Control

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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552450**
Control Number:
Date Received: Feb 10, 2022
Date Reported: Mar 13, 2022
Report Number: 2724645

Salinity - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Sodium	mg/kg	154	153	20	1	yes
Potassium	mg/kg	14	14	20	1	yes
Chloride	mg/kg	261	255	15	3	yes
Sulfate-S	mg/kg	257	261	20	1.2	yes
Date Acquired:	February 12, 2022					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Electrical Conductivity	dS/m	3.17	2.50	3.70	yes
% Saturation	%	66	50	75	yes
Calcium	mg/L	691	591.6	831.6	yes
Magnesium	mg/L	106	89.7	125.7	yes
Sodium	mg/L	34	27	45	yes
Potassium	mg/L	14	10.6	16.0	yes
Chloride	mg/L	29	20	44	yes
Sulfate-S	mg/L	535	431	659	yes
Date Acquired:	February 11, 2022				
Specific Gravity		1.712	1.590	1.770	yes
Date Acquired:	March 06, 2022				
Electrical Conductivity	dS/m	28.7	26.80	35.20	yes
Calcium	mg/L	252	226.9	261.1	yes
Magnesium	mg/L	102	91.0	104.8	yes
Sodium	mg/L	256	229	264	yes
Potassium	mg/L	251	230.7	265.5	yes
Chloride	mg/L	2070	1852	2229	yes
Sulfate-S	mg/L	154	137	158	yes
Date Acquired:	February 11, 2022				

Soil Acidity

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
pH	pH	5.7	5.2	7.0	yes
Date Acquired:	March 10, 2022				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
pH	pH	8.0	8.1	10	0.3	yes
Date Acquired:	February 12, 2022					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
pH	pH	6.9	6.5	7.1	yes
Date Acquired:	February 12, 2022				

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	ng	0	-10	10	yes
Date Acquired:	February 11, 2022				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F1 C6-C10	mg/kg	<10	<10	50	0	yes

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Quality Control

Bill To:	Paramount Resources Ltd 9904 106 Street Fort St. John, BC, Canada	Project ID:	PAR6206	Lot ID:	**1552450**
		Project Name:	Remediation	Control Number:	
		Project Location:	I-02	Date Received:	Feb 10, 2022
Attn:	Marsha Pereira	LSD:	I-02	Date Reported:	Mar 13, 2022
Sampled By:	Ross Pasmans	P.O.:		Report Number:	2724645
Company:	SynergyAspen Environmental	Proj. Acct. code:			
		OI Customer	PR210-Drilling and		

Volatile Petroleum Hydrocarbons - Soil - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F1 -BTEX	mg/kg	<10	<10	50	0	yes
Date Acquired:	March 07, 2022					

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	mg/kg	119	70	130	yes
Date Acquired:	February 11, 2022				

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Methodology and Notes

Bill To:	Paramount Resources Ltd 9904 106 Street Fort St. John, BC, Canada	Project ID:	PAR6206	Lot ID:	**1552450**
		Project Name:	Remediation	Control Number:	
		Project Location:	I-02	Date Received:	Feb 10, 2022
Attn:	Marsha Pereira	LSD:	I-02	Date Reported:	Mar 13, 2022
Sampled By:	Ross Pasmans	P.O.:		Report Number:	2724645
Company:	SynergyAspen Environmental	Proj. Acct. code:			
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Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Barium (Extractable) in soil (0.1 M CaCl2)	AENV		Analytical Method for Extractable Barium, FEB 2009	Feb 11, 2022	Element Edmonton - Roper Road
Barium (Fusion) in soil	ASTM	*	Standard Practice for Dissolution of Solid Waste by Lithium Metaborate Fusion, 2008., D 4503-08	Feb 14, 2022	Element Edmonton - Roper Road
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Feb 11, 2022	Element Calgary
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Mar 2, 2022	Element Calgary
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Mar 7, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Feb 11, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Mar 2, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Mar 7, 2022	Element Calgary
Metals ICP (Hot Block) in soil	EPA	*	Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements, October 1999, 200.2	Mar 9, 2022	Element Edmonton - Roper Road
Metals ICP (Hot Block) in soil	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Mar 9, 2022	Element Edmonton - Roper Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Feb 12, 2022	Element Edmonton - Roper Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Feb 13, 2022	Element Edmonton - Roper Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Feb 16, 2022	Element Edmonton - Roper Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Mar 10, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Feb 11, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Feb 11, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Feb 12, 2022	Element Edmonton - Roper Road

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Methodology and Notes

Bill To:	Paramount Resources Ltd 9904 106 Street Fort St. John, BC, Canada	Project ID:	PAR6206	Lot ID:	**1552450**
		Project Name:	Remediation	Control Number:	
		Project Location:	I-02	Date Received:	Feb 10, 2022
Attn:	Marsha Pereira	LSD:	I-02	Date Reported:	Mar 13, 2022
Sampled By:	Ross Pasmans	P.O.:		Report Number:	2724645
Company:	SynergyAspen Environmental	Proj. Acct. code:			
		OI Customer	PR210-Drilling and		

Method Name	Reference		Method	Date Analysis Started	Location
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Mar 10, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Feb 11, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Feb 11, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Feb 12, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Mar 10, 2022	Element Edmonton - Roper Road
Specific Gravity as Received in Sump Solids or Total Waste	D50	*	Appendix 3, Analytical Requirements, Specific Gravity, SG	Mar 6, 2022	Element Edmonton - Roper Road
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Feb 11, 2022	Element Calgary
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Feb 12, 2022	Element Calgary
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Mar 2, 2022	Element Calgary
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Mar 7, 2022	Element Calgary

** Reference Method Modified*

References

AENV	Alberta Environment, Soil Quality Guidelines for Barite
APHA	Standard Methods for the Examination of Water and Wastewater
ASTM	Annual Book of ASTM Standards
Carter	Soil Sampling and Methods of Analysis.
CCME	Canadian Council of Ministers of the Environment
D50	Directive 50: Drilling Waste Management
EPA	Environmental Protection Agency Test Methods - US
McKeague	Manual on Soil Sampling and Methods of Analysis
US EPA	US Environmental Protection Agency Test Methods

Comments:

- Mar 02, 2022 - Report was issued to include additional services requested by Marsha Pereira of SynergyAspen on March 2.

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Methodology and Notes

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		Project Name:	Remediation	Control Number:	
		Project Location:	I-02	Date Received:	Feb 10, 2022
Attn:	Marsha Pereira	LSD:	I-02	Date Reported:	Mar 13, 2022
Sampled By:	Ross Pasmans	P.O.:		Report Number:	2724645
Company:	SynergyAspen Environmental	Proj. Acct. code:			
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Report Transmission Cover Page

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 16, 2022
Report Number: 2724665

Contact	Company	Address
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Delivery	Format	Deliverables
Email - Merge Reports	PDF	COA
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report

Contact	Company	Address
Element Invoicing	**Paramount Resources Ltd**	7217 Roper Road Edmonton, AB T6B 3J4 Phone: (780) 438-5522 Fax: Email: invoicing.edmonton@element.com

Delivery	Format	Deliverables
Post	PDF	COC / Invoice

Contact	Company	Address
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Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report

Contact	Company	Address
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Delivery	Format	Deliverables
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Email - Merge Reports	PDF	COC / COA
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Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
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Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
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Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 16, 2022
Report Number: 2724665

Contact	Company	Address
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Delivery	Format	Deliverables
Email - Merge Reports	PDF	COA
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report

Notes To Clients:

- Mar 02, 2022 - Report was issued to include additional services requested by Marsha Pereira of SynergyAspen on March 2. Previous report 2720259.

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Analytical Report

Bill To: Paramount Resources Ltd
9904 106 Street
Fort St. John, BC, Canada
Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 16, 2022
Report Number: 2724665

			Reference Number	1552709-1	1552709-2	1552709-3
			Sample Date	Feb 09, 2022	Feb 09, 2022	Feb 09, 2022
			Sample Time	NA	NA	NA
			Sample Location			
			Sample Description	PAR6206 / TP22-05a-01 / 0.5-1	PAR6206 / TP22-05a-02 / 1.5-2	PAR6206 / TP22-05a-03 / 2.5-3
			Matrix	Soil	Soil	Soil
Analyte		**Units**		**Results**	**Results**	**Results**	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil							
Extraction Date	Total Extractables			13-Feb-22	13-Feb-22	13-Feb-22	
F2c C10-C16	Dry Weight	mg/kg		<25	148	<25	25
F3c C16-C34	Dry Weight	mg/kg		<50	800	93	50
F4c C34-C50	Dry Weight	mg/kg		<100	138	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg		<100	174	<100	100
% C50+		%		<5	<5	<5	
Silica Gel Cleanup							
Silica Gel Cleanup				Done	Done	Done	
Soil % Moisture							
Moisture	Soil % Moisture	% by weight		25.70	21.60	20.00	

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 16, 2022
Report Number: 2724665

Reference Number	1552709-1	1552709-3	1552709-5
Sample Date	Feb 09, 2022	Feb 09, 2022	Feb 09, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-05a-01 / 0.5-1	PAR6206 / TP22-05a-03 / 2.5-3	PAR6206 / TP22-05a-05 / 2.5-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	67.9	19.0	17.8	0.2
Barium	Fusion	mg/kg	790	2760	2830	40

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 16, 2022
Report Number: 2724665

Reference Number	1552709-2	1552709-3	1552709-4
Sample Date	Feb 09, 2022	Feb 09, 2022	Feb 09, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-05a-02 / 1.5-2	PAR6206 / TP22-05a-03 / 2.5-3	PAR6206 / TP22-05a-04 / 3.5-4
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.48	1.06	0.39	0.01
SAR	Saturated Paste		4.7	13.1	2.1	
% Saturation		%	90	77	75	
Calcium	Saturated Paste	mg/kg	16.5	17.7	19.6	
Magnesium	Saturated Paste	mg/kg	3.9	2.6	5.6	
Sodium	Saturated Paste	mg/kg	78	197	35	
Potassium	Saturated Paste	mg/kg	2	2	3	
Chloride	Saturated Paste	mg/L	10	19	5	3
Chloride	Saturated Paste	mg/kg	9	15	4	
Sulfate (SO4)	Saturated Paste	mg/kg	70.2	144	49.2	
TGR	Saturated Paste	T/ac	<0.1	0.2	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.3	7.7	7.6	

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 16, 2022
Report Number: 2724665

Reference Number	1552709-4	1552709-5	1552709-8
Sample Date	Feb 09, 2022	Feb 09, 2022	Feb 09, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-05a-04 / 3.5-4	PAR6206 / TP22-05a-05 / 2.5-3	PAR6206 / TP22-05b-03 / 2.5-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		13-Feb-22	13-Feb-22	13-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	<25	70	<25	25
F3c C16-C34	Dry Weight	mg/kg	65	295	54	50
F4c C34-C50	Dry Weight	mg/kg	<100	102	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	144	<100	100
% C50+		%	<5	5.2	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	17.80	18.30	16.70	

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 16, 2022
Report Number: 2724665

Reference Number	1552709-4	1552709-8	1552709-11
Sample Date	Feb 09, 2022	Feb 09, 2022	Feb 09, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-05a-04 / 3.5-4	PAR6206 / TP22-05b-03 / 2.5-3	PAR6206 / TP22-06a-02 / 1.5-2
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	0.009	<0.005	0.144	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	0.945	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	1.08	0.03
4-Bromofluorobenzene	Surrogate	%			87	60-140
Toluene-d8	Surrogate	%			80	60-140
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	77	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	75	10

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 16, 2022
Report Number: 2724665

Reference Number		1552709-5	1552709-6	1552709-11
Sample Date		Feb 09, 2022	Feb 09, 2022	Feb 09, 2022
Sample Time		NA	NA	NA
Sample Location				
Sample Description		PAR6206 / TP22-05a-05 / 2.5-3	PAR6206 / TP22-05b-01 / 0.5-1	PAR6206 / TP22-06a-02 / 1.5-2
Matrix		Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	1.09	0.28	0.54	0.01
SAR	Saturated Paste		13.7	0.5	2.9	
% Saturation		%	68	124	130	
Calcium	Saturated Paste	mg/kg	14.5	41.4	47.5	
Magnesium	Saturated Paste	mg/kg	2.6	8.6	11	
Sodium	Saturated Paste	mg/kg	178	15	99	
Potassium	Saturated Paste	mg/kg	2	5	10	
Chloride	Saturated Paste	mg/L	25	4	18	3
Chloride	Saturated Paste	mg/kg	17	5	23	
Sulfate (SO4)	Saturated Paste	mg/kg	145	56.3	91.7	
TGR	Saturated Paste	T/ac	0.2	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.8	7.4	6.7	

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 16, 2022
Report Number: 2724665

Reference Number	1552709-8	1552709-10	1552709-11
Sample Date	Feb 09, 2022	Feb 09, 2022	Feb 09, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-05b-03 / 2.5-3	PAR6206 / TP22-06a-01 / 0.5-1	PAR6206 / TP22-06a-02 / 1.5-2
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	29.1	81.8	174	0.2
Barium	Fusion	mg/kg		929	8310	40

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 16, 2022
Report Number: 2724665

Reference Number		1552709-9	1552709-10	1552709-11
Sample Date		Feb 09, 2022	Feb 09, 2022	Feb 09, 2022
Sample Time		NA	NA	NA
Sample Location				
Sample Description		PAR6206 / TP22-05b-04 / 2.5-4	PAR6206 / TP22-06a-01 / 0.5-1	PAR6206 / TP22-06a-02 / 1.5-2
Matrix		Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		13-Feb-22	13-Feb-22	13-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	1300	25
F3c C16-C34	Dry Weight	mg/kg	58	131	5500	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	1760	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	2920	100
% C50+		%	<5	<5	7.6	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	17.40	24.60	39.40	

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 16, 2022
Report Number: 2724665

Reference Number	1552709-11	1552709-19
Sample Date	Feb 09, 2022	Feb 09, 2022
Sample Time	NA	NA
Sample Location		
Sample Description	PAR6206 / TP22-06a-02 / 1.5-2	3:1 MIXR COMP Sample (-20):TP22-06a-02 (-11)
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	0.23	0.14		0.05
Antimony	Strong Acid Extractable	mg/kg		0.7		0.2
Arsenic	Strong Acid Extractable	mg/kg		8.6		0.2
Barium	Strong Acid Extractable	mg/kg		2250		1
Beryllium	Strong Acid Extractable	mg/kg		0.5		0.1
Cadmium	Strong Acid Extractable	mg/kg		0.53		0.01
Chromium	Strong Acid Extractable	mg/kg		22.8		0.5
Cobalt	Strong Acid Extractable	mg/kg		10.9		0.1
Copper	Strong Acid Extractable	mg/kg		25.7		1
Lead	Strong Acid Extractable	mg/kg		12.5		0.1
Mercury	Strong Acid Extractable	mg/kg		0.28		0.05
Molybdenum	Strong Acid Extractable	mg/kg		2.1		1
Nickel	Strong Acid Extractable	mg/kg		24.0		0.5
Selenium	Strong Acid Extractable	mg/kg		0.4		0.3
Silver	Strong Acid Extractable	mg/kg		0.1		0.1
Thallium	Strong Acid Extractable	mg/kg		0.12		0.05
Tin	Strong Acid Extractable	mg/kg		<1.0		1
Uranium	Strong Acid Extractable	mg/kg		0.9		0.5
Vanadium	Strong Acid Extractable	mg/kg		26.3		0.1
Zinc	Strong Acid Extractable	mg/kg		99		1

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 16, 2022
Report Number: 2724665

Reference Number	1552709-11	1552709-20
Sample Date	Feb 09, 2022	Feb 09, 2022
Sample Time	NA	NA
Sample Location		
Sample Description	PAR6206 / TP22-06a-02 / 1.5-2	COMP Sample TP22-06a-01 x 2(-10), TP22-06a-03 (-12)
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Specific Gravity	As Received		1.549	1.875		

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Project Location: I-02
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P.O.:
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OI Customer PR210-Drilling and

Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 16, 2022
Report Number: 2724665

Reference Number	1552709-12	1552709-13	1552709-16
Sample Date	Feb 09, 2022	Feb 09, 2022	Feb 09, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-06a-03 / 2.5-3	PAR6206 / TP22-06a-04 / 3.5-4	PAR6206 / TP22-06b-02 / 1.5-2
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		13-Feb-22	16-Feb-22	13-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	108	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	571	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	135	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	196	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	24.20	17.10	15.30	

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Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
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Report Number: 2724665

Reference Number	1552709-12	1552709-13	1552709-17
Sample Date	Feb 09, 2022	Feb 09, 2022	Feb 09, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-06a-03 / 2.5-3	PAR6206 / TP22-06a-04 / 3.5-4	PAR6206 / TP22-06b-03 / 2.5-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	95.9	40.6	34.2	0.2
Barium	Fusion	mg/kg	1070			40

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Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
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Report Number: 2724665

Reference Number		1552709-12	1552709-13	1552709-18
Sample Date		Feb 09, 2022	Feb 09, 2022	Feb 09, 2022
Sample Time		NA	NA	NA
Sample Location				
Sample Description		PAR6206 / TP22-06a-03 / 2.5-3	PAR6206 / TP22-06a-04 / 3.5-4	PAR6206 / TP22-06b-04 / 3.5-4
Matrix		Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.67	0.36	0.31	0.01
SAR	Saturated Paste		8.7	4.5	2.5	
% Saturation		%	91	94	115	
Calcium	Saturated Paste	mg/kg	16.3	12.3	20.6	
Magnesium	Saturated Paste	mg/kg	3.2	2.6	4.6	
Sodium	Saturated Paste	mg/kg	140	65	52	
Potassium	Saturated Paste	mg/kg	3	2	4	
Chloride	Saturated Paste	mg/L	18	4	4	3
Chloride	Saturated Paste	mg/kg	16	4	5	
Sulfate (SO4)	Saturated Paste	mg/kg	43.3	31.0	38.9	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.0	7.5	7.6	

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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 16, 2022
Report Number: 2724665

Reference Number	1552709-13
Sample Date	Feb 09, 2022
Sample Time	NA
Sample Location	
Sample Description	PAR6206 / TP22-06a-04 / 3.5-4
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Particle Size Analysis - Wet Sieve						
Texture			Fine-Grained			
75 micron sieve	% Retained	% by weight	23.0			0.1

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Analytical Report

Bill To: Paramount Resources Ltd
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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 16, 2022
Report Number: 2724665

Reference Number	1552709-13	1552709-17	1552709-19
Sample Date	Feb 09, 2022	Feb 09, 2022	Feb 09, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-06a-04 / 3.5-4	PAR6206 / TP22-06b-03 / 2.5-3	3:1 MIXR COMP Sample (-20):TP22-06a-02 (-11)
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	0.007	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	0.059	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	0.07	0.03
Methanol Field Preservation			Yes	Yes	No	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10

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Lot ID: **1552709**
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Date Reported: Mar 16, 2022
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Reference Number	1552709-17	1552709-19
Sample Date	Feb 09, 2022	Feb 09, 2022
Sample Time	NA	NA
Sample Location		
Sample Description	PAR6206 / TP22-06b-03 / 2.5-3	3:1 MIXR COMP Sample (-20):TP22-06a-02 (-11)
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		13-Feb-22	11-Mar-22		
F2c C10-C16	Dry Weight	mg/kg	<25	149		25
F3c C16-C34	Dry Weight	mg/kg	<50	713		50
F4c C34-C50	Dry Weight	mg/kg	<100	200		100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	281		100
% C50+		%	<5	<5		
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done		
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	18.90	26.80		

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Reference Number	1552709-19
Sample Date	Feb 09, 2022
Sample Time	NA
Sample Location	
Sample Description	3:1 MIXR COMP Sample (-20):TP22-06a-02 (-11)
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.69			0.01
SAR	Saturated Paste		3.9			
% Saturation		%	74			
Calcium	Saturated Paste	mg/kg	31.9			
Magnesium	Saturated Paste	mg/kg	6.4			
Sodium	Saturated Paste	mg/kg	79			
Potassium	Saturated Paste	mg/kg	4			
Chloride	Saturated Paste	mg/L	17			3
Chloride	Saturated Paste	mg/kg	13			
Sulfate (SO4)	Saturated Paste	mg/kg	107			
TGR	Saturated Paste	T/ac	<0.1			
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.4			

Approved by:

Max Hewitt
Operations Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
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Chromatograms Results

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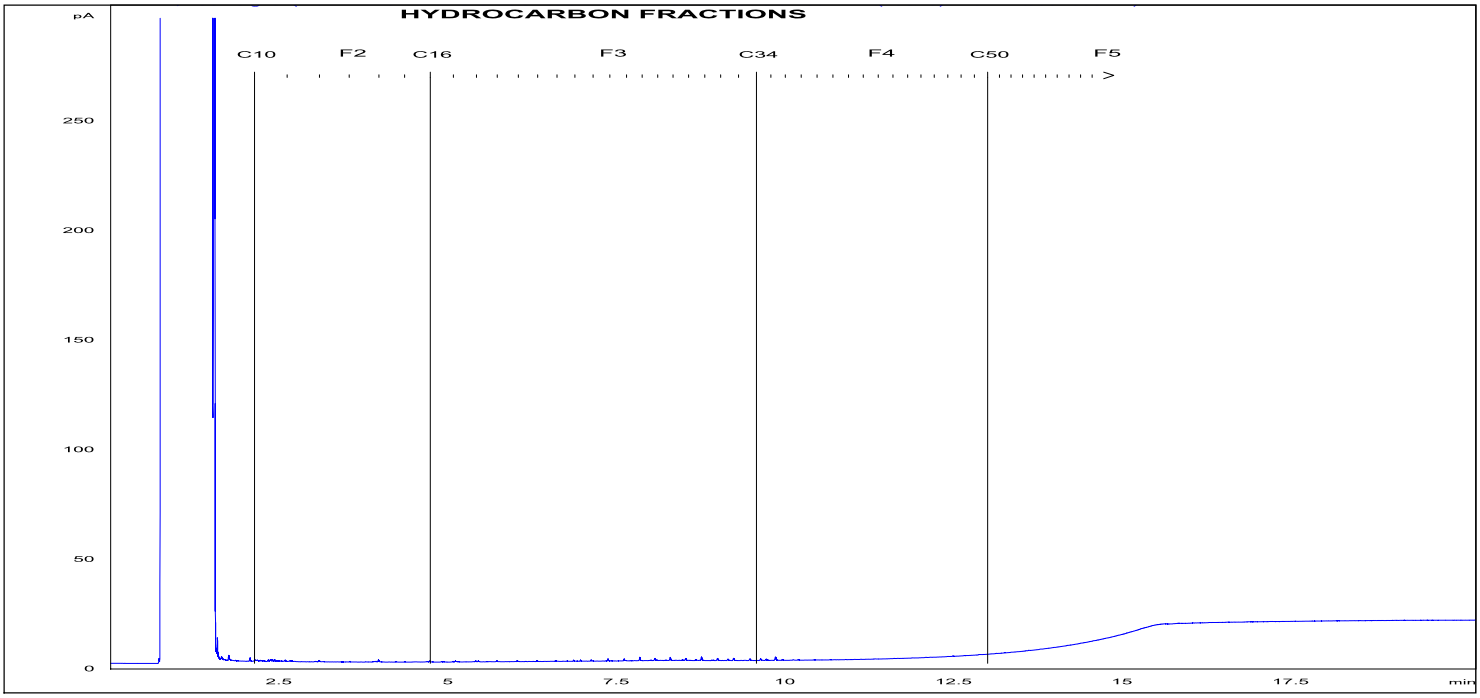
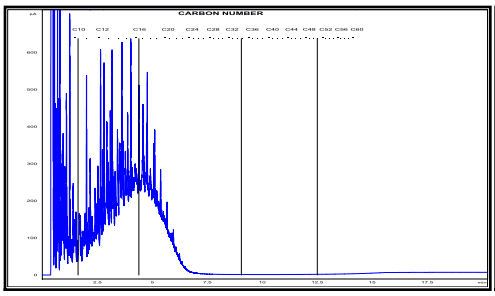
Reference Number: 1552709-13
Sample Description: PAR6206 / TP22-06a-04 / 3.5-4
Sample Date: February 9, 2022
Location:
Matrix: Soil

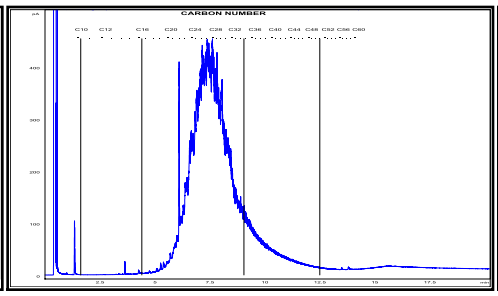


TYPICAL PRODUCT CHROMATOGRAMS

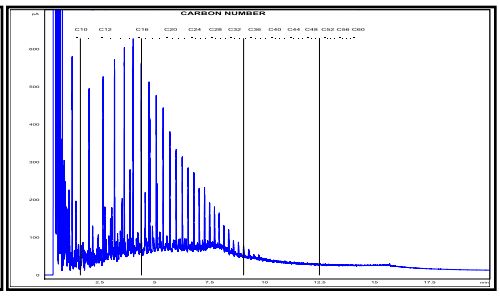
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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Barite Soil Analysis

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
Barium	mg/L	0.0155202	-0.20	0.20		yes
Date Acquired:	February 14, 2022					
Client Sample Replicates	**Units**	**Replicate 1**	**Replicate 2**	**% RSD Criteria**	**Absolute Criteria**	**Passed QC**
Barium	mg/kg	56.5	55.2	10	5.00	yes
Date Acquired:	February 14, 2022					
Control Sample	**Units**	**Measured**	**Lower Limit**	**Upper Limit**		**Passed QC**
Barium	mg/kg	7.48	5.10	8.70		yes
Date Acquired:	February 14, 2022					
Barium	mg/kg	0.10	0.09	0.11		yes
Date Acquired:	February 14, 2022					
Barium	mg/kg	10200	7573	12007		yes
Date Acquired:	February 14, 2022					

Extractable Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
F2c C10-C16	µg/mL	0	-10	10		yes
F3c C16-C34	µg/mL	0	-30	30		yes
F4c C34-C50	µg/mL	0	-20	20		yes
F4HTGCc C34-C50+	µg/mL	0	-20	20		yes
Date Acquired:	February 13, 2022					
Calibration Check	**Units**	**% Recovery**	**Lower Limit**	**Upper Limit**		**Passed QC**
F2c C10-C16	µg/mL	98.31	80	120		yes
F3c C16-C34	µg/mL	99.71	80	120		yes
F4c C34-C50	µg/mL	96.06	80	120		yes
F4HTGCc C34-C50+	µg/mL	94.45	80	120		yes
Date Acquired:	February 13, 2022					
Client Sample Replicates	**Units**	**Replicate 1**	**Replicate 2**	**% RSD Criteria**	**Absolute Criteria**	**Passed QC**
F2c C10-C16	mg/kg	111	126	50	10	yes
F3c C16-C34	mg/kg	555	599	50	10	yes
F4c C34-C50	mg/kg	172	190	50	10	yes
F4HTGCc C34-C50+	mg/kg	225	263	50	10	yes
Date Acquired:	March 07, 2022					
Matrix Spike	**Units**	**% Recovery**	**Lower Limit**	**Upper Limit**		**Passed QC**
F2c C10-C16	mg/kg	91	70	130		yes
F3c C16-C34	mg/kg	95	70	130		yes
F4c C34-C50	mg/kg	97	70	130		yes
F4HTGCc C34-C50+	mg/kg	96	70	130		yes
Date Acquired:	February 13, 2022					

Metals Strong Acid Digestion

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
Boron	mg/L	-0.00063805	-0.05	0.05		yes

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Lot ID: **1552709**
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Date Reported: Mar 16, 2022
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Metals Strong Acid Digestion - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Antimony	µg/L	0.00558575	-0.1	0.2	yes
Arsenic	µg/L	-0.00135498	-0.2	0.2	yes
Barium	µg/L	0.190836	-1	1	yes
Beryllium	µg/L	-0.000375076	-0.1	0.1	yes
Cadmium	µg/L	0.00111719	-0.01	0.01	yes
Chromium	µg/L	0.00256564	-0.5	0.5	yes
Cobalt	µg/L	0.00256195	-0.1	0.1	yes
Copper	µg/L	0.0217128	-0.6	1.2	yes
Lead	µg/L	0.00923978	-5.0	5.0	yes
Mercury	µg/L	0.0115013	-0.04	0.04	yes
Molybdenum	µg/L	-0.00618244	-1.0	1.0	yes
Nickel	µg/L	-0.0281314	-0.4	0.7	yes
Selenium	µg/L	0.00305562	-0.30	0.30	yes
Silver	µg/L	0.000618606	-0.09	0.14	yes
Thallium	µg/L	0.00702447	-0.04	0.04	yes
Tin	µg/L	0.0146162	-0.4	0.4	yes
Uranium	µg/L	0.00166689	-0.5	0.5	yes
Vanadium	µg/L	-0.0676596	-0.1	0.1	yes
Zinc	µg/L	0.15773	-1	1	yes

Date Acquired: March 14, 2022

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Antimony	mg/kg	0.8	0.9	20	0.4	yes
Arsenic	mg/kg	7.2	7.4	20	0.4	yes
Barium	mg/kg	269	286	20	2	yes
Beryllium	mg/kg	0.7	0.8	20	0.2	yes
Cadmium	mg/kg	0.43	0.47	20	0.02	yes
Chromium	mg/kg	23.8	22.6	20	1.1	yes
Cobalt	mg/kg	10.1	11.1	20	0.2	yes
Copper	mg/kg	31.0	31.3	20	2.2	yes
Lead	mg/kg	15.5	17.9	20	0.2	yes
Mercury	mg/kg	0.12	0.13	20	0.05	yes
Molybdenum	mg/kg	1.5	1.4	20	2.2	yes
Nickel	mg/kg	34.6	36.1	20	1.1	yes
Selenium	mg/kg	1.0	0.98	20	0.66	yes
Silver	mg/kg	0.2	0.3	20	0.22	yes
Thallium	mg/kg	0.16	0.16	20	0.11	yes
Tin	mg/kg	<1.0	<1.0	20	2.2	yes
Uranium	mg/kg	1.9	2.0	20	1.1	yes
Vanadium	mg/kg	30.5	30.7	20	0.2	yes
Zinc	mg/kg	133	137	20	2	yes

Date Acquired: March 14, 2022

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Antimony	mg/kg	39.8	37.6	42.4	yes
Arsenic	mg/kg	41.3	36.3	43.9	yes

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Metals Strong Acid Digestion - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Barium	mg/kg	203	188	212	yes
Beryllium	mg/kg	20.1	17.4	22.2	yes
Cadmium	mg/kg	2.10	1.88	2.28	yes
Chromium	mg/kg	102	93.2	107.0	yes
Cobalt	mg/kg	19.8	18.4	21.4	yes
Copper	mg/kg	210	186.6	216.6	yes
Lead	mg/kg	20.0	18.3	21.3	yes
Mercury	mg/kg	3.02	2.64	3.36	yes
Molybdenum	mg/kg	206	185.1	222.3	yes
Nickel	mg/kg	103	92.4	106.2	yes
Selenium	mg/kg	41.1	35.20	44.20	yes
Silver	mg/kg	20.1	18.20	22.40	yes
Thallium	mg/kg	9.81	9.02	10.82	yes
Tin	mg/kg	204	191.2	215.2	yes
Uranium	mg/kg	102	86.0	116.0	yes
Vanadium	mg/kg	20.3	18.0	21.6	yes
Zinc	mg/kg	206	186	212	yes
Date Acquired:	March 14, 2022				
Antimony	mg/kg	3.3	2.7	4.5	yes
Arsenic	mg/kg	3.9	2.9	4.9	yes
Barium	mg/kg	101	76	126	yes
Beryllium	mg/kg	0.3	0.2	0.4	yes
Cadmium	mg/kg	0.86	0.68	1.16	yes
Chromium	mg/kg	73.2	58.2	97.2	yes
Cobalt	mg/kg	6.2	4.7	7.9	yes
Copper	mg/kg	117	90.6	150.6	yes
Lead	mg/kg	254	185.9	333.5	yes
Mercury	mg/kg	0.07	0.05	0.09	yes
Molybdenum	mg/kg	1.3	0.8	1.3	yes
Nickel	mg/kg	24.7	18.2	30.8	yes
Selenium	mg/kg	<0.3	0.23	0.35	yes
Silver	mg/kg	3.3	2.30	5.30	yes
Thallium	mg/kg	0.07	0.05	0.09	yes
Tin	mg/kg	8.4	7.6	12.4	yes
Uranium	mg/kg	<0.5	0.4	0.6	yes
Vanadium	mg/kg	27.7	20.4	34.2	yes
Zinc	mg/kg	324	244	408	yes
Date Acquired:	March 14, 2022				

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.005	0.005	yes
Toluene	ng	0	-0.06	0.06	yes
Ethylbenzene	ng	0	-0.030	0.030	yes
Total Xylenes (m,p,o)	ng	0	-0.09	0.09	yes

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Mono-Aromatic Hydrocarbons - Soil - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Styrene	ng	0	-0.030	0.030	yes
Date Acquired:	February 13, 2022				

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	99.29	80	120	yes
Toluene	ng	92.73	80	120	yes
Ethylbenzene	ng	89.47	80	120	yes
m,p-Xylene	ng	88.11	80	120	yes
Total Xylenes (m,p,o)	ng	88.74	80	120	yes
Styrene	ng	89.51	80	120	yes
Date Acquired:	February 13, 2022				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Benzene	mg/kg	0.054	0.056	50	0.010	yes
Toluene	mg/kg	0.13	0.12	50	0.04	yes
Ethylbenzene	mg/kg	<0.005	<0.005	50	0.020	yes
m,p-Xylene	mg/kg	0.03	0.03	50	0.04	yes
o-Xylene	mg/kg	<0.02	<0.02	50	0.04	yes
Total Xylenes (m,p,o)	mg/kg	0.03	0.03	50	0.06	yes
Styrene	mg/kg	<0.01	<0.01	50	0.020	yes
Date Acquired:	February 16, 2022					

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	mg/kg	93	70	130	yes
Toluene	mg/kg	76	70	130	yes
Ethylbenzene	mg/kg	97	70	130	yes
m,p-Xylene	mg/kg	102	70	130	yes
o-Xylene	mg/kg	103	70	130	yes
Styrene	mg/kg	91	70	130	yes
Date Acquired:	February 16, 2022				

Physical and Aggregate Properties

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Specific Gravity		1.935	1.934	10	0.001	yes
Date Acquired:	March 06, 2022					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Specific Gravity		1.712	1.590	1.770	yes
Date Acquired:	March 06, 2022				

Salinity

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Calcium	mg/L	0.0579914	-2.0	2.0	yes
Magnesium	mg/L	0.0106582	-0.3	0.3	yes
Sodium	mg/L	0.00221093	-1	1	yes
Potassium	mg/L	0.01266	-1.0	1.0	yes
Chloride	mg/L	1.1035	-3	3	yes

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Salinity - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Sulfate-S	mg/L	0.0157991	-2	2	yes
Date Acquired:	February 13, 2022				

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Electrical Conductivity	dS/m	2.99	2.50	3.70	yes
% Saturation	%	67	50	75	yes
Calcium	mg/L	700	591.6	831.6	yes
Magnesium	mg/L	106	89.7	125.7	yes
Sodium	mg/L	37	27	45	yes
Potassium	mg/L	15	10.6	16.0	yes
Chloride	mg/L	27	20	44	yes
Sulfate-S	mg/L	548	431	659	yes
Date Acquired:	February 13, 2022				
Electrical Conductivity	dS/m	32.0	26.80	35.20	yes
Calcium	mg/L	248	226.9	261.1	yes
Magnesium	mg/L	99.2	91.0	104.8	yes
Sodium	mg/L	255	229	264	yes
Potassium	mg/L	248	230.7	265.5	yes
Chloride	mg/L	2010	1852	2229	yes
Sulfate-S	mg/L	152	137	158	yes
Date Acquired:	February 13, 2022				

Soil Acidity

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
pH	pH	6.58	5.2	7.0	yes
Date Acquired:	March 14, 2022				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
pH	pH	7.4	7.3	10	0.3	yes
Date Acquired:	March 14, 2022					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
pH	pH	7.0	6.5	7.1	yes
Date Acquired:	February 13, 2022				

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	ng	0	-10	10	yes
Date Acquired:	February 13, 2022				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F1 C6-C10	mg/kg	<10	<10	50	0	yes
F1 -BTEX	mg/kg	<10	<10	50	0	yes
Date Acquired:	February 16, 2022					

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	mg/kg	113	70	130	yes
Date Acquired:	February 16, 2022				

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Methodology and Notes

Bill To:	Paramount Resources Ltd 9904 106 Street Fort St. John, BC, Canada	Project ID:	PAR6206	Lot ID:	**1552709**
		Project Name:	Remediation	Control Number:	
		Project Location:	I-02	Date Received:	Feb 11, 2022
Attn:	Marsha Pereira	LSD:	I-02	Date Reported:	Mar 16, 2022
Sampled By:	Ross Pasmans	P.O.:		Report Number:	2724665
Company:	SynergyAspen Environmental	Proj. Acct. code:			
		OI Customer	PR210-Drilling and		

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Barium (Extractable) in soil (0.1 M CaCl2)	AENV		Analytical Method for Extractable Barium, FEB 2009	Feb 14, 2022	Element Edmonton - Roper Road
Barium (Fusion) in soil	ASTM	*	Standard Practice for Dissolution of Solid Waste by Lithium Metaborate Fusion, 2008., D 4503-08	Feb 14, 2022	Element Edmonton - Roper Road
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Feb 13, 2022	Element Calgary
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Feb 15, 2022	Element Calgary
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Feb 16, 2022	Element Calgary
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Mar 7, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Feb 13, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Feb 15, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Feb 16, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Mar 7, 2022	Element Calgary
Metals ICP (Hot Block) in soil	EPA	*	Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements, October 1999, 200.2	Mar 14, 2022	Element Edmonton - Roper Road
Metals ICP (Hot Block) in soil	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Mar 14, 2022	Element Edmonton - Roper Road
Particle Size by Wet Sieve	ASTM	*	Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing, C 117-17	Feb 13, 2022	Element Edmonton - Roper Road
Particle Size by Wet Sieve	Carter	*	Procedure for Particle Size Separation, 55.2.3	Feb 13, 2022	Element Edmonton - Roper Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Feb 13, 2022	Element Edmonton - Roper

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Methodology and Notes

Bill To: Paramount Resources Ltd
9904 106 Street
Fort St. John, BC, Canada
Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552709**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 16, 2022
Report Number: 2724665

Method Name	Reference		Method	Date Analysis Started	Location
pH by CaCl2 (1:2 ratio) in soil	McKeague				Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Feb 16, 2022	Element Edmonton - Roper Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Mar 14, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Feb 13, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Feb 16, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Mar 8, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Feb 13, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Feb 16, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Mar 8, 2022	Element Edmonton - Roper Road
Specific Gravity as Received in Sump Solids or Total Waste	D50	*	Appendix 3, Analytical Requirements, Specific Gravity, SG	Mar 6, 2022	Element Edmonton - Roper Road
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Feb 13, 2022	Element Calgary
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Feb 16, 2022	Element Calgary
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Mar 7, 2022	Element Calgary

** Reference Method Modified*

References

AENV	Alberta Environment, Soil Quality Guidelines for Barite
APHA	Standard Methods for the Examination of Water and Wastewater
ASTM	Annual Book of ASTM Standards
Carter	Soil Sampling and Methods of Analysis.
CCME	Canadian Council of Ministers of the Environment
D50	Directive 50: Drilling Waste Management
EPA	Environmental Protection Agency Test Methods - US
McKeague	Manual on Soil Sampling and Methods of Analysis
US EPA	US Environmental Protection Agency Test Methods

Comments:

- Mar 02, 2022 - Report was issued to include additional services requested by Marsha Pereira of SynergyAspen on March 2. Previous report 2720259.

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Methodology and Notes

Bill To:	Paramount Resources Ltd 9904 106 Street Fort St. John, BC, Canada	Project ID:	PAR6206	Lot ID:	**1552709**
Attn:	Marsha Pereira	Project Name:	Remediation	Control Number:	
Sampled By:	Ross Pasmans	Project Location:	I-02	Date Received:	Feb 11, 2022
Company:	SynergyAspen Environmental	LSD:	I-02	Date Reported:	Mar 16, 2022
		P.O.:		Report Number:	2724665
		Proj. Acct. code:			
		OI Customer	PR210-Drilling and		

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Report Transmission Cover Page

Bill To: Paramount Resources Ltd
9904 106 Street
Fort St. John, BC, Canada
Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Contact	Company	Address
Andrew Bergen	**SynergyAspen Environmental**	9904 106 Street Fort St. John, BC null Phone: (111) 222-3333 Fax: Email: abergen@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COA
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report

Contact	Company	Address
Element Invoicing	**Paramount Resources Ltd**	7217 Roper Road Edmonton, AB T6B 3J4 Phone: (780) 438-5522 Fax: Email: invoicing.edmonton@element.com

Delivery	Format	Deliverables
Post	PDF	COC / Invoice

Contact	Company	Address
Lori Johnson	**SynergyAspen Environmental**	9904 106 Street Fort St John, BC V1J 1V8 Phone: (250) 785-1030 Fax: (250) 785-1034 Email: ljohnson@synergyaspen.ca

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Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR

Contact	Company	Address
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Delivery	Format	Deliverables
Email - Merge Reports	PDF	COA
Email - Merge Reports	PDF	COC / COA
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Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
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Report Transmission Cover Page

Bill To: Paramount Resources Ltd
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Fort St. John, BC, Canada
Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Contact	Company	Address
Project Coordinator	**SynergyAspen Environmental**	2328 Clarke St. Port Moody, BC V3H 1Y8 Phone: (604) 931-1026 Fax: (604) 931-1046 Email: projectcoordinator@synergyaspen.ca

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Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR

Contact	Company	Address
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Notes To Clients:

- Feb 16, 2022 - Report was issued to include missing CCMEC analysis on sample 26.
  Previous report 2719219.
- Mar 08, 2022 - Sample 28, 30, 32 were prepared as lab mixtures. Loss of volatile compounds may have occurred during this preparation.

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Analytical Report

Bill To: Paramount Resources Ltd
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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-1	1552710-2	1552710-3
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-07-01 / 0.5-1	PAR6206 / TP22-07-02 / 1.5-2	PAR6206 / TP22-07-03 / 2.5-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		13-Feb-22	13-Feb-22	13-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	2880	25
F3c C16-C34	Dry Weight	mg/kg	104	71	11300	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	3690	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	5340	100
% C50+		%	<5	<5	5.3	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	23.70	26.40	51.10	

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Attn: Marsha Pereira
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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-1	1552710-3	1552710-4
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-07-01 / 0.5-1	PAR6206 / TP22-07-03 / 2.5-3	PAR6206 / TP22-07-04 / 3.5-4
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	56.5	83.2	12.7	0.2
Barium	Fusion	mg/kg	837	7070		40

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-2	1552710-3	1552710-4
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-07-02 / 1.5-2	PAR6206 / TP22-07-03 / 2.5-3	PAR6206 / TP22-07-04 / 3.5-4
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.38	0.72	0.84	0.01
SAR	Saturated Paste		0.5	9.2	5.4	
% Saturation		%	97	148	69	
Calcium	Saturated Paste	mg/kg	51.7	31.8	25.6	
Magnesium	Saturated Paste	mg/kg	11.2	5.2	5.6	
Sodium	Saturated Paste	mg/kg	15	259	97	
Potassium	Saturated Paste	mg/kg	5	7	3	
Chloride	Saturated Paste	mg/L	10	21	23	3
Chloride	Saturated Paste	mg/kg	10	31	16	
Sulfate (SO4)	Saturated Paste	mg/kg	15	57.6	153	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	6.7	4.6	7.5	

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-4	1552710-5	1552710-6
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-07-04 / 3.5-4	PAR6206 / TP22-08-01 / 0.5-1	PAR6206 / TP22-08-02 / 1.5-2
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		13-Feb-22	13-Feb-22	13-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	77	144	50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	18.70	25.60	22.50	

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Analytical Report

Bill To: Paramount Resources Ltd
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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-4	1552710-8	1552710-13
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-07-04 / 3.5-4	PAR6206 / TP22-08-04 / 3.5-4	PAR6206 / TP22-09-04 / 3.4-4
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10

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Analytical Report

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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-5	1552710-7	1552710-8
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-08-01 / 0.5-1	PAR6206 / TP22-08-03 / 2.5-3	PAR6206 / TP22-08-04 / 3.5-4
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	56.5	76.6	9.91	0.2
Barium	Fusion	mg/kg	853	3640		40

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Analytical Report

Bill To: Paramount Resources Ltd
9904 106 Street
Fort St. John, BC, Canada
Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-6	1552710-7	1552710-8
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-08-02 / 1.5-2	PAR6206 / TP22-08-03 / 2.5-3	PAR6206 / TP22-08-04 / 3.5-4
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.45	0.73	0.73	0.01
SAR	Saturated Paste		0.7	7.5	5.4	
% Saturation		%	86	79	69	
Calcium	Saturated Paste	mg/kg	56.4	24.1	22.3	
Magnesium	Saturated Paste	mg/kg	11.8	3.9	4.5	
Sodium	Saturated Paste	mg/kg	19	134	88	
Potassium	Saturated Paste	mg/kg	4	4	2	
Chloride	Saturated Paste	mg/L	11	21	20	3
Chloride	Saturated Paste	mg/kg	9	17	13	
Sulfate (SO4)	Saturated Paste	mg/kg	15	25.2	120	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	6.7	6.8	6.9	

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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-7	1552710-8	1552710-9
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-08-03 / 2.5-3	PAR6206 / TP22-08-04 / 3.5-4	PAR6206 / TP22-08-05 / 2.5-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		13-Feb-22	13-Feb-22	13-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	165	<25	790	25
F3c C16-C34	Dry Weight	mg/kg	715	64	3310	50
F4c C34-C50	Dry Weight	mg/kg	197	<100	1000	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	210	<100	1250	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	22.00	18.80	31.90	

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-7	1552710-9	1552710-16
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-08-03 / 2.5-3	PAR6206 / TP22-08-05 / 2.5-3	PAR6206 / TP22-10-03 / 2.5-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Specific Gravity	As Received		2.030	1.94	1.761	

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-9	1552710-10	1552710-12
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-08-05 / 2.5-3	PAR6206 / TP22-09-01 / 0.5-1	PAR6206 / TP22-09-03 / 2.5-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	81.2	59.7	68.2	0.2
Barium	Fusion	mg/kg	5750	882	21800	40

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-9	1552710-11	1552710-12
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-08-05 / 2.5-3	PAR6206 / TP22-09-02 / 1.5-2	PAR6206 / TP22-09-03 / 2.5-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.82	0.48	0.78	0.01
SAR	Saturated Paste		8.4	1.2	8.1	
% Saturation		%	80	75	87	
Calcium	Saturated Paste	mg/kg	22.8	43.1	24.1	
Magnesium	Saturated Paste	mg/kg	4.0	9.8	4.2	
Sodium	Saturated Paste	mg/kg	149	28	152	
Potassium	Saturated Paste	mg/kg	4	4	4	
Chloride	Saturated Paste	mg/L	36	13	27	3
Chloride	Saturated Paste	mg/kg	29	10	24	
Sulfate (SO4)	Saturated Paste	mg/kg	36.1	16	47.6	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.5	7.1	7.1	

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-10	1552710-11	1552710-12
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-09-01 / 0.5-1	PAR6206 / TP22-09-02 / 1.5-2	PAR6206 / TP22-09-03 / 2.5-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		13-Feb-22	13-Feb-22	13-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	32	25
F3c C16-C34	Dry Weight	mg/kg	66	<50	176	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	28.20	18.40	24.60	

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Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
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Reference Number	1552710-13	1552710-14	1552710-15
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-09-04 / 3.4-4	PAR6206 / TP22-10-01 / 0.5-1	PAR6206 / TP22-10-02 / 1.5-2
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		13-Feb-22	13-Feb-22	13-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	66	58	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	18.80	28.50	57.60	

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Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
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Reference Number	1552710-13	1552710-14	1552710-16
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-09-04 / 3.4-4	PAR6206 / TP22-10-01 / 0.5-1	PAR6206 / TP22-10-03 / 2.5-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	17.9	59.6	69.3	0.2
Barium	Fusion	mg/kg		962	94000	40

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Reference Number	1552710-13	1552710-15	1552710-16
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-09-04 / 3.4-4	PAR6206 / TP22-10-02 / 1.5-2	PAR6206 / TP22-10-03 / 2.5-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.87	0.33	1.26	0.01
SAR	Saturated Paste		4.1	0.5	17.2	
% Saturation		%	81	97	106	
Calcium	Saturated Paste	mg/kg	40.1	44.8	17.3	
Magnesium	Saturated Paste	mg/kg	9.1	9.9	4.0	
Sodium	Saturated Paste	mg/kg	99	15	314	
Potassium	Saturated Paste	mg/kg	4	5	6	
Chloride	Saturated Paste	mg/L	21	7	53	3
Chloride	Saturated Paste	mg/kg	17	6	56	
Sulfate (SO4)	Saturated Paste	mg/kg	203	14	203	
TGR	Saturated Paste	T/ac	<0.1	<0.1	0.3	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.1	8.1	7.2	

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Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number		1552710-16	1552710-17	1552710-19
Sample Date		Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time		NA	NA	NA
Sample Location				
Sample Description		PAR6206 / TP22-10-03 / 2.5-3	PAR6206 / TP22-10-04 / 3.5-4	PAR6206 / TP22-11-01 / 0.5-1
Matrix		Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		13-Feb-22	13-Feb-22	13-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	1400	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	5610	68	54	50
F4c C34-C50	Dry Weight	mg/kg	1730	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	2390	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	37.30	16.70	25.60	

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
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Reference Number	1552710-17	1552710-19	1552710-21
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-10-04 / 3.5-4	PAR6206 / TP22-11-01 / 0.5-1	PAR6206 / TP22-11-03 / 2.5-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	36.0	65.5	49.6	0.2
Barium	Fusion	mg/kg		1140	19600	40

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Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
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Reference Number	1552710-17	1552710-20	1552710-21
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-10-04 / 3.5-4	PAR6206 / TP22-11-02 / 1.5-2	PAR6206 / TP22-11-03 / 2.5-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.43	0.48	1.36	0.01
SAR	Saturated Paste		1.5	3.3	18.1	
% Saturation		%	102	89	72	
Calcium	Saturated Paste	mg/kg	37.2	29.6	13.6	
Magnesium	Saturated Paste	mg/kg	8.9	5.8	2.5	
Sodium	Saturated Paste	mg/kg	39	71	237	
Potassium	Saturated Paste	mg/kg	5	3	4	
Chloride	Saturated Paste	mg/L	13	13	45	3
Chloride	Saturated Paste	mg/kg	13	11	33	
Sulfate (SO4)	Saturated Paste	mg/kg	77.9	18	155	
TGR	Saturated Paste	T/ac	<0.1	<0.1	0.4	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.3	6.8	7.6	

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Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
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Report Number: 2724712

Reference Number	1552710-17	1552710-22	1552710-26
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-10-04 / 3.5-4	PAR6206 / TP22-11-04 / 3.5-4	PAR6206 / TP22-12-04 / 3.5-4
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
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Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-20	1552710-21	1552710-22
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-11-02 / 1.5-2	PAR6206 / TP22-11-03 / 2.5-3	PAR6206 / TP22-11-04 / 3.5-4
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		13-Feb-22	13-Feb-22	13-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	<25	104	<25	25
F3c C16-C34	Dry Weight	mg/kg	63	429	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	136	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	157	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	23.70	25.80	20.80	

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Analytical Report

Bill To: Paramount Resources Ltd
9904 106 Street
Fort St. John, BC, Canada
Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-22	1552710-23	1552710-24
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-11-04 / 3.5-4	PAR6206 / TP22-12-01 / 0.5-1	PAR6206 / TP22-12-02 / 1.5-2
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	18.9	71.4	46.6	0.2
Barium	Fusion	mg/kg		1030	837	40

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9904 106 Street
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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-22	1552710-24	1552710-25
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-11-04 / 3.5-4	PAR6206 / TP22-12-02 / 1.5-2	PAR6206 / TP22-12-03 / 2.5-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.79	0.38	1.12	0.01
SAR	Saturated Paste		5.0	2.5	22	
% Saturation		%	88	102	188	
Calcium	Saturated Paste	mg/kg	29.4	26.2	13	
Magnesium	Saturated Paste	mg/kg	7.3	6.2	4.0	
Sodium	Saturated Paste	mg/kg	111	55	496	
Potassium	Saturated Paste	mg/kg	4	3	11	
Chloride	Saturated Paste	mg/L	15	10	37	3
Chloride	Saturated Paste	mg/kg	13	10	69	
Sulfate (SO4)	Saturated Paste	mg/kg	200	21	377	
TGR	Saturated Paste	T/ac	<0.1	<0.1	0.2	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.6	7.4	8.7	

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Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
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Reference Number	1552710-23	1552710-24	1552710-25
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-12-01 / 0.5-1	PAR6206 / TP22-12-02 / 1.5-2	PAR6206 / TP22-12-03 / 2.5-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		13-Feb-22	13-Feb-22	13-Feb-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	1720	25
F3c C16-C34	Dry Weight	mg/kg	<50	58	6550	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	2200	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	3200	100
% C50+		%	<5	<5	5.6	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	22.80	22.70	39.00	

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-25	1552710-26	1552710-27
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-12-03 / 2.5-3	PAR6206 / TP22-12-04 / 3.5-4	PAR6206 / TP22-12-05 / 2.5-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Barite Soil Analysis						
Barium	Extractable	mg/kg	46.9	26.2	35.2	0.2
Barium	Fusion	mg/kg	111000			40

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Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-26	1552710-27	1552710-28
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6206 / TP22-12-04 / 3.5-4	PAR6206 / TP22-12-05 / 2.5-3	3:1 MIXR COMP Sample (-29):TP22-08-03 (-7)
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.89	1.30	0.49	0.01
SAR	Saturated Paste		6.1	25	1.8	
% Saturation		%	65	178	146	
Calcium	Saturated Paste	mg/kg	21.8	13	60.3	
Magnesium	Saturated Paste	mg/kg	5.7	4.1	13	
Sodium	Saturated Paste	mg/kg	100	534	72	
Potassium	Saturated Paste	mg/kg	3	11	6	
Chloride	Saturated Paste	mg/L	21	31	17	3
Chloride	Saturated Paste	mg/kg	14	55	25	
Sulfate (SO4)	Saturated Paste	mg/kg	154	461	122	
TGR	Saturated Paste	T/ac	<0.1	0.3	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.4	8.4	7.2	
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		16-Feb-22	13-Feb-22	11-Mar-22	
F2c C10-C16	Dry Weight	mg/kg	<25	2630	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	10200	105	50
F4c C34-C50	Dry Weight	mg/kg	<100	3450	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	5250	<100	100
% C50+		%	<5	6.3	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	16.90	38.20	22.70	

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Analytical Report

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9904 106 Street
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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-28	1552710-30	1552710-32
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	3:1 MIXR COMP Sample (-29):TP22-08-03 (-7)	3:1 MIXR COMP Sample (-31): TP22-08-05 (-9)	3:1 MIXR COMP Sample (-33):TP22-10-03 (-16)
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	0.08	0.09	0.07	0.05
Antimony	Strong Acid Extractable	mg/kg	0.5	0.5	0.6	0.2
Arsenic	Strong Acid Extractable	mg/kg	8.7	8.9	9.9	0.2
Barium	Strong Acid Extractable	mg/kg	1210	1420	2140	1
Beryllium	Strong Acid Extractable	mg/kg	0.5	0.5	0.5	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.38	0.40	0.46	0.01
Chromium	Strong Acid Extractable	mg/kg	18.5	20.5	22.3	0.5
Cobalt	Strong Acid Extractable	mg/kg	8.3	8.3	9.9	0.1
Copper	Strong Acid Extractable	mg/kg	18.3	18.6	27.6	1
Lead	Strong Acid Extractable	mg/kg	10.7	10.1	12.7	0.1
Mercury	Strong Acid Extractable	mg/kg	0.09	0.09	0.22	0.05
Molybdenum	Strong Acid Extractable	mg/kg	1.5	1.6	1.9	1
Nickel	Strong Acid Extractable	mg/kg	23.6	24.5	26.5	0.5
Selenium	Strong Acid Extractable	mg/kg	0.5	0.5	0.6	0.3
Silver	Strong Acid Extractable	mg/kg	0.1	0.1	0.1	0.1
Thallium	Strong Acid Extractable	mg/kg	0.13	0.13	0.14	0.05
Tin	Strong Acid Extractable	mg/kg	<1.0	<1.0	<1.0	1
Uranium	Strong Acid Extractable	mg/kg	0.8	0.8	0.9	0.5
Vanadium	Strong Acid Extractable	mg/kg	26.2	26.7	24.9	0.1
Zinc	Strong Acid Extractable	mg/kg	88	91	97	1
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	0.007	0.011	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	0.018	0.040	0.117	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	0.15	0.03
Methanol Field Preservation			No	No	No	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	14	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	14	10

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Analytical Report

Bill To: Paramount Resources Ltd
9904 106 Street
Fort St. John, BC, Canada
Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-29	1552710-31	1552710-33
Sample Date	Feb 10, 2022	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	COMP Sample TP22-08-01(-5), TP22-08-02 x 2 (-6)	COMP Sample TP22-08-01(-5), TP22-08-02 x 2 (-6)	COMP Sample TP22-10-01(-14), TP22-10-02(-15), TP22-10-04 (-17)
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Specific Gravity	As Received		2.026	2.026	1.968	

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Analytical Report

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9904 106 Street
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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Reference Number	1552710-30	1552710-32
Sample Date	Feb 10, 2022	Feb 10, 2022
Sample Time	NA	NA
Sample Location		
Sample Description	3:1 MIXR COMP Sample (-31): TP22-08-05 (-9)	3:1 MIXR COMP Sample (-33):TP22-10-03 (-16)
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.48	0.45		0.01
SAR	Saturated Paste		2.3	2.4		
% Saturation		%	118	243		
Calcium	Saturated Paste	mg/kg	43.2	71.5		
Magnesium	Saturated Paste	mg/kg	9.0	16		
Sodium	Saturated Paste	mg/kg	68	132		
Potassium	Saturated Paste	mg/kg	5	11		
Chloride	Saturated Paste	mg/L	15	12		3
Chloride	Saturated Paste	mg/kg	18	29		
Sulfate (SO4)	Saturated Paste	mg/kg	75.1	167		
TGR	Saturated Paste	T/ac	<0.1	<0.1		
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.2	7.4		
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		11-Mar-22	11-Mar-22		
F2c C10-C16	Dry Weight	mg/kg	111	204		25
F3c C16-C34	Dry Weight	mg/kg	555	951		50
F4c C34-C50	Dry Weight	mg/kg	172	287		100
F4HTGCc C34-C50+	Dry Weight	mg/kg	225	402		100
% C50+		%	<5	<5		
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done		
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	24.50	21.90		

Approved by:

Anthony Neumann, MSc
General Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
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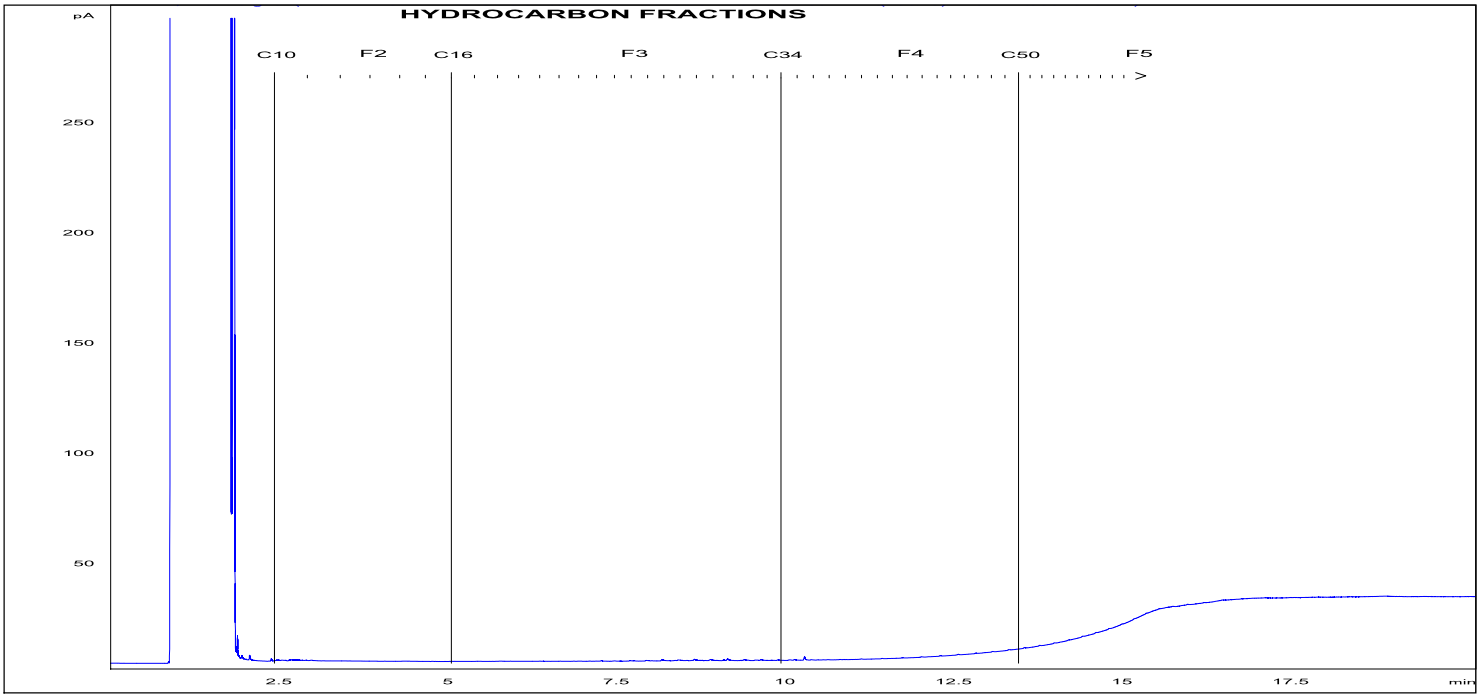
Chromatograms Results

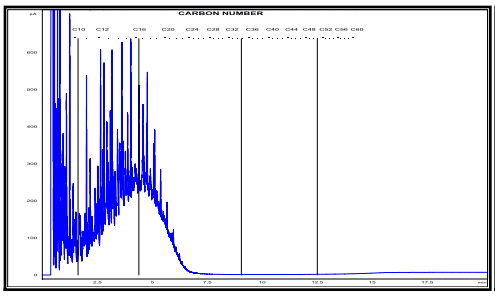
Bill To:	Paramount Resources Ltd 9904 106 Street Fort St. John, BC, Canada	Project ID:	PAR6206	Lot ID:	**1552710**
		Project Name:	Remediation	Control Number:	
		Project Location:	I-02	Date Received:	Feb 11, 2022
Attn:	Marsha Pereira	LSD:	I-02	Date Reported:	Mar 18, 2022
Sampled By:	Ross Pasmans	P.O.:		Report Number:	2724712
Company:	SynergyAspen Environmental	Proj. Acct. code:			
		OI Customer	PR210-Drilling and		

Reference Number: 1552710-26 Sample Description: PAR6206 / TP22-12-04 / 3.5-4
Sample Date: February 10, 2022 Location: Matrix: Soil

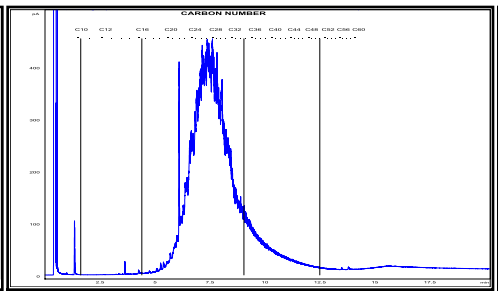


TYPICAL PRODUCT CHROMATOGRAMS

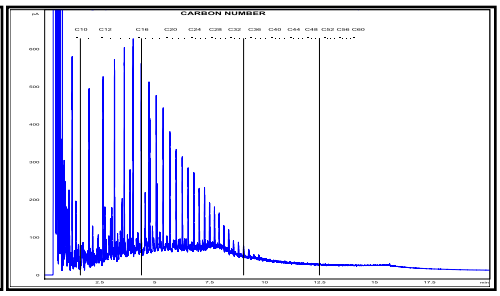
Winter Diesel



Motor Oil 10W30



Unweathered Crude



Product Carbon Number Ranges

Gasoline	C4-C12	Kerosene	C7-C16	Lubricating Oils	C20-C40
Varsol	C8-C12	Diesel	C8-C22	Crude Oils	C3-C60+

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Quality Control

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9904 106 Street
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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Barite Soil Analysis

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
Barium	mg/L	0.0155202	-0.20	0.20		yes
Date Acquired:	February 14, 2022					
Client Sample Replicates	**Units**	**Replicate 1**	**Replicate 2**	**% RSD Criteria**	**Absolute Criteria**	**Passed QC**
Barium	mg/kg	56.5	55.2	10	5.00	yes
Date Acquired:	February 14, 2022					
Control Sample	**Units**	**Measured**	**Lower Limit**	**Upper Limit**		**Passed QC**
Barium	mg/kg	7.48	5.10	8.70		yes
Date Acquired:	February 14, 2022					
Barium	mg/kg	0.10	0.09	0.11		yes
Date Acquired:	February 14, 2022					
Barium	mg/kg	10200	7573	12007		yes
Date Acquired:	February 14, 2022					

Extractable Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
F2c C10-C16	µg/mL	0	-10	10		yes
F3c C16-C34	µg/mL	0	-30	30		yes
F4c C34-C50	µg/mL	0	-20	20		yes
F4HTGCc C34-C50+	µg/mL	0	-20	20		yes
Date Acquired:	February 12, 2022					
Calibration Check	**Units**	**% Recovery**	**Lower Limit**	**Upper Limit**		**Passed QC**
F2c C10-C16	µg/mL	102.89	80	120		yes
F3c C16-C34	µg/mL	105.73	80	120		yes
F4c C34-C50	µg/mL	99.57	80	120		yes
F4HTGCc C34-C50+	µg/mL	99.29	80	120		yes
Date Acquired:	February 12, 2022					
Client Sample Replicates	**Units**	**Replicate 1**	**Replicate 2**	**% RSD Criteria**	**Absolute Criteria**	**Passed QC**
F2c C10-C16	mg/kg	<25	<25	50	10	yes
F3c C16-C34	mg/kg	104	69	50	10	yes
F4c C34-C50	mg/kg	<100	<100	50	10	yes
F4HTGCc C34-C50+	mg/kg	<100	<100	50	10	yes
Date Acquired:	February 12, 2022					
Matrix Spike	**Units**	**% Recovery**	**Lower Limit**	**Upper Limit**		**Passed QC**
F2c C10-C16	mg/kg	99	70	130		yes
F3c C16-C34	mg/kg	105	70	130		yes
F4c C34-C50	mg/kg	91	70	130		yes
F4HTGCc C34-C50+	mg/kg	89	70	130		yes
Date Acquired:	February 12, 2022					

Metals Strong Acid Digestion

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
Boron	mg/L	-0.00484255	-0.05	0.05		yes

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Quality Control

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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
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Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
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Metals Strong Acid Digestion - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Antimony	µg/L	0.00558575	-0.1	0.2	yes
Arsenic	µg/L	-0.00135498	-0.2	0.2	yes
Barium	µg/L	0.190836	-1	1	yes
Beryllium	µg/L	-0.000375076	-0.1	0.1	yes
Cadmium	µg/L	0.00111719	-0.01	0.01	yes
Chromium	µg/L	0.00256564	-0.5	0.5	yes
Cobalt	µg/L	0.00256195	-0.1	0.1	yes
Copper	µg/L	0.0217128	-0.6	1.2	yes
Lead	µg/L	0.00923978	-5.0	5.0	yes
Mercury	µg/L	0.0115013	-0.04	0.04	yes
Molybdenum	µg/L	-0.00618244	-1.0	1.0	yes
Nickel	µg/L	-0.0281314	-0.4	0.7	yes
Selenium	µg/L	0.00305562	-0.30	0.30	yes
Silver	µg/L	0.000618606	-0.09	0.14	yes
Thallium	µg/L	0.00702447	-0.04	0.04	yes
Tin	µg/L	0.0146162	-0.4	0.4	yes
Uranium	µg/L	0.00166689	-0.5	0.5	yes
Vanadium	µg/L	-0.0676596	-0.1	0.1	yes
Zinc	µg/L	0.15773	-1	1	yes

Date Acquired: March 14, 2022

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Antimony	mg/kg	0.8	0.9	20	0.4	yes
Arsenic	mg/kg	7.2	7.4	20	0.4	yes
Barium	mg/kg	269	286	20	2	yes
Beryllium	mg/kg	0.7	0.8	20	0.2	yes
Cadmium	mg/kg	0.43	0.47	20	0.02	yes
Chromium	mg/kg	23.8	22.6	20	1.1	yes
Cobalt	mg/kg	10.1	11.1	20	0.2	yes
Copper	mg/kg	31.0	31.3	20	2.2	yes
Lead	mg/kg	15.5	17.9	20	0.2	yes
Mercury	mg/kg	0.12	0.13	20	0.05	yes
Molybdenum	mg/kg	1.5	1.4	20	2.2	yes
Nickel	mg/kg	34.6	36.1	20	1.1	yes
Selenium	mg/kg	1.0	0.98	20	0.66	yes
Silver	mg/kg	0.2	0.3	20	0.22	yes
Thallium	mg/kg	0.16	0.16	20	0.11	yes
Tin	mg/kg	<1.0	<1.0	20	2.2	yes
Uranium	mg/kg	1.9	2.0	20	1.1	yes
Vanadium	mg/kg	30.5	30.7	20	0.2	yes
Zinc	mg/kg	133	137	20	2	yes

Date Acquired: March 14, 2022

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Antimony	mg/kg	39.8	37.6	42.4	yes
Arsenic	mg/kg	41.3	36.3	43.9	yes

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Quality Control

Bill To: Paramount Resources Ltd
9904 106 Street
Fort St. John, BC, Canada
Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Metals Strong Acid Digestion - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Barium	mg/kg	203	188	212	yes
Beryllium	mg/kg	20.1	17.4	22.2	yes
Cadmium	mg/kg	2.10	1.88	2.28	yes
Chromium	mg/kg	102	93.2	107.0	yes
Cobalt	mg/kg	19.8	18.4	21.4	yes
Copper	mg/kg	210	186.6	216.6	yes
Lead	mg/kg	20.0	18.3	21.3	yes
Mercury	mg/kg	3.02	2.64	3.36	yes
Molybdenum	mg/kg	206	185.1	222.3	yes
Nickel	mg/kg	103	92.4	106.2	yes
Selenium	mg/kg	41.1	35.20	44.20	yes
Silver	mg/kg	20.1	18.20	22.40	yes
Thallium	mg/kg	9.81	9.02	10.82	yes
Tin	mg/kg	204	191.2	215.2	yes
Uranium	mg/kg	102	86.0	116.0	yes
Vanadium	mg/kg	20.3	18.0	21.6	yes
Zinc	mg/kg	206	186	212	yes
Date Acquired:	March 14, 2022				
Antimony	mg/kg	3.3	2.7	4.5	yes
Arsenic	mg/kg	3.9	2.9	4.9	yes
Barium	mg/kg	101	76	126	yes
Beryllium	mg/kg	0.3	0.2	0.4	yes
Cadmium	mg/kg	0.86	0.68	1.16	yes
Chromium	mg/kg	73.2	58.2	97.2	yes
Cobalt	mg/kg	6.2	4.7	7.9	yes
Copper	mg/kg	117	90.6	150.6	yes
Lead	mg/kg	254	185.9	333.5	yes
Mercury	mg/kg	0.07	0.05	0.09	yes
Molybdenum	mg/kg	1.3	0.8	1.3	yes
Nickel	mg/kg	24.7	18.2	30.8	yes
Selenium	mg/kg	<0.3	0.23	0.35	yes
Silver	mg/kg	3.3	2.30	5.30	yes
Thallium	mg/kg	0.07	0.05	0.09	yes
Tin	mg/kg	8.4	7.6	12.4	yes
Uranium	mg/kg	<0.5	0.4	0.6	yes
Vanadium	mg/kg	27.7	20.4	34.2	yes
Zinc	mg/kg	324	244	408	yes
Date Acquired:	March 14, 2022				

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.005	0.005	yes
Toluene	ng	0	-0.06	0.06	yes
Ethylbenzene	ng	0	-0.030	0.030	yes
Total Xylenes (m,p,o)	ng	0	-0.09	0.09	yes

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Quality Control

Bill To: Paramount Resources Ltd
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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Mono-Aromatic Hydrocarbons - Soil - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Styrene	ng	0	-0.030	0.030	yes
Date Acquired:	February 12, 2022				

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	118.98	80	120	yes
Toluene	ng	111.72	80	120	yes
Ethylbenzene	ng	110.41	80	120	yes
m,p-Xylene	ng	115.57	80	120	yes
Total Xylenes (m,p,o)	ng	116.68	80	120	yes
Styrene	ng	113.51	80	120	yes
Date Acquired:	February 12, 2022				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Benzene	mg/kg	0.054	0.056	50	0.010	yes
Toluene	mg/kg	0.13	0.12	50	0.04	yes
Ethylbenzene	mg/kg	<0.005	<0.005	50	0.020	yes
m,p-Xylene	mg/kg	0.03	0.03	50	0.04	yes
o-Xylene	mg/kg	<0.02	<0.02	50	0.04	yes
Total Xylenes (m,p,o)	mg/kg	0.03	0.03	50	0.06	yes
Styrene	mg/kg	<0.01	<0.01	50	0.020	yes
Date Acquired:	February 16, 2022					

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	mg/kg	107	70	130	yes
Toluene	mg/kg	116	70	130	yes
Ethylbenzene	mg/kg	105	70	130	yes
m,p-Xylene	mg/kg	115	70	130	yes
o-Xylene	mg/kg	117	70	130	yes
Styrene	mg/kg	110	70	130	yes
Date Acquired:	February 12, 2022				

Physical and Aggregate Properties

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Specific Gravity		1.935	1.934	10	0.001	yes
Date Acquired:	March 06, 2022					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Specific Gravity		1.712	1.590	1.770	yes
Date Acquired:	March 06, 2022				

Salinity

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Calcium	mg/L	0.0390572	-2.0	2.0	yes
Magnesium	mg/L	0.00981339	-0.3	0.3	yes
Sodium	mg/L	0.0158602	-1	1	yes
Potassium	mg/L	0.0123432	-1.0	1.0	yes
Chloride	mg/L	1.62	-3	3	yes

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Quality Control

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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Salinity - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
Sulfate-S	mg/L	0.0511877	-2	2		yes
Date Acquired:	February 14, 2022					
Client Sample Replicates	**Units**	**Replicate 1**	**Replicate 2**	**% RSD Criteria**	**Absolute Criteria**	**Passed QC**
Electrical Conductivity	dS/m	3.68	3.30	20	0.03	yes
Calcium	mg/kg	330	318	20	0.6	yes
Magnesium	mg/kg	107	103	20	0.6	yes
Sodium	mg/kg	308	305	20	1	yes
Potassium	mg/kg	12	12	20	1	yes
Chloride	mg/kg	167	159	15	3	yes
Sulfate-S	mg/kg	586	556	20	1.2	yes
Date Acquired:	March 07, 2022					
Control Sample	**Units**	**Measured**	**Lower Limit**	**Upper Limit**		**Passed QC**
Electrical Conductivity	dS/m	3.26	2.50	3.70		yes
% Saturation	%	63	50	75		yes
Calcium	mg/L	715	591.6	831.6		yes
Magnesium	mg/L	108	89.7	125.7		yes
Sodium	mg/L	37	27	45		yes
Potassium	mg/L	14	10.6	16.0		yes
Chloride	mg/L	33	20	44		yes
Sulfate-S	mg/L	544	431	659		yes
Date Acquired:	February 14, 2022					
Electrical Conductivity	dS/m	31.0	26.80	35.20		yes
Calcium	mg/L	250	226.9	261.1		yes
Magnesium	mg/L	101	91.0	104.8		yes
Sodium	mg/L	251	229	264		yes
Potassium	mg/L	245	230.7	265.5		yes
Chloride	mg/L	2090	1852	2229		yes
Sulfate-S	mg/L	151	137	158		yes
Date Acquired:	February 14, 2022					

Soil Acidity

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
pH	pH	6.16	5.2	7.0		yes
Date Acquired:	March 14, 2022					
Client Sample Replicates	**Units**	**Replicate 1**	**Replicate 2**	**% RSD Criteria**	**Absolute Criteria**	**Passed QC**
pH	pH	4.6	4.6	10	0.3	yes
Date Acquired:	February 13, 2022					
Control Sample	**Units**	**Measured**	**Lower Limit**	**Upper Limit**		**Passed QC**
pH	pH	7.0	6.5	7.1		yes
Date Acquired:	February 13, 2022					

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
F1 C6-C10	ng	0	-10	10		yes

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Quality Control

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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Volatile Petroleum Hydrocarbons - Soil - Continued

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
Date Acquired:	February 12, 2022					
Client Sample Replicates	**Units**	**Replicate 1**	**Replicate 2**	**% RSD Criteria**	**Absolute Criteria**	**Passed QC**
F1 C6-C10	mg/kg	<10	<10	50	0	yes
F1 -BTEX	mg/kg	<10	<10	50	0	yes
Date Acquired:	February 16, 2022					
Matrix Spike	**Units**	**% Recovery**	**Lower Limit**	**Upper Limit**		**Passed QC**
F1 C6-C10	mg/kg	111	70	130		yes
Date Acquired:	February 12, 2022					

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Methodology and Notes

Bill To:	Paramount Resources Ltd 9904 106 Street Fort St. John, BC, Canada	Project ID:	PAR6206	Lot ID:	**1552710**
		Project Name:	Remediation	Control Number:	
		Project Location:	I-02	Date Received:	Feb 11, 2022
Attn:	Marsha Pereira	LSD:	I-02	Date Reported:	Mar 18, 2022
Sampled By:	Ross Pasmans	P.O.:		Report Number:	2724712
Company:	SynergyAspen Environmental	Proj. Acct. code:			
		OI Customer	PR210-Drilling and		

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Barium (Extractable) in soil (0.1 M CaCl2)	AENV		Analytical Method for Extractable Barium, FEB 2009	Feb 14, 2022	Element Edmonton - Roper Road
Barium (Fusion) in soil	ASTM	*	Standard Practice for Dissolution of Solid Waste by Lithium Metaborate Fusion, 2008., D 4503-08	Feb 14, 2022	Element Edmonton - Roper Road
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Feb 12, 2022	Element Calgary
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Feb 16, 2022	Element Calgary
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Mar 7, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Feb 12, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Feb 16, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Mar 7, 2022	Element Calgary
Metals ICP (Hot Block) in soil	EPA	*	Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements, October 1999, 200.2	Mar 14, 2022	Element Edmonton - Roper Road
Metals ICP (Hot Block) in soil	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Mar 14, 2022	Element Edmonton - Roper Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Feb 13, 2022	Element Edmonton - Roper Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Mar 14, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Feb 14, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Mar 7, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Feb 14, 2022	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Mar 7, 2022	Element Edmonton - Roper Road
Specific Gravity as Received in Sump Solids or Total Waste	D50	*	Appendix 3, Analytical Requirements, Specific Gravity, SG	Mar 6, 2022	Element Edmonton - Roper Road

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Methodology and Notes

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Attn: Marsha Pereira
Sampled By: Ross Pasmans
Company: SynergyAspen Environmental

Project ID: PAR6206
Project Name: Remediation
Project Location: I-02
LSD: I-02
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1552710**
Control Number:
Date Received: Feb 11, 2022
Date Reported: Mar 18, 2022
Report Number: 2724712

Method Name	Reference		Method	Date Analysis Started	Location
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Feb 12, 2022	Element Calgary
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Feb 16, 2022	Element Calgary
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Mar 7, 2022	Element Calgary

** Reference Method Modified*

References

AENV	Alberta Environment, Soil Quality Guidelines for Barite
APHA	Standard Methods for the Examination of Water and Wastewater
ASTM	Annual Book of ASTM Standards
Carter	Soil Sampling and Methods of Analysis.
CCME	Canadian Council of Ministers of the Environment
D50	Directive 50: Drilling Waste Management
EPA	Environmental Protection Agency Test Methods - US
McKeague	Manual on Soil Sampling and Methods of Analysis
US EPA	US Environmental Protection Agency Test Methods

Comments:

- Feb 16, 2022 - Report was issued to include missing CCMEC analysis on sample 26.
  Previous report 2719219.
- Mar 08, 2022 - Sample 28, 30, 32 were prepared as lab mixtures. Loss of volatile compounds may have occurred during this preparation.

Please direct any inquiries regarding this report to our Client Services group.
Results relate only to samples as submitted.
The test report shall not be reproduced except in full, without the written approval of the laboratory.

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Project Information

Project ID:	PAR6206
Project Name:	Stage 2 PSI
Project Location:	I-02
Legal Location:	I-02
PO/AFE#:	
Proj. Acct. Code:	
Quote #:	

Invoice To

Company:	Paramount Resources c/o SynergyAspen
Address:	9904 106 St
	Fort St John V1J 1V8
Attention:	Patricia Stebbing
Phone:	250-785-1030
Cell:	250-262-6173
Fax:	
E-mail:	pstebbing@synergyaspen.ca
Agreement ID:	
Copy of Report:	YES / NO

Report To

Company:	SynergyAspen Enironmental
Address:	9904 106 St
	Fort St John V1J 1V8
Attention:	Patricia Stebbing
Phone:	250-785-1030
Cell:	250-262-6173
Fax:	
E-mail 1:	pstebbing@synergyaspen.ca
E-mail 2:	
Copy of Invoice:	YES / NO

Additional Reports to

1) Name: Project Coordinator
E-mail: jectcoordinator@synergyaspe
2) Name:
E-mail:

Sample Custody

Sampled by: Jack Common
Company: SynergyAspen

I authorize Element to proceed with the work indicated on this form:

Signature:
Date/Time:

RUSH Priority

- ☐ Same Day (200%)
- ☐ Next Day/Two Day (100%)
- ☐ Three or Four Days (50%)
- ☑ 5 to 7 Days (Regular TAT)

Date Required _____

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples. If not all samples require RUSH, please indicate in the special instructions.

Report Results

- ☑ Email
- ☐ Online
- ☐ Fax
- ☑ QA/QC
- ☑ PDF
- ☑ Excel

Requirements

- ☐ HCDWORG
- ☐ SPIGEC
- ☐ AB Tier 1
- ☑ BCCSR

Other (list below)

Special Instructions/Comments (please include contact information including phone number if different from above).

Agreement number 2911

	Site I.D.	Sample Description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	PS1, 05 (GSA)	ABT1SAL-S (Salinity)	TT43 (Metals)	CCMEC (BTEX, F1-F4)	PAH2 (PAHs)	ABT1MEOHS (Methanol)	GLY2 (Glycol)					HOLD
			in m							Enter tests above (✓ relevant samples below)											
1		BH21-01-01	0	0.32	2021-10-04	soil	grab	1	x	x	x	x									x
2		BH21-01-02	0.64	0.96	2021-10-04	soil	grab	1	x													x
3		BH21-01-03	1.2	1.52	2021-10-04	soil	grab	1	x	x	x	x										x
4		BH21-01-04	2	2.32	2021-10-04	soil	grab	1	x													x
5		BH21-01-05	2.48	2.8	2021-10-04	soil	grab	1	x		x	x										x
6		BH21-01-06	3.08	3.62	2021-10-04	soil	grab	1	x	x												x
7		BH21-01-07	3.88	4.3	2021-10-04	soil	grab	1	x													x
8		BH21-01-08	4.85	0.4	2021-10-04	soil	grab	1	x	x												x
9		BH21-02-01	0	0.32	2021-10-04	soil	grab	3	x			x										x
10		BH21-02-02	0.64	0.96	2021-10-04	soil	grab	3	x				x									x
11		BH21-02-03	1.2	1.52	2021-10-04	soil	grab	3	x													x
12		BH21-02-04	1.96	2.28	2021-10-04	soil	grab	3	x		x		x									x
13		BH21-02-05	2.68	3	2021-10-04	soil	grab	3	x													x
14		BH21-02-06	0	0.32	2021-10-04	soil	grab	3	x			x										x
15		BH21-03-01	0	0.32	2021-10-04	soil	grab	3	x				x	x								x

Please indicate any potentially hazardous samples

Submission of this form acknowledges acceptance of Element's Standard of terms and conditions (https://www.element.com/terms/terms-and-conditions)

Page 1 of 2 Control # F5K1004B01

ED 120-005

affix barcode here

Lot: 1525504 COC

Temp. received: °C

Date/Time stamp:

Delivery Method:

Waybill:

Received by:

Special Instructions/Comments (please include contact information including ph. # if different from above).

	Site I.D.	Sample description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	PS1, 05 (GSA)	ABT1SAL-S (Salinity)	TT43 (Metals)	CCMEC (BTEX, F1-F4)	PAH2 (PAHs)	ABT1MEOHS (Methanol)	GLY2 (Glycol)					HOLD
			in m							Enter tests above (✓ relevant samples below)											
		BH21-03-02	0.64	0.96	2021-10-04	soil	grab	3	x		x										x
		BH21-03-03	1.2	1.52	2021-10-04	soil	grab	3	x												x
		BH21-03-04	1.96	2.28	2021-10-04	soil	grab	3	x												x
		BH21-03-05	2.68	3	2021-10-04	soil	grab	3	x			x	x								x

Please indicate any potentially hazardous samples

Control # F5K1004B02

element

element
www.Element.com

Project Information

Project ID:	PAR6206
Project Name:	Stage 2 PSI
Project Location:	I-02
Legal Location:	I-02
PO/AFE#:	
Proj. Acct. Code:	
Quote #:	

Invoice To

Company:	SynergyAspen Environmental
Address:	9904 106 St
	Fort St John. BC, V1J 1V8
Attention:	Patricia Stebbing
Phone:	250-262-6173
Cell:	
Fax:	
E-mail:	pstebbing@synergyaspen.ca
Agreement ID:	
Copy of Report:	YES / NO

Report To

Company:	SynergyAspen Environmental
Address:	9904 106 St
	Fort St John, BC, V1J 1V8
Attention:	Patricia Stebbing
Phone:	250-262-6173
Cell:	
Fax:	
E-mail 1:	pstebbing@synergyaspen.ca
E-mail 2:	projectcoordinator@synergyaspen.ca
Copy of Invoice:	YES

Additional Reports to

1) Name:
E-mail:
2) Name:
E-mail:

Sample Custody

Sampled by: Jack Common
Company: SynergyAspen Environmental

I authorize Element to proceed with the work indicated on this form:

Signature:
Date/Time:

RUSH Priority

- ☐ Same Day (200%)
- ☐ Next Day/Two Day (100%)
- ☐ Three or Four Days (50%)
- ☑ 5 to 7 Days (Regular TAT)

Date Required _____

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples. If not all samples require RUSH, please indicate in the special instructions.

Report Results

- ☑ Email
- ☑ QA/QC
- ☐ Online
- ☑ PDF
- ☐ Fax
- ☑ Excel

Requirements

- ☐ HCDWORG
- ☐ SPIGEC
- ☐ AB Tier 1
- ☑ BCCSR

Other (list below)

Special Instructions/Comments (please include contact information including phone number if different from above).

Agreement 113625 – SynergyAspen – Gov't Funding Strathcona Rates

	Site I.D.	Sample Description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	PS1, 05 (GSA)	ABT1SAL-S (Salinity)	TT43 (Metals)	CCMEC (BTEX, F1-F4)	PAH2 (PAHs)	ABT1MEOHS (Methanol)	GLY2 (Glycol)					Hold
			in m							Enter tests above (✓ relevant samples below)											
1	PAR6206	BH21-04-01	0	0.32	5-Oct-21	Soil	Grab	3	x												x
2	PAR6206	BH21-04-02	0.64	0.96	5-Oct-21	Soil	Grab	3	x			x	x								x
3	PAR6206	BH21-04-03	1.2	1.52	5-Oct-21	Soil	Grab	3	x				x								x
4	PAR6206	BH21-04-04	1.88	2.2	5-Oct-21	Soil	Grab	3	x		x										x
5	PAR6206	BH21-04-05	2.68	3	5-Oct-21	Soil	Grab	3	x												x
6	PAR6206	BH21-05-01	0	0.32	5-Oct-21	Soil	Grab	3	x												x
7	PAR6206	BH21-05-02	0.64	0.96	5-Oct-21	Soil	Grab	3	x		x		x	x							x
8	PAR6206	BH21-05-03	1.2	1.52	5-Oct-21	Soil	Grab	3	x			x									x
9	PAR6206	BH21-05-04	1.88	2.2	5-Oct-21	Soil	Grab	3	x				x								x
10	PAR6206	BH21-05-05	2.68	3	5-Oct-21	Soil	Grab	3	x												x
11	PAR6206	BH21-05-06	1.2	1.52	5-Oct-21	Soil	Grab	3	x			x									x
12	PAR6206	BH21-06-01	0	0.32	5-Oct-21	Soil	Grab	3	x			x	x								x
13	PAR6206	BH21-06-02	0.64	0.96	5-Oct-21	Soil	Grab	3	x												x
14	PAR6206	BH21-06-03	1.2	1.52	5-Oct-21	Soil	Grab	3	x												x
15	PAR6206	BH21-06-04	1.88	2.2	5-Oct-21	Soil	Grab	3	x												x

Please indicate any potentially hazardous samples

Submission of this form acknowledges acceptance of Element's Standard of terms and conditions (https://www.element.com/terms/terms-and-conditions)

Page 1 of 3 F5K1005A01

Lot: 1525982 COC

Temp. received: 12.1 °C
Date/Time stamp: Oct 8 @ 1411
Delivery Method: Hand
Waybill: KHaire
Received by:

Special Instructions/Comments (please include contact information including ph. # if different from above).

	Site I.D.	Sample description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	PS1, 05 (GSA)	ABT1SAL-S (Salinity)	TT43 (Metals)	CCMEC (BTEX, F1-F4)	PAH2 (PAHs)	ABT1MEOHS (Methanol)	GLY2 (Glycol)				Hold
			in m							Enter tests above (✓ relevant samples below)										
	PAR6206	BH21-06-05	2.68	3	5-Oct-21	Soil	Grab	3	x		x		x							x
	PAR6206	BH21-07-01	0	0.32	5-Oct-21	Soil	Grab	3	x											x
	PAR6206	BH21-07-02	0.64	0.96	5-Oct-21	Soil	Grab	3	x											x
	PAR6206	BH21-07-03	1.2	1.52	5-Oct-21	Soil	Grab	3	x											x
	PAR6206	BH21-07-04	1.88	2.2	5-Oct-21	Soil	Grab	3	x		x									x
	PAR6206	BH21-07-05	2.52	2.84	5-Oct-21	Soil	Grab	3	x				x							x
	PAR6206	BH21-07-06	3.08	3.4	5-Oct-21	Soil	Grab	3	x											x
	PAR6206	BH21-07-07	3.72	4.04	5-Oct-21	Soil	Grab	3	x				x							x
	PAR6206	BH21-07-08	4.18	4.5	5-Oct-21	Soil	Grab	3	x			x								x
	PAR6206	BH21-07-09	3.72	4.04	5-Oct-21	Soil	Grab	3	x				x							x
	PAR6206	BH21-08-01	0	0.32	5-Oct-21	Soil	Grab	3	x		x									x
	PAR6206	BH21-08-02	0.64	0.96	5-Oct-21	Soil	Grab	3	x				x							x
	PAR6206	BH21-08-03	1.2	1.52	5-Oct-21	Soil	Grab	3	x											x
	PAR6206	BH21-08-04	1.88	2.2	5-Oct-21	Soil	Grab	3	x				x	x						x
	PAR6206	BH21-08-05	2.52	2.84	5-Oct-21	Soil	Grab	3	x			x								x
	PAR6206	BH21-08-06	3.08	3.4	5-Oct-21	Soil	Grab	3	x											x
	PAR6206	BH21-08-07	3.76	4.08	5-Oct-21	Soil	Grab	3	x											x
	PAR6206	BH21-08-08	4.18	4.5	5-Oct-21	Soil	Grab	3	x											x
	PAR6206	BH21-09-01	0	0.32	5-Oct-21	Soil	Grab	3	x			x	x							x
	PAR6206	BH21-09-02	0.64	0.96	5-Oct-21	Soil	Grab	3	x											x
	PAR6206	BH21-09-03	1.2	1.52	5-Oct-21	Soil	Grab	3	x											x
	PAR6206	BH21-09-04	1.88	2.2	5-Oct-21	Soil	Grab	3	x											x
	PAR6206	BH21-09-05	2.52	2.84	5-Oct-21	Soil	Grab	3	x		x									x
	PAR6206	BH21-09-06	3.08	3.4	5-Oct-21	Soil	Grab	3	x				x							x
	PAR6206	BH21-09-07	3.64	3.96	5-Oct-21	Soil	Grab	3	x											x

Please indicate any potentially hazardous samples

Control # F5K1005A02

element

Special Instructions/Comments (please include contact information including ph. # if different from above).

	Site I.D.	Sample description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	PS1, 05 (GSA)	ABT1SAL-S (Salinity)	TT43 (Metals)	CCMEC (BTEX, F1-F4)	PAH2 (PAHs)	ABT1MEOHS (Methanol)	GLY2 (Glycol)				Hold
			in m							Enter tests above (✓ relevant samples below)										
	PAR6206	BH21-09-08	4.18	4.5	5-Oct-21	Soil	Grab	3	x											x
	PAR6206	BH21-09-09	2.52	2.84	5-Oct-21	Soil	Grab	3	x											x
	PAR6206	HA21-01-01	0	0.3	5-Oct-21	Soil	Grab	3	x											x
	PAR6206	HA21-02-01	0	0.3	5-Oct-21	Soil	Grab	3	x											x

Please indicate any potentially hazardous samples

Control # F5K1005A03

element

NORTH SHORE
Environmental Consultants

Paramount Resources Ltd.
Para et al Fort Liard I-46 60°10' 123°15'
Phase 1 Environmental Site Assessment
March 2017



Paramount Resources Ltd.
4700 Bankers Hall West
888 3rd Street SW
Calgary, Alberta T2P 5C5

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INTRODUCTION

Paramount Resources Ltd. (Paramount) retained North Shore Environmental Consultants Inc. (North Shore) to conduct a Phase 1 Environmental Site Assessment (ESA) for the Para et al Fort Liard I-46 well located in the Northwest Territories (NWT) at Unit I, Section 46 Grid Area 60° 10', 123° 15' (Site).

The purpose of the Phase 1 ESA was to assess and qualify potential environmental concerns associated with the Site through a historic records review and site visit. The Phase 1 ESA was conducted in general accordance with the Canadian Standards Association (CSA) *Standard Z678-01: Phase I Environmental Site Assessment* (CSA, 2001). The Alberta Energy Regulator (AER) *Assessing Drilling Waste Disposal Areas: Compliance Option for Reclamation Certification* (AER, 2014) guidelines were used to assess the drilling waste associated with the Site.

FINDINGS

The Para et al Fort Liard I-46 well was spud on November 12, 1999 and the rig was released on January 15, 2000. The well was drilled to a final depth of 2,055 metres. The well did not produce. The wellsite is accessible by helicopter and winter road.

Infrastructure identified in association with the site includes a wellhead. There were no campsites, log decks, or borrow pits identified in association with the wellsite. A remote drilling waste disposal area (DWDA) was identified during the file review; however, the location of the remote DWDA is not known.

A review of 2001 aerial imagery of the site shows a potential area of concern near the east boundary of the site and the central portion of the lease appears to lack vegetation establishment.

Drilling Waste Disposal

The surface hole section of the well was drilled using a gel-chem drilling mud. According to file documentation, the drilling waste associated with the surface hole was disposed of at a remote DWDA. The intermediate hole was drilled with an invert mud system which was re-used at another site, and the main hole was underbalanced drilled with nitrogen as a carrying medium. Further details regarding drilling waste disposal locations related to the intermediate and main hole drilling waste was not available in the available documentation reviewed.

Drill stem tests (DSTs) 1 through 7 were conducted during intermediate and main hole drilling operations in December 1999 and January 2000 recovering gasified invert, invert, fresh water, invert-cut fresh water, salt water, and water-cut invert.

Formal drilling waste disposal documentation was not available for the well and as a result a Compliance Option 2 checklist and associated calculations were completed as per the *Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification* document (AER, 2014). The surface hole drilling waste meets the requirements of the checklist and associated calculations and no further assessment of the remote DWDA is required. The drilling waste associated with the intermediate and main hole does not meet the requirements of the Compliance

Option 2 checklist, and as a result, further assessment of a potential on site DWDA is recommended. Construction reports noted that invert storage pits were constructed on site but it is not known if they were utilized or how they were disposed of.

The construction report also indicates that a flare pit was constructed on site; however, there is no indication that the flare pit was utilized.

Spills & Complaints

A review of the NWT Resource Wildlife and Economic Development's Hazardous Material Spill Database did not identify any spills associated with the I-46 wellsite.

An Environmental Inspection completed by Indian and Northern Affairs Canada was completed on September 20, 2000 and noted subsided areas that needed to be filled in.

Previous Assessments/Reports

There were no previous assessments or reports available for review.

Interviews

There were no Paramount operations personnel with historic knowledge of drilling or production activities at the Site available for an interview.

Site Visit

During the February 2017 site visit, North Shore noted that the wellhead was still in place. On site vegetation was not visible as the site was snow covered. An apparent subsided area was noted approximately east of well centre. There are no known borrow pits, log decks, or campsites associated with the wellsite.

CONCLUSIONS AND RECOMMENDATIONS

Based on the information gathered for this Phase 1 ESA from the historic records review and the site inspection, North Shore concludes that there is a potential for environmental impact in connection with the site. A Phase 2 ESA is recommended to assess the following areas of potential concern:

- Well centre;
- Potential area of concern on the east side of the lease; and
- Potential on site DWDA.

DISCLOSURE

North Shore Environmental Consultants Inc. (North Shore) has prepared this report taking into account government regulations available at the time of the assessment. North Shore has not made an independent verification of historical or analytical results provided by third parties and therefore makes no assurances regarding the accuracy of such information. It has assumed such information is correct. Where indicated or implied the conclusions are based on visual observation and/or analytical testing conducted at the time of the assessment. The conclusions do not apply to any areas of the site not investigated.

This report is intended for the exclusive use of the company, organization, or individual to whom it is addressed and may not be relied upon by any third party without the express written permission of North Shore. The investigation and reporting has been conducted with a reasonable level of attention and skill, in accordance with standards prevailing in the environmental consulting profession at the time of report date in the location in which the report was prepared.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. North Shore accepts no responsibility for damages, if any, suffered by any third party as a result of the use of this report or any decisions made or actions based on this report.

In the preparation of this report, selected Alberta Energy Regulator (AER) reference material has been gathered from AbaData™ (property of Abacus Datagraphics Ltd.), which is an online information source. The information provided by AbaData is received directly from the AER, electronically updated on a monthly basis and is assumed to be correct.

CLOSURE

North Shore appreciated the opportunity to work on this project. If we can provide clarification of any part of this report, please contact the undersigned at (780) 467-3354.

This report was prepared by:



_____

Angela Bricker, B.Sc., P.Ag.
Environmental Consultant

Reviewed By:



_____

Ann Tuson, R.T.(Ag.)
Environmental Consultant

REFERENCES

Alberta Energy Regulator (AER). 2015. *Directive 050: Drilling Waste Management*. Retrieved from: https://www.aer.ca/rules-and-regulations/directives/directive-050

Alberta Energy Regulator (AER). 2014. *Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification*. Edmonton, Alberta. March 2014.

Alpine Environmental (Alpine). 2005. *Annual 2005 Environmental Site Assessment Report F-36 Wellsite, Northwest Territories Calgary, Alberta.* October 2005

Petroleum Services Association of Canada. 2016. *Drilling Fluid Product Listing for Potential Toxicity Information*. Retrieved from: www.psac.ca/mudlist/pdf/mud_list.pdf

Mackenzie Valley Land and Water Board. 2017. *Mackenzie Valley Land and Water Board – Public Registry – Online Review System*. Accessed January 2017. Retrieved from: https://mvlwb.com/

NWT Environment and Natural Resources. 2017. *Hazardous Materials Spills Database.* Accessed January 2017. Retrieved from: http://apps.enr.gov.nt.ca/app/spills/epd_spills/asp/login.asp

Government of NWT. 2017. *Office of the Regulator of Oil and Gas Operations – Public Registry.* Accessed January 2017. Retrieved from: http://www.orogo.gov.nt.ca/registry

Government of NWT. 2017. *Northwest Territories Geological Survey* Accessed January 2017. Retrieved from: http://www.nwtgeoscience.ca/

List of Appendices

Appendix A Survey Plan
Site Diagram

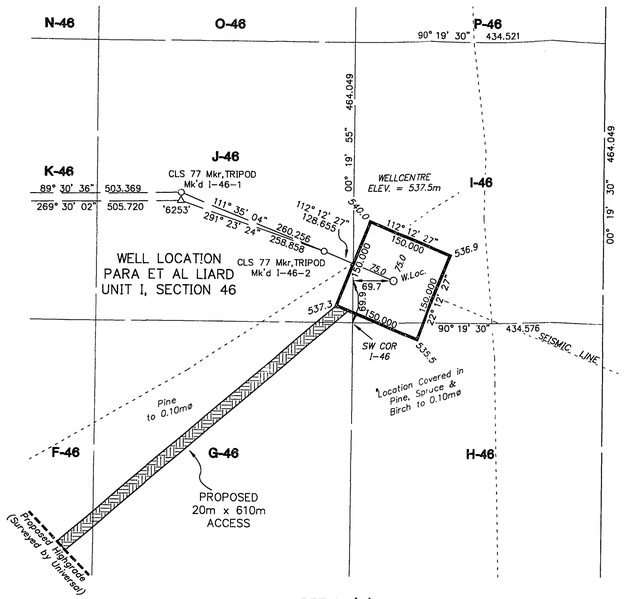
Appendix B Spill Report
Aerial Photographs
Correspondence

Appendix C Drilling Waste Documentation

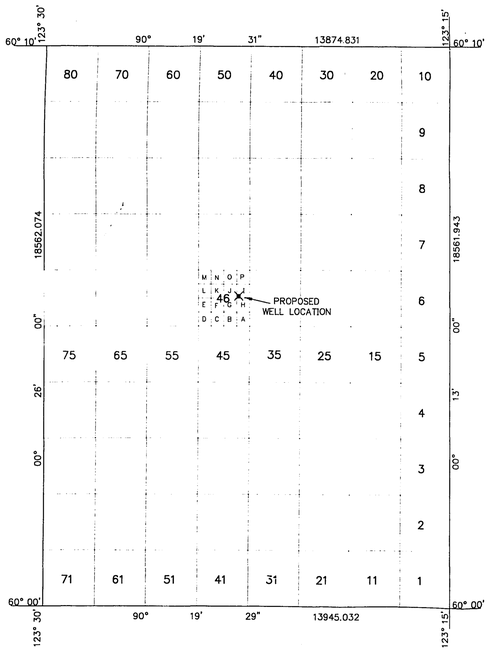
Appendix D Site Visit Photos

APPENDIX A

Survey Plan
Site Diagram



DETAIL 'A'
UNIT I, SECTION 46
SCALE 1:5,000

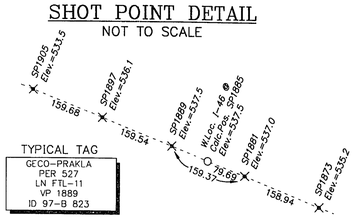


GRID AREA 60°10', 123°15'
SCALE 1:100,000

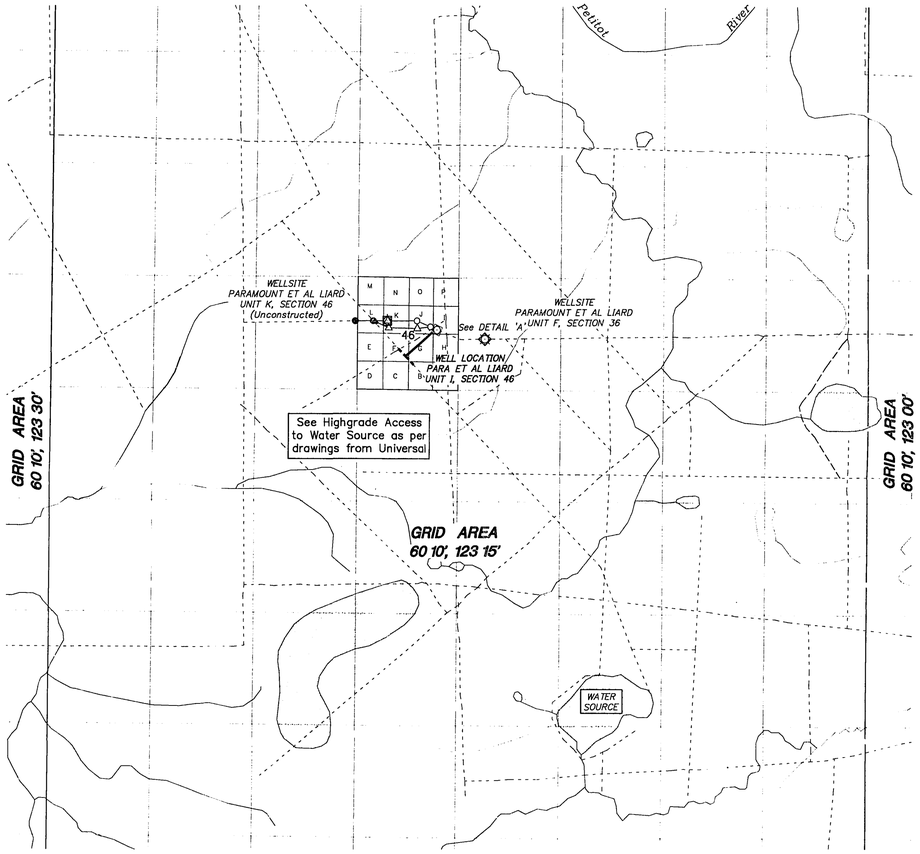
AREAS REQUIRED:

WELLSITE:	150mx150m	=	2.25 ha.
ACCESS:	20mx610m	=	1.22 ha.
CAMPSITE:	40mx60m	=	0.24 ha.
TOTAL:			3.71 ha.

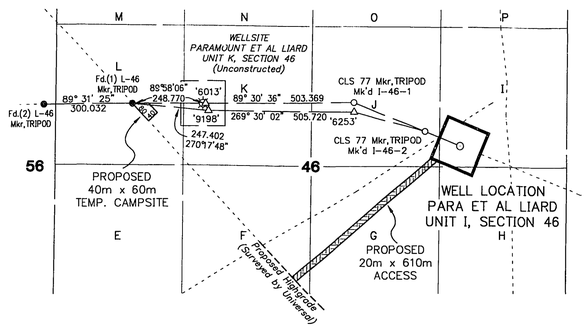
SHOT POINT DETAIL
NOT TO SCALE



TYPICAL TAG
GECO-PRAKLA
PER 527
LN FTL-11
VP 1889
ID 97-B 823



DETAIL 'B'
SCALE 1:10,000



All coordinates shown are on 1927 North American Datum.
They are based on values for Found Wellsite Monuments Fd.CLS(1) L-46 Grid Area 60° 10', 123° 15' and Fd.CLS(2) L-46 Grid Area 60° 10', 123° 15'.

GEOGRAPHIC AND UTM COORDINATES, (1927 NAD)				
Station	Latitude	Longitude(W)	Northings	Eastings
CONTROL MONUMENTS				
L-46-1	60°05'36.782"	123°24'05.680"	6661691.266	477663.419
L-46-2	60°05'36.642"	123°24'25.087"	6661688.773	477363.541
GRID AREA				
NE	60° 10' 00"	123° 15' 00"	6669792.783	486125.259
NW	60° 10' 00"	123° 30' 00"	6669871.559	472250.651
SE	60° 00' 00"	123° 15' 00"	6651230.973	486055.060
SW	60° 00' 00"	123° 30' 00"	6651310.016	472110.252
I-46, NE	60°05'45.214"	123°22'29.999"	6661943.459	479143.204
I-46, NW	60°05'45.214"	123°22'58.124"	6661945.924	478708.690
I-46, SW	60°05'30.214"	123°22'58.124"	6661481.882	478706.002
I-46, SE	60°05'30.214"	123°22'29.999"	6661479.417	479140.571
TRAVERSE STATIONS				
TH '6013'	60°05'36.835"	123°23'49.587"	6661691.405	477912.070
I-46-1	60°05'37.070"	123°23'17.027"	6661695.711	478415.180
I-46-2	60°05'34.023"	123°23'01.336"	6661600.018	478657.070
TH '6253'	60°05'37.028"	123°23'16.963"	6661694.384	478416.158
TH '9198'	60°05'36.788"	123°23'49.675"	6661689.983	477910.699
PROPOSED WELL				
I-46	60°05'32.474"	123°22'53.612"	6661551.415	478776.125

PLAN AND FIELD NOTES

OF SURVEY OF

PROPOSED EXPLORATORY WELL

PARA ET AL LIARD

IN UNIT I, SECTION 46

GRID AREA 60° 10' , 123° 15'

NORTHWEST TERRITORIES

CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50,000

0m 500m 1000m 2000m 3000m 4000m 5000m

SURVEYED FOR

PARAMOUNT RESOURCES LTD.

BY : R.O. BLACKALL, CLS
JUNE, 1999.

LEGEND

UTM coordinates are computed for Zone 10, central meridian 123° W.
Bearings were derived from the bearing 89° 31' 25" computed between Fd. CLS 77 Wellsite Control Monuments L-46-1 Grid Area 60° 10', 123° 15' and L-46-2 Grid Area 60° 10', 123° 15' and are referred to the Meridian 123° W.
Distances are expressed in metres and decimals thereof.
Distances shown in traverse are measured distances reduced to the horizontal at general ground level.
For the computation of coordinates measured distances have been reduced to the UTM plane by multiplying them by an average combined scale factor of 0.9995214. Coordinates were then adjusted to fit the control.
Distances shown on grid area subdivisions are UTM plane.
Authorized control monuments found ..... ●
Monuments placed ..... O
Mkr. denotes metal marker post 2.0m long placed 0.30m N.
Elevations were derived from Geodetic of Canada Monument 'Petitot' Elev. = 218.241m

Survey was completed prior to drilling; therefore well as drilled may not necessarily agree with proposed location.

I, R.O. Blackall, of the City of Fort St. John, British Columbia, Canada Lands Surveyor, make oath and say that I have in my own proper person, according to law and the instructions of the Surveyor General of Canada Lands, faithfully and correctly executed the survey shown by this plan and field notes, and that the said plan and field notes are correct and true to the best of my knowledge and belief.
SO HELP ME GOD

R.O. Blackall, CLS

Sworn before me at Fort St. John, this 06th day of July, 1999.

A Commissioner for Oaths

THIS SURVEY WAS EXECUTED DURING THE PERIOD
JUNE 22nd TO JUNE 23rd, 1999. BY R.O. BLACKALL, CLS

PARAMOUNT RESOURCES LIMITED

WITNESS

DATE

REV.No.	DESCRIPTION	DATE

McElhanney
LAND SURVEYS LTD.
10014 - 97th Ave., Suite 202
Fort St. John, British Columbia
Phone:(250)787-0356, Fax:(250)787-0310

DATE : 99/07/02 JOB No.: 3111-07261WS BY: BRC

20X

File: I-46_17PH1.dwg Date: March-20-17 10:31:08 AM

CONIFER DOMINATED

LEASE BOUNDARY

SOIL PILES

CONIFER DOMINATED

UNCLEARED
(□U□ENILE BRCH)

SNOW BANK

ACCESS

SNOW BANK

CLEARED

UNCLEARED

CUTLINE

LEGEND

- I-46 WELL CENTRE
- RIG ANCHOR
- EXTREMELY O□ERGROWN AREA (UNABLE TO DRILL)
- LOW AREA

NOTES:

DATE OF SITE □ISIT: FEBRUARY 9□2017.

LOCATIONS ARE APPROXIMATE.

DRAWING SHOULD BE PRINTED ON 11x17 PAPER FOR ACCURATE SCALING.

0 5 10 20 30m

Scale 1 : 800

SITE □ISIT DIAGRAM

NORTH SHORE Environmental Consultants

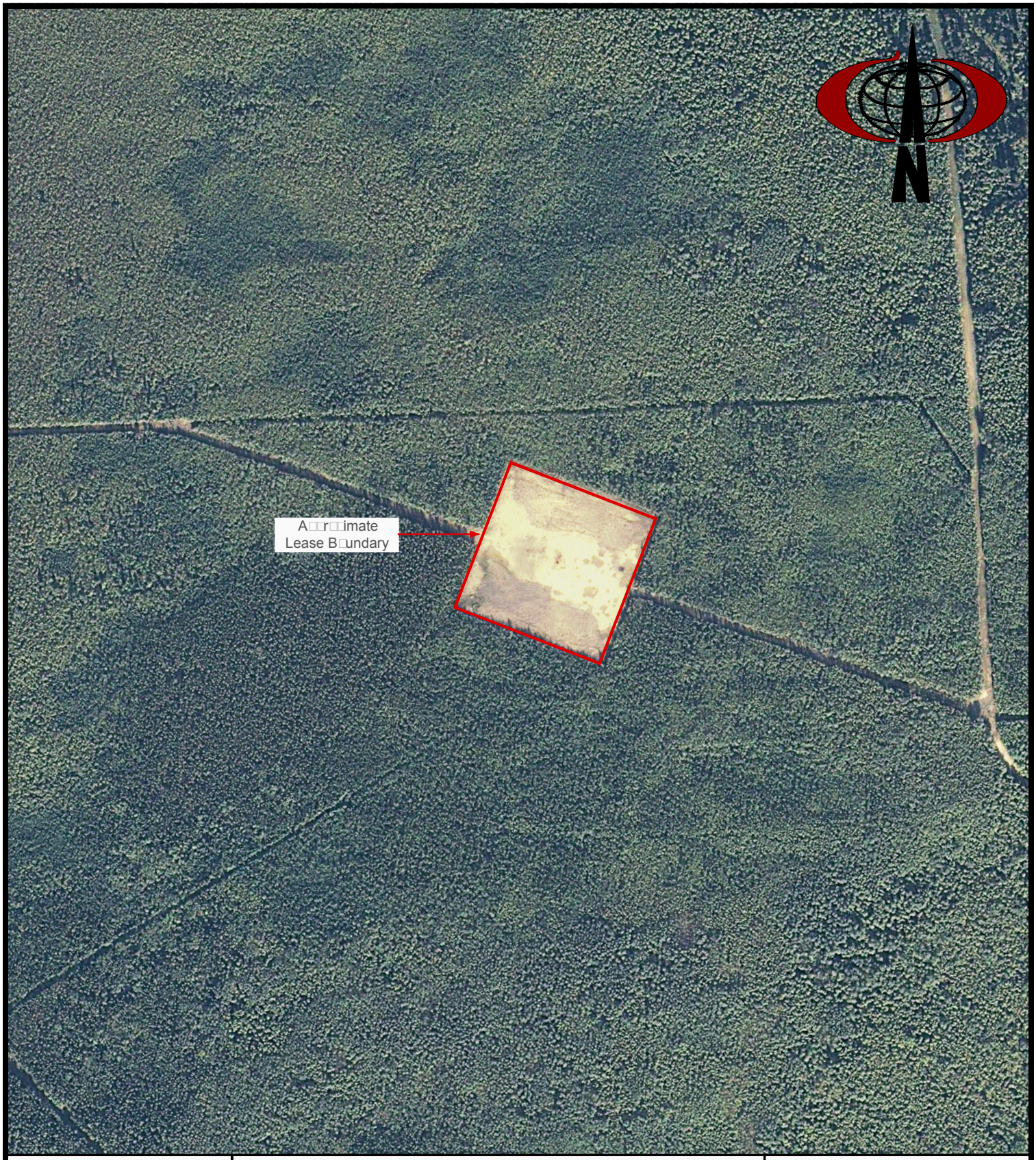
Date: 20-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. I-46 (NORTHWEST TERRITORIES)	Figure: 1
File name: I-46_17PH1-B.dwg	Requested by: DM		

APPENDIX B

Spill Report
Aerial Photographs
Correspondence

No Spills Found

Your search returned zero results



NORTH SHORE
Environmental Consultants
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T8A 2□6

□aramount Resour□es □td□

Para et al Liard I-46

2001 Satellite Imagery

0 50 100 200

SCALE IN METERS

S□ale: 1:5000

NOTE: SCALE IS APPROXIMATE ± 1m



NORTH SHORE
Environmental Consultants

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T8A 2□6

□aramount Resour□es □td□

Para et al Liard I-46

2001 Satellite Imagery

S□ale: N□t t□ S□ale

PARAMOUNT RESOURCES LTD.

DAILY CONSTRUCTION & RESTORATION REPORT

Date: NOV 23 99

WELL NAME: FORT LIARD I-46 DAY:

TYPE OF JOB: LEASE PREPARATION

CURRENT OPERATION:

REMARKS: BUILD CONTAINMENT BERMS FOR INVERT STORAGE PIT, INSTALL LINER, BUILD FLARE PIT.

OTHER COST ITEMS:

116 MAINTENANCE - Road, Site, Airstrip	112 AIRSTRIP PREP	CONSTRUCTION		RESTORATION	
EQUIPMENT LIST	HOURS & RATE	ROAD/103	SITE/104	ROAD/108	SITE/109
LABOUR, SLASHERS, ETC.					
FOREMAN w/VEHICLE,ETC.					
OPERATOR TRAVEL w/TRUCK					
FUEL					
TRUCKING - EQUIP., MATERIALS					
MISC. - CULVERTS, GEOGRIDS, ETC.					
SUBSISTENCE - CAMP					
CATS BEAVER	#10264 Nov 23 $	675.00			
CATS BEAVER	#10258 Nov 24 $	1960.00			
CATS					
SCRAPERS					
GRADERS					
WATER TRUCK, PUMPS					
OTHER			PREV100	Nov 16 $	83232.00
OTHER					
OTHER					

TEMP., WEATHER: -10 / -20

ROAD CONDITIONS:

REPORTED BY: ROD ARMSTRONG

MOBILE # & AREA: 403 815-2603

DAILY $	2635.00		
CUMM	85,867.00		
SUPERVISION - DAILY	-0-	CUMM	

DC REP 005 v1.0 92-03-06

Indian and Northern Affairs Canada | Affaires Indiennes et du Nord Canada

September 20, 2000

ENVIRONMENTAL INSPECTION REPORT

Permittee:	**Paramount Resources Ltd., 4700, 888 3rd Ave. SW. Calgary, Alberta, G2P-5C5**

		Permit Expiry Date	Last Previous Inspection
Land Use Permit No.	**N1999A0075**	**October 6, 2001**	**April 20,2000**
Quarrying Permit No.			
Contractor:	**Beaver Enterprises**	**Subcontractor:**	

Location(s) Inspected:	**Barge landing, all weather road, I-03 ROW, I-03-camp site and well site, well sites 0-35, M-25, I-46, F-36 battery site.**

Current Stage of Operation:	**The barge landing and is operational but no one is using it at this time due to spring break-up. The all weather road is partially completed. The Right Of Way for the Pipeline is near completion, reclamation has started**

Program Modifications Approved:	

Condition of Operation "A" - Acceptable "U" - Unacceptable "N/A" - Not Applicable

	Operating Condition	Aspect Inspected						
		barge landing	all weather road	I-03 right of way	I-03 camp	camp near barge landing	I-03 wellsite	
A	Location as Permitted	A	A	A	A	A	A	
B	Timing as Permitted	A	A	A	A	A	A	
C	Equipment as Approved	A	A	A	A	A	A	
D	Methods & Techniques	A	A	A	A	A	A	
E	Facilities	A	A	A	-	A	-	
F	Erosion	A	A >	A	A	A	A	see explanatory remarks
G	Chemicals, Waste	A	-	A	-	A	-	
H	Wildlife and Fisheries Habitat	A	A	A	A	A	A	
I	Ecological Resource	-	-	-	-	-	-	
K	Fuel Storage	A	A	A	-	A	-	
L	Brush Disposal	A	A	A	A	A	A	
M	Matters Not Inconsistent	A	A	A	A	A	A	
N	Water Engineering	-	-	-				
O	Water Supply	A	A	A	A	A	A	
P	Restoration	-	-	-	-		-	
Q	Quarrying Methods	-	A	-	-		-	
R	Sections 12 to 19 T.L.U.R.	-	-	-	-		-	
S								
T								

Explanatory Remarks

Please take note that on September 20, 2000, Resource Management Officers Darren Unrau and Daniel Quevillon inspected the above noted areas by air to monitor compliance with land use permit operating conditions. Also accompanying the DIAND officer was Ms. Emma Pike, Regulatory Officer for the Mackenzie Valley Land and Water Board in Yellowknife.

Barge Landing and Camp and fuel storage

The barge landing was operational and in good condition. A drainage trench was constructed near the barge landing area eliminating erosion problems at the Liard River. The equipment and rig for the I-03 project was being stored on this site and in a coordinated manner. The camp is operational and has a sump directly behind it. The outdoor sump is fenced in. This waste disposal method is acceptable. The fuel is kept in a berm which is lined with a HDPE impermeable liner. No spills were noted during this inspection.

All weather road from the barge landing to I-03 ROW access

The all weather road leading from the barge landing to the I-03 well site ROW was nearly completed. They still needed clay to cap that part of the road. The work on this road is coming along at a slow pace due to the heavy rains the Fort Liard area.

ROW into I-03 and camp and well site

The ROW which lead to the I-03 well site was still under construction. Clay is also needed there to cap the road. This whole area was visibly wet and this was being caused by the continuous rain falls in the area. The camp area is under construction, all trees have been cut down and removed. All trees have also been removed from the well site area and they were leveling the site with a dozer.

Erosion problem

It is important to note that we were informed by the consultant on site that an area of concern was going to be re-mediated as soon as the ground was frozen. I am talking about the bridge at kilometer 9. This bridge will have to be removed and installed again in an appropriate manner. This area is very wet and it is now known that beavers frequent this location. All of these circumstances will have to be taken in consideration when putting the bridge back in. It is highly recommended that Paramount Resources Ltd. submit an engineered plan showing how this bridge is being installed along with elaborating on erosion control. Now, should this bridge and all other bridges leading to A-01 be temporary winter bridges, they should all have been removed last spring. We would appreciate clarification of the status of these bridges as soon as possible.

Well sites O-35, M-25 and I-46

All the above noted well sites were inspected and it is recommended that Paramount Resources Ltd. go in these locations and fill in the sumps that have slumped. All well sites have these slumped areas.

F-36 battery site

All areas inspected were found to be acceptable at this time.

All of the areas inspected were found to be acceptable at this time.

Should you have any questions or concerns relating to this matter, please do not hesitate in contacting this office anytime at (867) 695-2626.

Representative's Signature

RMO Initials

Inspector's Signature

APPENDIX C

Drilling Waste Documentation

Professional Declaration for Reclamation Certificate Applications

Submit one Declaration for each report

1 This Declaration is made in conjunction with an application for a reclamation certificate (the"Application") made by

Paramount Resources Ltd. (Applicant)

for the following land(s): Para et al Fort Liard I-46 (insert legal description).

2 I am a practicing professional member [Registration/member number] 4818

of the Alberta Institute of Agrologists

which is a regulated professional organization (the "Professional Organization"). I have a minimum of five years verifiable experience in remediation or reclamation relevant to the Competencies Table contained in the Competencies for Remediation and Reclamation Advisory Committee's Recommendations Report (ESRD 2006).

3 As a member of the Professional Organization, I have the ability to sign off on work required for reclamation certificate applications as defined by the Alberta Energy Regulator and am authorized by the Applicant to prepare and submit the attached report or document, (the "Professional Report") listed below.

4 To the best of my knowledge and the best of my professional ability, recognizing the standard of care expected of a reasonable professional doing this work, it is my professional opinion that all the information contained in the Professional Report is accurate and complete, and contains all the relevant information for the purposes of this Application.

5 The results reported in the Professional Report are consistent with all current and applicable Provincial policy, criteria, standards and guidelines for the remediation or reclamation.

6 The Professional Report, including all attachments, data and supplemental information, were prepared by me, or under my direct supervision, or was prepared by a third party(ies) and has been reviewed and accepted by me; and was prepared in accordance with an appropriate quality assurance/quality control system that ensured qualified personnel properly gathered and evaluated all the information contained in and underlying the Professional Reports. All the information submitted is, to the best of my knowledge, true, accurate and complete.

7 I carry, or my employer: North Shore Environmental Consultants Inc.

(insert legal name of employer)

carries professional liability insurance (errors and omissions). This insurance will be maintained for the specified liability period, subject to insurance availability.

8 I am aware that it is an offence under section 227 of the Environmental Protection and Enhancement Act to provide false, misleading or inaccurate information and that there are significant fines for committing these offences, including the possibility of imprisonment. See below for the relevant sections.

Report Title: Assessing Drilling Waste Disposal Areas - Compliance Option 2
Para et al Fort Liard I-46

Date: March 20, 2017

Name: Ann Tuson, R.T.(Ag.)

Signature: Ann Tuson, R.T.(Ag.)

Digitally signed by Ann Tuson, R.T.(Ag.)
DN: cn=Ann Tuson, R.T.(Ag.), o=North Shore Environmental Consultants Inc., ou, email=atuson@northshoreenv.com, c=CA
Date: 2017.03.20 09:30:31 -06'00'

Note: If you wish to sign the form with an electronic signature you are bound with the same force as though you had a fixed signature on paper.

Registration/Member number: 4818

Section 227 of the Environmental Protection and Enhancement Act

Offences s. 227 A person who

(a) knowingly provides false or misleading information pursuant to a requirement under this Act to provide information,
(b) provides false or misleading information pursuant to a requirement under this Act to provide information

is guilty of an offence.

Penalties s. 228(1) A person who commits an offence referred to in section 60, 87, 108(1), 109(1) or 227(a), (d), (f) or (h) is liable to

(a) in the case of an individual, to a fine or not more than $100 000 or to imprisonment for a period of not more than 2 years or to both fine and imprisonment, or
(b) in the case of a corporation, to a fine of not more than $1 000 000.

(2) A person who commits an offence referred to in section 61, 67, 75, 76, 79, 88, 108(2), 109(2) 110(1) or (2), 111, 112, 137, 148, 149, 155, 157, 163, 169, 170, 173, 176, 188, 191, 192, 209, 227(b), (c), (e), (g), or (i) or 251 is liable.

(a) in the case of an individual, to a fine or not more than $50 000, or
(b) in the case of a corporation, to a fine of not more than $500 000.

Formation Multitester	1636 - 1992 mKB
Cement Volume Log:	1555 - 2054 mKB

GAS, OIL, & WATER ANALYSES: N/A

FORMATION STIMULATION: N/A

FORMATION AND TEST RESULTS: N/A

DETAILED TEST PRESSURE DATA READINGS: N/A

E. ENVIRONMENTAL CONSIDERATIONS

There are no known outstanding environmental considerations on this well. The gel-chem mud system used on the surface hole was hauled and treated at a remote sump. The invert mud system used for the intermediate hole was re-used at another location. The main hole was drilled underbalanced with noitrogen as a carrying medium.

Compliance Option 2
Drilling Waste Disposal Assessment Checklist

Compliance Option 2 - Drilling Waste Disposal Assessment Checklist

If any response to the checklist questions leads to a Phase 2 ESA requirement or there is insufficient information to complete the Compliance Option Two Checklist, a Phase 2 ESA must be conducted in accordance with Compliance Option Three.

1. General Disposal and Drilling Fluid Information:
The well licensee should be able to review various sources of information pertaining to the drilling activities on-site. Many information sources, other than the *Notification of Drilling Waste Disposal*, *Drilling Waste Management Disposal Form*, or *Drilling Waste Pipeline Disposal Form* can be reviewed for information relating to the drilling waste disposal and drilling fluid systems. These can include Tour Reports, daily drilling records, well files, and contractor invoices.

1.0 Well Information:

Unique Identifier (UI)	Para et al Fort Liard I-46
Spud Date	November 12, 1999
Well Depth	2,055 m

1.1 Disposal Method (if known)*: Surface Hole: Mix-bury-cover at remote sump, Intermediate Hole: Invert mud re-used at another location, Main Hole: Unknown, assumed mix bury cover

* If waste was disposed at an AER or ESRD approved facility, list supporting documentation under Reference Documents.

1.2 Disposal Location (if known)**: Remote sump location unknown, assumed on site DWDA

** If checklist indicates that a Phase 2 ESA (Compliance Option Three) is required, it must be undertaken at the disposal location. If the disposal location is unknown, the Phase 2 ESA must be undertaken at the wellsite.
For the purpose of this form: if the disposal method and/or location remains unknown after all available information sources have been checked, the drilling waste disposal location is assumed to be on-site.

	Yes	No
1.3 Were there other drilling waste disposal events on the site (e.g. wellbore re-entry or another well drilled, using fluids containing drilling fluid additives)?	☐	☒
If yes, were the disposal areas separate from one another?	☐ Drilling waste information must be evaluated for each disposal.	☐ Drilling waste information must be evaluated by combining the drilling fluid additives and well depths. If drilling waste information is missing or incomplete for one or both wells, a Phase 2 (Compliance Option Three) is required.

	Yes	No
1.4 Was a remote site used? If, Yes, is the remote site included in this reclamation application? If not included, is the remote site a multi-well disposal location?	☒ ☐ ☒ In Comments section, indicate which well the remote site will be tied to for the purposes of reclamation	☐ ☒ ☐ Single well remote disposal site must be included with reclamation certificate application, unless it already has received a Reclamation Certificate.
1.5 Has the well licensee reviewed the Daily Drilling Records and other available drilling documentation?	☒	☐ Phase 2 required
1.6 Can it be determined from the available records what type of drilling fluid system was used?	☒	☐ Phase 2 required
1.7 Were water-based drilling fluids used for all sections (i.e., gel chemical drilling fluid systems)? If No, is there evidence that demonstrates the non-water based wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., appropriately approved waste management facility)?	☒ ☐	☐ ☐ Phase 2 required
1.8 Is a mud list available? If Yes, can all the additives on the mud list be identified and described? Record the additives and their description (e.g., chrome-free lignosulfonate, aldehyde-based bactericide, etc.) on the attached form.	☒ ☐	☐ Phase 2 required ☒ Phase 2 required

	Yes	No
1.9 Do the Daily Drilling Records show evidence of a flow or kick that may have resulted in the introduction of produced fluids (i.e., hydrocarbons or salts) into the drilling fluids?	☐	☒
If Yes, is there information/documentation available to demonstrate that they were appropriately treated or disposed of as per *Directive 50* or *Directive 58* (i.e., approved waste management facility)?	☐	☐ Phase 2 required
1.10 Do the Daily Drilling Records show evidence of returned drill stem test fluids?	☒	☐
If Yes, is there information/documentation available to demonstrate that they were appropriately treated or disposed of as per *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐	☒
If treatment or disposal as per *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* cannot be confirmed, is there sufficient information/documentation available to complete the DST calculations?	☒ Show calculation on attached form	☐ Phase 2 required
1.11 Were cement returns buried on-site or at a remote site linked to the well?	☐	☐

2. Hydrocarbon Management

	Yes	No
2.1 Was hydrocarbon-based drilling fluid used?	☒	☐
If Yes, is there evidence that wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐	☒ Phase 2 required

	Yes	No
2.2 Was the well a horizontal oil well? If Yes, is there evidence that wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐ ☐	☒ ☐ Phase 2 required
2.3 Was the well drilled using under-balanced techniques? If Yes, is there information/documentation available to demonstrate that the drilling wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☒ ☐	☐ ☒ Phase 2 required
2.4 Was hydrocarbon added to the drilling fluid? If Yes, was the hydrocarbon contaminated drilling waste disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☒ ☐	☐ ☒ Phase 2 required

3. Metals (Trace Elements) Management

	Yes	No
3.1 Was the disposal completed before November 1, 2012?	☒ Complete questions 3.2 to 3.5	☐ Go to question 3.6
3.2 Was barite added to the drilling fluid? If Yes, did it meet the requirements specified in the attached metal calculation table?	☒ ☒ Show calculation on attached form	☐ ☐ Phase 2 required

	Yes	No
3.3 Was zinc carbonate added to the drilling fluid? If Yes, did it meet the requirements specified in the attached metal calculation table?	☐ ☐ Show calculation on attached form	☒ ☐ Phase 2 required
3.4 Were chrome-based thinners added to the drilling fluid? If Yes, did it meet the requirements specified in the attached metal calculation table?	☒ ☒ Show calculation on attached form	☐ ☐ Phase 2 required
3.5 Were any other additives used that would have triggered testing for metals under Section 3 or 5 of *Directive 50 (1996 version)*? If Yes, are waste analytical data and application rates (land treatment, landspreading) or maximum application (mix-bury-cover) available? If above data are available, did the application rate or maximum application meet *Directive 50* requirements?	☐ ☐ ☐	☒ ☐ Phase 2 required ☐ Phase 2 required
3.6 Did metal concentrations in the waste trigger a requirement for post-disposal sampling? If yes, did all post-disposal samples meet the soil metal endpoints specified in Section 3 of *Directive 50* (2012 version)?	☐ ☐	☐ ☐ Phase 2 required

4. Salinity Management

	Yes	No
4.1 Does the water based drilling waste meet the requirements specified in the attached Salt Calculation Table?	☒ (Surface Hole) Show calculation on attached form	☒ (Intermediate Hole) Phase 2 required
4.2 Was a salt zone encountered during drilling?	☐	☒
If Yes, is there evidence that demonstrates the drilling wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., appropriately approved waste management facility)?	☐	☐ Phase 2 required

Mud Additives (Attach additional pages if necessary.)

Product Name	Amount Used	Brief Description of Product
Surface Hole – Gel Chem System		
Gel	224 sacks	Viscosifier
Soda Ash	5 sacks	Calcium remover
Desco	3 sacks	Thinner, dispersant *contains chrome*
Sawdust	23 sacks	Lost circulation material
Intermediate Hole – Invert System		
Barite	484 sacks	Weighting material
Bentone	36 sacks	Viscosifier
Lime	39 sacks	Alkalinity, pH control
Soluflake	13 sacks	Lost circulation material
Crb	1 sack	Unknown mud additive
Carbo Teq E Invert	11.5 m^3, 2 bbl	Invert mud
Calcium Carbonate	68 sacks	Weighting material
Calcium Chloride	20 sacks	Weighting material
Mil Clean	2 bbl	Surface Active Agent
Floor Dry	4 sacks	Oil absorbent material
DFE	2 sacks	Unknown mud additive
Emulsifier	2 sacks	Emulsifier
B Mc	15 sacks	Unknown mud additive
Sawdust	30 sacks	Lost circulation material

Reference Documents (List all source documents used in the completion of this checklist. Attach additional pages if necessary. Documents must be supplied to the AER if requested.)

AbaData Well Information
PSAC Historic Drilling Fluid Products
Paramount Resources Ltd. Daily Drilling Report
Paramount Well File Information
http://www.qmax.com/mud/Floor%20Dry.pdf

Comments (Please provide any additional comments relevant to the decision process within the checklist. Attach additional pages if necessary.)

A Notification of Drilling Waste Disposal document was not available for review. File documentation noted that surface hole gel-chem drilling waste was disposed at a remote drilling waste disposal area (DWDA) in an unknown location. The intermediate hole was drilled with invert which was reused at another site, and the main hole was underbalanced drilled with nitrogen as a carrying medium.

The surface hole drilling waste meets the requirements of the Compliance Option 2 checklist and further assessment of the remote DWDA is not recommended. The location of the remote DWDA is unknown.

The intermediate and main hole drilling waste do not meet the requirements of the Compliance Option 2 checklist as it fails the salt calculation and unknown drilling mud additives were used. Due to a lack of details as to where the intermediate and main hole drilling waste was disposed, it is recommended that potential drilling waste disposal areas be assessed at the I-46 wellsite. Construction reports noted that invert storage pits were constructed on site but it is not known if they were utilized or how they

were disposed of.

Location: Para et al Fort Liard I-46 **Spud:** November 12, 1999

Surface Hole

Chromium-based Thinner:

Alternative 1:

If waste chromium, mix ratio and waste bulk density data are available use the following calculator to estimate post-disposal chromium concentration.

Directions: Enter the Total Chromium Concentration in mg/kg measured in the waste, the Waste Dry Bulk Density in kg/m3, and Mix Ratio in the appropriate cells. The spreadsheet will calculate the Post-Disposal Chromium Concentration. If this value is greater than 64 mg/kg, a Phase 2 ESA (Compliance Option 3) is required.

Waste Chromium Concentration (mg/kg)		Waste Dry Bulk Density* (kg/m^3)		Mix Ratio						Post-Disposal Cr Concentration (mg/kg)
	x		÷		÷	1500	+	30	=	#DIV/0!

* Waste Dry Bulk Density = (Waste Specific Gravity – 1) x 1600

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

Alternative 2:

If the above data is not available use the following equation to calculate the number of sacks of chrome thinner added per meter drilled. If the number of sacks exceeds the limits below, a Phase 2 is required.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Well Depth in metres. The spreadsheet will calculate the number of sacks per metre. This value must be less than or equal to **0.020.** If the value exceeds the objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Total Number of Sacks (25 kg/sack*)		Well Depth (m)		Mix Ratio**		Sacks per Metre
3	÷	505	÷	3	=	0.002

Result
PASS

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

= Required Field

Location: Para et al Fort Liard I-46 **Spud:** November 12, 1999

Surface Hole
Salt Calculations for Option 2:

Alternative 2
If the volume of drilling waste is not known, use the following calculator to determine the NaOH Equivalent Sacks per metre of well depth. This value must be less than **0.0260** for wells drilled before October 22 1996, or **0.0350** for wells drilled on or after this date. If the value exceeds the target, a Phase 2 ESA (Compliance Option 3) must be conducted.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Well Depth in metres. The spreadsheet will calculate the NaOH Equivalent Sacks per Metre.

Additive	Number of sacks (25 kg/sack*)		NaOH Equivalency Factor		NaOH Equivalent Sacks
Caustic Soda		X	1.00	=	0
Soda Ash	5	X	0.75	=	3.75
Sodium Chloride		X	0.68	=	0
Sodium Bicarbonate		X	0.95	=	0
Sodium Silicate		X	1.37	=	0
Sodium acid pyrophosphate (SAPP)		X	0.22	=	0
Calcium Chloride		X	0.72	=	0
Calcium Nitrate		X	0.34	=	0
Envirofloc		X	0.41	=	0
Gypsum**		X	0.59	=	0
Lime**		X	1.08	=	0
** Max = 0.02 x well depth (m)					
Potassium chloride		X	0.54	=	0
Potassium sulphate		X	0.46	=	0
Caustic potash		X	0.71	=	0
Potassium formate		X	0.47	=	0
Potassium silicate		X	0.32	=	0
Potassium nitrate		X	0.40	=	0
Diammonium phosphate		X	0.63	=	0
Ammonium nitrate		X	0.57	=	0
Ammonium sulphate		X	0.61	=	0
Drill Stem Test Returns		X	0.68	=	0

Total NaOH Equivalent Sacks	=	3.75
Well Depth (m)	÷	505
NaOH Equivalent Sacks per Metre	=	**0.0074**

Result
PASS

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Note: Up to 0.02 sacks of gypsum and lime per metre of well depth should be counted with other salt additives. Because of the limited solubility of gypsum and lime, sacks in excess of this value need not be counted.

= Required Field

Location: Para et al Fort Liard I-46 **Spud:** November 12, 1999

Intermediate Hole
Metal Calculations for Compliance Options One and Two

Note: Different default mix ratios are provided depending on whether the well was drilled before or after October 22, 1996. The 1996 version of *Guide 50*, *Drilling Waste Management,* which was issued by the Energy Resources Conservation Board on this date, increased the minimum mix ratio requirement from 1:1 to 3:1.

Barite: **Intermediate Hole**

Directions: Fill in the number of sacks and adjust for sack weight if different than 40 kg. Enter the Well Depth in metres. The spreadsheet will calculate the number of sacks per metre. This value must be less than or equal to **0.22** If the value exceeds the objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Total Number of Sacks (40 kg/sack*)		Well Depth (m)		Mix Ratio**		Sacks per Metre
484	÷	2055	÷	3	=	0.08

Result
PASS

* Sack weight may be adjusted by dividing the number of sacks by 40 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

Location: Para et al Fort Liard I-46 **Spud:** November 12, 1999

Intermediate Hole
Salt Calculations for Option 2:

Alternative 2
If the volume of drilling waste is not known, use the following calculator to determine the NaOH Equivalent Sacks per metre of well depth. This value must be less than **0.0260** for wells drilled before October 22 1996, or **0.0350** for wells drilled on or after this date. If the value exceeds the target, a Phase 2 ESA (Compliance Option 3) must be conducted.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Well Depth in metres. The spreadsheet will calculate the NaOH Equivalent Sacks per Metre.

Additive	Number of sacks (25 kg/sack*)		NaOH Equivalency Factor		NaOH Equivalent Sacks
Caustic Soda		X	1.00	=	0
Soda Ash		X	0.75	=	0
Sodium Chloride		X	0.68	=	0
Sodium Bicarbonate		X	0.95	=	0
Sodium Silicate		X	1.37	=	0
Sodium acid pyrophosphate (SAPP)		X	0.22	=	0
Calcium Chloride	20	X	0.72	=	14.4
Calcium Nitrate		X	0.34	=	0
Envirofloc		X	0.41	=	0
Gypsum**		X	0.59	=	0
Lime**	39	X	1.08	=	42.12
** Max = 0.02 x well depth (m)					
Potassium chloride		X	0.54	=	0
Potassium sulphate		X	0.46	=	0
Caustic potash		X	0.71	=	0
Potassium formate		X	0.47	=	0
Potassium silicate		X	0.32	=	0
Potassium nitrate		X	0.40	=	0
Diammonium phosphate		X	0.63	=	0
Ammonium nitrate		X	0.57	=	0
Ammonium sulphate		X	0.61	=	0
Drill Stem Test Returns	205.9471386	X	0.68	=	140.0440542

Total NaOH Equivalent Sacks	=	196.5640542
Well Depth (m)	÷	2055
NaOH Equivalent Sacks per Metre	=	**0.0957**

Result
FAIL

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Note: Up to 0.02 sacks of gypsum and lime per metre of well depth should be counted with other salt additives. Because of the limited solubility of gypsum and lime, sacks in excess of this value need not be counted.

= Required Field

Alberta Energy Regulator

Drill Stem Test Returns for Option 2

Location: **Spud:**

Hydrocarbons

Directions: Enter the drill stem diameter for the drill stem test (DST) section in millimeters, the length of the DST return in metres, the percent oil content of the DST fluid, the well depth in metres and the mix ratio. The spreadsheet will calculate the post disposal oil concentration If this value is greater than **0.10%** (dry weight) in subsoil or **0.50%** (dry weight) in topsoil, a Phase 2 ESA (Compliance Option 3) is required.

Inner Diameter of Pipe (mm)	Length of Drill Stem Test Return (m)	Volume of Returns (m^3)		Oil Content (%)*		Vol. of Oil (m^3 x 100)
65	40	0.132665	x	100.00%	=	13.2665
65	2	0.00663325	x	100.00%	=	0.663325
65	1000	3.316625	x	100.00%	=	331.6625
65	40	0.132665	x	100.00%	=	13.2665
		0	x		=	0
		0	x		=	0
				Total Volume of Oil	=	358.858825
					÷	0.6
				Well Depth (m)	÷	2055
				Mix Ratio**	÷	3
				Post-Disposal Oil Concentration (%)	=	0.10

Result
PASS

* Actual measured oil concentration must be used if available. If only visual descriptions are available then use the following to estimate oil concentration:

Flecked = 5%
Emulsion = 25%
Oil or oil-cut mud= 100%

Do not include gas-cut mud or mud with no indication of oil.

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter “3”. If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

= Required Field

Drill Stem Test Return Calculations for Compliance Option Two

Location: Para et al Fort Liard I-46 **Spud:** November 12, 1999

Alternative 2: Chloride

Directions: Enter the drill stem diameter for the drill stem test (DST) section in millimeters, the length of the DST return (including mud returns) in metres and the chloride concentration of the DST fluid in mg/L. The spreadsheet will calculate the equivalent number of sacks. This value must be entered in the salt calculation in the cell labelled "Drill Stem Test Returns".

Inner Diameter of Pipe (mm)	Length of Drill Stem Test Return (m)	Volume of Returns (m^3)*		Chloride Concentration* (mg/L)				Number of Sacks
65	40	0.132665	x	215000	÷	7600	=	3.75302303
65	2	0.00663325	x	215000	÷	7600	=	0.18765115
65	1643	5.449214875	x	215000	÷	7600	=	154.155421
65	350	1.16081875	x	22000	÷	7600	=	3.3602648
65	40	0.132665	x	215000	÷	7600	=	3.75302303
65	120	0.397995	x	50000	÷	7600	=	2.61838816
				Total number of sacks			=	167.827771

*If chloride concentration is not specified, use 215,000 mg/L. Chloride concentrations from formation water databases or adjacent wells are currently not acceptable.

= Required Field

APPENDIX D

Site Visit Photos



Photograph 1: View from well centre, facing north.



Photograph 2: View from well centre, facing east.



Photograph 3: View from well centre, facing south.



Photograph 4: View from well centre, facing west.



Photograph 5: View of the wellhead.



Photograph 6: View of mounds on the northwest corner.



Photograph 7: View of vegetation growth on the south side of the site.



Photograph 8: View of snow bank on north side of site.

May 12, 2017

Paramount Resources Ltd.
4700 Bankers Hall West
888 3rd Street SW
Calgary, Alberta T2P 5C5

Attention: **Larry Yoon, B.Sc., P.Biol**
Environmental Specialist

Reference: **Para et al Fort Liard I-46 60°10' 123°15'**
Phase 2 Environmental Site Assessment

North Shore Environmental Consultants Inc. is pleased to submit our Phase 2 Environmental Site Assessment report for the I-46 wellsite to Paramount Resources Ltd.

North Shore appreciated the opportunity to work on this project and if we can provide clarification of any part of this report, please call the undersigned at (780) 467-3354.

Yours truly,

North Shore Environmental Consultants Inc.

Brent Walchuk, B.Sc., P.Ag.
Remediation/Reclamation Supervisor

NORTH SHORE
Environmental Consultants

Paramount Resources Ltd.
Para et al Fort Liard I-46 60°10' 123°15'
Phase 2 Environmental Site Assessment
May 2017



Paramount Resources Ltd.
4700 Bankers Hall West
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North Shore Environmental Consultants Inc. (North Shore) was retained by Paramount Resources Ltd. (Paramount) to conduct a Phase 2 Environmental Site Assessment (ESA) for the Para et al Fort Liard I-46 wellsite located in the Northwest Territories (NWT) at Unit I, Section 46 Grid Area 60° 10', 123° 15' (Site). The site is located near Fort Liard, Northwest Territories. The objective of the Phase 2 ESA was to assess areas of potential environmental concern identified during the Phase 1 ESA conducted by North Shore in March 2017.

Assessment activities included collecting soil samples to determine if select compounds used or produced on the Site exceed the applicable remediation guidelines. The areas of potential environmental concern included the following:

- Well centre
- East potential area of concern
- Drilling waste disposal area

On February 9, 2017, 27 boreholes were advanced at the Site. Based on a review of the analytical data, field observations, and field screening information from the Phase 2, ten of eleven soil samples at well centre reported arsenic guideline exceedences. Further characterization of background soil quality is recommended.

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1 INTRODUCTION

North Shore Environmental Consultants Inc. (North Shore) was retained by Paramount Resources Ltd. (Paramount) to conduct a Phase 2 Environmental Site Assessment (ESA) at the Para et al Fort Liard I-46 wellsite (Site) located near Fort Liard, Northwest Territories.

1.1 Objective

The objective of the Phase 2 ESA was to assess areas of potential environmental concern identified during the Phase 1 ESA conducted by North Shore in March 2017.

1.2 Scope of Work

The scope of work for the Phase 2 ESA included the following:

- Review background information to assist with establishing site specific protocols.
- Prepare for ground disturbance activities. The defined work area included the lease and a 30 meter (m) buffer zone around the lease boundary.
- Supervise two sets of private utility locating surrounding the proposed ground disturbance locations.
- Conduct a tailgate safety meeting prior to initiating work each day at the Site. This includes North Shore personnel and contractors.
- Characterize and delineate any suspected impacted areas and advance two control boreholes near the site boundary location in a landscape representative of onsite topography.
- Log soil stratigraphy according to the Canadian System of Soil Classification (CSSC) (Soil Classification Working Group, 1998) with additional comments on potential impacts. Collect samples from each borehole and record organic vapor readings.
- Collect borehole soil samples as required based on field screening results.
- Collect field duplicates for every ten samples submitted for analysis.
- Submit selected soil samples for laboratory analysis to determine concentrations of suspected contaminants and background concentrations for control soil.
- Prepare a Phase 2 ESA report to document the results of the laboratory analysis.

2 BACKGROUND

2.1 Site Description

The Site is located at surface location Unit I, Section 46 Grid Area 60° 10', 123° 15', approximately 17 kilometers (km) southeast of Fort Liard, Northwest Territories. Access to the Site is from the west. A location map of the Site is included as Figure 1 and a survey plan is included in Appendix A.

2.2 Land Use and Receptors

The lease is situated on Crown land in a mixed-wood forested area. The Site has not been reclaimed, but natural encroachment from the surrounding forest is evident throughout the lease. An aerial photograph or satellite image of the quarter section is included as Figure 2. Site photographs are included as Appendix B.

2.3 Site History and Infrastructure

The Para et al Fort Liard I-46 well was spud on November 12, 1999 and the rig was released on January 15, 2000. The well was drilled to a final depth of 2,055 meters. The well did not produce.

Infrastructure identified in association with the site includes a wellhead. There were no campsites, log decks, or borrow pits identified in association with the wellsite. A remote drilling waste disposal area (DWDA) was identified during the file review; however, the location of the remote DWDA is not known. Site photographs are included in Appendix B.

2.4 Previous Environmental Work

A Phase 1 ESA was completed by North Shore in March 2017 (North Shore, 2017). There was a wellhead surrounded by a conductor barrel with grate paneling present on the site at the time of the February 2017 site visit conducted by North Shore. Based on the information gathered from the Phase 1 ESA records, and the February 2017 site visit, North Shore concluded that there was a potential for environmental impact associated with the Site. North Shore recommended intrusive sampling on the Site to assess the well centre, potential area of concern of the east side of the lease and the on site drilling waste disposal area.

3 METHODOLOGY

3.1 Safe Work Procedures

North Shore personnel adhered to Paramount's policies and procedures to complete the assessment and investigation program. Standard oilfield personal-protective equipment (hard hat, steel-toed boots, safety glasses, and fire retardant coveralls) were worn by all personnel on-site. A calibrated four way gas monitor for H2S, O2, CO, and organic vapors was also carried by each person participating in the field work. Nitrile gloves were worn when handling soil samples. All personnel onsite were required to possess copies of the applicable safety certification (Paramount Orientation, Ground Disturbance Level 2, H_2S Alive, Transportation of Dangerous Goods, Workplace Hazardous Material Information System, and Standard Level First Aid). North Shore personnel acquired a Paramount Safe Work Permit prior to commencing fieldwork and a tailgate safety meeting was conducted at the beginning of each work day.

Prior to initiating any ground disturbance the proposed assessment area was swept twice by a third party company for the presence of buried facilities. The wellhead surrounded by a conductor barrel with grate paneling was the only facilities present at the time of assessment. All ground disturbance documentation was peer reviewed prior to commencing the fieldwork.

3.2 Drilling Program

On February 9, 2017, 27 boreholes (17C01 through 17C02 and 17BH01 through 17BH25) were advanced as part of the drilling program (Figure 3). Boreholes were completed using a tracked B-57 drill rig equipped with 15 cm solid-stem augers. Boreholes were completed to a maximum depth of 6.0 mbgl (meters below ground level), depending on the assessment location and subsurface conditions.

Delineation of potentially impacted areas was based on field screening, visual cues, and professional judgment. Vertical and horizontal delineations were completed to determine the spatial extent of the potentially impacted material. If potentially impacted material was identified during borehole logging, vertical delineation was completed by sampling parameters above the suspected impact zone and to a depth of 1.0 m below the suspected lowest point of contamination. Horizontal delineation was completed by advancing boreholes in 5.0 m horizontal increments in each direction (north, south, east, and west) until clean material, as determined by field screening and professional judgment, was identified. Select delineation samples were collected for laboratory analyses. The GPS location, reference from a fixed point, and rationale of each borehole is included in the borehole logs in Appendix C.

3.3 Soil Sampling

Throughout the sample collection process, North Shore adhered to sampling procedures described in the Canadian Council of Ministers of Environment (CCME) Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites (CCME, 1993). Samples of the recovered soil were visually inspected for evidence of impacts such as free product, staining, or discoloration. The outermost layer of the samples was trimmed using a soil tool to avoid cross-contamination. North Shore personnel wore a pair of clean, chemical resistant nitrile gloves for each soil sample collected as an added preventative cross-contamination measure.

Soil vapor concentrations were field screened for volatile hydrocarbon constituents using an RKI Eagle gas detector (RKI Eagle), calibrated with a 400 parts per million (ppm) concentration of hexane gas with the methane elimination switch turned on. Samples selected for vapor screening were placed into plastic bags, sealed, agitated, and allowed to volatilize. Volatile organic compounds (VOCs) that accumulated within the headspace were then measured in ppm and recorded on the borehole logs.

Soil samples were also field screened for salinity related parameters by measuring electrical conductivity (EC) using a Spectrum Technologies Inc. Field Scout Soil and Water EC Meter (EC Probe). Prior to sampling, the EC probe was calibrated with a 2.76 dS/m calibration solution. Once the soil on the auger had been trimmed, the EC probe was inserted directly into the soil media in order to obtain an in-situ EC reading. The EC reading was allowed to stabilize for three seconds before being recorded in the field documents.

All soil samples were placed in sealable plastic bags for field screening organic vapors while 40 mL vials with methanol and 125 mL glass jars with Teflon-lined lids were used for organic analyses. Jarred samples were packed tightly to minimize headspace, help prevent the loss of VOCs, and minimize biodegradation. All samples collected were labeled and placed in a cooler with ice or ice packs to

maintain a temperature as close to 4°C as possible. Soil samples were transported to an accredited laboratory for analysis. Standard chain of custody protocols were followed during the transport of the samples.

Soil characteristics at each borehole location were described using classification procedures and terminology from The Canadian System of Soil Classification (Soil Classification Working Group, 1998).

3.4 Quality Assurance and Quality Control

3.4.1 Laboratory QA/QC

Soil samples collected during the February 9, 2017 sampling event were submitted to AGAT Laboratory (AGAT) in Calgary, Alberta for analysis. The analytical suite was selected based on regulated compounds that are typically found on oil and gas sites.

AGAT is a Standards Council of Canada (SCC), ISO 9000 Series and ISO/IEC 17025 accredited laboratory and Canadian Association of Environmental Analytical Laboratories (CAEAL) accredited laboratory that uses ESRD recognized methods to conduct laboratory analyses. Method blanks, control standards samples, Certified Reference Material (CRM) standards, method spikes, replicates, duplicates, and instrument blanks are routinely analyzed as part of the QA/QC program at the laboratory. AGAT has indicated that analytical data is only released if it passes the laboratory QA/QC procedures. A summary of the QA/QC procedures adopted by AGAT during the analyses of samples for petroleum hydrocarbon concentrations, salinity parameters, and metals concentrations is included in Appendix D.

4 COMPARISON GUIDELINES

4.1 Comparison Guidelines

Selection of the appropriate set of guidelines is based on the texture of the dominant soil type along with current and potential future land use as determined in the assessment. Where both fine and coarse grain strata are present, grain size is determined by the stratum governing horizontal and vertical migration to a receptor. Seven soil samples collected from depths ranging from 0.0 to 6.0 mbgl were analyzed for particle size (75 micron sieve). All seven samples were reported to be coarse-grained. As a result, the guidelines for coarse-grained soils were applied.

As per the direction of Paramount, the guidelines for residential/parkland land use were applied to the Site and laboratory values were compared to the following:

- Soil regulated metals, benzene, toluene, ethylbenzene, and xylenes (BTEX), and PHC fractions F1-F4 results were compared to the Canadian Council of Ministers of the Environment (CCME) - Tier 1 Soil Remediation Guidelines (CCME, 2017).
- Saturated paste boron results were compared to the AEP Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Tier 1 Guidelines; AEP, 2016a).

- Soil EC, Sodium Adsorption Ration (SAR) and pH values were compared to Environmental Guidelines for Contaminated Site Remediation (EGCSR, 2003) Environment Division. Government of the Northwest Territories (EGCSR, 2003).

4.2 Background Control Characterization and Salinity Guidelines

During the Phase 2 ESA, two control boreholes (17C01 to 17C02) were advanced in undisturbed background locations to a maximum depth of 6.0 mbgl. The purpose of the control sampling was to characterize background soil conditions and to determine the generic salt remediation guideline values for the Site.

Six subsoil samples were collected from the two control locations and were submitted for detailed salinity and/or arsenic analyses.

All EC and SAR analytical results complied with the EGCSR Guidelines. Five of the samples reported pH values ranging from 4.09 to 5.48, indicating naturally occurring acidic soils in the area. The onsite values were compared to the same general EC and SAR range. All control samples reported metals values that met the applicable remediation guidelines (Tables 1 through 3).

5 RESULTS OF FIELD INVESTIGATION

5.1 Stratigraphy

Based on the boreholes advanced during the drilling program, soil conditions generally consisted of coarse sand to 6.0 mbgl.

5.2 Soil Results

Soil results for areas of concern are summarized in Sections 5.2.1 through 5.2.3. The laboratory analyses for soil samples are presented in Tables 1 through 3 along with the applicable comparison guidelines.

5.2.1 Well Centre

One borehole (17BH01) was advanced to assess well centre. Three soil samples (17BH01 0.8 – 1.0 mbgl, 17BH01 2.2 – 2.5 mbgl and 17BH01 4.3-4.5 mbgl) were analyzed for petroleum hydrocarbon, metal, and/or detailed salinity parameters. Samples 17BH01 0.8 – 1.0 mbgl and 17BH01 2.2 – 2.5 mbgl reported arsenic concentration with values of 42.7 mg/kg and 26.8 mg/kg, and pH values of 4.04 and 4.01, respectively. All of other samples met the applicable guidelines for hydrocarbon concentrations, metals, and detailed salinity parameters.

Four boreholes (17BH02 through 17BH05) were advanced to delineate well centre. Eight soil samples (17BH02 0.8 – 1.0 mbgl, 17BH02 2.2 – 2.5 mbgl, 17BH03 0.8 – 1.0 mbgl, 17BH03 2.2 – 2.5 mbgl, 17BH04 0.8 – 1.0 mbgl, 17BH04 2.2 – 2.5 mbgl, 17BH05 0.8 – 1.0 mbgl, and 17BH05 2.2 – 2.5 mbgl) were analyzed for arsenic. All of the samples reported arsenic values ranging from 15.4 mg/kg to 48.1 mg/kg. The exceedances were not delineated vertically or horizontally.

5.2.2 East Potential Area of Concern

One exploratory borehole (17BH19) was drilled within the area of potential concern on the east side of the lease. A natural, undisturbed soil profile with non-detect field screening values was encountered in the borehole; therefore, no samples were submitted for laboratory analysis.

5.2.3 Exploratory Boreholes

No visual indicators (i.e., subsided areas or atypical vegetation) were present during the Phase 2 to suggest the possible location of the DWDA. Therefore, 12 exploratory boreholes (17BH06 through 17BH17) were advanced within a 30 m radius of the wellbore and six exploratory boreholes (17BH18 and 17BH20 through 17BH25) were advanced in the corners of the lease in an effort to locate the potential DWDA. Field observations did not identify any material indicative of drilling waste. Two soil samples (17BH06 1.7 – 1.9 mbgl and 17BH23 1.7 – 1.9 mbgl) that reported the highest field screening values for EC and VOCs and were analyzed for hydrocarbon and detailed salinity parameters. All of the samples met applicable guidelines.

5.3 Quality Assurance/Quality Control

Quality assurance and quality control for analytical data was also assessed by comparing analytical results from select samples to duplicate samples obtained from the same sample location. Primary and duplicate samples were compared and the relative percent differences (RPD) were calculated.

RPD criteria has been applied to field duplicates in order to evaluate the precision of the results. If both the original and duplicate sample concentrations are greater than or equal to five times the laboratory detection limit for a given parameter, the RPD must be less than or equal to 40% (water) and 60% (soils) (CCME, 2016). If the results lie outside of the range, they should be considered estimates only. The results of North Shore's QA/QC program are discussed in Section 5.3.1.

5.3.1 North Shore Environmental's QA/QC Program

Two soil sampling QA/QC measurements were conducted by duplicating soil samples 17C01 2.8 – 3.0 mbgl and 17BH01 0.8 – 1.0 mbgl. Laboratory comparisons reported good reproducibility for all benzene, toluene, ethylbenzene and total xylene (BTEX), petroleum hydrocarbon (PHC) (F1 – F4), particle size, metals, soluble ions, pH, EC and SAR values. The calculated RPD value for arsenic suggests that the sample shows good reproducibility for the purposes of this project. It should be noted that parameters with criteria (BTEX, PHC (F1 – F4), metals, pH, EC and SAR) all met the applicable criteria or were similar to natural background soil values. RPD value calculations and results for the QA/QC measurements are included in Tables 4 through 6.

6 SUMMARY AND CONCLUSIONS

North Shore completed a Phase 2 ESA on the Site on February 10, 2017. The assessment consisted of an investigation of the well centre, potential area of concern of the east side of the lease and the potential on site drilling waste disposal area. A total of 27 boreholes were advanced, including two control locations.

Eleven soil samples collected from well centre did not meet the applicable remediation guidelines for arsenic. The impacted area was not delineated horizontally or vertically.

All of the remaining analyzed samples met the applicable remediation guidelines. Based on field observations and laboratory analysis, and naturally occurring arsenic in the general area, further characterization of background soils is recommended.

7 DISCLOSURE

North Shore Environmental Consultants Inc. (North Shore) has prepared this report taking into account government regulations available at the time of the assessment. North Shore has not made an independent verification of historical or analytical results provided by third parties and therefore makes no assurances regarding the accuracy of such information. It has assumed such information is correct. Where indicated or implied the conclusions are based on visual observation and/or analytical testing conducted at the time of the assessment. The conclusions do not apply to any areas of the site not investigated.

This report is intended for the exclusive use of the company, organization, or individual to whom it is addressed and may not be relied upon by any third party without the express written permission of North Shore. The investigation and reporting has been conducted with a reasonable level of attention and skill, in accordance with standards prevailing in the environmental consulting profession at the time of report date in the location in which the report was prepared.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. North Shore accepts no responsibility for damages, if any, suffered by any third party as a result of the use of this report or any decisions made or actions based on this report.

8 CLOSURE

North Shore appreciated the opportunity to work on this project. If we can provide clarification of any part of this report, please contact the undersigned at (780) 467-3354.

This report was prepared by:

Derek Moore, B.Sc., P.Ag.
Environmental Consultant

Reviewed By:



Angela Bricker, B.Sc., P.Ag.
Environmental Consultant

9 REFERENCES

Alberta Environment (AENV). 2001. Soil Quality Guidelines for Unrestricted Land Use from "Salt Contamination Assessment and Remediation Guidelines. Environmental Sciences Division. Edmonton, Alberta. Publication No. T/606. May 2001.

Alberta Environment and Parks (AEP). 2016a. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 197 pp. February 2, 2016. ISBN:978-1-4601-2695-0. (On-line Edition) Website http://aep.alberta.ca

Canadian Council of Ministers of Environment (CCME) 1993. Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites (CCME 1993).

Canadian Council of Ministers of the Environment (CCME). 2016. Volume 1 Guidance Manual: Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment. PN 1551. ISBN 978-1-77202-026-7 PDF. 2016.

Canadian Council of Ministers of Environment (CCME) 2017. Canadian Environmental Quality Guidelines Summary Table. Accessed On-line March, 2017. (CCME 2017).

Environmental Guidelines for Contaminated Site Remediation (EGCSR). 2003. Department of Environment and Natural Resources – Government of the Northwest Territories. (On-line Edition) Website http://www.enr.gov.nt.ca/sites/default/files/guidelines/siteremediation.pdf

North Shore Environmental Consultants. 2017. *Phase 1 Environmental Site Assessment Para et al Fort Liard I-46* Fort Liard, Northwest Territories. March 2017.

Soil Classification Working Group. 1998. *The Canadian System of Soil Classification*. 3rd edition. Agriculture and Agri-Food Canada. Publication 1646 (revised). 187pp.

TABLES

Paramount Resources Ltd.
Table 1. Soil - BTEX, Petroleum Hydrocarbons (F1-F4) and Grain Size
Phase 2 Environmental Site Assessment Report I-46
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	BTEX and PHC (F1-F4)										
			Benzene	Toluene	Ethylbenzene	Total Xylenes	Fraction 1[2]	Fraction 2	Fraction 3	Fraction 4[3]	Chrom. returned to baseline	% Moisture	Grain Size 75 µm Sieve
CCME Surface Soil Guidelines[1] (mg/kg)			**0.03**	**0.37**	**0.082**	**11**	**30**	**150**	**300**	**2800**	**NC**	**NC**	**NC**
CCME Subsurface Soils Guidelines[1] (mg/kg)			**0.03**	**0.37**	**0.082**	**11**	**30**	**150**	**2500**	**10000**	**NC**	**NC**	**NC**
BACKGROUND CONTROLS													
17C01	0.8-1.0	09-Feb-17											Coarse (85)
17C01	2.8-3.0	09-Feb-17											Coarse (83)
17C01	4.7-4.9	09-Feb-17											Coarse (78)
17C02	0.3-0.5	09-Feb-17											Coarse (85)
17C02	1.7-1.9	09-Feb-17											Coarse (83)
17C02	3.2-3.4	09-Feb-17											Coarse (84)
WELL CENTRE AREA													
17BH01	0.8-1.0	09-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	25	<10	Yes	3	
17BH01	2.2-2.5	09-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	5	
EXPLORATORY BOREHOLES													
17BH06	1.7-1.9	09-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	3	
17BH23	1.7-1.9	09-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	4	

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Coarse**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Fraction 1 petroleum hydrocarbons (C6-C10) minus benzene, toluene, ethylbenzene and xylene concentrations

[3] - Fraction 4 petroleum hydrocarbons (C34-C50 or >C34) as determined by high temperature gas chromatography

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 2. Soil - Regulated Metals
Phase 2 Environmental Site Assessment Report I-46
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Antimony (Sb)	Arsenic (As)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Fusion Barium (Ba) - True Total	Beryllium (Be)	Boron (B) Sat Paste (mg/L)	Cadmium (Cd)	Chromium (Cr) - Total	Hexavalent Chromium (Cr+6)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
CCME Guidelines[1] (mg/kg)			**20**	**12**	**500**	**0**	**0**	**4**	**NC**	**10**	**64**	**0.4**	**50**	**63**	**140**	**6.6**	**10**	**45**	**1**	**20**	**1**	**50**	**23**	**130**	**200**
BACKGROUND CONTROLS																									
17C01	0.8-1.0	09-Feb-17		2.8																					
17C01	2.2-2.5	09-Feb-17		6.2																					
17C01	4.3-4.5	09-Feb-17		3.5																					
17C02	0.8-1.0	09-Feb-17		3.4																					
17C02	1.3-1.5	09-Feb-17		2.1																					
17C02	2.8-3.0	09-Feb-17		6.0																					
WELL CENTRE AREA																									
17BH01	0.8-1.0	09-Feb-17	1.8	**42.7**	119			<0.5	<0.5	<0.5	11.7	<0.3	2.5	15.1	7.6	<0.5	2.3	5.0	<0.5	<0.5	<0.5	<0.5	<0.5	28.0	29
17BH01	2.2-2.5	09-Feb-17	1.1	**26.8**	61.5			<0.5	<0.5	<0.5	7.6	<0.3	1.6	9.9	5.0	<0.5	1.3	3.2	<0.5	<0.5	<0.5	<0.5	<0.5	18.1	23
17BH01	4.3-4.5	09-Feb-17		10.9																					
17BH02	0.8-1.0	09-Feb-17		**30.3**																					
17BH02	2.2-2.5	09-Feb-17		**18.2**																					
17BH03	0.8-1.0	09-Feb-17		**15.4**																					
17BH03	2.2-2.5	09-Feb-17		**15.7**																					
17BH04	0.8-1.0	09-Feb-17		**25.5**																					
17BH04	2.2-2.5	09-Feb-17		**29.0**																					
17BH05	0.8-1.0	09-Feb-17		**31.2**																					
17BH05	2.2-2.5	09-Feb-17		**17.9**																					

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Coarse**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 3. Soil - Detailed Salinity
Phase 2 Environmental Site Assessment Report I-46
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Lab pH (6.0-8.5)[1]	Lab EC (dS/m)	SAR	Saturation %	Soluble Ions						Guideline
							Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO4) mg/kg	
CCME Guidelines[1]					<5								1
EGCSR Guidelines[2]			6-8	<2	<5								2
BACKGROUND CONTROLS													
17C01	0.8-1.0	09-Feb-17	6.05	0.07	0.64	26	<2	<1	<1	<2	<2	3	1,2
17C01	2.8-3.0	09-Feb-17	**5.37**	0.09	0.48	26	<2	1	<1	<2	<2	6	1,2
17C01	4.7-4.9	09-Feb-17	**5.48**	0.09	0.45	35	<2	2	<1	<2	<2	7	1,2
17C02	0.3-0.5	09-Feb-17	**4.09**	0.09	0.69	31	<2	1	<1	<2	2	6	1,2
17C02	1.7-1.9	09-Feb-17	**4.25**	0.12	0.63	26	<2	2	<1	<2	<2	9	1,2
17C02	3.2-3.4	09-Feb-17	**4.51**	0.08	0.58	42	2	2	<1	<2	<2	8	1,2
WELL CENTRE AREA													
17BH01	0.8-1.0	09-Feb-17	**4.04**	0.13	0.82	31	3	2	<1	3	9	8	1,2
17BH01	2.2-2.5	09-Feb-17	**4.01**	0.08	0.77	26	<2	<1	<1	<2	<2	4	1,2
EXPLORATORY BOREHOLES													
17BH06	1.7-1.9	09-Feb-17	**5.24**	0.08	0.51	36	<2	1	<1	<2	<2	8	1,2
17BH23	1.7-1.9	09-Feb-17	**5.61**	0.36	2.57	25	11	3	1	3	12	15	1,2

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Coarse**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Environmental Guidelines for Contaminated Site Remediation (EGCSR). 2003

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NA - Not Applicable

NS - Not Specified

Paramount Resources Ltd.
Table 4. Soil - Quality Control - BTEX and Petroleum Hydrocarbons (F1-F4)
Phase 2 Environmental Site Assessment Report I-46
May 2017

Sample ID	Sample Date (dd-mm-yy)	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	Fraction 1 mg/kg	Fraction 2 mg/kg	Fraction 3 mg/kg	Fraction 4 mg/kg	Grain Size 75 µm Sieve
17C01 2.8-3.0	09-Feb-17									83
Dup A 2.8-3.0	09-Feb-17									84
Detection Limit		---	---	---	---	---	---	---	---	1
Difference		---	---	---	---	---	---	---	---	-1
Relative Percent Difference		---	---	---	---	---	---	---	---	-1.20
Duplicate Sample Results		---	---	---	---	---	---	---	---	Good

Sample ID	Sample Date (dd-mm-yy)	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	F1 (C6-C10) mg/kg	F2 (C10-C16) mg/kg	Fraction 3 mg/kg	Fraction 4 mg/kg	Grain Size 75 µm Sieve
17BH01 0.8-1.0	09-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	25	<10	
Dup B 0.8-1.0	09-Feb-17	0.005	<0.05	<0.01	<0.05	<10	38	124	24	
Detection Limit		0.005	0.05	0.01	0.05	10	10	10	10	---
Difference		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	-99	#VALUE!	---
Relative Percent Difference		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	-132.89	#VALUE!	---
Duplicate Sample Results		---	---	---	---	---	---	NA	---	---

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 5. Soil - Quality Control - Regulated Metals
Phase 2 Environmental Site Assessment Report I-46
May 2017

Sample ID	Sample Date	Antimony (An)	Arsenic (As)	Barium (Ba)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Beryllium (Be)	Boron (B)	Cadmium (Cd)	Chromium (Cr) - Total	Chromium (Cr) - Hex.	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thalium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
	(dd-mm-yy)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
17BH01 0.8-1.0	09-Feb-17	1.8	42.7	119			<0.5	<0.5	<0.5	11.7	<0.3	2.5	15.1	7.6	<0.5	2.3	5.0	<0.5	<0.5	<0.5	<0.5	<0.5	28.0	29
Dup B 0.8-1.0	09-Feb-17	2.1	48.1	120			<0.5	<0.5	<0.5	11.5	<0.3	2.5	23.5	8.0	<0.5	2.3	5.8	0.5	<0.5	<0.5	<0.5	<0.5	30.3	28
Detection Limit		0.5	0.5	0.5	---	---	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Difference		0.3	5.4	1	---	---	#VALUE!	#VALUE!	#VALUE!	-0.2	#VALUE!	0	8.4	0.4	#VALUE!	0	0.8	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	2.3	1
Relative Percent Difference		15.38	11.89	0.84	---	---	#VALUE!	#VALUE!	#VALUE!	-1.72	#VALUE!	0.00	43.52	5.13	#VALUE!	0.00	14.81	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	7.89	3.51
Duplicate Sample Results		Good	Good	Good	---	---	---	---	---	Good	---	Good	Good	Good	---	Good	Good	---	---	---	---	---	Good	Good

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 6. Soil - Quality Control - Detailed Salinity
Phase 2 Environmental Site Assessment Report I-46
May 2017

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17C01 2.8-3.0	09-Feb-17	6.05	0.07	0.64	<2	<1	<1	<2	<2	3
Dup A 2.8-3.0	09-Feb-17	5.37	0.09	0.48	<2	1	<1	<2	<2	6
Detection Limit		0.02	0.05	---	2	1	1	2	2	2
Difference		0.68	-0.02	0.16	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	-3
Relative Percent Difference		11.91	-25.00	28.57	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	-66.67
Duplicate Sample Results		Good	Good	Good	---	---	---	---	---	NA

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17BH01 0.8-1.0	09-Feb-17	4.04	0.13	0.82	3	2	<1	3	9	8
Dup B 0.8-1.0	09-Feb-17	3.98	0.1	0.67	<2	1	<1	<2	<2	6
Detection Limit		0.02	0.05	---	2	1	1	2	2	2
Difference		0	0	0.15	#VALUE!	-1	#VALUE!	#VALUE!	#VALUE!	2
Relative Percent Difference		-1.50	-26.09	20.13	#VALUE!	-66.67	#VALUE!	#VALUE!	#VALUE!	28.57
Duplicate Sample Results		Good	Good	Good	---	NA	---	---	---	Good

Rev: 17.01.25

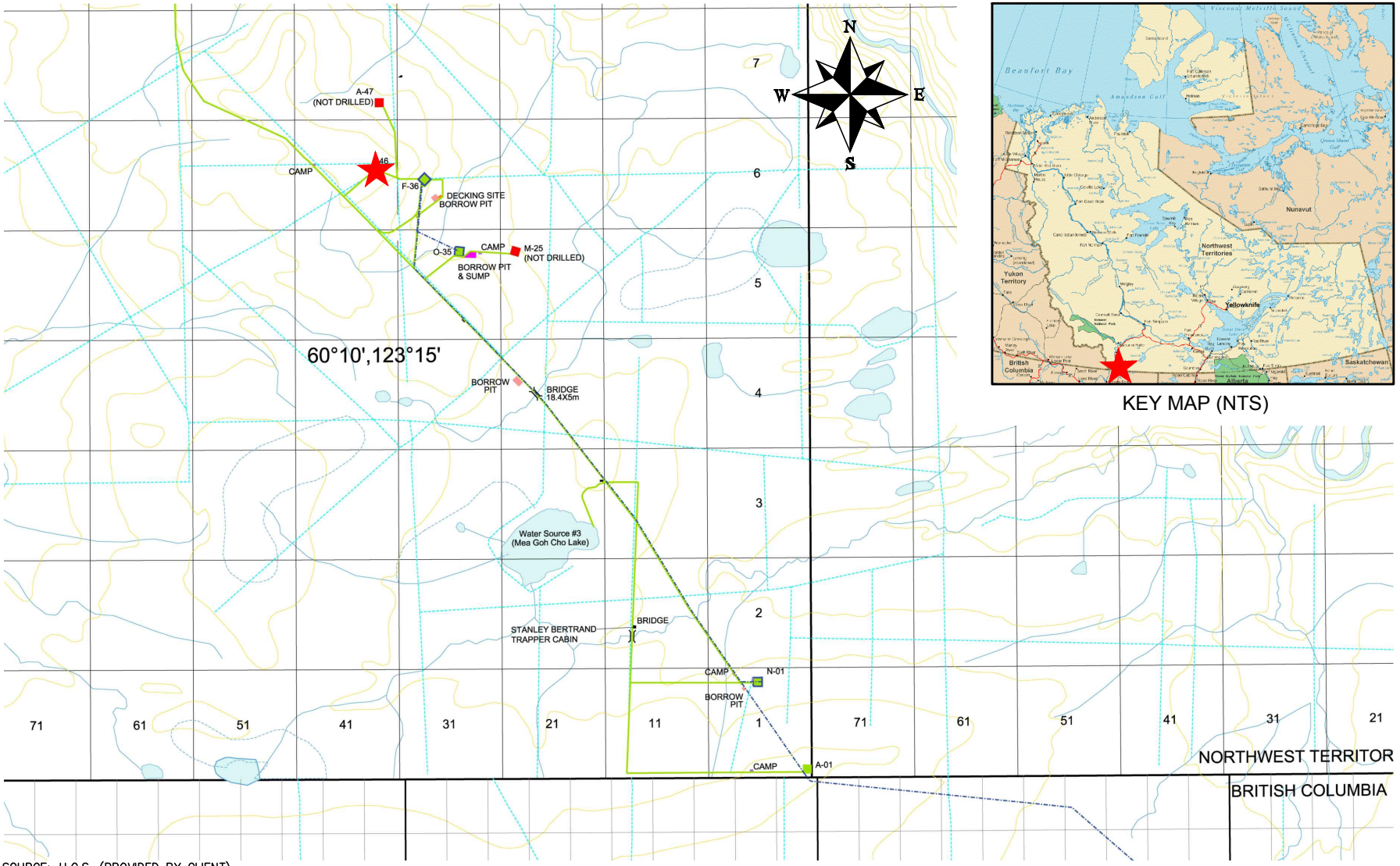
Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply



FIGURES

File: I-46_SLM.dwg Date: March-18-17 10:16:25 AM



KEY MAP (NTS)

SOURCE: U.G.S. (PROVIDED BY CLIENT)

LEGEND

★ SITE LOCATION

0 1000 2000 4000m

Scale 1 : 100 000

NORTH SHORE
Environmental Consultants

Date: 18-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. I-46 (NORTHWEST TERRITORIES)	Figure: 1
File name: I-46_SLM-A.dwg	Requested by: DM		

SITE LOCATION MAP

File: I-46_17PH2.dwg Date: March-24-17 1:46:31 PM



SEPTEMBER 2001 SATELLITE AERIAL PHOTO SOURCE: DIGITALGLOBE (IKONOS)

LEGEND

I-46 WELL CENTRE

0 50 100 200m

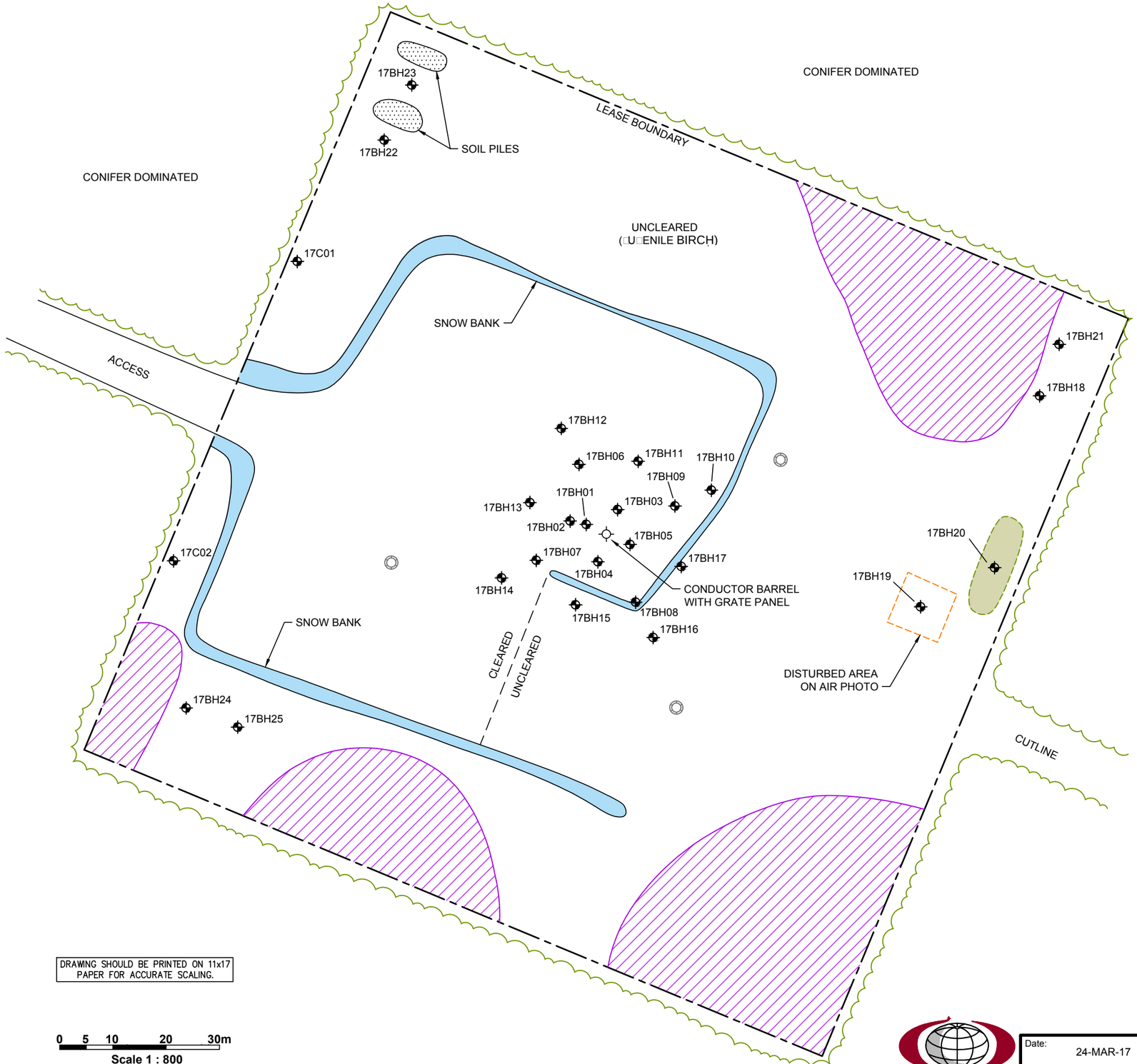
Scale 1 : 5000

AERIAL O□ER□IEW

NORTH SHORE Environmental Consultants

Date: 24-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. I-46 (NORTHWEST TERRITORIES)	Figure: 2
File name: I-46_SLM-A.dwg	Requested by: DM		

File: I-46_17PH2.dwg Date: March-24-17 1:49:01 PM



LEGEND

- I-46 WELL CENTRE
- SAMPLE LOCATION
- RIG ANCHOR
- EXTREMELY OVERGROWN AREA (UNABLE TO DRILL)
- LOW AREA

NOTES:

LOCATIONS ARE APPROXIMATE.

DRAWING SHOULD BE PRINTED ON 11x17 PAPER FOR ACCURATE SCALING.

0 5 10 20 30m

Scale 1 : 800

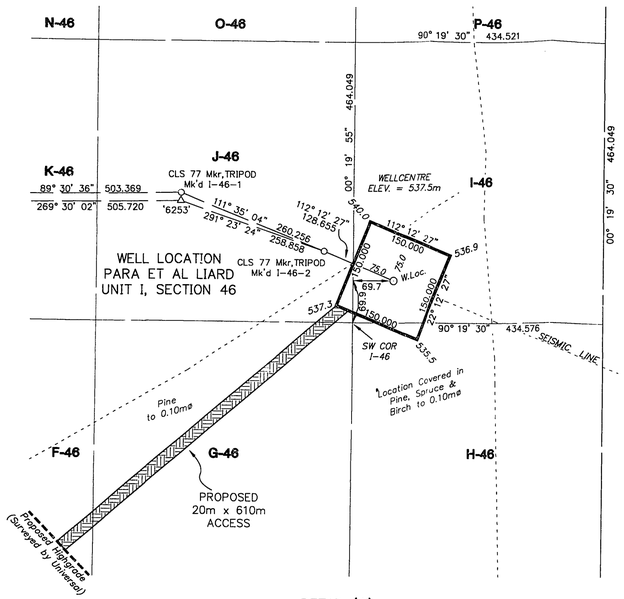
SITE DIAGRAM SHOWING SAMPLING LOCATIONS

NORTH SHORE Environmental Consultants

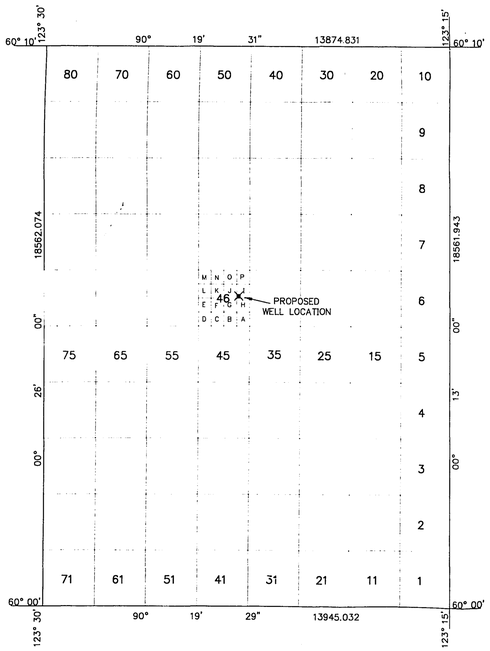
Date: 24-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. I-46 (NORTHWEST TERRITORIES)	Figure: 3
File name: I-46_17PH2-A.dwg	Requested by: DM		

APPENDIX A

Survey Plan



DETAIL 'A'
UNIT I, SECTION 46
SCALE 1:5,000

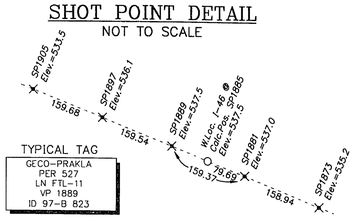


GRID AREA 60°10', 123°15'
SCALE 1:100,000

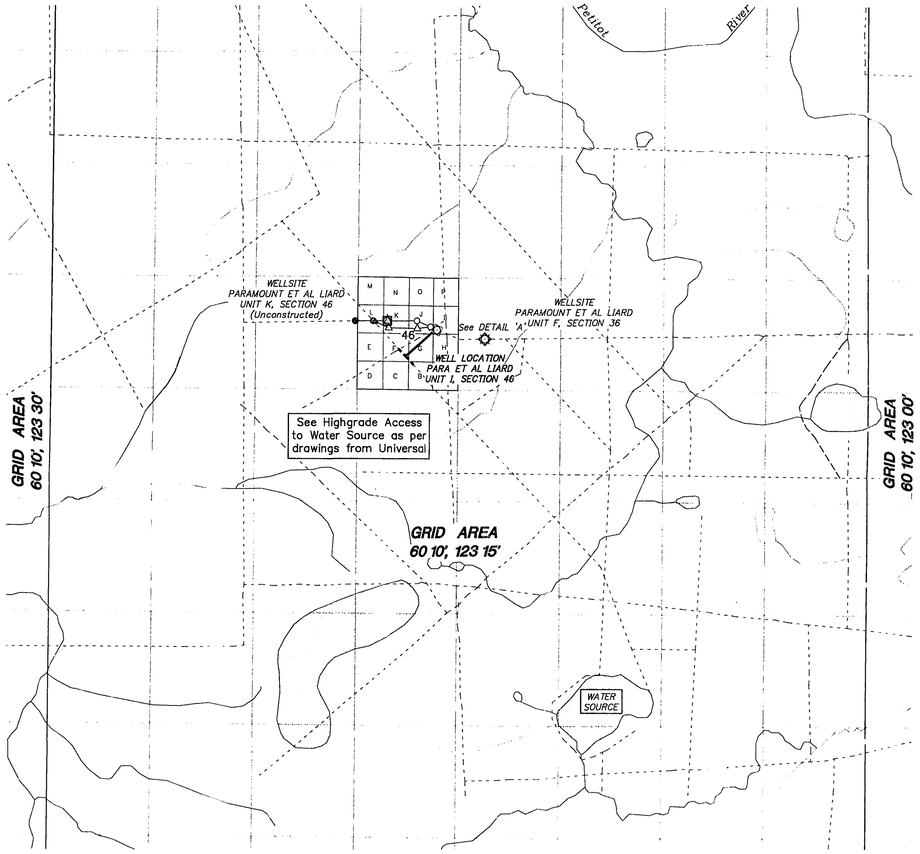
AREAS REQUIRED:

WELLSITE:	150mx150m	=	2.25 ha.
ACCESS:	20mx610m	=	1.22 ha.
CAMPSITE:	40mx60m	=	0.24 ha.
TOTAL:			3.71 ha.

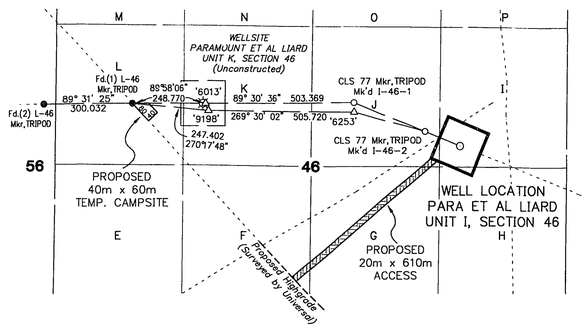
SHOT POINT DETAIL
NOT TO SCALE



TYPICAL TAG
GECO-PRAKLA
PER 527
LN FTL-11
VP 1889
ID 97-B 823



DETAIL 'B'
SCALE 1:10,000



All coordinates shown are on 1927 North American Datum.
They are based on values for Found Wellsite Monuments Fd.CLS(1) L-46 Grid Area 60° 10', 123° 15' and Fd.CLS(2) L-46 Grid Area 60° 10', 123° 15'.

GEOGRAPHIC AND UTM COORDINATES, (1927 NAD)				
Station	Latitude	Longitude(W)	Northings	Eastings
CONTROL MONUMENTS				
L-46-1	60°05'36.782"	123°24'05.680"	6661691.266	477663.419
L-46-2	60°05'36.642"	123°24'25.087"	6661688.773	477363.541
GRID AREA				
NE	60° 10' 00"	123° 15' 00"	6669792.783	486125.259
NW	60° 10' 00"	123° 30' 00"	6669871.559	472250.651
SE	60° 00' 00"	123° 15' 00"	6651230.973	486055.060
SW	60° 00' 00"	123° 30' 00"	6651310.016	472110.252
I-46, NE	60°05'45.214"	123°22'29.999"	6661943.459	479143.204
I-46, NW	60°05'45.214"	123°22'58.124"	6661945.924	478708.690
I-46, SW	60°05'30.214"	123°22'58.124"	6661481.882	478706.002
I-46, SE	60°05'30.214"	123°22'29.999"	6661479.417	479140.571
TRAVERSE STATIONS				
TH '6013'	60°05'36.835"	123°23'49.587"	6661691.405	477912.070
I-46-1	60°05'37.070"	123°23'17.027"	6661695.711	478415.180
I-46-2	60°05'34.023"	123°23'01.336"	6661600.018	478657.070
TH '6253'	60°05'37.028"	123°23'16.963"	6661694.384	478416.158
TH '9198'	60°05'36.788"	123°23'49.675"	6661689.983	477910.699
PROPOSED WELL				
I-46	60°05'32.474"	123°22'53.612"	6661551.415	478776.125

PLAN AND FIELD NOTES

OF SURVEY OF

PROPOSED EXPLORATORY WELL

PARA ET AL LIARD

IN UNIT I, SECTION 46

GRID AREA 60° 10' , 123° 15'

NORTHWEST TERRITORIES

CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50,000

0m 500m 1000m 2000m 3000m 4000m 5000m

SURVEYED FOR

PARAMOUNT RESOURCES LTD.

BY : R.O. BLACKALL, CLS
JUNE, 1999.

LEGEND

UTM coordinates are computed for Zone 10, central meridian 123° W.
Bearings were derived from the bearing 89° 31' 25" computed between Fd. CLS 77 Wellsite Control Monuments L-46-1 Grid Area 60° 10', 123° 15' and L-46-2 Grid Area 60° 10', 123° 15' and are referred to the Meridian 123° W.
Distances are expressed in metres and decimals thereof.
Distances shown in traverse are measured distances reduced to the horizontal at general ground level.
For the computation of coordinates measured distances have been reduced to the UTM plane by multiplying them by an average combined scale factor of 0.9995214. Coordinates were then adjusted to fit the control.
Distances shown on grid area subdivisions are UTM plane.
Authorized control monuments found ..... ●
Monuments placed ..... O
Mkr. denotes metal marker post 2.0m long placed 0.30m N.
Elevations were derived from Geodetic of Canada Monument 'Petitot' Elev. = 218.241m

Survey was completed prior to drilling; therefore well as drilled may not necessarily agree with proposed location.

I, R.O. Blackall, of the City of Fort St. John, British Columbia, Canada Lands Surveyor, make oath and say that I have in my own proper person, according to law and the instructions of the Surveyor General of Canada Lands, faithfully and correctly executed the survey shown by this plan and field notes, and that the said plan and field notes are correct and true to the best of my knowledge and belief.
SO HELP ME GOD

R.O. Blackall, CLS

Sworn before me at Fort St. John, this 06th day of July, 1999.

A Commissioner for Oaths

THIS SURVEY WAS EXECUTED DURING THE PERIOD
JUNE 22nd TO JUNE 23rd, 1999. BY R.O. BLACKALL, CLS

PARAMOUNT RESOURCES LIMITED

WITNESS

DATE

REV.No.	DESCRIPTION	DATE

McElhanney
LAND SURVEYS LTD.
10014 - 97th Ave., Suite 202
Fort St. John, British Columbia
Phone:(250)787-0356, Fax:(250)787-0310

DATE : 99/07/02 JOB No.: 3111-07261WS BY: BRC

20X

APPENDIX B

Site Photographs



Photograph 1: View of wellhead facing east.



Photograph 2: View of grate panelling at well centre.



Photograph 3: Standing at well centre viewing north.



Photograph 4: Standing at well centre viewing east.



Photograph 5: Standing at well centre viewing south.



Photograph 6: Standing at well centre viewing west.



Photograph 7: View of coarse sand at 17C01.



Photograph 8: View of rig anchor south of well centre.



Photograph 9: View of snow bank on the north side of the lease.



Photograph 10: View of soil mounds in the northwest corner of the lease.

APPENDIX C

Borehole Logs

Borehole Log: 17C01

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 20-30% fine gravel <8mm, 15-20% coarse gravel 8-64mm, undisturbed, sand inclusions	0.00 - 0.20	1	B			
			0.30 - 0.50	2	B			
			0.80 - 1.00	3	B	M, PS, SAL		
1		*EC field screening values not obtained at all sampling depths due to coarse sand	1.30 - 1.50	4	B			
			1.70 - 1.90	5	B			
2			2.20 - 2.50	6	B	M		
			2.80 - 3.00	7,8	B	PS, SAL		
3		Dup A @ 2.8-3.0	3.20 - 3.40	9	B			Drill Cuttings
4			4.30 - 4.50	10	B	M		
			4.70 - 4.90	11	B	PS, SAL		
5								
			5.80 - 6.00	12	B			
6								

End of Borehole at 6.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661811 E: 478626

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 25m Northwest, 78m Southwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17C02

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0		Sand (coarse), light brown (10YR 6/3), single-grained,	0.00 - 0.20	13	B			
		*EC field screening values not obtained due to coarse sand	0.30 - 0.50	14	B	PS, SAL		
			0.80 - 1.00	15	B	M		
1			1.30 - 1.50	16	B	M		
			1.70 - 1.90	17	B	PS, SAL		
2			2.20 - 2.50	18	B			Drill Cuttings
			2.80 - 3.00	19	B	M		
3			3.20 - 3.40	20	B	PS, SAL		
4			4.30 - 4.50	21	B			

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661751 E: 478604

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 35m Southeast, 74m Southwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH01

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 50% coarse gravel 8-64mm, disturbed, coarse sand inclusions	0.00 - 0.20	22	B			
			0.30 - 0.50	23	B			
		Dup B @ 0.8-1.0	0.80 - 1.00	24,25	B+J	HC, M, SAL		
1			1.30 - 1.50	26	B			
			1.70 - 1.90	27	B			
2			2.20 - 2.50	28	B+J	HC, M, SAL		Drill Cuttings
			2.80 - 3.00	29	B			
3			3.20 - 3.40	30	B			
4			4.30 - 4.50	31	B	M		

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661756 E: 478681

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 4m Southwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH02

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Well Centre Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 50% coarse gravel 8-64mm, disturbed, coarse sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00	32	B+J	M		
1			1.30 - 1.50					
			1.70 - 1.90					
2			2.20 - 2.50	33	B+J	M		Drill Cuttings
			2.80 - 3.00					
3								
4								

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661752 E: 478676

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 8m Southwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH03

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Well Centre Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 50% coarse gravel 8-64mm, disturbed, coarse sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00	34	B+J	M		
1			1.30 - 1.50					
			1.70 - 1.90					
2			2.20 - 2.50	35	B+J	M		Drill Cuttings
			2.80 - 3.00					
3								
4								

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661754 E: 478682

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 5m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH04

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Well Centre Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 50% coarse gravel 8-64mm, disturbed, coarse sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00	36	B+J	M		
1			1.30 - 1.50					
			1.70 - 1.90					
2			2.20 - 2.50	37	B+J	M		Drill Cuttings
			2.80 - 3.00					
3								
4								

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661744 E: 478680

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 5m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH05

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 50% coarse gravel 8-64mm, disturbed, coarse sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00	38	B+J	M		
1			1.30 - 1.50					
			1.70 - 1.90					
2			2.20 - 2.50	39	B+J	M		Drill Cuttings
			2.80 - 3.00					
3								
4								

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661748 E: 478688

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 5m Northeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH06

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 30-50% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*VOC field screening values not obtained at all sampling depths due to delineation sampling						
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90	40	B+J	HC, SAL		
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661763 E: 478679

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 10m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH07

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 30-50% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661745 E: 478671

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 10m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH08

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 30-50% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661739 E: 478689

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 10m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH09

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 30-50% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
		*Exploratory borehole; no samples obtained	0.30 - 0.50					
0.5		*VOC field screening values not obtained at all sampling depths due to delineation sampling						
			0.80 - 1.00					Drill Cuttings
1.0								
			1.30 - 1.50					
1.5								
		Auger refusal @ 1.8m	1.70 - 1.90					
		End of Borehole at 1.80 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661755 E: 478693

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 10m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH10

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 30-50% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661756 E: 478699

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 15m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH11

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 30-50% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661764 E: 478686

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 15m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH12

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 30-50% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661768 E: 478675

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 15m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH13

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 30-50% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661752 E: 478667

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 15m Southwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH14

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 30-50% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661740 E: 478665

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 15m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH15

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 30-50% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661735 E: 478679

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 15m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH16

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 30-50% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661732 E: 478691

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 15m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH17

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 30-50% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661735 E: 478699

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 17m Northeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH18

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sandy loam, yellowish brown (10YR 5/4), single-grained, moist, loose, 5-10% fine gravel <8mm, 15-20% coarse gravel 8-64mm	0.00 - 0.20					
		Clay, brown (10YR 5/3), massive, moist, firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed	0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained	0.80 - 1.00					
1.0		*VOC field screening values not obtained at all sampling depths due to delineation sampling						
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661760 E: 478759

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 55m Northwest, 65m Northeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH19

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: East Potential Area of Concern

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 30-50% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661740 E: 478741

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 10m Northwest, 60m Northeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

NORTH SHORE
Environmental Consultants

Borehole Log: 17BH20

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sandy loam, yellowish brown (10YR 5/4), single-grained, moist, loose, 5-10% fine gravel <8mm, 15-20% coarse gravel 8-64mm	0.00 - 0.20					
		Clay, brown (10YR 5/3), massive, moist, firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed	0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained	0.80 - 1.00					
1.0		*VOC field screening values not obtained at all sampling depths due to delineation sampling						
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661743 E: 478757

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 22m Northwest, 69m Northeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH21

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sandy loam, yellowish brown (10YR 5/4), single-grained, moist, loose, 5-10% fine gravel <8mm, 15-20% coarse gravel 8-64mm	0.00 - 0.20					
		Clay, brown (10YR 5/3), massive, moist, firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed	0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained	0.80 - 1.00					
1.0		*VOC field screening values not obtained at all sampling depths due to delineation sampling	1.30 - 1.50					
1.5			1.70 - 1.90					Drill Cuttings
2.0			2.20 - 2.50					
2.5			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661783 E: 478775

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 65m Northwest, 64m Northeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH22

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 30-50% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661824 E: 478640

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 52m Northwest, 66m Southwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH23

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 30-50% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*VOC field screening values not obtained at all sampling depths due to delineation sampling						
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90	41	B+J	HC, SAL		
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661835 E: 478635

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 64m Northwest, 67m Southwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH24

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*EC field screening values not obtained due to coarse sand	0.80 - 1.00					
1.0		*VOC field screening values not obtained at all sampling depths due to delineation sampling						
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661711 E: 478605

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 60m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH25

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: I-46

Area of Concern: Exploratory Borehole

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Sand (coarse), light gray (10YR 7/1), single-grained, dry, loose, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*EC field screening values not obtained due to coarse sand	0.80 - 1.00					
1.0		*VOC field screening values not obtained at all sampling depths due to delineation sampling						
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661706 E: 478595

Drill Date: 2/9/2017 (mm/dd/yy)

From Benchmark: 60m Southeast, 50m Southwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

APPENDIX D

Laboratory Certificates of Analyses

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: PARAMOUNT RESOURCES LTD
4700, 888 3rd ST SW
CALGARY, AB T2P5C5
(403) 290-3600

ATTENTION TO: Larry Yoon

PROJECT: I-46

AGAT WORK ORDER: 17F187462

SOIL ANALYSIS REVIEWED BY: Melinda Guay, Technical Reviewer

TRACE ORGANICS REVIEWED BY: Ngoc (Ruby) Vu, Lab Technician

DATE REPORTED: Mar 02, 2017

PAGES (INCLUDING COVER): 17

VERSION*: 3

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*NOTES

VERSION 3:Arsenic added to samples: 287, 290, 294, 302, 304, 307. (Mar 02/17 GH)

Version 2 supersedes version 1 issued on March 2nd 2017. Added total arsenic to samples: 322, 323, 324, 325, 326, 328, 329, 334 and 335 - March 31st 2017 CS.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)
Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Results relate only to the items tested and to all the items tested
All reportable information as specified by ISO 17025:2005 is available from AGAT Laboratories upon request

AGAT Laboratories

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FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 17F187462

PROJECT: I-46

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-02

		SAMPLE DESCRIPTION:		17BH01 0.8-1.0	17BH01 2.2-2.5	Dup B 0.8-1.0
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2017-02-09	2017-02-09	2017-02-09
Parameter	Unit	G / S	RDL	8192313	8192319	8192337
Antimony	mg/kg	20	0.5	1.8	1.1	2.1
Arsenic	mg/kg	17	0.5	**42.7**	**26.8**	**48.1**
Barium	mg/kg	750	0.5	119	61.5	120
Beryllium	mg/kg	5	0.5	<0.5	<0.5	<0.5
Boron (Saturated Paste)	mg/L	3.3	0.5	<0.5	<0.5	<0.5
Cadmium	mg/kg	1.4	0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	64	0.5	11.7	7.6	11.5
Chromium, Hexavalent	mg/kg	0.4	0.3	<0.3	<0.3	<0.3
Cobalt	mg/kg	20	0.5	2.5	1.6	2.5
Copper	mg/kg	63	0.5	15.1	9.9	23.5
Lead	mg/kg	70	0.5	7.6	5.0	8.0
Mercury	mg/kg	6.6	0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg	4	0.5	2.3	1.3	2.3
Nickel	mg/kg	45	0.5	5.0	3.2	5.8
Selenium	mg/kg	1	0.5	<0.5	<0.5	0.5
Silver	mg/kg	20	0.5	<0.5	<0.5	<0.5
Thallium	mg/kg	1	0.5	<0.5	<0.5	<0.5
Tin	mg/kg	5	0.5	<0.5	<0.5	<0.5
Uranium	mg/kg	23	0.5	<0.5	<0.5	<0.5
Vanadium	mg/kg	130	0.5	28.0	18.1	30.3
Zinc	mg/kg	200	1	29	23	28

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Alberta Tier 1 - Soil - Agricultural - Fine

8192313-8192337 Results are based on the dry weight of the sample.

Certified By:

Results relate only to the items tested and to all the items tested

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 17F187462

PROJECT: I-46

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME/ Tier 1 Metals

DATE RECEIVED: 2017-02-15 **DATE REPORTED: 2017-03-02**

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: 17C01 0.8-1.0	17C01 2.2-2.5	17C01 4.3-4.5	17C02 0.8-1.0	17C02 1.3-1.5	17C02 2.8-3.0	17BH01 4.3-4.5	17BH02 0.8-1.0
				SAMPLE TYPE: Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
				DATE SAMPLED: 2017-02-09	2017-02-09	2017-02-09	2017-02-09	2017-02-09	2017-02-09	2017-02-09	2017-02-09
				8192287	8192290	8192294	8192302	8192304	8192307	8192322	8192323
Arsenic	mg/kg	17	0.5	2.8	6.2	3.5	3.4	2.1	6.0	10.9	**30.3**

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: 17BH02 2.2-2.5	17BH03 0.8-1.0	17BH03 2.2-2.5	17BH04 0.8-1.0	17BH04 2.2-2.5	17BH05 0.8-1.0	17BH05 2.2-2.5
				SAMPLE TYPE: Soil	Soil	Soil	Soil	Soil	Soil	Soil
				DATE SAMPLED: 2017-02-09	2017-02-09	2017-02-09	2017-02-09	2017-02-09	2017-02-09	2017-02-09
				8192324	8192325	8192326	8192328	8192329	8192334	8192335
Arsenic	mg/kg	17	0.5	**18.2**	15.4	15.7	**25.5**	**29.0**	**31.2**	**17.9**

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Alberta Tier 1 - Soil - Agricultural - Fine

8192287-8192335 Results are based on the dry weight of the sample.

Certified By:

Results relate only to the items tested and to all the items tested

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 17F187462

PROJECT: I-46

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Particle Size by Sieve

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-02

		SAMPLE DESCRIPTION:		17C01 0.8-1.0	17C01 2.8-3.0	17C01 4.7-4.9	17C02 0.3-0.5	17C02 1.7-1.9	17C02 3.2-3.4	Dup A 2.8-3.0
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-02-09	2017-02-09	2017-02-09	2017-02-09	2017-02-09	2017-02-09	2017-02-09
Parameter	**Unit**	**G / S**	**RDL**	**8192287**	**8192291**	**8192295**	**8192301**	**8192305**	**8192308**	**8192336**
Sieve Analysis - 75 microns	%		1	85	83	78	85	83	84	84
Sieve Texture				Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8192287-8192336 Value reported is amount of sample retained on a 75 micron sieve after wash with water and represents proportion by weight particles larger than indicated sieve size.

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17F187462

PROJECT: I-46

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-02

		SAMPLE DESCRIPTION:		17C01 0.8-1.0	17C01 2.8-3.0	17C01 4.7-4.9	17C02 0.3-0.5	17C02 1.7-1.9	17C02 3.2-3.4		17BH01 0.8-1.0
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil		Soil
		DATE SAMPLED:		2017-02-09	2017-02-09	2017-02-09	2017-02-09	2017-02-09	2017-02-09		2017-02-09
Parameter	**Unit**	**G / S**	**RDL**	**8192287**	**8192291**	**8192295**	**8192301**	**8192305**	**8192308**	**RDL**	**8192313**
pH (CaCl2 Extraction)	pH Units		N/A	6.05	5.37	5.48	4.09	4.25	4.51	N/A	4.04
Electrical Conductivity (Sat. Paste)	dS/m		0.05	0.07	0.09	0.09	0.09	0.12	0.08	0.05	0.13
Sodium Adsorption Ratio	N/A			0.64	0.48	0.45	0.69	0.63	0.58		0.82
Saturation Percentage	%		1	26	26	35	31	26	42	1	31
Chloride, Soluble	mg/L		5	<5	<5	<5	8	<5	<5	5	28
Calcium, Soluble	mg/L		1	3	5	6	4	6	4	1	8
Potassium, Soluble	mg/L		2	3	4	3	5	5	3	2	10
Magnesium, Soluble	mg/L		1	1	2	2	1	2	1	1	2
Sodium, Soluble	mg/L		2	5	5	5	6	7	5	2	10
Sulfate, Soluble	mg/L		2	13	22	21	20	33	19	4	27
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	0	0	0	0	0	N/A	0
Calcium, Soluble (meq/L)	meq/L		0.05	0.15	0.25	0.30	0.20	0.30	0.20	0.05	0.40
Calcium, Soluble (mg/kg)	mg/kg		1	<1	1	2	1	2	2	1	2
Chloride, Soluble (meq/L)	meq/L		0.06	<0.06	<0.06	<0.06	0.23	<0.06	<0.06	0.06	0.79
Chloride, Soluble (mg/kg)	mg/kg		2	<2	<2	<2	2	<2	<2	2	9
Magnesium, Soluble (meq/L)	meq/L		0.08	0.08	0.16	0.16	0.08	0.16	0.08	0.08	0.16
Magnesium, Soluble (mg/kg)	mg/kg		1	<1	<1	<1	<1	<1	<1	1	<1
Potassium, Soluble (meq/L)	meq/L		0.05	0.08	0.10	0.08	0.13	0.13	0.08	0.05	0.26
Potassium, Soluble (mg/kg)	mg/kg		2	<2	<2	<2	<2	<2	<2	2	3
Sodium, Soluble (meq/L)	meq/L		0.09	0.22	0.22	0.22	0.26	0.30	0.22	0.09	0.43
Sodium, Soluble (mg/kg)	mg/kg		2	<2	<2	<2	<2	<2	2	2	3
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	0.27	0.46	0.44	0.42	0.69	0.40	0.04	0.56
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	3	6	7	6	9	8	2	8

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Certificate of Analysis

AGAT WORK ORDER: 17F187462

PROJECT: I-46

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-02

		SAMPLE DESCRIPTION:		17BH01 2.2-2.5	Dup A 2.8-3.0	Dup B 0.8-1.0	17BH06 1.7-1.9	17BH23 1.7-1.9
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-02-09	2017-02-09	2017-02-09	2017-02-09	2017-02-09
Parameter	Unit	G / S	RDL	8192319	8192336	8192337	8192338	8192339
pH (CaCl2 Extraction)	pH Units		N/A	4.01	4.89	3.98	5.24	5.61
Electrical Conductivity (Sat. Paste)	dS/m		0.05	0.08	0.10	0.10	0.08	0.36
Sodium Adsorption Ratio	N/A			0.77	0.54	0.67	0.51	2.57
Saturation Percentage	%		1	26	26	26	36	25
Chloride, Soluble	mg/L		5	<5	8	6	<5	47
Calcium, Soluble	mg/L		1	3	6	5	4	13
Potassium, Soluble	mg/L		2	5	4	5	4	10
Magnesium, Soluble	mg/L		1	1	2	2	2	5
Sodium, Soluble	mg/L		2	6	6	7	5	43
Sulfate, Soluble	mg/L		2	17	22	23	22	61
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	0	0	0	0
Calcium, Soluble (meq/L)	meq/L		0.05	0.15	0.30	0.25	0.20	0.65
Calcium, Soluble (mg/kg)	mg/kg		1	<1	2	1	1	3
Chloride, Soluble (meq/L)	meq/L		0.06	<0.06	0.23	0.17	<0.06	1.33
Chloride, Soluble (mg/kg)	mg/kg		2	<2	2	<2	<2	12
Magnesium, Soluble (meq/L)	meq/L		0.08	0.08	0.16	0.16	0.16	0.41
Magnesium, Soluble (mg/kg)	mg/kg		1	<1	<1	<1	<1	1
Potassium, Soluble (meq/L)	meq/L		0.05	0.13	0.10	0.13	0.10	0.26
Potassium, Soluble (mg/kg)	mg/kg		2	<2	<2	<2	<2	3
Sodium, Soluble (meq/L)	meq/L		0.09	0.26	0.26	0.30	0.22	1.87
Sodium, Soluble (mg/kg)	mg/kg		2	<2	<2	<2	<2	11
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	0.35	0.46	0.48	0.46	1.27
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	4	6	6	8	15

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8192287-8192339 If sodium results in mg/L are less than detection, SAR is non-calculable and is reported as 0.
Sodium Adsorption Ratio is a calculated parameter. The calculated value is the ratio of the sodium concentration in mmol/L over the square rooted sum of the calcium and magnesium concentrations in mmol/L.
Theoretical Gypsum Requirement is a calculated parameter. The calculation is from “A Comparison of Methods for Gypsum Requirement of Brine-Contaminated Soils”, Canadian Journal of Soil Science, 1998.

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AGAT WORK ORDER: 17F187462

PROJECT: I-46

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-02

		SAMPLE DESCRIPTION:		17BH01 0.8-1.0	17BH01 2.2-2.5	Dup B 0.8-1.0	17BH06 1.7-1.9	17BH23 1.7-1.9
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-02-09	2017-02-09	2017-02-09	2017-02-09	2017-02-09
Parameter	**Unit**	**G / S**	**RDL**	**8192313**	**8192319**	**8192337**	**8192338**	**8192339**
Benzene	mg/kg		0.005	<0.005	<0.005	0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	<10	38	<10	<10
C16 - C34 (F3)	mg/kg		10	25	<10	124	<10	<10
C34 - C50 (F4)	mg/kg		10	<10	<10	24	<10	<10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	NA	NA	NA	NA	NA
Moisture Content	%		1	3	5	9	3	4
Surrogate	**Unit**	**Acceptable Limits**						
Toluene-d8 (BTEX)	%	50-150		92	86	90	82	97
Ethylbenzene-d10 (BTEX)	%	50-150		110	66	78	86	100
o-Terphenyl (F2-F4)	%	50-150		96	101	96	96	95

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8192313-8192339 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17F187462

PROJECT: I-46

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Mar 02, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)															
pH (CaCl2 Extraction)	47	8192253	7.33	7.31	0.3%	N/A	99%	90%	110%						
Electrical Conductivity (Sat. Paste)	47	8192253	15.9	18.2	13.5%	< 0.05	92%	90%	110%						
Saturation Percentage	47	8192253	56	46	19.6%	< 1	91%	80%	120%						
Chloride, Soluble	1806	8191359	7	6	NA	< 5	106%	80%	120%				101%	80%	120%
Calcium, Soluble	47	8192253	587	697	17.1%	< 1	95%	80%	120%				93%	80%	120%
Potassium, Soluble	47	8192253	58	64	9.8%	< 2	97%	80%	120%				93%	80%	120%
Magnesium, Soluble	47	8192253	145	176	19.3%	< 1	100%	80%	120%				94%	80%	120%
Sodium, Soluble	47	8192253	2770	3140	12.5%	< 2	98%	80%	120%				106%	80%	120%
Sulfate, Soluble	47	8192253	94	101	7.2%	< 2	89%	80%	120%				94%	80%	120%
Particle Size by Sieve															
Sieve Analysis - 75 microns	47	8193744	37	35	3.2%	< 1	111%	80%	120%						
CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)															
Antimony	47	8191375	<0.5	<0.5	NA	< 0.5	96%	80%	120%				96%	80%	120%
Arsenic	47	8191375	14.0	14.2	1.4%	< 0.5	93%	80%	120%				109%	80%	120%
Barium	47	8191375	273	284	3.9%	< 0.5	95%	80%	120%				102%	80%	120%
Beryllium	47	8191375	0.7	0.8	NA	< 0.5	118%	80%	120%				120%	80%	120%
Boron (Saturated Paste)	47	8192253	5.3	5.8	9.0%	< 0.5	111%	80%	120%				99%	80%	120%
Cadmium	47	8191375	<0.5	<0.5	NA	< 0.5	100%	80%	120%				99%	80%	120%
Chromium	47	8191375	19.3	19.6	1.5%	< 0.5	99%	80%	120%				113%	80%	120%
Chromium, Hexavalent	47	8191375	<0.3	<0.3	NA	< 0.3	89%	80%	120%				81%	80%	120%
Cobalt	47	8191375	10.6	10.6	0.0%	< 0.5	99%	80%	120%				102%	80%	120%
Copper	47	8191375	19.3	18.7	3.2%	< 0.5	97%	80%	120%				103%	80%	120%
Lead	47	8191375	11.9	12.2	2.5%	< 0.5	100%	80%	120%				105%	80%	120%
Mercury	47	8191375	<0.5	<0.5	NA	< 0.5	104%	80%	120%				102%	80%	120%
Molybdenum	47	8191375	1.6	1.6	NA	< 0.5	102%	80%	120%				107%	80%	120%
Nickel	47	8191375	26.5	26.3	0.8%	< 0.5	97%	80%	120%				101%	80%	120%
Selenium	47	8191375	0.6	0.6	NA	< 0.5	104%	80%	120%				102%	80%	120%
Silver	47	8191375	<0.5	<0.5	NA	< 0.5	100%	80%	120%				98%	80%	120%
Thallium	47	8191375	<0.5	<0.5	NA	< 0.5	97%	80%	120%				96%	80%	120%
Tin	47	8191375	0.6	<0.5	NA	< 0.5	101%	80%	120%				100%	80%	120%
Uranium	47	8191375	1.0	1.0	NA	< 0.5	105%	80%	120%				110%	80%	120%
Vanadium	47	8191375	34.2	35.6	4.0%	< 0.5	100%	80%	120%				110%	80%	120%
Zinc	47	8191375	96	90	6.5%	< 1	97%	80%	120%				101%	80%	120%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated
If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17F187462

PROJECT: I-46

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Mar 02, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
CCME/ Tier 1 Metals															
Arsenic	61	8196710	8.0	7.4	7.8%	< 0.5	96%	80%	120%				81%	80%	120%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

CCME/ Tier 1 Metals															
Arsenic	88	8275195	5.5	5.9	7.0%	< 0.5	93%	80%	120%				96%	80%	120%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17F187462

PROJECT: I-46

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Mar 02, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)															
Benzene	1176	8191147	<0.005	<0.005	NA	< 0.005	114%	80%	120%	93%	80%	120%	114%	60%	140%
Toluene	1176	8191147	<0.05	<0.05	NA	< 0.05	90%	80%	120%	89%	80%	120%	109%	60%	140%
Ethylbenzene	1176	8191147	<0.01	<0.01	NA	< 0.01	94%	80%	120%	100%	80%	120%	120%	60%	140%
Xylenes	1176	8191147	<0.05	<0.05	NA	< 0.05	93%	80%	120%	81%	80%	120%	91%	60%	140%
C6 - C10 (F1)	1176	8191147	<10	<10	NA	< 10	88%	80%	120%	89%	80%	120%	91%	60%	140%
C10 - C16 (F2)	1030	8191147	< 10	< 10	NA	< 10	96%	80%	120%	102%	80%	120%	103%	60%	140%
C16 - C34 (F3)	1030	8191147	11	< 10	NA	< 10	100%	80%	120%	98%	80%	120%	98%	60%	140%
C34 - C50 (F4)	1030	8191147	< 10	< 10	NA	< 10	100%	80%	120%	80%	80%	120%	76%	60%	140%
Moisture Content	1030	8191147	12	13	8.0%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By:

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Method Summary

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17F187462

PROJECT: I-46

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Arsenic	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Barium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Beryllium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Boron (Saturated Paste)	INOR-171-6002, 171-6201	CARTER & GREGORICH 2007	ICP/OES
Cadmium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Chromium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP/MS
Chromium, Hexavalent	INOR-171-6215	ASA 20-4.3; REISENAUER 1982	SPECTROPHOTOMETER
Cobalt	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Copper	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Lead	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Mercury	INOR-171-6006, -6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Molybdenum	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Nickel	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Selenium	INORG-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Silver	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Thallium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Tin	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Uranium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Vanadium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Zinc	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Sieve Analysis - 75 microns	INOR-171-6009	KROETSCH 2007; SHEPPARD 2007	SIEVE
pH (CaCl2 Extraction)	INOR-171-6207	SHEPPARD 2007; HENDERSHOT 2008	PH METER
Electrical Conductivity (Sat. Paste)	INO-171-6206	SHEPPARD 2007; MILLER 2007	CONDUCTIVITY METER
Sodium Adsorption Ratio	INOR-171-6201 & INOR-171-6002	McKeague 3.26	CALCULATION
Saturation Percentage	SOIL 0140; SOIL 0110; SOIL 0120	MILLER 2007; SHEPPARD 2007	GRAVIMETRIC
Chloride, Soluble			COLORIMETER
Calcium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Potassium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Magnesium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES

Results relate only to the items tested and to all the items tested

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Method Summary

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17F187462

PROJECT: I-46

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Sodium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Sulfate, Soluble	INOR-171-6201 & INOR-171-6002	SHEPPARD 2007; EATON 2005; MILLER 2007, SM 3120B	ICP/OES
Theoretical Gypsum Requirement	SOIL 0260	USDA HDBK 60, 22D	N/A
Trace Organics Analysis			
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C10 - C16 (F2)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Moisture Content	LAB-175-4002	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID

Results relate only to the items tested and to all the items tested

Desktop Remediation Report

PARA ET AL FORT LIARD
I-46 60-10-123-15
South Liard Field
WID# 1871

Prepared for:
Paramount Resources Ltd

SYNERGYASPEN PROJECT No. PAR6209

May 28, 2021



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APPENDICES

I. Borehole logs and Drawings from North Shore Preliminary Stage 2 Report
II. Historical Borehole Logs, Drawings and Tables
III. Water Well and Water Body Search Results

1. INTRODUCTION

At the request of Paramount Resources Limited (Paramount), SynergyAspen completed a Desktop Remediation™ (DTR) review of historical environmental site assessment information and data for the Paramount former wellsite *PARA ET AL* I-46 - 60-10-123-15, with Well Identification number 1871 (the Site). The Site is in the South Liard field of the Northwest Territories.

The scope of work for the DTR involved reviewing and assessing available analytical data to determine the applicability of various guidelines based on land uses and receptors at the Site. Recommendations for remediation at the Site will be provided based on regulatory requirements.

The areas of potential environmental concern (APECs) identified in the 2017 Phase 1 ESA for the Site by North Shore Environmental Limited (North Shore) were the wellbore, the potential on-site drilling waste disposal area (DWDA), and a potential area of concern on the east side of the lease (North Shore, 2017a). The area of environmental concern (AECs) identified in the 2017 Phase 2 ESA for the Site was the wellbore area, due to exceedances of arsenic in soil.

2. CURRENT SITE DESCRIPTION

The Site was winter-access, and the well did not produce. The well was drilled to a depth of 2055 meters between November 12, 1999 and January 15, 2000, in the South Liard field, approximately 60 kilometres (km) southwest of Fort Liard, Northwest Territories (NT). The Site location is presented on Drawing PAR6209-001.

The Site is approximately 150m x 150m, with a 40m x 60m campsite west along the main access road. Site details and surrounding land uses are shown on Drawing PAR6209-002 and PAR6209-003. Table A below summarizes general information regarding the Site's location, topography, hydrogeology, and surrounding land uses.

TABLE A: Summary of General Information

Item	Description
Site Latitude & Longitude	60° 05' 32.23" N, 123° 23' 00.00" W
NTS Map	I-46 - 60°-00'-123°-15'
Well ID #	1871
Land Owner(s)	Crown
Drilling Dates	November 12, 1999 to January 15, 2000
Total Depth	2055m
Site Description & Size	Site dimensions are approximately 150 m x 150 m square, with one corner aligned to the north, and access from the southwest.
Site Facilities	Wellhead was located at the centre of the Site;
Topography:	
Regional Surface Grade	The regional grade is gently sloping north (0-1%) towards the Liard River
On Site Drainage	The lease slopes south (0-1%) based on the survey details
Surface Cover	In 2017 the Site was covered in birch saplings.
Geology	Bedrock geology consists of Wapiti Formation which is comprised fine clastic sedimentary rocks, Conglomerate, fine to coarse grained sandstone; carbonaceous shale and coal from cretaceous geological period [BCGS online map resource].
Hydrology & Hydrogeology:	
Nearest Surface Water	Government of NWT ATLAS website shows no water bodies within 500m of the Site. A low area is present ~1200m southeast of the Site.
Water Wells	Government of NWT ATLAS website shows no water wells within 500m of the Site (Appendix III).
Depth to Groundwater	Unknown
Groundwater Flow	Unknown but likely to the east towards the unnamed tributary of the Liard River
Surrounding Land Use (Site)	
North	Mixed wood Boreal forest

Item	Description
East	Mixed wood Boreal Forest
South	Mixed wood Boreal Forest
West	Mixed wood Boreal Forest

3. HISTORICAL REVIEW

The scope of this report included a review of available historical environmental site assessment (ESA) information for the Site. Findings from the review of the available reports are summarized below.

3.1 Phase 1 ESA – 2017

North Shore Environmental Consultants Inc. (North Shore) completed a Phase 1 ESA on the Site, published in March of 2017. The Phase 1 ESA indicated the well was a drilled and abandoned well spud in 1999, with a wellhead, conductor barrel and a grate panel as the only structure present at the time of assessment. Based on Compliance Option #2 checklist due to lack of formal drilling waste documentation, the on-site DWDA required assessment for unknown disposal of invert drilling fluid used in the well (North Shore, 2017a).

3.2 Phase 2 ESA - 2017

North Shore completed a Phase 2 ESA on the Site, published in May of 2017. The Phase 2 ESA investigated the wellbore, east potential area of concern, and suspected on-site DWDA at the Site, and consisted of 27 boreholes advanced at the Site, to a maximum depth of 6.5 meters below ground (mbg). Analytical results from the Phase 2 ESA were compared to the following guidelines for the respective parameters: Canadian Council of Ministers of the Environment (CCME) 2017 Tier 1 Soil Remediation Guidelines and the 2003 Northwest Territories Environmental Guidelines for Contaminated Site Remediation for pH and salinity parameters (North Shore, 2017b). Results from the Phase 2 ESA showed low pH across the Site, and elevated arsenic that was not comparable to background levels in the surface and the subsurface of the wellbore area. Results from shallow soil samples (0.8-1.0 mbg) showed arsenic ranged from 15.4 to 42.7 mg/kg; and ranged from 15.7 to 26.8 mg/kg in the subsurface 2.2-2.5 mbg. One soil sample collected from the wellbore area at a depth of 4.3-4.5 mbg had an arsenic concentration of 10.9 mg/kg, below the applicable guideline of 12mg/kg at the site (North Shore, 2017b). The recommendation from the Phase 2 ESA was further characterization of the background soil at the Site (North Shore, 2017b).

4. SUMMARY OF SITE SOIL CONDITIONS

Based on a review of historical reports, SynergyAspen developed a list of areas of environmental concern (AECs) for the Site. The AECs, along with contaminants of concern (COCs) and associated regulated parameters, are shown on Table B below. The AEC is shown in Drawing PAR6209-002.

TABLE B: AECs and Associated COCs in Soil

AEC Label	AECs	Impacted Borehole(s)	COCs (depth)
A	Wellbore	17BH01; 17BH02; 17BH03; 17BH04; 17BH05	Arsenic (0.8-2.5 mbg)

Soil Stratigraphy

There were two background boreholes assessed at the Site in the North Shore 2017 Phase 2 ESA. Soil stratigraphy at background borehole 17C01 was coarse-grained sand and gravel to 6.5mbg, and in 17C02 was coarse-grained sand to 4.5 mbg, the maximum depth of assessment. The material was described as "dry", and "loose", for the length of the borehole, suggesting no surface water or groundwater was present at the Site (North Shore, 2017b).

The stratigraphy at the wellbore APEC was shown in 5 boreholes 17BH01, 17BH02, 17BH03, 17BH04, and 17BH05. Stratigraphy was described as poorly-graded gravel with sand, to 4.5mbg, the maximum depth of assessment.

In boreholes along the southeast boundaries of the Site, 17BH18, 17BH20, and 17BH21, the stratigraphy was described as sandy loam to 0.2mbg overlying heavy clay with gravel to 3.0 mbg, the maximum depth of assessment.

Hydrogeology

Seven soil samples collected at varying depths from the background boreholes, were analyzed for grain size analysis, by sieve pan. The sieve method provides the percentage split between coarse and fine-grained material based on retention on a 75µm mesh screen sieve. The grain size analysis results ranged from 78% to 85% retention on the sieve, indicating coarse-grained material was dominant at the Site (North Shore, 2017b).

The shallow subsurface regional geology of the area north of Maxhamish Lake was reviewed through borehole logs from Phase 2 ESAs completed at four sites in the region. The borehole logs from the following sites were reviewed:

- PARA ET AL MAXHAMISH B- 21-K/094-O-14 (WA#03717) (North Shore, 2017c)
- PARA ET AL MAXHAMISH B- 043-K/094-O-14 (WA#12563) (North Shore, 2017d)
- PARA ET AL MAXHAMISH B- 083-K/094-O-14 (WA#13773) (North Shore, 2017e)
- PARA ET AL MAXHAMISH A-96-J/094-O-14 (WA#13772) (North Shore, 2017f)

The sites were located respectively approximately 19 kilometres (km) south-southeast, 16.6km south-southeast, 13.1km south-southeast, and 15.3km southeast of the I-46 Site. Soil stratigraphy at the b-21-K/94-O-14 site was topsoil and silty-clay overlying clay subsurface. Delineation boreholes around the site showed clay overlying hard clay, with minor occurrences of sandy loam. Hydraulic conductivity testing was completed at the site from 3 groundwater monitoring wells installed during the Phase 2 ESA: hydraulic conductivity values ranged from $1.0x10^{-9}$ meters per second (m/s) to $2.0x10^{-10}$ m/s, as expected from the soil type at the site (2017c).

The soil profile at background locations at the b-043-K site showed loam surface soil to 0.2m, overlying clay-loam soil to approximately 3.0mbg, followed by silty-clay-loam to 4.5mbg, and silty-loam to 6.0mbg. All samples from various depths submitted for grain-size analysis through sieve analysis showed fine-grained soils dominant in the soil profile at the site (North Shore, 2017d).

The borehole logs from background locations at the b-083-K and A-96-J sites showed consistent profiles with loam surface soil to 0.2mbg, followed by clay to approximately 3.0 mbg, overlying “hard clay” to 6.0mbg, the maximum depth of investigation; a layer of silty-clay was noted in one borehole from the a-069-J site. A sand layer was noted in one borehole from 2.4-2.8 mbg at the b-083-K site. All samples submitted for grain-size analysis through sieve analysis from both sites showed fine-grained soils dominant in the soil profile at the sites (North Shore, 2017e,f). Copies of the reviewed borehole logs and figures are provided in Appendix I and II.

From the Phase 2 ESA for the Site and hydraulic conductivity information the region, there was a sufficient minimum confining layer present between the Site and a deeper regional aquifer. Hydraulic conductivity values of the deeper soils at the Site would be expected to be low due to the hard clay soil at the Site. Therefore, drinking water (DW) standards would not apply at the Site within the shallow soils, but would apply in the deeper aquifer unit, if present. At the time of the assessments there were no water wells or residences within 500m of the Site.

5. ENVIRONMENTAL REGULATORY FRAMEWORK

Numerical soil standards for evaluating the results of the Phase 2 ESA were based on the CCME 2018 *Canadian Environmental Soil Quality Guidelines* (the CESQ), and the Northwest Territories *Environmental Guidelines for Contaminated Site Remediation* (the Environmental Guidelines) (Minister of the Environment and Natural Resources [ENR], 2003). The selection of applicable guideline limits in both documents are dependent upon site conditions, applicable receptors at a site, and relevant exposure pathways. From the land use definitions and soil depth considerations in the guideline documents, the Residential/Parkland land use was used to evaluate the 2017 Phase 2 ESA results for the Site.

For assessment of the available data for the I-46 Site, the *Tier 1 – Criteria-based Approach* described in the Environmental Guidelines and the CESQ guidelines were used to determine the applicable arsenic concentration limits for the Site.

For the evaluation of receptors and pathways related to groundwater protection, water use considered proximity to potable water and aquatic receptors, current and potential future use of groundwater aquifers as water sources, and the potential for groundwater extraction based on the hydraulic conductivity of the shallow regional soils. From the Site information in Section 2, there were no groundwater wells, water bodies, or residences within 500m of the Site. Based on the rationale in Section 4 regarding low hydraulic conductivity due to fine-grained soil in the region, and the lack of water bodies, water wells or residences in proximity to the Site, the Protection of Potable Groundwater, Protection of Freshwater Aquatic Life, and Protection of Livestock Watering pathways would not be operative at the Site.

The following receptor pathways were determined to be applicable at the Site:

For analytical results from soil samples <1.5mbg:	For analytical results from soil samples >1.5mbg:
• Direct Contact; and • Ecological Soil Contact.	• Ecological Soil Contact; • Nutrient and Energy Cycling check.

6. COMPARISON OF DATA

Based on the 2017 Phase 2 ESA, soil analytical results were compared to the applicable guideline limits with respect to the operative receptor pathways at the Site. Table C shows the historic Site soil data and various applicable soil guidelines for arsenic in soil at the Site:

TABLE C: Soil Quality Guidelines Applicable at the Site (mg/kg)

Parameter	Analytical Results	ENR 2003 Residential	CCME 1997*	CCME 1991 Residential	CCME 1991 Industrial	ENR 2003**
Arsenic	15.4 – 42.7	12	12	30	50	160

*All land uses
**Yellowknife and area soils (ENR, 2003)

Further discussion regarding the applicability of various guidelines with respect to expected land uses, available receptors, and site-specific conditions is included in the next section.

7. RESULTS AND CONCLUSIONS

Exceedances for arsenic were noted in surface and subsurface samples from the Well center at the Site. Analytical soil data from the 2017 North Shore Phase 2 ESA were compared to the current ENR and CCME guidelines applicable to the Site. A discussion of the results is presented below.

7.1 Soil Results

7.1.1 Arsenic

The CCME Residential/Parkland guideline for Arsenic in soils was based on protection of human health from soil ingestion with a limit of 12mg/kg, and the protection of environmental health, with a soil contact limit of 19 mg/kg (CCME, 1997). The 1991 CCME interim guideline for arsenic was 50 mg/kg.

Referring to CCME fact sheets, *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health*, the fate and behaviour for arsenic according to the site-specific conditions and application of standards is as follows:

- If there was a spill or release leading to the exceedances for arsenic at the Wellbore, contamination from other chemicals, including hydrocarbons, salinity, and metals would be expected. As no residual hydrocarbon, salinity, or metals parameters were indicated in the analytical results for the Well Center, it was unlikely that the elevated arsenic concentrations at the Well Center were the result of a spill or release.
- The Site is not currently occupied by humans and the Site is unlikely to be occupied by humans in the future. While the arsenic concentration in soil samples at the Wellbore were above the guideline limit for soil ingestion and soil contact, the depth of the impacts at >0.8mbg was below the rooting depth for plants, and at a depth that would require mechanical excavation to expose impacted soil. Therefore, soil ingestion and soil contact pathways would not be operative at the Site.
- ENR Guidelines for soil in and around the Yellowknife area noted natural occurrences of arsenic up to 300mg/kg, with the average in and around the Yellowknife area of 150mg/kg (ENR, 2003). The ENR determined a remediation objective of 160mg/kg for Residential land use in Yellowknife area soils, based on accessibility (soil ingestion and soil contact) to the yard for 2 hours per day, 5 months of the year (ENR, 2003). Access to the subject Site by the public is currently less than 5 months of the year for a maximum concentration of 42.7 mg/kg in soil. The Site is in a remote

setting where access is limited to helicopter transport or winter roads, and toddlers or the public are not expected on a regular basis at the Site. The Site aligns with Industrial land uses, in contrast to the models for residential/parkland areas.

- The mobility of arsenic is dependent mainly on the pH of the soil at the Site. For all soil samples, the pH at the Site was low, ranging from 4.1 to 6.0 in the background samples, and ranged from 4.0 to 5.6 in the exploratory boreholes. The boreholes were noted to be dry sand, therefore under mainly aerobic conditions at the surface. The BC Ministry of environment and Climate Change Strategy's *Protocol 2 for Contaminated Sites: Site-Specific Soil Standards* indicate the at the infiltration rate of surface water is lowest in the northeast of BC, at 0.08m per year of water (MECCS, 2017). Under low pH conditions, silicate minerals acquire a positive charge, and are available for adsorption of arsenic anions present in solution. While leaching is increased in sandy soil, leaching is inversely proportional to the amount of adsorption sites available. Under low pH aerobic conditions with low rates of infiltration, arsenic will tend to stay adsorbed to soil minerals, and leaching from soil will be minimized (CCME, 1997).
- If removal of the elevated arsenic exceedance at the Wellbore was undertaken, the heavy equipment used to excavate the soil would likely cause significant impacts to the reclaimed condition at the Site compared to the minimal risk to humans and the environment that may be imposed by the arsenic remaining *in-situ*.
- The arsenic data was reviewed to determine if there were any significant statistical outliers. The outlier test is another method to determine whether all of the arsenic concentrations belong to one population representing natural background soil quality. If there was anthropogenic arsenic present, outliers in the data set would be expected. Using the data in Table I, there were seventeen samples submitted from the Site. The quartiles were: Q1 = 4.75 µg/g, Q2 = 15.7 µg/g and Q3 = 27.9 µg/g; the Inter-Quartile Range (IQR) was 22.25 µg/g. Outliers were defined by any value that lies outside of the lower range as calculated by Q1–1.5xIQR and the upper range as calculated Q3+1.5xIQR, shown below.

-28.6 µg/g = (Q1 – 1.5 x IQR) ←→**61.3 µg/g** = (Q3 + 1.5 x IQR)

The highest reported arsenic concentration at the Site of 42.7 µg/g is within the lower and upper quartile ranges.

TABLE D: Arsenic Concentrations at the Site

Sample ID	Depth (m)	Arsenic (µg/g)
17C01	0.8-1.0	2.8
17C01	2.2-2.5	6.2
17C01	4.3-4.5	3.5
17C01	0.8-1.0	3.4
17C01	1.3-1.5	2.1
17C01	2.8-3.0	6.0
17BH01	0.8-1.0	42.7
17BH01	2.2-2.5	26.8
17BH01	4.3-4.5	10.9
17BH02	0.8-1.0	30.3
17BH02	2.2-2.5	18.2
17BH03	0.8-1.0	15.4
17BH03	2.2-2.5	15.7
17BH04	0.8-1.0	25.5
17BH04	2.2-2.5	29
17BH05	0.8-1.0	31.2
17BH05	2.2-2.5	17.9

Based on the above rationale, the arsenic exceedances detected at the Well Center at the Site did not pose a risk to human and ecological receptors at the Site.

7.2 Conclusions

Based on a review of results from the 2017 Stage 2 PSI at the Site, SynergyAspen determined that the single arsenic exceedance at the Site was reasonably expected to pose no risk to receptors at the Site. Rationale for the determination was based on the depth of the samples; the lack of associated contaminant impacts; low pH and aerobic site conditions; low soil infiltration rates; lack of access by the public on a regular basis; and the increased disruption to a reclaimed site. The rationale regarding arsenic exceedances at the Site were considered to meet the ENR and CCME requirements for determining the risk to receptors at the Site.

8. CLOSURE

Based on the evaluation of the available historic data, no further environmental work is required at the Site prior to submission of the report to the ENR.

Thank you for the opportunity to conduct the work presented herein. If you have any questions or comments, please do not hesitate to contact the undersigned at 250-785-1030.

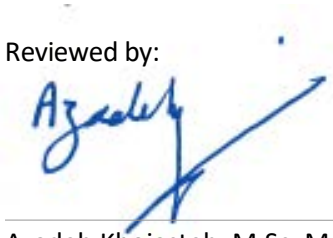
Respectfully Submitted,

SYNERGYASPEN ENVIRONMENTAL INC.

Written By:

Jason Richl, B.Sc.
Environmental Client Manager

Reviewed by:



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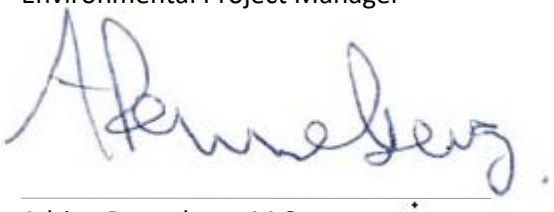


Adrian Renneberg, M.Sc.
Environmental Client Manager

9. REFERENCES

BC MECCS. 2019. *Contaminated Sites Regulation. BC Reg 375-96*. Environmental Management Act. Amended January 24, 2019. Victoria, BC. March 19, 2019. 266 pp.

BC MECCS. 2017. *Protocol 2 for Contaminated Sites: Site-Specific Numerical Soil Standards.* Ver 2.1. Environmental Management Act. Victoria, BC. November 1, 2017. 18pp.

Canadian Council of Ministers of the Environment (CCME). 2018. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health: Zinc. In: Canadian Environmental Quality Guidelines. 8pp. Online: http://ceqg-rcqe.ccme.ca/download/en/359/ Accessed February 15, 2021.

Minister of the Environment and Natural Resources (ENR). 2003 Environmental Guidelines for Contaminated Site Remediation. Government of the Northwest Territories. November, 2003. 39pp.

North Shore Environmental Consultants Limited (North Shore). 2017a. Paramount Resources Ltd. Para et al Fort Liard I-46 60˚10' 123˚ 15'. Phase 1 Environmental Site Assessment – March 2017. March [], 2017. 40pp.

North Shore. 2017b. Paramount Resources Ltd. Para et al Fort Liard I-46 60˚10' 123˚ 15'. Phase 2 Environmental Site Assessment – May 2017. May 12, 2017. 75pp.

North Shore. 2017c. Paramount Resources Limited. 200/B-21-K/94-O-14 Stage II Preliminary Site Investigation – November 2017. November 28, 2017. 237pp.

North Shore. 2017d. Paramount Resources Limited. 200/B-43-K/94-O-14 Stage II Preliminary Site Investigation – May 2017. May 24, 2017. 114pp.

North Shore. 2017e. Paramount Resources Limited. 200/B-83-K/94-O-14 Stage II Preliminary Site Investigation – May 2017. May 30, 2017. 115pp.

North Shore. 2017f. Paramount Resources Limited. 200/A-69-J/94-O-14 Stage II Preliminary Site Investigation – March 2017. March 31, 2017. 93pp.

10. USER RELIANCE AND GENERAL LIMITATIONS

10.1 User Reliance

SynergyAspen Environmental Inc. (SynergyAspen) prepared this report for the sole use of Paramount Resources Limited (the Client). The Client was privy to the establishment of this project's scope and is aware of its terms and conditions.

Should the Client submit this report to a regulatory authority, the regulatory authority may rely on the results within the context of the document's General Limitations for the purpose of determining whether the Client is meeting (has met) its requirements concerning applicable environmental regulations.

Third party reliance is subject to the scope of work agreed upon by SynergyAspen and the Client and is only suitable within the limitations of the project/document. The activities detailed herein were performed for the Client and this document may not be appropriate for the purposes of a relying party. Application of this document for aims beyond those practically intended by the Client and SynergyAspen is at the exclusive risk of the user. SynergyAspen does not accept legal responsibility for any damages toward any third party as a result of the application, use of, or any conclusion drawn based on this report.

As far as the nature of these investigative activities involves professional opinion, SynergyAspen offers no assurance that the results contained herein support a particular course of action. The investigative activities may have included the application of judgment to scientific principles; hence certain results of this work may be based on subjective interpretation. Professional opinions expressed herein are derived from the specifics currently available within the confines of the existing information, scope of work, budget, and schedule.

10.2 General Limitations

The results and conclusions herein were developed according to the degree of care and skill generally exercised by contemporary environmental professionals within similar conditions and localities. The findings herein are somewhat reliant upon information provided by others. If any of the information is erroneous, amendments to the results, conclusions, and recommendations may be required.

The results, conclusions, and recommendations SynergyAspen presents herein represent SynergyAspen's best professional judgement according to the site conditions and on available information during preparation of this report. They were determined explicitly for this site and are somewhat reliant upon visual observation of the site, subsurface investigation at specific locations and depths, and select analysis of specific materials (as detailed herein).

While this assessment has attempted to identify all areas of potential environmental concern at the Site, it is possible that other areas of potential environmental concern may have escaped detection due to imprecise government records, undocumented historical environmental accidents, or other undocumented activities that resulted in contamination.

DRAWINGS

- PAR6209-001 – Site Location Plan
- PAR6209-002 – Site Plan
- PAR6209-003 – Areas of Potential Environmental Concern
- Wellsite Survey



CHK	BY	REVISION DESCRIPTION	DATE	REV.
JR	TW	ISSUED TO CLIENT	–	–
–	–	–	–	–

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
–	–	–	–
–	–	–	–

LEGEND

- DRAINAGE LINE
- ROADS
- WETLAND/MUSKEG
- OIL AND GAS WELLS
- LIARD I-46 60-10-123-15

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. DATA COMPILED BY SYNGIS: SYNERGYASPEN GEOGRAPHIC INFORMATION SYSTEM.
3. VALTUS IMAGERY SERVICES – SEPTEMBER-OCTOBER 2011.
4. ORIGINAL DRAWING PAPER SIZE 8.5x11 INCHES.

SynergyAspen ENVIRONMENTAL

TITLE:

SITE LOCATION PLAN
(60° 05' 032.47" N, 123° 22' 53.61" W)

CLIENT NAME: PARAMOUNT RESOURCES LTD.			
SITE LOCATION:	DATE: 2021-05-14		PAR6209
I-46 60-10-132-15 LIARD	SCALE: 1:20,000	DWG No:	001
	DWN: TW CHK'D: JR		



CHK	BY	REVISION DESCRIPTION	DATE	REV.
JR	TW	ISSUED TO CLIENT	–	–
–	–	–	–	–

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
–	MAXAR IMAGERY	2017-09-07	–
3111-07261WS	SURVEY PLAN OF WELLSITE	1999-07-02	–

LEGEND

- WELLBORE
- APPROXIMATE LEASE BOUNDARY
- ROAD CENTRELINE (SOURCE: IHS)

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM MEASUREMENTS TAKEN IN THE FIELD. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.

SynergyAspen ENVIRONMENTAL

TITLE:

SITE PLAN

CLIENT NAME: PARAMOUNT RESOURCES LTD.

SITE LOCATION:	DATE: 2021-05-14		PAR6209
I-46 60-10-132-15 LIARD	SCALE: 1:1,000	DWG No:	002
	DWN: TW CHK'D: JR		



AEC Label	AECs	Impacted Borehole(s)	COCs (depth)
A	Wellbore Centre	17BH01; 17BH02; 17BH03; 17BH04; 17BH05	Arsenic (0.8-2.5 mbg)

CHK	BY	REVISION DESCRIPTION	DATE	REV.
JR	TW	ISSUED TO CLIENT	–	–
–	–	–	–	–

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
–	MAXAR IMAGERY	2017-09-07	–
3111-07261WS	SURVEY PLAN OF WELLSITE	1999-07-02	–

LEGEND

- WELLBORE
- APPROXIMATE BOREHOLE LOCATION (NORTH SHORE)
- APPROXIMATE BOREHOLE LOCATION (NORTH SHORE – PASSED)
- APPROXIMATE LEASE BOUNDARY
- ROAD CENTRELINE (SOURCE: IHS)

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM MEASUREMENTS TAKEN IN THE FIELD. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.

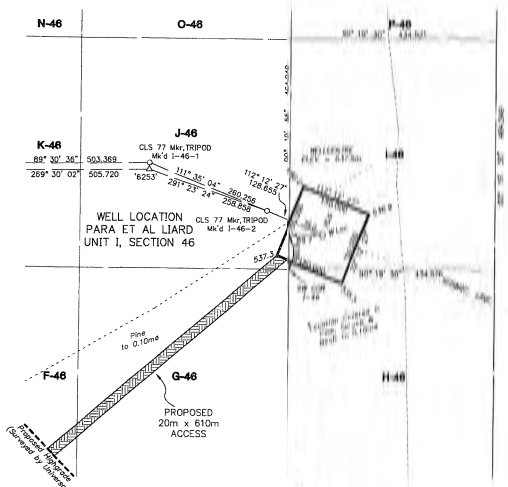
SynergyAspen ENVIRONMENTAL

TITLE:

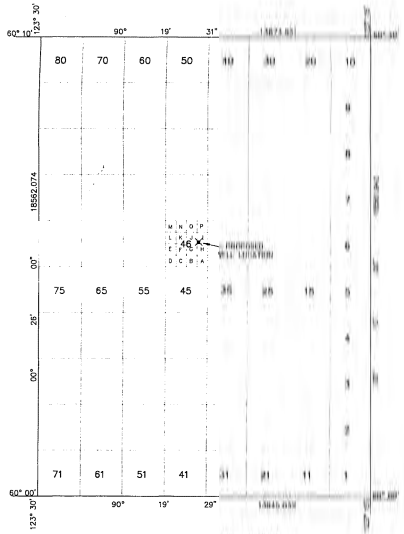
AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

CLIENT NAME: PARAMOUNT RESOURCES LTD.

SITE LOCATION:	DATE: 2021-05-14	PAR6209
I-46 60-10-132-15 LIARD	SCALE: 1:1,000	DWG No: 003
	DWN: TW CHK'D: JR	



DETAIL 'A'
UNIT I, SECTION 46
SCALE 1:5,000



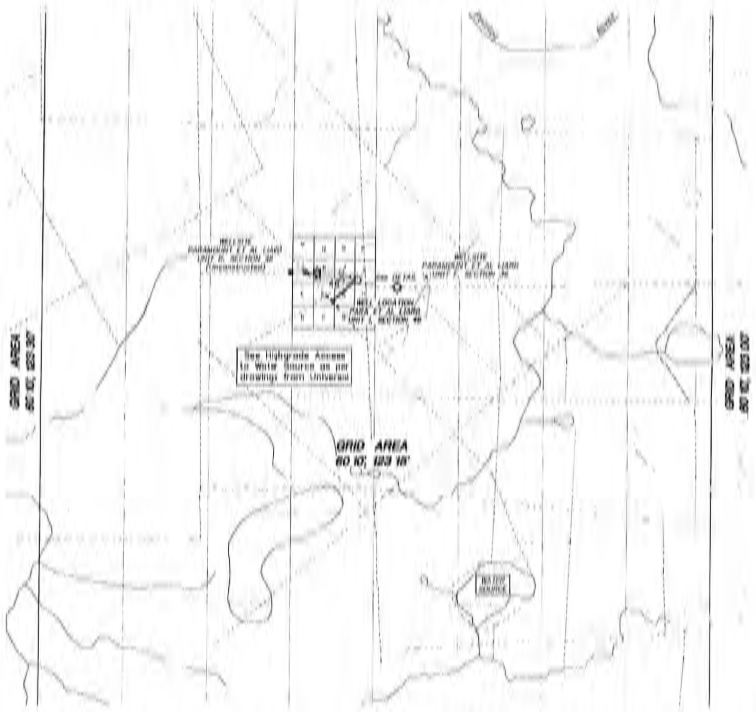
GRID AREA 60°10', 123°15'
SCALE 1:100,000

AREAS REQUIRED:

WELLSITE	160m x 150m =	2.25 ha
ACCESS	20m x 610m =	1.22 ha
CAMPSITE	40m x 60m =	0.24 ha
TOTAL:		3.71 ha

SHOT POINT DETAIL
NOT TO SCALE





PLAN AND FIELD NOTES
OF SURVEY OF
PROPOSED EXPLORATORY WELL
PARA ET AL LIARD
IN UNIT I, SECTION 46
GRID AREA 60° 10', 123° 15'
NORTHWEST TERRITORIES
CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50,000

SURVEYED FOR
PARAMOUNT RESOURCES LTD.

BY: R.G. BLACKALL O.L.S.
JUNE, 1999

LEGEND

All coordinates are computed for Zone 10, central meridian 123° W. Bearings were derived from the azimuths 89° 31' 05" computed between C.L.S. '77 Marker Control Monuments 1-46-1 and Area 001'10", 123°15' and 1-46-2 Grid Area 60° 10', 123° 15' and are referred to the Meridian 123° W.
Distances are expressed in metres and decimals thereof.
Distances shown in brackets are measured distances reduced to the horizontal at ground level.
For the computation of coordinates measured distances have been reduced to the sea level by multiplying them by an average combined scale factor of 0.9996316. Coordinates were then adjusted to the control.
Distances shown on grid are subdivisions are UTM plane.
Surveyed control monuments found
Monuments placed
Set 20mSS metal marker post 1.20m long placed 0.60m in [illegible] were placed over Geodetic or Control Monument
Radial Dist. = 104.21m

Survey was completed prior to drilling. Therefore well as drilled may not necessarily agree with proposed location

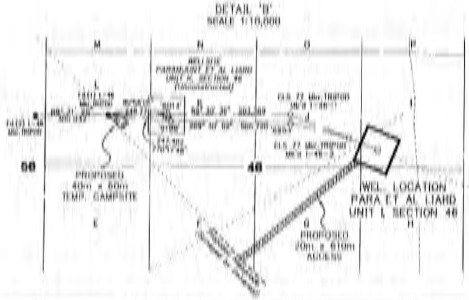
I, R.G. Blackall, of the City of Fort St. John, British Columbia, Canada Land Surveyor, make oath and say that I have in my own proper person, according to law and the best evidence of the Surveyor General of Canada Lands, performed the survey, preparing the survey plans by me and that notes and that the said plan and field notes are correct and true to the best of my knowledge and belief.
SO HELP ME GOD

Sworn before me at Fort St. John, this 16th day of July, 1999

R.G. Blackall O.L.S.

A Notary Public in and for the Province of British Columbia

DETAIL 'B'
SCALE 1:10,000



All coordinates shown are on 1927 North American Datum.
They are based on values for found Geodetic Monuments recovered 1-46 Grid Area 60° 10', 123°15' and 1-46-1 Grid Area 60° 10', 123° 15'

GEOGRAPHIC AND UTM COORDINATES (1927 NAD)

Station	Latitude (Longitude(W))	Northings	Eastings
CONTROL MONUMENTS			
1-46	60°05'08.766" (123°20'00.040")	6661891.266	577283.519
1-46-1	60°05'08.545" (123°16'39.087")	6661886.773	577383.541
GRID AREA			
[illegible]	60° 10' 00" 123° 15' 00"	6666741.760	580124.858
[illegible]	60° 10' 00" 123° 15' 00"	6666741.058	579221.031
[illegible]	60° 10' 00" 123° 15' 00"	6666741.058	578317.203
[illegible]	60° 10' 00" 123° 15' 00"	6666741.058	577413.375
[illegible]	60° 10' 00" 123° 15' 00"	6666741.058	576509.547
1-46-1	60°05'08.545" (123°16'39.087")	6661886.773	577383.541
1-46	60°05'08.766" (123°20'00.040")	6661891.266	577283.519
1-46-2	60°05'08.988" (123°23'20.993")	6661895.759	577183.497
1-46-3	60°05'09.209" (123°26'41.946")	6661900.252	577083.475
1-46-4	60°05'09.431" (123°30'02.899")	6661904.745	576983.453
TRAVERSE STATIONS			
10 8019	60°05'08.845" (123°23'48.587")	6661888.100	577317.070
10 8020	60°05'08.766" (123°23'20.040")	6661891.266	577283.519
46 1	60°05'08.766" (123°21'16.087")	6661891.266	577083.475
10 8021	60°05'08.766" (123°19'16.087")	6661891.266	576883.431
10 8022	60°05'08.766" (123°17'16.087")	6661891.266	576683.387
10 8023	60°05'08.766" (123°15'16.087")	6661891.266	576483.343
PROPOSED WELL			
46	60°05'08.545" (123°16'39.087")	6661886.773	577276.126

THIS SURVEY WAS EXECUTED DURING THE PERIOD
JUNE 22TH TO JUNE 27TH 1999 BY R.G. BLACKALL O.L.S.

PARAMOUNT RESOURCES LIMITED

WITNESS

DATE

REV.No.	DESCRIPTION	DATE

McELHANNEY
LAND SURVEYS LTD.
10014 - 97th Ave., Suite 202
Fort St. John, British Columbia
Phone:(250)787-0366, Fax:(250)787-0310

DATE : 99/07/02 JOB No.: 3111-07261WS BY DRC

20X

APPENDIX I

Borehole Logs and Drawings from North Shore Preliminary Stage 2 Report
(See Stage 2 Report)

APPENDIX III

Water Well and Water Body Search Results

ATLAS
Government of Northwest Territories

Paramount I-46
Water Body Search



May 28, 2021

Legend

- Block Land Transfer Boundaries
- Development Areas
- Surveyed Parcels
- Surveyed Easements
- Municipal Boundaries
- Condominium Units
- Building Footprints
- Line Approximately 31m from O.H.W.M.

Scale 1: 10,000

250 metres

UTM Zone: 10

COPYRIGHT Government of the Northwest Territories, Department of Lands.

F-36

NORTH SHORE
Environmental Consultants

Paramount Resources Ltd.
Para et al Liard F-36 60°10' 123°15'
Phase 1 Environmental Site Assessment
March 2017



Paramount Resources Ltd.
4700 Bankers Hall West
888 3rd Street SW
Calgary, Alberta T2P 5C5

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INTRODUCTION

Paramount Resources Ltd. (Paramount) retained North Shore Environmental Consultants Inc. (North Shore) to conduct a Phase 1 Environmental Site Assessment (ESA) for the Para et al Liard F-36 gas well located in the Northwest Territories (NWT) at Unit F, Section 36 Grid Area 60° 10', 123° 15' (Site).

The purpose of the Phase 1 ESA was to assess and qualify potential environmental concerns associated with the Site through a historic records review and site visit. The Phase 1 ESA was conducted in general accordance with the Canadian Standards Association (CSA) *Standard Z678-01: Phase I Environmental Site Assessment* (CSA, 2001). The Alberta Energy Regulator (AER) *Assessing Drilling Waste Disposal Areas: Compliance Option for Reclamation Certification* (AER, 2014) guidelines were used to assess the drilling waste associated with the Site.

FINDINGS

The Para et al Liard F-36 well was drilled over two winter seasons. It was spud on March 3, 1998 and drilled until March 28, 1998 to a depth of 1494 metres. Drilling was stopped due to spring break-up and deteriorating road conditions. Drilling of the main hole was completed the following winter between December 23, 1998 and February 5, 1999 to a final depth of 2110 metres. The well produced sweet natural gas, condensate and produced water between 2000 and 2005 before the site was deactivated by Paramount in April 2008. Fluids were transported from the site via pipeline to the Paramount Maxhamish d-36-I compressor station in BC. The wellsite is accessible by helicopter and winter roads.

Infrastructure identified in association with the site includes the following: wellhead, two pipe racks, radio tower, meter building, two separator skids, methanol tank within a 1 m high steel containment, aboveground storage tank (AST) in secondary containment, flare knockout drum with vent stack, pig launcher, surface piping, risers, fuel tank and other various chemical barrels and tanks. The Paramount June 2009 As-built plan of the area shows a decking site and borrow pit were located southeast of the wellsite. It is not known for certain if these were cleared in association with the wellsite. A 30 m by 60 m campsite was noted on the survey plan to the east of the wellsite. There were no remote sumps identified in association with the wellsite.

<u>March 1998 Drilling Event (0-1494m)</u>

The surface and intermediate hole sections of the well were drilled using a gel-chem drilling mud. According to documentation completed by Chiron Technologies Inc., the drilling waste associated with the original drilling event was disposed of on site by mix-bury-cover and pump-off to the north of the lease. The sump was located northwest of well centre. Formal drilling waste disposal documentation was not available for review and as a result a Compliance Option 2 checklist and associated calculations were completed as per the *Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification* document (AER, 2014). The drilling waste meets the requirements of the checklist and associated calculations and no further assessment of the drilling waste disposal area is required.

December 1998-February 1999 Re-entry Event (1494-2110m)

The main hole section of the well was drilled using a nitrified calcium chloride invert mud system. There was no information in the available documentation reviewed with respect to how or where the main hole drilling waste was disposed of. As a worst case scenario, it is assumed that the drilling waste was disposed of on site. The drilling waste does not meet the requirements of the Compliance Option 2 checklist and associated calculations and further investigation of a potential on site drilling waste disposal area is required.

Drill stem tests (DSTs) #1-3 were conducted during initial drilling operations in March 1998 recovering drilling mud and gasified mud. DST's #4-8 were conducted during the well re-entry recovering mud, gassy inhibited water and gassy watery invert. The Chiron Technologies Pump-off/Lease Diagram shows a flare pit was located on the east side of the lease. The DST reports noted 'vent contents to flare' and 'chamber left open to the pit' during DST testing and as a result further assessment of the drilling flare pit is required.

Spills & Complaints

A review of the NWT Resource Wildlife and Economic Development's Hazardous Material Spill Database identified the following spills associated with the F-36 wellsite:

Spill No.	Date	Spill Location	Product Released	Volume	Source
2003739	December 10, 2003	F-36 Pipeline ROW	Condensate Water	40 L	Pipe or Line
2003662	November 3, 2003	F-36 Wellsite	Condensate & Produced Water	1000 L	Storage Tank < 4000 L
2001359	November 21, 2001	F-36 Wellsite	Condensate Water	150 L	Storage Tank < 4000 L
2001099	April 1, 2001	F-36 Wellsite Riser for 4" Pipeline	Methanol Water	10 L	Pipe or Line
2001071	March 8, 2001	F-36 Wellsite	Glycol	12 L	Drum or Barrel

The Alpine Environmental (Alpine) Annual 2005 Environmental Site Assessment Report indicated that an area of stained gravel was previously noted in the area of the flare stack in 2004 and a small amount of staining was present near the wellhead.

An NWT Spill Report identified on off lease spill along the access road into the F-36 wellsite between January 21 and 23, 2000. It was estimated that 800 L of waste was released on the access road during rig move events and accumulated in two low spots along the road; however the exact locations are not known. There was contradicting information available with respect to the type of material released. One spill report indicated that the spill material may have contained hydrocarbons and had a hydrocarbon odor while another spill report identified the material as drilling fluid. Snow was windrowed to the road center and then cleaned up and taken to the remote drilling waste lined sump at O-35.

The July 30, 2013 Aboriginal Affairs and Northern Development Canada Environmental Inspection Report noted staining on the ground beside one of the fuel containment berms and the wellhead. Hydrocarbon material was present on one side of the fuel containment berm indicating that it had overflowed. Old spill pads were noted littered on the site.

Previous Assessments/Reports

Alpine completed an Annual ESA report in October 2005. The assessment was conducted to visually inspect the wellsite for signs of environmental impact and note changes in site conditions compared to previous site visits. The Alpine report references an April 22, 2004 report entitled *Vent Stack Release – Fort Liard Re: INAC Spill Numbers 01-739 and 03-662.* The report contained results with respect to biopile and associated flare stack excavations and indicated impacts remain in-situ at the base of the flare stack; however, a formal copy of the report could not be obtained from available company records.

In January 1998, Golder Associates Ltd. and Western Oilfield Environmental Services Ltd. completed an Environmental Impact Assessment for the Fort Liard Additional Exploratory Drilling Project. The assessment was conducted to meet the requirements of the Canadian Environmental Assessment Act.

Interviews

There were no Paramount operations personnel with historic knowledge of drilling or production activities at the Site available for an interview. The assessment was conducted to meet the requirements of the Canadian Environmental Assessment Act.

Site Visit

A site visit was conducted on February 1, 2017 under snowy conditions. Dead vegetation identified on site from the previous year's growing season consisted of spruce, birch, willow, cattail, fescue, brome and dock. The wellsite was surrounded by spruce, birch, willow, fescue and brome. A lagoon was observed on the northeast portion of the site and a subsided area with cattails was noted on the southwest side of the lease. A berm surrounded the well pad and a 20 m cut on the north side of the wellsite was used to fill the southern half of the lease. Erosion from water run-off was evident throughout the site. Infrastructure present on the lease at the time of the assessment included a 400 bbl tank in containment, 3 ASTs in containment containing corrosion inhibitor, radio tower, electrical boxes, flare knock-out tank, above and below ground pipelines, flare stack, three shacks and pipe racks and pilings throughout.

CONCLUSIONS AND RECOMMENDATIONS

Based on the information gathered for this Phase 1 ESA from the historic records review and the site inspection, North Shore concludes that there is a potential for environmental impact in connection with the site. A Phase 2 ESA is recommended to assess the following areas of potential concern:

- Well centre;
- Production facility/former spill areas;
- Flare stack area;
- Potential drilling waste disposal area associated with the well re-entry, including the former sump area on the northwest portion of the site; and
- Drilling flare pit area.

DISCLOSURE

North Shore Environmental Consultants Inc. (North Shore) has prepared this report taking into account government regulations available at the time of the assessment. North Shore has not made an independent verification of historical or analytical results provided by third parties and therefore makes no assurances regarding the accuracy of such information. It has assumed such information is correct. Where indicated or implied the conclusions are based on visual observation and/or analytical testing conducted at the time of the assessment. The conclusions do not apply to any areas of the site not investigated.

This report is intended for the exclusive use of the company, organization, or individual to whom it is addressed and may not be relied upon by any third party without the express written permission of North Shore. The investigation and reporting has been conducted with a reasonable level of attention and skill, in accordance with standards prevailing in the environmental consulting profession at the time of report date in the location in which the report was prepared.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. North Shore accepts no responsibility for damages, if any, suffered by any third party as a result of the use of this report or any decisions made or actions based on this report.

In the preparation of this report, selected Alberta Energy Regulator (AER) reference material has been gathered from AbaData™ (property of Abacus Datagraphics Ltd.), which is an online information source. The information provided by AbaData is received directly from the AER, electronically updated on a monthly basis and is assumed to be correct.

CLOSURE

North Shore appreciated the opportunity to work on this project. If we can provide clarification of any part of this report, please contact the undersigned at (780) 467-3354.

This report was prepared by:



Ann Tuson
Environmental Consultant

Reviewed By:



Angela Bricker, B.Sc., P.Ag.
Environmental Consultant

REFERENCES

Alberta Energy Regulator (AER). 2015. *Directive 050: Drilling Waste Management*. Retrieved from: https://www.aer.ca/rules-and-regulations/directives/directive-050

Alberta Energy Regulator (AER). 2014. *Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification*. Edmonton, Alberta. March 2014.

Alpine Environmental (Alpine). 2005. *Annual 2005 Environmental Site Assessment Report F-36 Wellsite, Northwest Territories Calgary, Alberta.* October 2005

Petroleum Services Association of Canada. 2016. *Drilling Fluid Product Listing for Potential Toxicity Information*. Retrieved from: www.psac.ca/mudlist/pdf/mud_list.pdf

Mackenzie Valley Land and Water Board. 2017. *Mackenzie Valley Land and Water Board – Public Registry – Online Review System*. Accessed January 2017. Retrieved from: https://mvlwb.com/

NWT Environment and Natural Resources. 2017. *Hazardous Materials Spills Database.* Accessed January 2017. Retrieved from: http://apps.enr.gov.nt.ca/app/spills/epd_spills/asp/login.asp

Government of NWT. 2017. *Office of the Regulator of Oil and Gas Operations – Public Registry.* Accessed January 2017. Retrieved from: http://www.orogo.gov.nt.ca/registry

Government of NWT. 2017. *Northwest Territories Geological Survey* Accessed January 2017. Retrieved from: http://www.nwtgeoscience.ca/

List of Appendices

Appendix A Survey Plan
Site Diagram

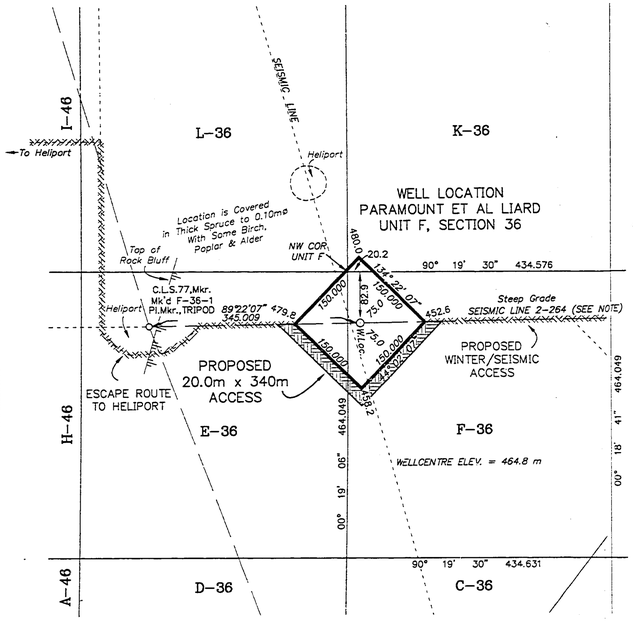
Appendix B Spill Report
Aerial Photographs
Construction/Operations Sketch
Correspondence

Appendix C Drilling Waste Documentation

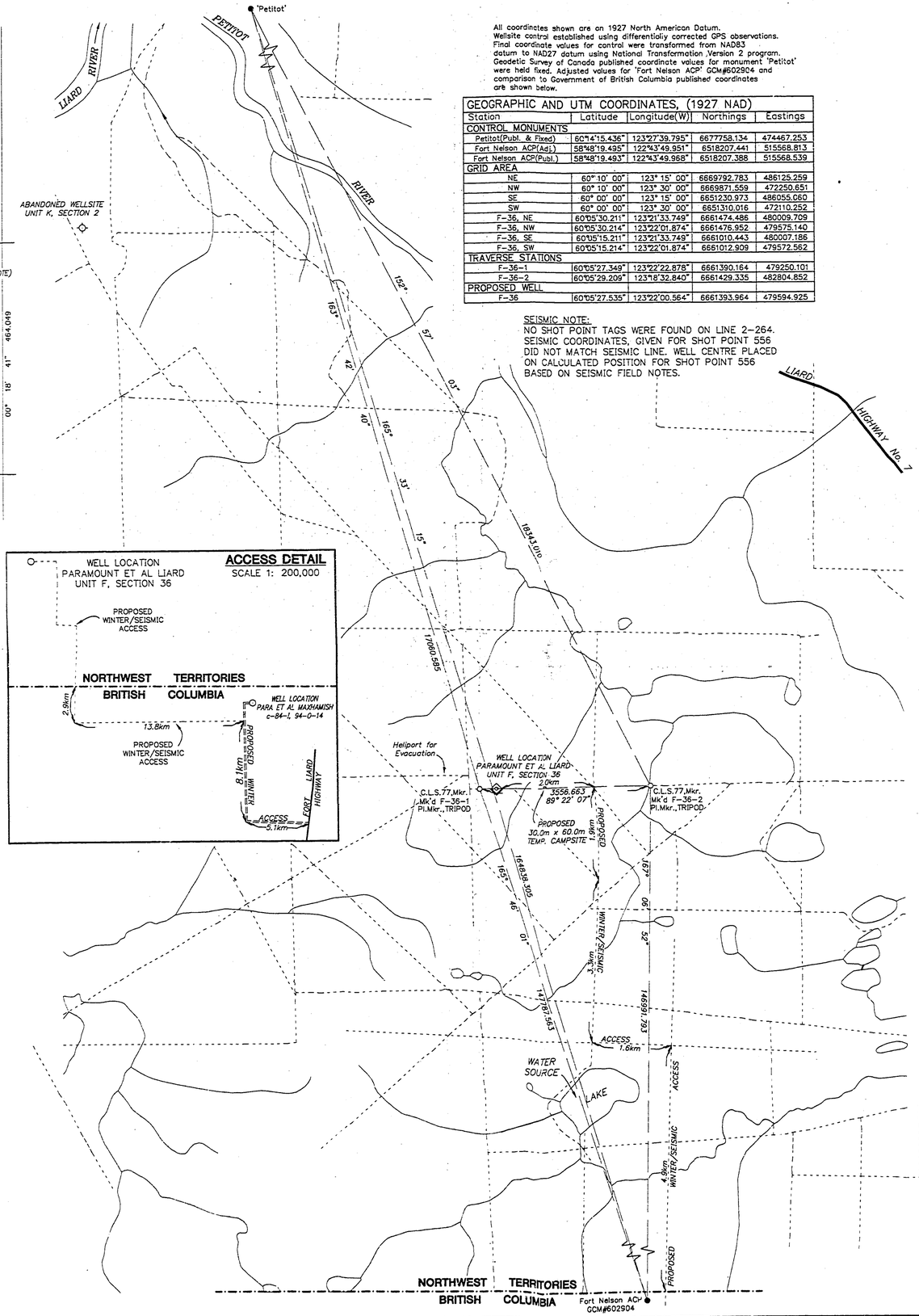
Appendix D Site Visit Photos

APPENDIX A

Survey Plan
Site Diagram



DETAIL
UNIT F, SECTION 36
SCALE 1:5,000



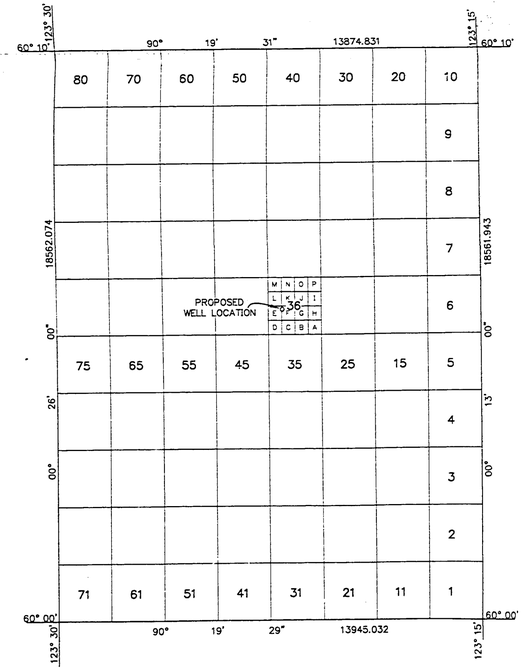
ACCESS DETAIL
SCALE 1: 200,000

All coordinates shown are on 1927 North American Datum.
Wellsite control established using differentially corrected GPS observations.
Final coordinate values for control were transformed from NAD83 datum to NAD27 datum using National Transformation Version 2 program, Geodetic Survey of Canada published coordinate values for monument 'Petitot' were held fixed. Adjusted values for 'Fort Nelson ACP' GCM#602904 and comparison to Government of British Columbia published coordinates are shown below.

GEOGRAPHIC AND UTM COORDINATES, (1927 NAD)

Station	Latitude	Longitude(W)	Northings	Eastings
CONTROL MONUMENTS				
Petitot(Publ. & Fixed)	60°14'15.436"	123°27'39.795"	6677758.134	474467.253
Fort Nelson ACP(Adj.)	58°48'19.495"	122°43'49.951"	6518207.441	515568.813
Fort Nelson ACP(Publ.)	58°48'19.493"	122°43'49.968"	6518207.388	515568.539
GRID AREA				
NE	60° 10' 00"	123° 15' 00"	6669792.783	486125.259
NW	60° 10' 00"	123° 30' 00"	6669871.559	472250.651
SE	60° 00' 00"	123° 15' 00"	6651230.973	486055.080
SW	60° 00' 00"	123° 30' 00"	6651310.016	472110.252
F-36, NE	60°05'30.211"	123°21'33.749"	6661474.486	480009.709
F-36, NW	60°05'30.214"	123°22'01.874"	6661476.952	479575.140
F-36, SE	60°05'15.211"	123°21'33.749"	6661010.443	480007.186
F-36, SW	60°05'15.214"	123°22'01.874"	6661012.909	479572.562
TRAVERSE STATIONS				
F-36-1	60°05'27.349"	123°22'22.878"	6661390.164	479250.101
F-36-2	60°05'29.209"	123°18'32.840"	6661429.335	482804.852
PROPOSED WELL				
F-36	60°05'27.535"	123°22'00.564"	6661393.964	479594.925

SEISMIC NOTE:
NO SHOT POINT TAGS WERE FOUND ON LINE 2-264. SEISMIC COORDINATES, GIVEN FOR SHOT POINT 556 DID NOT MATCH SEISMIC LINE. WELL CENTRE PLACED ON CALCULATED POSITION FOR SHOT POINT 556 BASED ON SEISMIC FIELD NOTES.



GRID AREA 60°10', 123°15'
SCALE 1:100,000



PLAN AND FIELD NOTES

OF SURVEY OF

PROPOSED EXPLORATORY WELL

PARAMOUNT ET AL LIARD

IN UNIT F, SECTION 36

GRID AREA 60° 10' , 123° 15'

NORTHWEST TERRITORIES
CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50,000
0m 500m 1000m 2000m 3000m 4000m 5000m

SURVEYED FOR
PARAMOUNT RESOURCES LTD.

BY : W.V. JOHNSON, CLS
NOVEMBER, 1997.

LEGEND
UTM coordinates are computed for Zone 10, central meridian 123° W.
Bearings were derived from differentially corrected GPS Observations and are referred to meridian 123° W.
Distances are expressed in metres and decimals thereof.
Distances shown in traverse are measured distances reduced to the horizontal at general ground level.
For the computation of coordinates measured distances have been reduced to the UTM plane by multiplying them by an average combined scale factor of 0.9995232.

Distances shown on grid area subdivisions are UTM plane.
Authorized control monuments found ..... ●
Monuments placed ..... ○
Traverse Hub placed ..... △
Mkr. denotes metal marker post 2.0m long placed 0.30m N.
Elevations were derived from Geodetic Survey of Canada Monument 'Petitot' Elev. = 218.241 m
Survey was completed prior to drilling; therefore well as drilled may not necessarily agree with proposed location.

I, W.V. Johnson, of the City of Fort St. John, British Columbia, Canada Lands Surveyor, make oath and say that I have in my own proper person, according to law and the instructions of the Surveyor General of Canada Lands, faithfully and correctly executed the survey shown by this plan and field notes, and that the said plan and field notes are correct and true to the best of my knowledge and belief.
SO HELP ME GOD

W.V. Johnson, CLS

Sworn before me at Fort St. John, this 23rd day of November, 1997.

THIS SURVEY WAS EXECUTED DURING THE PERIOD
NOVEMBER 14th TO NOVEMBER 17th, 1997. BY W.V. JOHNSON, CLS

PARAMOUNT RESOURCES LTD.

WITNESS

DATE

REV.No.	DESCRIPTION	DATE
1	CHANGED WINTER ACCESS	97/12/10

McELHANNEY ASSOCIATES
PROFESSIONAL LAND SURVEYORS
10014 - 97th Ave., Suite 202
Fort St. John, British Columbia
Phone:(250)787-0356, Fax:(250)787-0310
McElhanney

DATE : 97/11/21 JOB No : 3111-06155WS RH

MOUNT COTY

MCKAY LAKES

123°30'

60°20',123°15'

60°20',123°00'

STAGING AREA

CAMP

MAINTENANCE YARD

RESIDENCE

BARGE SITE

CAMP SITE

I-02 DECKING SITE

CAMP

BRIDGE 5X15m

FORT LIARD HIGHWAY

Betalamea Lake

Petitot River

FORT LIARD

A-47 (NOT DRILLED)

I-46

CAMP

F-36

DECKING SITE BORROW PIT

123°30'

60°10',123°00'

O-35

CAMP

M-25 (NOT DRILLED)

BORROW PIT & SUMP

60°10',123°15'

BORROW PIT

BRIDGE 18.4X5m

Water Source #3 (Mea Goh Cho Lake)

STANLEY BERTRAND TRAPPER CABIN

BRIDGE

CAMP

N-01

BORROW PIT

CAMP

A-01

NORTHWEST TERRITORIES

BRITISH COLUMBIA

94O13I

94O14L

94O14K

94O14J

94O14I

MAXHAMISH COMPRESSOR

LEGEND

- SEISMIC
- AIRSTRIP - (FOREIGN)
- AIRSTRIP
- PIPELINE R/W
- PIPELINE R/W FOREIGN
- ACCESS ROAD - (FOREIGN)
- WINTER ACCESS ROAD
- ALL SEASON ACCESS ROAD
- CONTOUR
- LEASE - (TIED-IN)
- LEASE - (NOT TIED-IN)
- LEASE - (FOREIGN)
- LEASE - RECLAIMED
- BORROW PIT
- CAMP SITE
- SUMP / PIT
- DECKING SITE
- BATTERY SITE
- OTHER CLEARING
- BRIDGE
- TOWER

SCALE 1:50,000

1250 0 1250 2500 3750 5000 METERS

2500 0 5000 10000 15000 FEET

N

DISCLAIMER: The information contained herein is compiled from various government and industry sources. The Universal Group of Companies and its data suppliers provide no warranty regarding the accuracy or completeness of this information. No liability can be assumed by The Universal Group of Companies or its data suppliers resulting from the use or interpretation of this information, or from any decisions made based on this information.

Paramount resources ltd.

FORT LIARD SOUTH

As-Built June 2009

94O14I (BC P&NG GRID) to

SE1/4 60°20',123°30' (NWT GRID)

REV.	DESCRIPTION	INI.	DATE
3	Updated map title	BPV	03-JUN-09
2	Removed I-03 W/S & updated map title	BPV	12-SEP-07
1	Added Bridge in Sec.12 and Road in Sec.1 & 11.	BPV	05-DEC-06
0	Original construction (from 2005 map)	WGT	13-JUN-06

SPECIFICATIONS	
Datum:	NAD 83
Projection:	UTM
NTS Ref:	95B
Zone:	10
Scale:	1:50 000
C.I.:	100m
Filename:	050399G01_2009
Model:	50K Ft Liard South
Job No:	05-0399G

IMAGERY (Air Photo / Satellite)	
Date:	2000
Type:	1m Orthophoto

PREPARED BY:

UNIVERSAL GEOSYSTEMS U.G.S. SPATIAL INFORMATION SERVICES

Ph:. 262-1336
Fax: 262-1308
www.universalsurveys.com

REV. 3

File: F-36_17PH1.dwg Date: March-24-17 12:43:32 PM

MIXEDWOOD FOREST

50-60%

CUT

FILL

APPROXIMATE F-36
LEASE BOUNDARY

WATER WELL

FORMER LAGOON

COMMUNICATIONS TOWER

SHACK

DWDA

DRUMS

MIXEDWOOD FOREST

50-60%

FLARE KNOCK-OUT TANK

30-40%

FORMER
FACILITY

30-40%

FILL

FORMER TANK

COLLAR

SHACK
W TANKS

SHACK
W TANKS

METHANK
TANK

MIXEDWOOD FOREST

PIG RUN

ACCESS ROAD

LEGEND

- WELL CENTRE
- UNDERGROUND PIPELINE
- ABOVEGROUND PIPELINE
- FORMER FEATURE
- PIPE RACK
- FLARE STACK
- RISER
- TANK
- 2-5% GROUND SLOPE DIRECTION / GRADIENT

NOTES:

LOCATIONS ARE APPROXIMATE.

DATE OF SITE VISIT: FEBRUARY 1, 2017.

0 5 10 20 30m

Scale 1 : 800

DRAWING SHOULD BE PRINTED ON 11x17
PAPER FOR ACCURATE SCALING.

SITE VISIT DIAGRAM

NORTH SHORE
Environmental Consultants

Date: 24-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. F-36 (NORTHWEST TERRITORIES)	Figure: 1
File name: F-36_17PH1-A.dwg	Requested by: DM		

APPENDIX B

Spill Report
Aerial Photographs
Construction/Operations Sketches
Correspondence

Hazardous Materials Spill Database

Environment Division of ENR

Scotia 6, 5102-50th Avenue; Yellowknife, NT X1A 3S8

Phone: (867) 873-7654 Fax: (867) 873-0221

Sorted By: Location for the year (s): 2017

Spill No.	Date	Ter	Region	Location	Site Description	Commodity	Quantity	Source	Agency
2003739	2003-12-10	NT	DEH	-	F-36 30 Miles South of Fort Liard	Condensate Water	40 L	PL	NEB
2003662	2003-11-03	NT	DEH	-	F-36 Wellsite 60:05:463N 132:22:114W	Condensate & Produced Water	1000 L	ST<	NEB
2001359	2001-11-21	NT	DEH	-	Well Site Location F-36 near Fort Liard	Condensate Water	150 L	ST<	NEB
2001099	2001-04-01	NT	DEH	-	F-36 Wellsite Riser for 4" Pipeline 60:10N 123:15W	Methanol/Water	10 L	PL	NEB
2001071	2001-03-08	NT	DEH	-	F-36 60:05N 122:22W	Glycol	12 L	DRUM	NEB

Total Spills on this Report: 5

This report contains information regarding spills that were reported to the NWT 24-Hour Spill Line. The absence of information on any particular location in no way guarantees that contamination has not occurred at that location.

LEGEND

Region:
BAF - Baffin
DEH - Deh Cho
INU - Inuvik
KEE - Keewatin
KIT - Kitikmeot
NSL - North Slave
SAH - Sahtu
SSL - South Slave

Source:
AIR - Aircraft
DRUM - Drum or Barrel
MV - Marine Vessel
NS - Natural Seepage
OTH - Other Transportation
PL - Pipe or Line
RT - Rail Train
SL - Sewage Lagoon
ST< - Storage Tank <4000 litres
ST> - Storage Tank >4000 litres
TP - Tailings Pond
TRU - Truck
UK - Unkown
WELL - Wet Wells, Flaring
Boom

Agency:
CCG - Canadian Coast Guard
EP - Environment Canada
GN - Government of Nunavut
GNWT - Government of Northwest Territories
ILA - Inuvialiut Land Administration
INAC - Indian and Northern Affairs Canada
NEB - National Energy Board



NORTH SHORE
Environmental Consultants
□143□201 Kas□a R□ad
S□erw□□d Par□□AB
T8A 2□6

□aramount Resour□es □td□

Para et al Liard F-36

2001 Satellite Imagery

0 50 100 200

SCALE IN METERS

S□ale: 1:5000

NOTE: SCALE IS APPROXIMATE ± 1m



NORTH SHORE
Environmental Consultants

□143□201 Kas□a R□ad
S□erw□□d Par□□AB
T8A 2□6

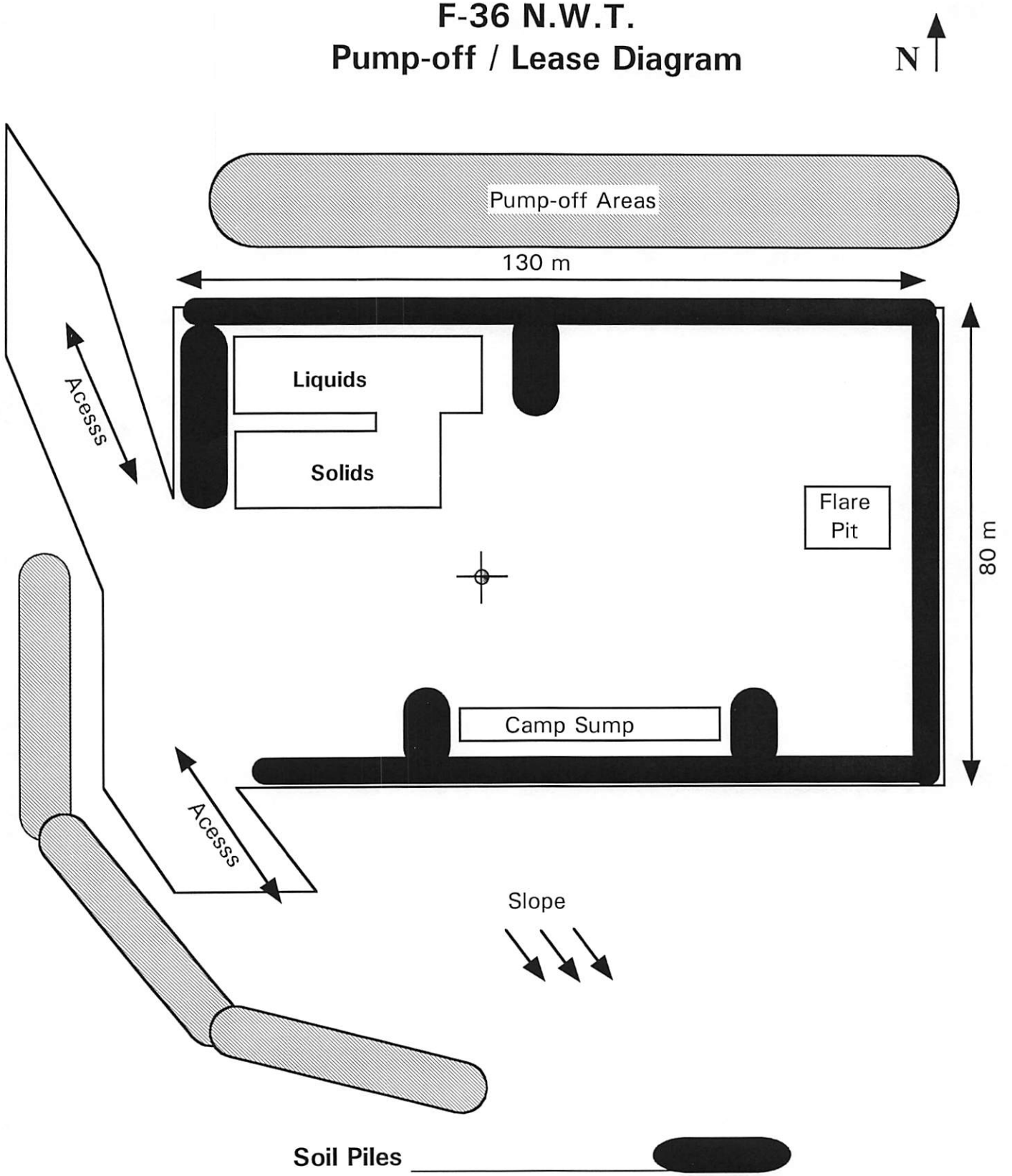
□aramount Resour□es □td□

Para et al Liard F-36

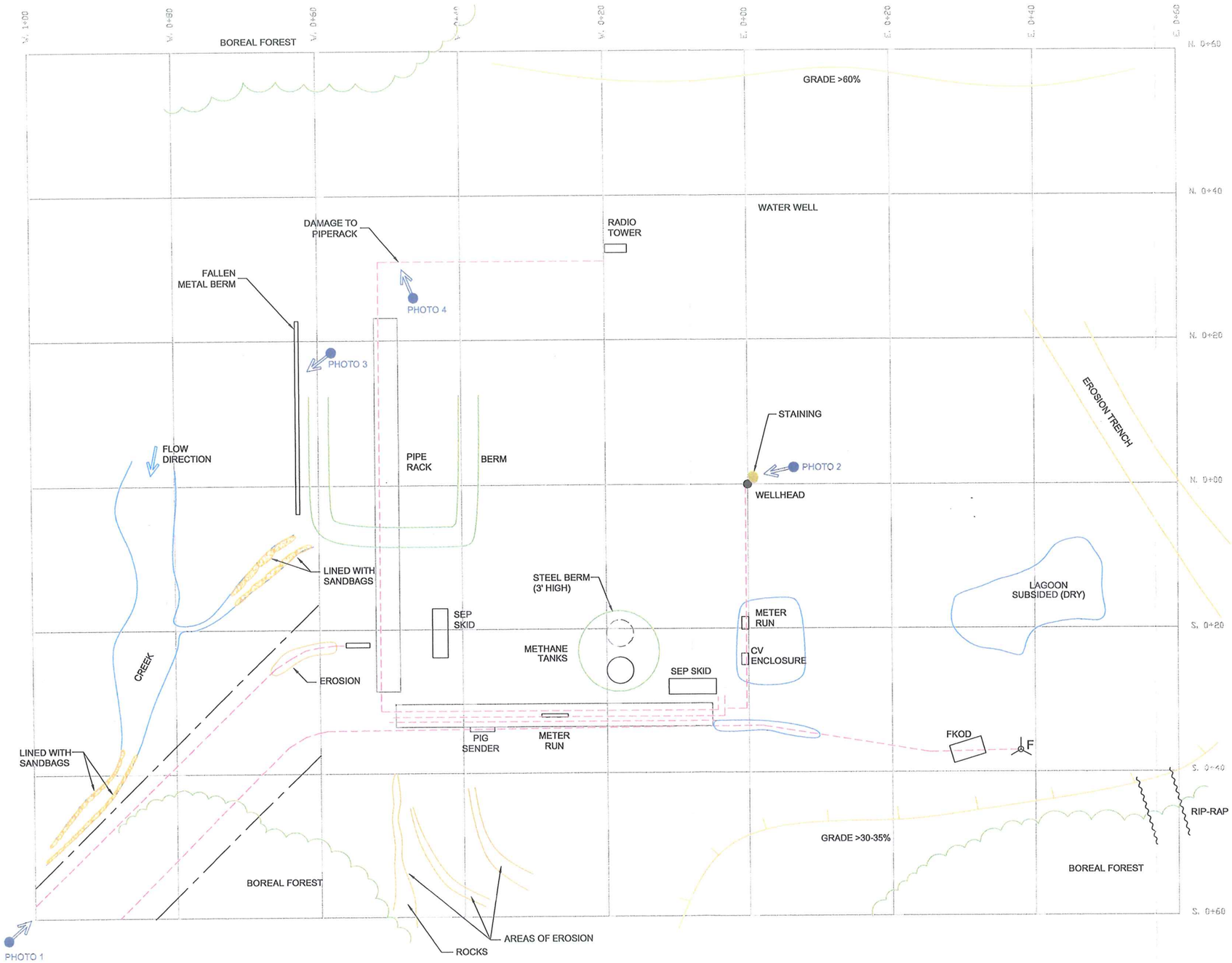
2001 Satellite Imagery

S□ale: N□t t□ S□ale

Paramount Resources Ltd.
F-36 N.W.T.
Pump-off / Lease Diagram



Pump-Off Date: March 28-April 1/98



LEGEND:

PHOTOPLATE LOCATION AND DIRECTION

FKOD FKOD - FLARE KNOCKOUT DRUM

F F - FLARE STACK

0 5 10m

NO.	DESCRIPTION	DATE	BY	APP'D
5				
4				
3				
2				
1				

REVISIONS

ALPINE ENVIRONMENTAL

CLIENT:

PARAMOUNT RESOURCES LTD.

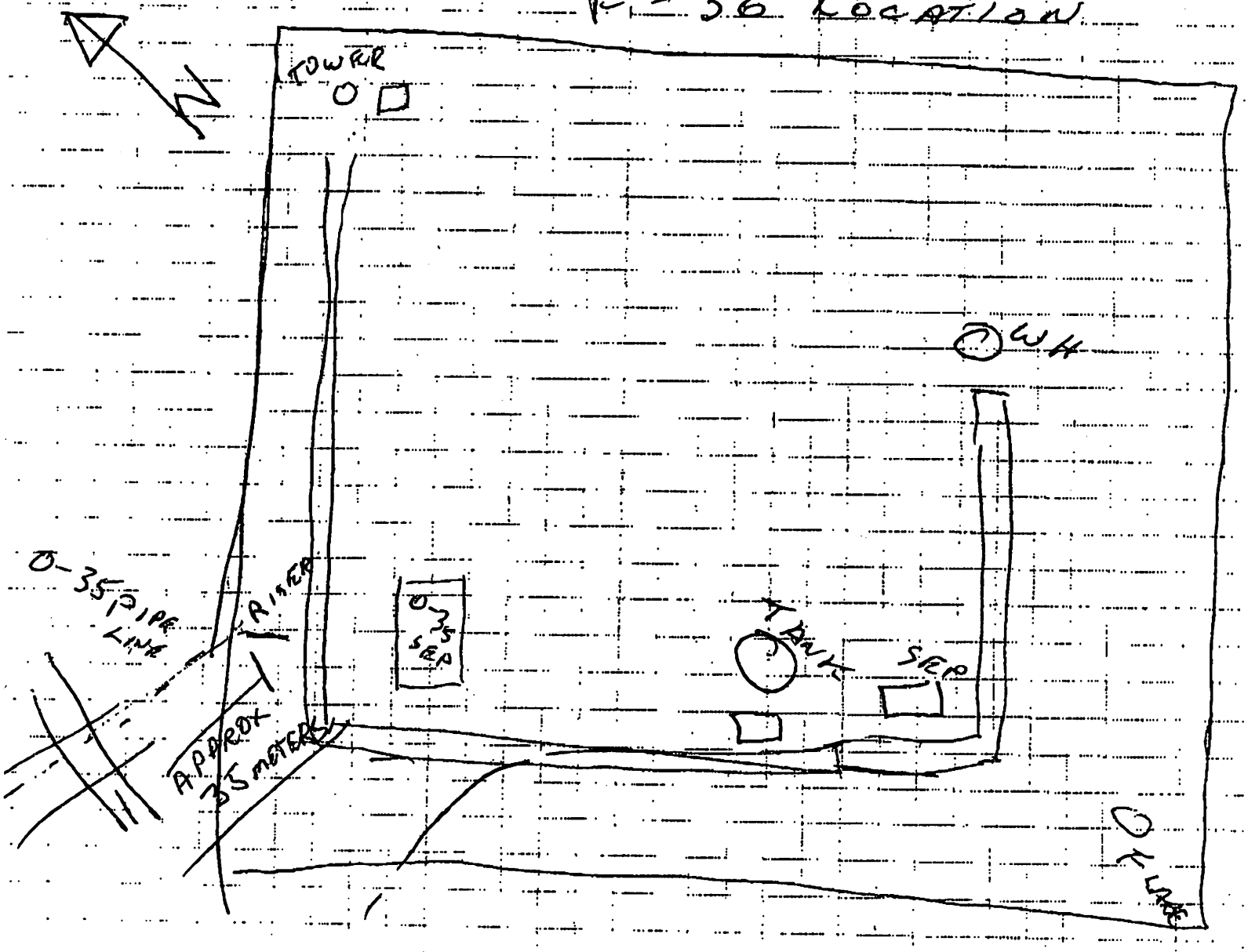
PROJECT:

F-36 WELLSITE

FIGURE 2
SITE PLAN

PROJECT FN-01312-CS.01	DESIGNED SG/SDE	SCALE 1: 750	
DATE 2002-07-28	DRAWN TN/DS	XREF	
DWG No AF1312-02	CHECKED SM	APPROVED	

F-36 LOCATION



12"

SALES

ATTEN: GORO-FERGUSON
GEORGE-

From: Ann Tuson
To: Ann Tuson
Subject: FW: Looking for Production Information
Date: Thursday, January 26, 2017 12:11:13 PM
Attachments: image001.jpg

From: Kristen Cameron [mailto:Kristen_Cameron@gov.nt.ca]
Sent: Thursday, January 26, 2017 10:42 AM
To: Brent Walchuk
Cc: DST_ITI_OROGO
Subject: RE: Looking for Production Information

Brent,

I have included a table below that shows the annual production statistics gathered by the NEB for the Fort Liard fields.

There are four fields:

- Liard Wells: Liard F-25A, K-29, M-25, 2K29, 3K-29, 2M-25, K29A
- Liard North Wells: North Liard P-66A
- Fort Liard SE Wells: SE Fort Liard N-01
- Fort Liard Wells: Fort Liard F-36, O-35

There is monthly data by well, but it would take me a while to compile the historical records for release. Please let me know if this information suits your purpose, and feel free to call if you have any questions.

Field Name	Year	Annual Wellhd Gas Prod (10^3m^3)	Annual Oil Prod (m^3)	Annual Cond Prod (m^3)	Annual Wtr Prod (m^3)
Liard Wells:	Liard F-25A, K-29, M-25, 2K29, 3K-29, 2M-25, K29A				
Liard	2000	490,079.2	-	-	21,530.9
Liard	2001	1,213,623.8	-	-	75,896.1
Liard	2002	834,139.7	-	-	144,375.2
Liard	2003	680,340.6	-	-	215,589.5
Liard	2004	465,409.7	-	4,002.3	-
Liard	2005	203,286.2	-	-	114,509.2
Liard	2006				
Liard	2007				
Liard	2008				
Liard	2009				
Liard	2010				
Liard North Wells:	North Liard P-66A				
Liard North	2000	60,113.4			23,386.8
Liard North	2001	1,824.0			5,488.5
Liard North	2002				

Fort Liard SE Wells:		SE Fort Liard N-01			
Fort Liard SE	2001	33,153.6	-	-	259.4
Fort Liard SE	2002	61,898.6	-	422.3	778.4
Fort Liard SE	2003	51,128.2	-	566.2	1,666.5
Fort Liard SE	2004	48,152.9	-	44.6	421.2
Fort Liard SE	2005	38,799.0	-	-	46.0
Fort Liard SE	2006	-	-	-	-
Fort Liard SE	2007	-	-	-	-
Fort Liard SE	2008	-	-	-	-
Fort Liard SE	2009	-	-	-	-
Fort Liard SE	2010	-	-	-	-
Fort Liard Wells:		Fort Liard F-36, O-35			
Fort Liard	2000	81,792.3	-	-	-
Fort Liard	2001	57,173.5	-	-	-
Fort Liard	2002	35,705.4	-	-	-
Fort Liard	2003	15,721.4	-	-	-
Fort Liard	2004	10,422.3	-	-	-
Fort Liard	2005	50,737.9	-	-	-
Fort Liard	2006				
Fort Liard	2007				
Fort Liard	2008				
Fort Liard	2009				
Fort Liard	2010				

- Kristen

From: Brent Walchuk [mailto:bwalchuk@northshoreenv.com]
Sent: Monday, January 23, 2017 07:50
To: Kristen Cameron
Cc: Ann Tuson
Subject: RE: Looking for Production Information

Thanks Kristen. If there are any issues sending the information via email let me know and we could send it through North Shore's FTP site.

Thanks,

Brent

From: Kristen Cameron [mailto:Kristen_Cameron@gov.nt.ca]
Sent: Friday, January 20, 2017 3:29 PM
To: Brent Walchuk
Cc: Ann Tuson
Subject: RE: Looking for Production Information

Brent,

Thanks for sending the specifics. If the information is readily available, we may have it in a few days, but it can sometimes take a couple of weeks if it has been archived.

In the meantime, I have found production reports for 2005 and 2006. I will see what information I can send you from those reports.

- Kristen

From: Brent Walchuk [mailto:bwalchuk@northshoreenv.com]
Sent: Friday, January 20, 2017 10:15
To: Kristen Cameron
Cc: Ann Tuson
Subject: RE: Looking for Production Information

Hi Kristen,

Thank you for the quick response. The production records that we are looking for are from the early 2000's. Specifically, we are looking for information for the Paramount Resources wells O-35, N-01, I-46, F-36, and A-01. From the information we currently have it looks like these wells produced between 2002 and 2007. I believe there will only be production information for F-36, O-35, and N-01. The other two wells were drilled and abandoned.

Would you be able to see if there are production records for these wells?

Thanks,

Brent

From: Kristen Cameron [mailto:Kristen_Cameron@gov.nt.ca]
Sent: Friday, January 20, 2017 10:09 AM
To: Brent Walchuk
Cc: Ann Tuson
Subject: RE: Looking for Production Information

Hello, Brent,

Thank you for contacting OROGO. As of April 2014, the Regulator has jurisdiction for the regulation of oil and gas works and activities in the onshore Northwest Territories (NWT), with the exception of the Inuvialuit Settlement Region and lands that were not transferred from the Government of Canada to the Government of the Northwest Territories.

Production statistics by field for 2014, 2015, and 2016 are available on our website at www.orogo.gov.nt.ca on the 'Documents' page. The files are listed alphabetically. *Production Statistic Reports* are on page 3, and there is one document for each year. However, all production since 2014 has been from the Cameron Hills field. There has been no recent production in the Fort Liard area. If you need historical production data, let me know and I will see if we can obtain it.

Please feel free to call me if you have any questions.

Kristen Cameron
Manager, Information Office | Gestionnaire, bureau d'information
Office of the Regulator of Oil and Gas Operations | Bureau de l'organisme de réglementation des opérations pétrolières et gazières
Government of the Northwest Territories | Gouvernement des Territoires du Nord-Ouest
PO Box 1320
Yellowknife NT X1A 2L9
Tel | Tél : 867-767-9097 x78004
Fax | Téléc : 867-920-0798
Web | Site Web : www.orogo.gov.nt.ca
NWT-NU Spill Line: 867-920-8130
OROGO Incident Reporting Line | Pour signaler un incident: 867-445-8551

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From: Brent Walchuk [mailto:bwalchuk@northshoreenv.com]
Sent: Thursday, January 19, 2017 16:48
To: Kristen Cameron
Cc: Ann Tuson
Subject: Looking for Production Information

Hi Kristen,

North Shore is currently completing Phase 1 ESAs for some wellsites in the Fort Liard area. We are relatively new to working in the Northwest Territories and we are trying to track down production information for the wells. Would this information be available in the OROGO Public Registry? Any help or information that you can provide would be greatly appreciated.

Thanks,

Brent

Brent Walchuk, B.Sc., P.Ag.
Remediation/Reclamation Supervisor
North Shore Environmental Consultants Inc.
#143, 201 Kaska Road
Sherwood Park, AB T8A 1K5
Office: (780) 467-3354 ext. 120

Cell: (780) 271-0870

Brent Walchuk
Environmental Consultant
#143, 201 Kaska Road
Sherwood Park, Alberta T8A 2J6
Tel: 1-780-467-3354 Cell:1-780-271-0870 Fax: 1-780-464-9622
bwalchuk@northshoreenv.com **http://www.northshoreenv.com**

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APPENDIX C

Drilling Waste Documentation

CHIRON TECHNOLOGIES INC.

Drilling Waste Analysis Form

LEASE INFORMATION:

Client: Paramount Resources **Job File #** 5081-SU **Lab File #** 561

Surface Hole Location: F-36 **Well #**

Down Hole Location: **Plot #**

Spread Area Location:

DISPOSAL METHOD:

M, B & C ___ **LWD** ___ **PUMP-OFF** X **LANDSPREADING** ___ **OTHER** ___

SAMPLE INFORMATION:

Date Sampled: April 2, 1998 **Sampled By:** Greg Puddester

Date Analyzed: April 6, 1998 **Analyzed By:** Stacey Waldie

Sample Name: Total Waste

	RECEIVING SOIL:	SOIL WASTE:	LIQUIDS:	
SG				
pH				
EC				ms/cm
Na				mg/L
TH (CaCO3)				mg/L
SAR				
Cl				mg/L

	TOTAL WASTE:	SOLIDS	
SGA	1.09		
SGU			
SGR			
pH	9.98		
EC	1.85		ms/cm
Na	333.35		mg/L
TH (CaCO3)	28		mg/L
SAR	27.39		
Cl	46.86		mg/L

COMMENTS:

PRINT LOG IN

CHIRON TECHNOLOGIES INC.

Drilling Waste Analysis Form

LEASE INFORMATION:

Client: Paramount Resources **Job File #** 5081-SU **Lab File #** 562

Surface Hole Location: F-36 **Well #** _____

Down Hole Location: _____ **Plot #** _____

Spread Area Location: _____

DISPOSAL METHOD:

M, B & C X **LWD** _____ **PUMP-OFF** _____ **LANDSPREADING** _____ **OTHER** _____

SAMPLE INFORMATION:

Date Sampled: April 2, 1998 **Sampled By:** Greg Puddester

Date Analyzed: April 6, 1998 **Analyzed By:** Stacey Waldie

Sample Name: Solids

	RECEIVING SOIL:	SOIL WASTE:	LIQUIDS:	
SG				
pH				
EC				ms/cm
Na				mg/L
TH (CaCO3)				mg/L
SAR				
Cl				mg/L

	TOTAL WASTE:	SOLIDS	
SG		1.09	
SGU			
SGR			
pH		12.13	
EC		11.29	ms/cm
Na		~~7.48~~ 564.17	mg/L
TH (CaCO3)		1184	mg/L
SAR		7.13	
Cl		30.34	mg/L

COMMENTS:

Chiron Technologies Inc.

MICROTOX ANALYSIS

DATE:	April 6,1998	JOB FILE #	5081-SU
COMPANY:	Paramount Resources	LAB FILE #	561
LOCATION:	F-36		
DATE SAMPLED:	April 2,1998		
DATE ANALYZED:	April 6,1998	DATE RECEIVED:	April 3,1998
SAMPLE NAME:	Total Waste	ANALYZED BY:	Stacey Waldie

TOXICITY

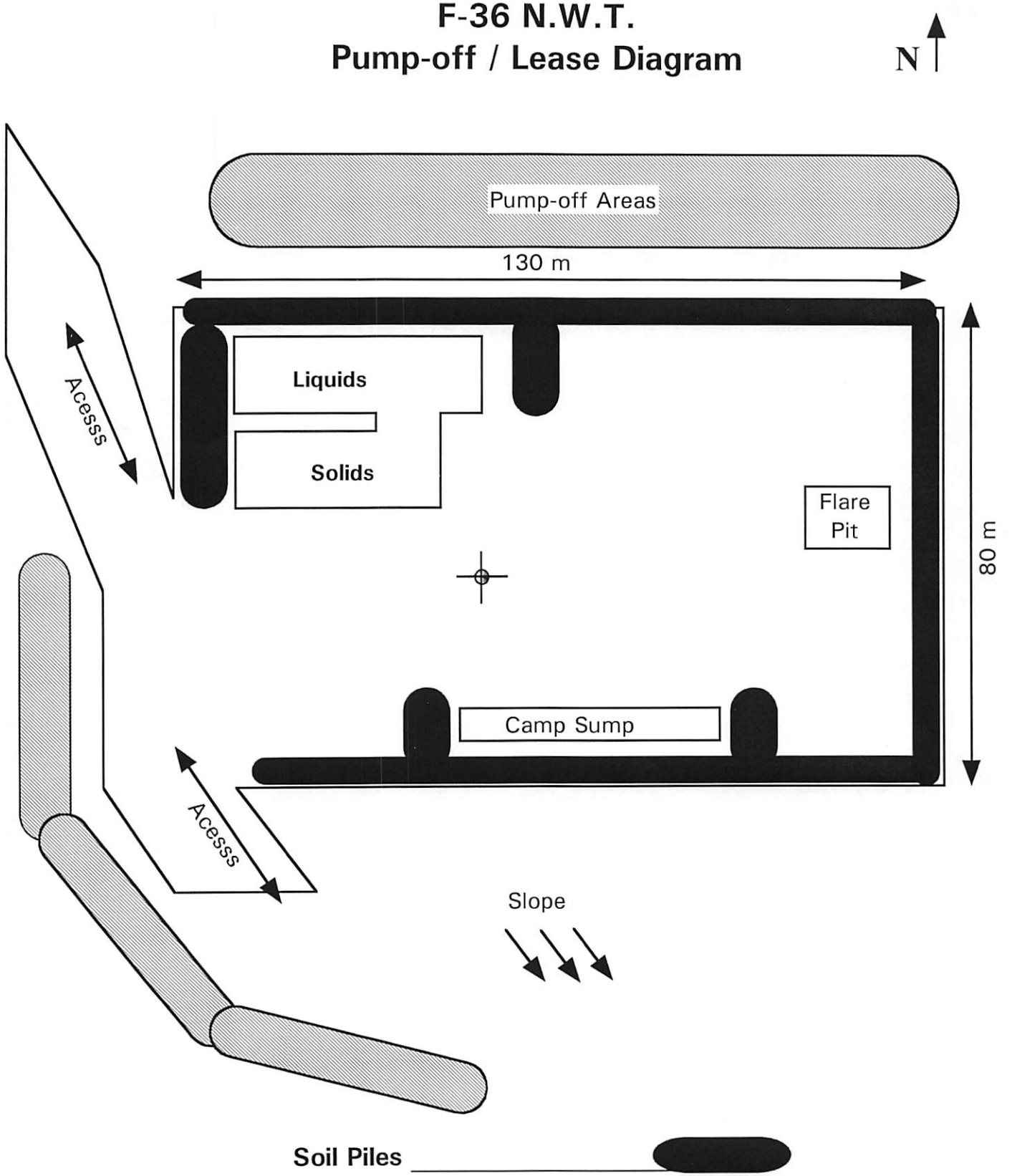
EC 50 (15 min, 15C) = >100%
EC 20 (15 min, 15C) = >100%
EC 50 (05 min, 15C) = >100%
EC 20 (05 min, 15C) = >100%

SAMPLE ADJUSTMENT

DECANTED:	FILTERED: X	CENTRIFUGED:
Initial pH: 9.98	Adjusted to: 8.14	With: Sulphuric Acid
Visual Color:	Before: Dark Brown	After: Dark Orange
Visual Turbidity:	Before: High	After: None

Additional Adjustment:

Paramount Resources Ltd.
F-36 N.W.T.
Pump-off / Lease Diagram



Pump-Off Date: March 28-April 1/98

Compliance Option 2
Drilling Waste Disposal Assessment Checklist

Compliance Option 2 - Drilling Waste Disposal Assessment Checklist

If any response to the checklist questions leads to a Phase 2 ESA requirement or there is insufficient information to complete the Compliance Option Two Checklist, a Phase 2 ESA must be conducted in accordance with Compliance Option Three.

1. General Disposal and Drilling Fluid Information:
The well licensee should be able to review various sources of information pertaining to the drilling activities on-site. Many information sources, other than the *Notification of Drilling Waste Disposal*, *Drilling Waste Management Disposal Form*, or *Drilling Waste Pipeline Disposal Form* can be reviewed for information relating to the drilling waste disposal and drilling fluid systems. These can include Tour Reports, daily drilling records, well files, and contractor invoices.

1.0 Well Information:

Unique Identifier (UI)	Para et al Liard F-36
Spud Date	March 3, 1998
Well Depth	1494 m

1.1 Disposal Method (if known)*: Mix-bury-cover and pump-off

* If waste was disposed at an AER or ESRD approved facility, list supporting documentation under Reference Documents.

1.2 Disposal Location (if known)**: On site, northwest of well centre

** If checklist indicates that a Phase 2 ESA (Compliance Option Three) is required, it must be undertaken at the disposal location. If the disposal location is unknown, the Phase 2 ESA must be undertaken at the wellsite.

For the purpose of this form: if the disposal method and/or location remains unknown after all available information sources have been checked, the drilling waste disposal location is assumed to be on-site.

	Yes	No
1.3 Were there other drilling waste disposal events on the site (e.g. wellbore re-entry or another well drilled, using fluids containing drilling fluid additives)?	☒	☐
If yes, were the disposal areas separate from one another?	☒ Drilling waste information must be evaluated for each disposal.	☐ Drilling waste information must be evaluated by combining the drilling fluid additives and well depths. If drilling waste information is missing or incomplete for one or both wells, a Phase 2 (Compliance Option Three) is required.

	Yes	No
1.4 Was a remote site used? If, Yes, is the remote site included in this reclamation application? If not included, is the remote site a multi-well disposal location?	☐ ☐ ☐ In Comments section, indicate which well the remote site will be tied to for the purposes of reclamation	☒ ☐ ☐ Single well remote disposal site must be included with reclamation certificate application, unless it already has received a Reclamation Certificate.
1.5 Has the well licensee reviewed the Daily Drilling Records and other available drilling documentation?	☒	☐ Phase 2 required
1.6 Can it be determined from the available records what type of drilling fluid system was used?	☒	☐ Phase 2 required
1.7 Were water-based drilling fluids used for all sections (i.e., gel chemical drilling fluid systems)? If No, is there evidence that demonstrates the non-water based wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., appropriately approved waste management facility)?	☒ ☐	☐ ☐ Phase 2 required
1.8 Is a mud list available? If Yes, can all the additives on the mud list be identified and described? Record the additives and their description (e.g., chrome-free lignosulfonate, aldehyde-based bactericide, etc.) on the attached form.	☒ ☒	☐ Phase 2 required ☐ Phase 2 required

	Yes	No
1.9 Do the Daily Drilling Records show evidence of a flow or kick that may have resulted in the introduction of produced fluids (i.e., hydrocarbons or salts) into the drilling fluids?	☐	☒
If Yes, is there information/documentation available to demonstrate that they were appropriately treated or disposed of as per *Directive 50* or *Directive 58* (i.e., approved waste management facility)?	☐	☐ Phase 2 required
1.10 Do the Daily Drilling Records show evidence of returned drill stem test fluids?	☒	☐
If Yes, is there information/documentation available to demonstrate that they were appropriately treated or disposed of as per *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐	☒
If treatment or disposal as per *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* cannot be confirmed, is there sufficient information/documentation available to complete the DST calculations?	☒ Show calculation on attached form	☐ Phase 2 required
1.11 Were cement returns buried on-site or at a remote site linked to the well?	☐	☐

2. Hydrocarbon Management

	Yes	No
2.1 Was hydrocarbon-based drilling fluid used?	☐	☒
If Yes, is there evidence that wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐	☐ Phase 2 required

	Yes	No
2.2 Was the well a horizontal oil well? If Yes, is there evidence that wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐ ☐	☒ ☐ Phase 2 required
2.3 Was the well drilled using under-balanced techniques? If Yes, is there information/documentation available to demonstrate that the drilling wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐ ☐	☒ ☐ Phase 2 required
2.4 Was hydrocarbon added to the drilling fluid? If Yes, was the hydrocarbon contaminated drilling waste disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐ ☐	☒ ☐ Phase 2 required

3. Metals (Trace Elements) Management

	Yes	No
3.1 Was the disposal completed before November 1, 2012?	☒ Complete questions 3.2 to 3.5	☐ Go to question 3.6
3.2 Was barite added to the drilling fluid? If Yes, did it meet the requirements specified in the attached metal calculation table?	☒ ☒ Show calculation on attached form	☐ ☐ Phase 2 required

	Yes	No
3.3 Was zinc carbonate added to the drilling fluid? If Yes, did it meet the requirements specified in the attached metal calculation table?	☐ ☐ Show calculation on attached form	☒ ☐ Phase 2 required
3.4 Were chrome-based thinners added to the drilling fluid? If Yes, did it meet the requirements specified in the attached metal calculation table?	☒ ☒ Show calculation on attached form	☐ ☐ Phase 2 required
3.5 Were any other additives used that would have triggered testing for metals under Section 3 or 5 of *Directive 50 (1996 version)*? If Yes, are waste analytical data and application rates (land treatment, landspreading) or maximum application (mix-bury-cover) available? If above data are available, did the application rate or maximum application meet *Directive 50* requirements?	☐ ☐ ☐	☒ ☐ Phase 2 required ☐ Phase 2 required
3.6 Did metal concentrations in the waste trigger a requirement for post-disposal sampling? If yes, did all post-disposal samples meet the soil metal endpoints specified in Section 3 of *Directive 50* (2012 version)?	☐ ☐	☐ ☐ Phase 2 required

4. Salinity Management

	Yes	No
4.1 Does the water based drilling waste meet the requirements specified in the attached Salt Calculation Table?	☒ Show calculation on attached form	☐ Phase 2 required
4.2 Was a salt zone encountered during drilling?	☐	☒
If Yes, is there evidence that demonstrates the drilling wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., appropriately approved waste management facility)?	☐	☐ Phase 2 required

Surface & Intermediate Hole Drilling Mud Additive List (0 - 1494 metres)

Product Name	Amount Used	Brief Description of Product
Gel	1091	Viscosifier
Envirofloc	17 sacks	Flocculant
Barite	218 sacks	Weighting Material
Lignite	21 sacks	Thinner/Dispersant
AquaPac	17 sacks	Viscosifier
SAPP	2 sacks	Thinner/Dispersant
Bicarb of Soda	1 sack	Alkalinity pH Control
Caustic Soda	21 sacks	Alkalinity pH Control
Desco	1 sack	Chrome-based Thinner/Dispersant
Detergent	3 pails	Surface Active Agent
Sawdust	62 sacks	Lost Circulation Material
Vis-Plus	1 sacks	Viscosifier
Soda Ash	2 sacks	Calcium Remover

Reference Documents (List all source documents used in the completion of this checklist. Attach additional pages if necessary. Documents must be supplied to the AER if requested.)

Concord Drilling Fluids Ltd. Well Data Recap & Summary
Paramount Resources Ltd. Daily Drilling Report
Chiron Technologies Inc. Drilling Waste Analysis Form & Pump-off/Lease Diagram
Paramount Well File Information
Mackenzie Valley Land and Water Board – Public Registry – Online Review System

Comments (Please provide any additional comments relevant to the decision process within the checklist. Attach additional pages if necessary.)

According to documentation completed by Chiron Technologies Inc., the drilling waste associated with the original drilling event was disposed of on site by mix-bury-cover and pump-off to the north of the lease. The sump was located northwest of well centre. Formal drilling waste disposal documentation was not available for review and as a result a Compliance Option 2 checklist and associated calculations were completed.

The drilling waste meets the requirements of the checklist and associated calculations and no further assessment of the drilling waste disposal area is required.

A separate Compliance Option checklist has been completed for the drilling waste associated with the December 1998-February 1999 well re-entry.

Location: Para et al Liard F-36 **Spud:** 3-Mar-98

Metal Calculations for Compliance Options One and Two

Note: Different default mix ratios are provided depending on whether the well was drilled before or after October 22, 1996. The 1996 version of *Guide 50* , *Drilling Waste Management,* which was issued by the Energy Resources Conservation Board on this date, increased the minimum mix ratio requirement from 1:1 to 3:1.

Barite:

Directions: Fill in the number of sacks and adjust for sack weight if different than 40 kg. Enter the Well Depth in metres. The spreadsheet will calculate the number of sacks per metre. This value must be less than or equal to **0.22** If the value exceeds the objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Total Number of Sacks (40 kg/sack*)		Well Depth (m)		Mix Ratio**		Sacks per Metre	
218	÷	1494	÷	3	=	0.049	Meets

* Sack weight may be adjusted by dividing the number of sacks by 40 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter “3”. If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

Location: Para et al Liard F-36 **Spud:** 3-Mar-98

Chromium-based Thinner:

Alternative 1:

If waste chromium, mix ratio and waste bulk density data are available use the following calculator to estimate post-disposal chromium concentration.

Directions: Enter the Total Chromium Concentration in mg/kg measured in the waste, the Waste Dry Bulk Density in kg/m3, and Mix Ratio in the appropriate cells. The spreadsheet will calculate the Post-Disposal Chromium Concentration. If this value is greater than 64 mg/kg, a Phase 2 ESA (Compliance Option 3) is required.

Waste Chromium Concentration (mg/kg)		Waste Dry Bulk Density* (kg/m^3)		Mix Ratio						Post-Disposal Cr Concentration (mg/kg)
	x		÷		÷	1500	+	30	=	#DIV/0!

* Waste Dry Bulk Density = (Waste Specific Gravity – 1) x 1600

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

Alternative 2:

If the above data is not available use the following equation to calculate the number of sacks of chrome thinner added per meter drilled. If the number of sacks exceeds the limits below, a Phase 2 is required.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Well Depth in metres. The spreadsheet will calculate the number of sacks per metre. This value must be less than or equal to **0.020.** If the value exceeds the objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Total Number of Sacks (25 kg/sack*)		Well Depth (m)		Mix Ratio**		Sacks per Metre	
1	÷	1494	÷	3	=	0.000223115	Meets

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

= Required Field

Location: Para et al Liard F-36 **Spud:** 3-Mar-98

Salt Calculations for Option 2:

Alternative 2

If the volume of drilling waste is not known, use the following calculator to determine the NaOH Equivalent Sacks per metre of well depth. This value must be less than **0.0260** for wells drilled before October 22 1996, or **0.0350** for wells drilled on or after this date. If the value exceeds the target, a Phase 2 ESA (Compliance Option 3) must be conducted.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Well Depth in metres. The spreadsheet will calculate the NaOH Equivalent Sacks per Metre.

Additive	Number of sacks (25 kg/sack*)		NaOH Equivalency Factor		NaOH Equivalent Sacks
Caustic Soda	21	X	1.00	=	21
Soda Ash	2	X	0.75	=	1.5
Sodium Chloride		X	0.68	=	0
Sodium Bicarbonate	1	X	0.95	=	0.95
Sodium Silicate		X	1.37	=	0
Sodium acid pyrophosphate (SAPP)	2	X	0.22	=	0.44
Calcium Chloride		X	0.72	=	0
Calcium Nitrate		X	0.34	=	0
Envirofloc	17	X	0.41	=	6.97
Gypsum**		X	0.59	=	0
Lime**		X	1.08	=	0
** Max = 0.02 x well depth (m)					
Potassium chloride		X	0.54	=	0
Potassium sulphate		X	0.46	=	0
Caustic potash		X	0.71	=	0
Potassium formate		X	0.47	=	0
Potassium silicate		X	0.32	=	0
Potassium nitrate		X	0.40	=	0
Diammonium phosphate		X	0.63	=	0
Ammonium nitrate		X	0.57	=	0
Ammonium sulphate		X	0.61	=	0
Drill Stem Test Returns	14.86780164	X	0.68	=	10.11010511

Total NaOH Equivalent Sacks	=	40.97010511
Well Depth (m)	÷	1494
NaOH Equivalent Sacks per Metre	=	**0.0274**

Result

Meets

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Note: Up to 0.02 sacks of gypsum and lime per metre of well depth should be counted with other salt additives. Because of the limited solubility of gypsum and lime, sacks in excess of this value need not be counted.

Drill Stem Test Return Calculations for Compliance Option Two

Location: Para et al Liard F-36 **Spud:** 3-Mar-98

Alternative 2: Chloride

Directions: Enter the drill stem diameter for the drill stem test (DST) section in millimeters, the length of the DST return (including mud returns) in metres and the chloride concentration of the DST fluid in mg/L. The spreadsheet will calculate the equivalent number of sacks. This value must be entered in the salt calculation in the cell labelled "Drill Stem Test Returns".

Inner Diameter of Pipe (mm)	Length of Drill Stem Test Return (m)	Volume of Returns (m^3)*		Chloride Concentration* (mg/L)				Number of Sacks
84.8	8.5	0.047982214	x	2000	÷	7600	=	0.0126269
84.8	80	0.451597312	x	250000	÷	7600	=	14.8551747
		0	x		÷	7600	=	0
		0	x		÷	7600	=	0
		0	x		÷	7600	=	0
		0	x		÷	7600	=	0
				Total number of sacks			=	14.8678016

*If chloride concentration is not specified, use 215,000 mg/L. Chloride concentrations from formation water databases or adjacent wells are currently not acceptable.

= Required Field

Compliance Option 2
Drilling Waste Disposal Assessment Checklist

Compliance Option 2 - Drilling Waste Disposal Assessment Checklist

If any response to the checklist questions leads to a Phase 2 ESA requirement or there is insufficient information to complete the Compliance Option Two Checklist, a Phase 2 ESA must be conducted in accordance with Compliance Option Three.

1. General Disposal and Drilling Fluid Information:
The well licensee should be able to review various sources of information pertaining to the drilling activities on-site. Many information sources, other than the *Notification of Drilling Waste Disposal*, *Drilling Waste Management Disposal Form*, or *Drilling Waste Pipeline Disposal Form* can be reviewed for information relating to the drilling waste disposal and drilling fluid systems. These can include Tour Reports, daily drilling records, well files, and contractor invoices.

1.0 Well Information:

Unique Identifier (UI)	Para et al Liard F-36 Re-entry
Spud Date	December 23, 1998
Well Depth	2110

1.1 Disposal Method (if known)*: Unknown

* If waste was disposed at an AER or ESRD approved facility, list supporting documentation under Reference Documents.

1.2 Disposal Location (if known)**: Unknown

** If checklist indicates that a Phase 2 ESA (Compliance Option Three) is required, it must be undertaken at the disposal location. If the disposal location is unknown, the Phase 2 ESA must be undertaken at the wellsite.

For the purpose of this form: if the disposal method and/or location remains unknown after all available information sources have been checked, the drilling waste disposal location is assumed to be on-site.

	Yes	No
1.3 Were there other drilling waste disposal events on the site (e.g. wellbore re-entry or another well drilled, using fluids containing drilling fluid additives)?	☒	☐
If yes, were the disposal areas separate from one another?	☒ Drilling waste information must be evaluated for each disposal.	☐ Drilling waste information must be evaluated by combining the drilling fluid additives and well depths. If drilling waste information is missing or incomplete for one or both wells, a Phase 2 (Compliance Option Three) is required.

	Yes	No
1.4 Was a remote site used? If, Yes, is the remote site included in this reclamation application? If not included, is the remote site a multi-well disposal location?	☐ ☐ ☐ In Comments section, indicate which well the remote site will be tied to for the purposes of reclamation	☒ ☐ ☐ Single well remote disposal site must be included with reclamation certificate application, unless it already has received a Reclamation Certificate.
1.5 Has the well licensee reviewed the Daily Drilling Records and other available drilling documentation?	☒	☐ Phase 2 required
1.6 Can it be determined from the available records what type of drilling fluid system was used?	☒	☐ Phase 2 required
1.7 Were water-based drilling fluids used for all sections (i.e., gel chemical drilling fluid systems)? If No, is there evidence that demonstrates the non-water based wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., appropriately approved waste management facility)?	☐ ☐	☒ ☒ Phase 2 required
1.8 Is a mud list available? If Yes, can all the additives on the mud list be identified and described? Record the additives and their description (e.g., chrome-free lignosulfonate, aldehyde-based bactericide, etc.) on the attached form.	☒ ☒	☐ Phase 2 required ☐ Phase 2 required

	Yes	No
1.9 Do the Daily Drilling Records show evidence of a flow or kick that may have resulted in the introduction of produced fluids (i.e., hydrocarbons or salts) into the drilling fluids?	☐	☒
If Yes, is there information/documentation available to demonstrate that they were appropriately treated or disposed of as per *Directive 50* or *Directive 58* (i.e., approved waste management facility)?	☐	☐ Phase 2 required
1.10 Do the Daily Drilling Records show evidence of returned drill stem test fluids?	☒	☐
If Yes, is there information/documentation available to demonstrate that they were appropriately treated or disposed of as per *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐	☒
If treatment or disposal as per *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* cannot be confirmed, is there sufficient information/documentation available to complete the DST calculations?	☒ Show calculation on attached form	☐ Phase 2 required
1.11 Were cement returns buried on-site or at a remote site linked to the well?	☐	☐

2. Hydrocarbon Management

	Yes	No
2.1 Was hydrocarbon-based drilling fluid used?	☒	☐
If Yes, is there evidence that wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐	☒ Phase 2 required

	Yes	No
2.2 Was the well a horizontal oil well? If Yes, is there evidence that wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐ ☐	☒ ☐ Phase 2 required
2.3 Was the well drilled using under-balanced techniques? If Yes, is there information/documentation available to demonstrate that the drilling wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐ ☐	☒ ☐ Phase 2 required
2.4 Was hydrocarbon added to the drilling fluid? If Yes, was the hydrocarbon contaminated drilling waste disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☒ ☐	☐ ☒ Phase 2 required

3. Metals (Trace Elements) Management

	Yes	No
3.1 Was the disposal completed before November 1, 2012?	☒ Complete questions 3.2 to 3.5	☐ Go to question 3.6
3.2 Was barite added to the drilling fluid? If Yes, did it meet the requirements specified in the attached metal calculation table?	☒ ☒ Show calculation on attached form	☐ ☐ Phase 2 required

	Yes	No
3.3 Was zinc carbonate added to the drilling fluid?	☐	☒
If Yes, did it meet the requirements specified in the attached metal calculation table?	☐ Show calculation on attached form	☐ Phase 2 required
3.4 Were chrome-based thinners added to the drilling fluid?	☐	☒
If Yes, did it meet the requirements specified in the attached metal calculation table?	☐ Show calculation on attached form	☐ Phase 2 required
3.5 Were any other additives used that would have triggered testing for metals under Section 3 or 5 of *Directive 50 (1996 version)*?	☐	☒
If Yes, are waste analytical data and application rates (land treatment, landspreading) or maximum application (mix-bury-cover) available?	☐	☐ Phase 2 required
If above data are available, did the application rate or maximum application meet *Directive 50* requirements?	☐	☐ Phase 2 required
3.6 Did metal concentrations in the waste trigger a requirement for post-disposal sampling?	☐	☐
If yes, did all post-disposal samples meet the soil metal endpoints specified in Section 3 of *Directive 50* (2012 version)?	☐	☐ Phase 2 required

4. Salinity Management

	Yes	No
4.1 Does the water based drilling waste meet the requirements specified in the attached Salt Calculation Table?	☐ Show calculation on attached form	☒ Phase 2 required
4.2 Was a salt zone encountered during drilling?	☐	☒
If Yes, is there evidence that demonstrates the drilling wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., appropriately approved waste management facility)?	☐	☐ Phase 2 required

Main Hole Drilling Mud Additive List (1494 – 2110 metres)

Product Name	Amount Used	Brief Description of Product
Calcium Carbonate	238 sacks @ 25 kg	Weighting Material
Calcium Chloride Fines	22 sacks @ 40 kg	Weighting Material/Calcium Chloride Fine
Carbomul SEA	4 units @ 55 G	Emulsifier
Carbotec L SEA	3 units @ 55 G	Oil Mud Emulsifier
Carbo TEQ-E Invert	63 m^3	Hydrocarbon, Lubricant
Diesel Fuel	24 m^3	Hydrocarbon, Lubricant
Lime	82 sacks @ 20 kg	Alkalinity pH Control
Mil-Bar	1118 kg @ 40 kg	Barite, Weighting Material
Mil-Clean	1 unit @ 55 G	Surface Active Agent
OilGel 3000	37 sacks @ 22.7 kg	Viscosifier
Sawdust	77 sacks @ 18.1 kg	Lost Circulation Material
SoluFlake Fine	50 sacks @ 22.7 kg	Flaked Calcium Carbonate, LCM
SoluFlake Medium	16 sacks @ 22.7 kg	Flaked Calcium Carbonate, LCM

Reference Documents (List all source documents used in the completion of this checklist. Attach additional pages if necessary. Documents must be supplied to the AER if requested.)

Concord Drilling Fluids Ltd. Well Data Recap & Summary
Paramount Resources Ltd. Daily Drilling Report
Chiron Technologies Inc. Drilling Waste Analysis Form & Pump-off/Lease Diagram
Paramount Well File Information
Mackenzie Valley Land and Water Board – Public Registry – Online Review System

Comments (Please provide any additional comments relevant to the decision process within the checklist. Attach additional pages if necessary.)

According to the June 1999 Final Well Report, the main hole was drilled using a nitrified calcium chloride invert mud system. There was no information in available documentation reviewed with respect to how or where the main hole drilling waste was disposed of. As a worst case scenario, it is assumed that the drilling waste was disposed of on site.

The drilling waste does not meet the requirements of the Compliance Option 2 checklist and associated calculations and further investigation of a potential on site drilling waste disposal area is required.

Location: Para et al Liard F-36 Re-entry **Spud:** 23-Dec-98

Metal Calculations for Compliance Options One and Two

Note: Different default mix ratios are provided depending on whether the well was drilled before or after October 22, 1996. The 1996 version of *Guide 50* , *Drilling Waste Management,* which was issued by the Energy Resources Conservation Board on this date, increased the minimum mix ratio requirement from 1:1 to 3:1.

Barite:

Directions: Fill in the number of sacks and adjust for sack weight if different than 40 kg. Enter the Well Depth in metres. The spreadsheet will calculate the number of sacks per metre. This value must be less than or equal to **0.22** If the value exceeds the objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Total Number of Sacks (40 kg/sack*)		Well Depth (m)		Mix Ratio**		Sacks per Metre	
1118	÷	2110	÷	3	=	0.18	Meets

* Sack weight may be adjusted by dividing the number of sacks by 40 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter “3”. If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

Location: Para et al Liard F-36 Re-entry **Spud:** 23-Dec-98

Salt Calculations for Option 2:

Alternative 2

If the volume of drilling waste is not known, use the following calculator to determine the NaOH Equivalent Sacks per metre of well depth. This value must be less than **0.0260** for wells drilled before October 22 1996, or **0.0350** for wells drilled on or after this date. If the value exceeds the target, a Phase 2 ESA (Compliance Option 3) must be conducted.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Well Depth in metres. The spreadsheet will calculate the NaOH Equivalent Sacks per Metre.

Additive	Number of sacks (25 kg/sack*)		NaOH Equivalency Factor		NaOH Equivalent Sacks
Caustic Soda		X	1.00	=	0
Soda Ash		X	0.75	=	0
Sodium Chloride		X	0.68	=	0
Sodium Bicarbonate		X	0.95	=	0
Sodium Silicate		X	1.37	=	0
Sodium acid pyrophosphate (SAPP)		X	0.22	=	0
Calcium Chloride	35.2	X	0.72	=	25.344
Calcium Nitrate		X	0.34	=	0
Envirofloc		X	0.41	=	0
Gypsum**		X	0.59	=	0
Lime**	42.2	X	1.08	=	45.576
** Max = 0.02 x well depth (m)					
Potassium chloride		X	0.54	=	0
Potassium sulphate		X	0.46	=	0
Caustic potash		X	0.71	=	0
Potassium formate		X	0.47	=	0
Potassium silicate		X	0.32	=	0
Potassium nitrate		X	0.40	=	0
Diammonium phosphate		X	0.63	=	0
Ammonium nitrate		X	0.57	=	0
Ammonium sulphate		X	0.61	=	0
Drill Stem Test Returns	365.4372985	X	0.68	=	248.497363

Total NaOH Equivalent Sacks	=	319.417363	
Well Depth (m)	÷	2110	**Result**
NaOH Equivalent Sacks per Metre	=	**0.1514**	**Exceeds**

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Note: Up to 0.02 sacks of gypsum and lime per metre of well depth should be counted with other salt additives. Because of the limited solubility of gypsum and lime, sacks in excess of this value need not be counted.

= Required Field

Drill Stem Test Return Calculations for Compliance Option Two

Location: Para et al Liard F-36 Re-entry **Spud:** 23-Dec-98

Alternative 2: Chloride

Directions: Enter the drill stem diameter for the drill stem test (DST) section in millimeters, the length of the DST return (including mud returns) in metres and the chloride concentration of the DST fluid in mg/L. The spreadsheet will calculate the equivalent number of sacks. This value must be entered in the salt calculation in the cell labelled "Drill Stem Test Returns".

Inner Diameter of Pipe (mm)	Length of Drill Stem Test Return (m)	Volume of Returns (m^3)*		Chloride Concentration* (mg/L)				Number of Sacks
84.8	43	0.242733555	x	250000	÷	7600	=	7.98465642
84.8	80	0.451597312	x	250000	÷	7600	=	14.8551747
84.8	1750	9.8786912	x	250000	÷	7600	=	324.956947
84.8	95	0.536271808	x	250000	÷	7600	=	17.64052
		0	x		÷	7600	=	0
		0	x		÷	7600	=	0
						Total number of sacks	=	365.437299

*If chloride concentration is not specified, use 215,000 mg/L. Chloride concentrations from formation water databases or adjacent wells are currently not acceptable.

= Required Field

APPENDIX D

Site Visit Photos



Photograph 1: View of corrosion inhibitor tank, facing west.



Photograph 2: View of a drum of Norkool ™ standing beside radio tower on northwest edge of lease.



Photograph 3: View of electrical boxes along lease edge.



Photograph 4: View of flare knockout tank, facing southwest.



Photograph 5: View of former tank area on the west side of the lease, facing southwest.



Photograph 6: View of pilings associated with radio tower, facing north.



Photograph 7: View of radio tower, facing north.



Photograph 8: View of radio tower shack, facing northwest.



Photograph 9: View of damaged pipe rack in western corner of lease, facing west.



Photograph 10: View of water well on the north side of the lease, facing northwest.



Photograph 11: View of pilings on the north side of lease, facing north.



Photograph 12: View of methanol tank farm area, facing south.



Photograph 13: View of facilities, facing east.



Photograph 14: View from well centre facing east.



Photograph 15: View from well centre, facing west.



Photograph 16: View of well centre facing south.

May 12, 2017

Paramount Resources Ltd.
4700 Bankers Hall West
888 3rd Street SW
Calgary, Alberta T2P 5C5

Attention: **Larry Yoon, B.Sc., P.Biol.**
Environmental Specialist

Reference: **F-36 (60° 10' 123° 15')**
NWT Phase 2 Environmental Site Assessment

North Shore Environmental Consultants Inc. is pleased to submit our Phase 2 Environmental Site Assessment Report for the F-36 (60° 10', 123° 15') wellsite to Paramount Resources Ltd.

North Shore appreciated the opportunity to work on this project and if we can provide clarification of any part of this report, please call the undersigned at (780) 467-3354.

Yours truly,

North Shore Environmental Consultants Inc.



Brent Walchuk B.Sc., P.Ag.
Remediation/Reclamation Supervisor

NORTH SHORE
Environmental Consultants

Paramount Resources Ltd.
Para et al Fort Liard F-36 60°10' 123°15'
Phase 2 Environmental Site Assessment
May 2017



Paramount Resources Ltd.
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EXECUTIVE SUMMARY

North Shore Environmental Consultants Inc. (North Shore) was retained by Paramount Resources Ltd. (Paramount) to conduct a Phase 2 Environmental Site Assessment (ESA) at the F-36 (60° 10', 123° 15') wellsite (Site) located near Fort Liard, NWT. The objective of the Phase 2 ESA was to assess areas of potential environmental concern identified during the Phase 1 ESA conducted by North Shore in March 2017. Assessment activities included collecting soil samples to determine if select compounds used or produced on the Site exceed the applicable remediation guidelines. The areas of potential environmental concern included the following:

- Well centre;
- Production facility/former spill areas;
- Flare stack area;
- Potential drilling waste disposal area (DWDA) associated with the well re-entry, including the former sump area on the northwest portion of the site; and
- Drilling flare pit area.

Between February 1, 2017 and February 3, 2017, 37 boreholes were advanced at the Site. Based on a review of the analytical data, field observations, and field screening information from the Phase 2 ESA, several analyzed soil parameters did not meet the applicable remediation guidelines. Additionally, soil impacts that were identified during the Phase 2 ESA were not fully delineated.

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1 INTRODUCTION

North Shore Environmental Consultants Inc. (North Shore) was retained by Paramount Resources Ltd. (Paramount) to conduct a Phase 2 Environmental Site Assessment (ESA) at the Para et al Liard F-36 (60° 10', 123° 15') wellsite (Site) located near Fort Liard, Northwest Territories (NWT).

1.1 Objective

The objective of the Phase 2 ESA was to assess areas of potential environmental concern identified during the Phase 1 ESA conducted by North Shore in March 2017 (North Shore, 2017).

1.2 Scope of Work

The scope of work for the Phase 2 ESA included the following:

- Review background information to assist with establishing site specific protocols.
- Prepare for ground disturbance activities. The defined work area included the lease and a 30 metre (m) buffer zone around the lease boundary.
- Supervise two sets of private utility locating surrounding the proposed ground disturbance locations.
- Conduct a tailgate safety meeting prior to initiating work each day at the Site. This includes North Shore personnel and contractors.
- Characterize and delineate any suspected impacted areas and advance two control boreholes near the site boundary location in a landscape representative of onsite topography.
- Log soil stratigraphy according to the Canadian System of Soil Classification (CSSC) (Soil Classification Working Group, 1998) with additional comments on potential impacts. Collect samples from each borehole and record organic vapor readings.
- Collect borehole soil samples as required based on field screening results.
- Collect field duplicates for every ten samples submitted for analysis.
- Submit selected soil samples for laboratory analysis to determine concentrations of suspected contaminants and background concentrations for control soil.
- Prepare a Phase 2 ESA report to document the results of the laboratory analysis.

2 BACKGROUND

2.1 Site Description

The Site is located at Unit F, Section 36 Grid Area 60° 10', 123° 15' approximately 40 kilometres (km) southeast of Fort Liard, NWT. Access to the site is from the west. A location map of the Site is included as Figure 1 and a survey plan is included in Appendix A.

2.2 Land Use and Receptors

The lease is situated on Crown land in a mixed-wood forested area. The Site has not been reclaimed, but natural encroachment from the surrounding forest is evident throughout the lease. A satellite image of the quarter section is included as Figure 2. Site photographs are included as Appendix B.

2.3 Site History and Infrastructure

The Para et al Liard F-36 well was drilled over two winter seasons. It was spudded on March 3, 1998 and drilled until March 28, 1998 to a depth of 1494 m. Drilling of the main hole was completed the following winter between December 23, 1998 and February 5, 1999 to a final depth of 2110 m. The well produced sweet natural gas, condensate and produced water between 2000 and 2005 before the site was deactivated by Paramount in April 2008.

Infrastructure identified in association with the site includes the following: wellhead, two pipe racks, radio tower, meter building, two separator skids, methanol tank within a 1 m high steel containment, aboveground storage tank (AST) in secondary containment, flare knockout drum with vent stack, pig launcher, surface piping, risers, fuel tank and other various chemical barrels and tanks. There were no remote sumps identified in association with the wellsite.

A total of four spills were reported on the wellsite between 2001 and 2003 and included a 1000 litre (L) release of condensate and produced water from a storage tank, a 150 L release of condensate water from a storage tank, a 10 L release of methanol water from a riser on the wellsite, and a 12 L release of glycol from a drum or barrel on the site. A NWT spill report also identified an off lease spill along the access road into the F-36 wellsite between January 21 and 23, 2000. It was estimated that 800 L of waste was released on the access road during rig move events and accumulated in two low spots along the road; however the exact locations are not known. There was contradicting information available with respect to the type of material released. One spill report indicated that the spill material may have contained hydrocarbons and had a hydrocarbon odor while another spill report identified the material as drilling fluid. Snow was windrowed to the road center and then cleaned up and taken to the remote drilling waste lined sump at O-35.

2.4 Previous Environmental Work

A Phase 1 ESA was completed by North Shore in March 2017 (North Shore, 2017). Areas of potential of environmental concern that were recommended for investigation included:

- Well centre;
- Production facility/former spill areas;
- Flare stack area;
- Potential drilling waste disposal area (DWDA) associated with the well re-entry, including the former sump area on the northwest portion of the site; and
- Drilling flare pit area.

3 METHODOLOGY

3.1 Safe Work Procedures

North Shore personnel adhered to Paramount Resources policies and procedures to complete the assessment and investigation program. Standard oilfield personal-protective equipment (hard hat, steel-toed boots, safety glasses, and fire retardant coveralls) were worn by all personnel on-site. A calibrated four way gas monitor for H_2S, O2, CO, and organic vapours was also carried by each person participating in the field work. Nitrile gloves were worn when handling soil samples. All personnel onsite were required to possess copies of the applicable safety certification (Ground Disturbance Level 2, H_2S Alive, Transportation of Dangerous Goods, Workplace Hazardous Material Information System, and Standard Level First Aid). North Shore personnel acquired a Paramount Resources Safe Work Permit prior to commencing fieldwork and a tailgate safety meeting was conducted at the beginning of each work day.

Prior to initiating any ground disturbance, a file review was completed and the proposed assessment area was swept by a third party company for the presence of buried facilities.

3.2 Drilling Program

3.2.1 Borehole Drilling

Between February 1 and 3, 2017, 37 boreholes were advanced as part of the drilling program (Figure 3). Boreholes were completed using a tracked-mounted B-57 drilling rig equipped with 15 cm solid-stem. Boreholes were completed to a maximum depth of 10.5 metres below ground level (mbgl), depending on the assessment location and subsurface conditions.

Delineation of potentially impacted areas was based on field screening, visual cues, and professional judgment. Vertical and horizontal delineations were completed to determine the spatial extent of the potentially impacted material. If potentially impacted material was identified during borehole logging, vertical delineation was completed by sampling parameters above the suspected impact zone and to a depth of 1.0 m below the suspected lowest point of contamination. Horizontal delineation was completed by advancing boreholes in 5.0 m horizontal increments in each direction (north, south, east, and west) until clean material, as determined by field screening and professional judgment, was identified. Select delineation samples were collected for laboratory analyses. The GPS location, reference from a fixed point, and rationale of each borehole is included in the borehole logs in Appendix C.

3.3 Soil Sampling

Throughout the sample collection process, North Shore adhered to sampling procedures described in the Canadian Council of Ministers of Environment (CCME) Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites (CCME, 1993). Samples of the recovered soil were visually inspected for evidence of impact such as free product, staining, or discoloration. The outermost layer of the samples was trimmed using a soil tool to avoid cross-contamination. North Shore personnel wore a pair of clean, chemical resistant nitrile gloves for each soil sample collected as an added preventative cross-contamination measure.

Soil vapor concentrations were field screened for volatile hydrocarbon constituents using an RKI Eagle gas detector (RKI Eagle), calibrated with a 400 parts per million (ppm) concentration of hexane gas with the methane elimination switch turned on. Samples selected for vapor screening were placed into plastic bags, sealed, agitated, and allowed to volatilize. Volatile organic compounds (VOCs) that accumulated within the headspace were then measured in ppm or percent of the lower explosive limit (LEL) and recorded on the borehole logs.

Soil samples were also field screened for salinity related parameters by measuring electrical conductivity (EC) using a Spectrum Technologies Inc. Field Scout Soil and Water EC Metre (EC Probe). Prior to sampling, the EC probe was calibrated with a 2.76 dS/m calibration solution. Once the soil on the auger had been trimmed, the EC probe was inserted directly into the soil media in order to obtain an in-situ EC reading. The EC reading was allowed to stabilize for three seconds before being recorded in the field documents.

All soil samples were placed in sealable plastic bags for field screening organic vapors and inorganic analyses. Soil samples for volatile organic analyses included field preservation with methanol and glass jars with Teflon-lined lids for all other organic analyses. Jarred samples were packed tightly to minimize headspace, help prevent the loss of VOCs, and minimize biodegradation. All samples collected were labeled and placed in a cooler with ice or ice packs to maintain a temperature as close to 4°C as possible. Soil samples were transported to an accredited laboratory for analysis. Standard chain of custody protocols were followed during the transport of the samples.

Soil characteristics at each borehole location were described using classification procedures and terminology from The Canadian System of Soil Classification (Soil Classification Working Group, 1998).

3.4 Quality Assurance and Quality Control

3.4.1 Laboratory QA/QC

Soil samples collected during the February 1 to February 3, 2017, sampling event were submitted to AGAT Laboratory (AGAT) in Calgary, Alberta for analysis. The analytical suite was selected based on regulated compounds that are typically found on oil and gas sites.

AGAT is a Standards Council of Canada (SCC), ISO 9000 Series and ISO/IEC 17025 accredited laboratory and Canadian Association of Environmental Analytical Laboratories (CAEAL) accredited laboratory that uses ESRD recognized methods to conduct laboratory analyses. Method blanks, control standards samples, Certified Reference Material (CRM) standards, method spikes, replicates, duplicates, and instrument blanks are routinely analyzed as part of the QA/QC program at the laboratory. AGAT has indicated that analytical data is only released if it passes the laboratory QA/QC procedures. A summary of the QA/QC procedures adopted by AGAT during the analyses of samples for petroleum hydrocarbon concentrations, salinity parameters, and metals concentrations is included in Appendix D.

4 COMPARISON GUIDELINES

4.1 Comparison Guidelines

Selection of the appropriate set of guidelines is based on the texture of the dominant soil type along with current and potential future land use as determined in the assessment. Where both fine and coarse grain strata are present, grain size is determined by the stratum governing horizontal and vertical migration to a receptor. Fourteen soil samples collected from depths ranging from 0.0 to 6.4 mbgl were analyzed for particle size (75 micron sieve). Ten samples were reported to be fine-grained and four samples were reported to be coarse-grained. The areas of concern assessed during the Phase 2 ESA were predominantly located within fine grained soil; therefore, the fine grained soil guidelines were applied.

As per the direction of Paramount, the guidelines for residential/parkland land use were applied to the Site and laboratory values were compared to the following:

- Soil regulated metals, glycol, benzene, toluene, ethylbenzene, and xylenes (BTEX), PHC fractions F1-F4 and polycyclic aromatic hydrocarbons (PAH) results were compared to the Canadian Council of Ministers of the Environment (CCME) - Tier 1 Soil Remediation Guidelines (CCME, 2017).
- Saturated paste boron and methanol results were compared to the AEP Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Tier 1 Guidelines; AEP, 2016a).
- Soil EC, Sodium Adsorption Ration (SAR) and pH values were compared to Environmental Guidelines for Contaminated Site Remediation (EGCSR, 2003) Environment Division. Government of the Northwest Territories (EGCSR, 2003).
- Soil EC and SAR values in the DWDA were compared to the ERCB Directive 050 Equivalent Salinity Guidelines (Directive 050 Guidelines; ERCB, 2012) or if control soils exceed these guidelines, to maximum control concentrations (SCAR Guidelines, AENV, 2001).

4.2 Background Control Characterization and Salinity Guidelines

During the Phase 2 ESA, two control boreholes (17C01 and 17C02) were advanced in undisturbed background locations to a maximum depth of 10.5 mbgl. The purpose of the control sampling was to characterize background soil conditions and to determine the generic salt remediation guideline values for the Site.

One topsoil and six subsoil samples were collected from the two control locations and selected samples were submitted for detailed salinity and/or trace metal analyses.

All control EC and SAR results complied with the CCME and EGCSR Guidelines. The onsite values were compared to the same general EC and SAR range. One of the seven control samples reported a pH value of 5.90 that did not meet the EGCSR Guidelines. This is an indication that the soils in the area have naturally occurring low pH values. Two samples reported selenium values of 1.3 mg/kg and 1.2 mg/kg. When the values are rounded to the appropriate number of significant digits, the value meets

the applicable guideline. All of the other control samples met the applicable remediation guidelines. (Tables 2 through 3).

5 RESULTS OF FIELD INVESTIGATION

5.1 Stratigraphy

Based on the boreholes advanced during the drilling program, soil conditions generally consisted of sandy clay fill from the cut and fill construction of the wellsite over a sandy clay to heavy clay parent material.

5.2 Soil Results

Soil results for areas of concern are summarized in Sections 5.2.1 through 5.2.6. The laboratory analyses for soil samples are presented in Tables 1 through 5 along with the applicable comparison guidelines.

5.2.1 Well Centre Area

Five boreholes (17BH01 to 17BH05) were advanced to a maximum depth of 4.5 mbgl to assess and delineate the well centre area. The boreholes were advanced prior to abandonment; therefore the wellhead was still in place. Ground cover in the area was uniform and similar to the surrounding lease. VOC field screening results from the well centre samples were all less than 60 ppm. EC field screening results from well centre samples ranged from 0.04 to 0.81 dS/m.

Four samples (including one duplicate sample) from borehole 17BH01 were submitted for petroleum hydrocarbons, and three samples were submitted for detailed salinity and metal analyses. All of the samples exceeded applicable remediation guidelines for either benzene, ethylbenzene, PHC F2, and/or PHC F3. Additionally one sample exceeded chromium guidelines. All other analyzed parameters complied with the applicable guidelines.

Eight samples collected from the delineation boreholes were analyzed for petroleum hydrocarbons and four samples were analyzed for chromium. One of the samples did not meet the applicable remediation guidelines for PHC F2. All of the remaining delineation samples met the applicable remediation guidelines for hydrocarbons and chromium. Vertical delineation of the impacts and lateral delineation of the chromium were accomplished, however lateral delineation of the hydrocarbon impacts was not achieved as part of the assessment.

5.2.2 Production Facilities Area

Ten boreholes (17BH06, 17BH10 to 17BH18) were advanced within production facility areas. Boreholes were advanced to a maximum depth of 3.0 mbgl. All above and below ground infrastructure was in place at the time of the assessment, which affected the placement of some boreholes. Due to the unknown location of the various spills on the wellsite, soil samples were collected in areas with a high likelihood of being associated with former release areas.

Ten samples were submitted for petroleum hydrocarbon, 12 samples were submitted for metals analysis, ten samples were submitted for detailed salinity analysis and 11 samples were submitted for glycol and/or methanol analysis.

One sample reported a selenium value of 1.2 mg/kg, which exceeds the applicable guideline, however when rounded to the nearest appropriate significant digit, the value meets CCME guidelines. One sample collected within a meter shack area did not meet the applicable remediation guidelines for EC with a value if 2.80 dS/m. The identified exceedance was delineated vertically, but not laterally. Upon review of the chemistry contributing the elevated EC value, it was determined that the EC value is potentially being driven by higher concentrations of sodium, calcium, and sulphate that occur naturally in the parent material. The EC value is not believed to be associated with oil and gas activity, given the chloride concentration of 6 mg/kg and lack of any other guideline exceedance for the petroleum hydrocarbons, metals and detailed salinity parameters analysed in the general production facility area. The exceedance is also at depth, below 1 mbgl, and will be placed even deeper in the soil profile upon reclamation, and is not expected to negatively affect vegetation or equivalent land use capability. All of the other soil samples collected within the former production facility/spill areas met the applicable remediation guidelines or were comparable to background control values.

At the time of the assessment, the location of the former spill area along the access road that was noted in the Phase 1 ESA was unknown and a visual assessment could not be completed due to snow covered ground conditions. The access road will be visually assessed during the growing season for any visual signs of a former spill area. If warranted, soil samples will be collected from any suspect areas at that time.

5.2.3 Flare Area

Six boreholes (17BH19 to 17BH24) were advanced to assess and delineate the flare stack and flare knockout tank area. Thirteen soil samples were submitted for petroleum hydrocarbon analysis, twelve samples were submitted for metals and detailed salinity analysis, and nine samples were submitted for PAH analysis to assess the areas of concern.

Three samples from the flare knockout tank exceeded the applicable remediation guidelines for benzene, toluene, ethylbenzene, PHC F2, and/or naphthalene. One sample from the flare stack did not meet the applicable remediation guidelines for EC with a value of 2.45 dS/m. Upon review of the chemistry contributing the elevated EC value, it was determined that the EC value is potentially being driven by higher concentrations of sodium, calcium, and sulphate that occur naturally in the parent material. The EC value is not believed to be associated with oil and gas activity, given the chloride concentration of < 2 mg/kg and lack of any other guideline exceedance for the petroleum hydrocarbons, metals and detailed salinity parameters analysed in the flare stack area. The exceedance is also at depth, below 1 mbgl, and will be placed even deeper in the soil profile upon reclamation, and is not expected to negatively affect vegetation or equivalent land use capability. All other samples submitted for analysis met the applicable remediation guidelines.

Lateral delineation of the hydrocarbon and PAH impacts associated with the flare knockout tank were accomplished, however vertical delineation was not achieved as part of the assessment. Lateral and

vertical delineation of the elevated EC values associated with the flare stack and lagoon area was not achieved as part of the assessment.

5.2.4 Lagoon Area

One borehole (17BH25) was advanced to assess the lagoon area. Two samples were submitted for petroleum hydrocarbons, and three samples were submitted for metals and detailed salinity. Two samples reported EC values of 2.41 dS/m and 2.36 dS/m. Upon review of the chemistry contributing the elevated EC values, it was determined that the EC values are potentially being driven by higher concentrations of sodium, calcium, and sulphate that occur naturally in the parent material. The EC values are not believed to be associated with oil and gas activity, given the chloride concentrations of < 2 mg/kg and lack of any other guideline exceedance for the petroleum hydrocarbons, metals and detailed salinity parameters analysed in the lagoon area. The exceedance is also at depth, below 1 mbgl, and will be placed even deeper in the soil profile upon reclamation, and is not expected to negatively affect vegetation or equivalent land use capability. All other samples submitted for analysis met the applicable remediation guidelines.

5.2.5 Drilling Waste Disposal Area

No surficial visual indicators (i.e., subsided areas or atypical vegetation) were present during the Phase 2 ESA to suggest the possible location of the DWDA. However, the Phase 1 ESA did note a DWDA northwest of well centre for the first well entry. Field observations identified suspected drilling waste material from 2.5 mbgl to a maximum depth of 3.9 mbgl in four boreholes (17BH26, 17BH27, 17BH32, and 17BH33).

Ten samples collected from the drilling waste mix zone were submitted for petroleum hydrocarbon, detailed salinity and/or metal analyses. Six samples did not meet the applicable remediation guidelines for benzene, toluene, and/or ethylbenzene. Arsenic, EC, SAR, and soil pH exceedances were also identified within the drilling waste mix zone. One sample reported a barium value above the applicable remediation guidelines, but met guidelines for fusion true total barium. All other samples submitted for analysis met the applicable remediation guidelines. Sample 17BH26 2.5-3.0 mbgl, which did not meet the remediation guidelines for arsenic, was re-run for arsenic using new material from the sample bag; the re-run sample still exceeded the remediation guidelines for arsenic with a value of 20.1 mg/kg.

One sample (17BH26 5.2-2.4 mbgl) was collected beneath the drill waste mix zone and was analyzed for petroleum hydrocarbons, metals and detailed salinity parameters. The sample met the applicable remediation guidelines, indicating that vertical delineation of the impacted area has been achieved.

Four delineation boreholes (17BH28, 17BH29, 17BH30, and 17BH31) were advanced to delineate the DWDA. Four samples collected from the boreholes were analyzed for petroleum hydrocarbons, metals and detailed salinity parameters. One sample did not meet the applicable remediation guidelines for arsenic with a value of 14.4 mg/kg. All of the other analyzed samples met the applicable remediation guidelines. With the exception of arsenic, lateral delineation of the DWDA was achieved as part of the assessment.

5.2.6 Potential Drilling Flare Pit Area

Two exploratory boreholes (17BH34 and 17BH35) were drilled in search of a potential drilling flare pit area. No visual impacts or field screening results were encountered in either borehole; therefore, no samples were submitted for laboratory analysis. Based on the location of the access road and the drilling waste disposal area, as well as the cut and fill construction of the wellsite, a drilling flare pit was unlikely to be constructed on the other boundaries of the wellsite and these areas were not investigated as part of the assessment.

5.3 Quality Assurance/Quality Control

Quality assurance and quality control for analytical data was also assessed by comparing analytical results from select samples to duplicate samples obtained from the same sample location. Primary and duplicate samples were compared and the relative percent differences (RPD) were calculated.

RPD criteria has been applied to field duplicates in order to evaluate the precision of the results. If both the original and duplicate sample concentrations are greater than or equal to five times the laboratory detection limit for a given parameter, the RPD should be less than or equal to 40% (water) and 60% (soils) (CCME, 2016). If the results lie outside of the range, they should be considered estimates only. The results of North Shore's QA/QC program are discussed in Section 5.3.1.

5.3.1 North Shore Environmental's QA/QC Program

Five soil sampling QA/QC measurements were conducted by duplicating soil samples 17C01 3.2 – 3.4 mbgl, 17BH01 1.7 – 1.9 mbgl, 17BH10 2.2-2.5 mbgl, 17BH25 1.3-1.5 mbgl and 17BH33 3.0-3.2 mbgl (referred to as Dup A 3.2-3.4 mbgl, Dup B 1.7-1.9 mbgl, Dup C 2.2-2.5 mbgl, Dup E 1.3-1.5 mbgl and Dup F 3.0-3.2 mbgl). Laboratory comparisons reported good reproducibility for all benzene, toluene, ethylbenzene and total xylene (BTEX), petroleum hydrocarbon (PHC) (F1 – F4), particle size, metals, soluble ions, pH, EC and SAR values, with the exception of two parameters. RPD values for Dup B (sulphate) and Dup F (benzene) exceeded the 60% criteria for soils. RPD value calculations and results for the QA/QC measurements are included in Tables 5 through 9.

6 SUMMARY AND CONCLUSIONS

North Shore completed a Phase 2 ESA on the Site between February 1 and 3, 2017. The assessment consisted of an assessment of the well centre, production facility/former spill areas, the flare stack/flare knockout/lagoon area, the DWDA, and potential drilling flare pit areas. A total of 37 boreholes were advanced, including two control locations.

Petroleum hydrocarbon and chromium exceedances were identified within the well centre area as part of the assessment. Petroleum hydrocarbon, arsenic, soil pH, EC and SAR values above the applicable remediation guidelines were identified within the drilling waste disposal area and the flare stack/knockout tank area did not meet the applicable remediation guidelines for petroleum hydrocarbon parameters. Elevated EC values were identified within a production facility area, the flare stack/knockout tank area, and the lagoon area. However, interpretation of the soil chemistry determined that the elevated EC values are likely naturally occurring. All of the remaining analyzed

soil samples met the applicable remediation guidelines or were comparable to background soil conditions.

Due to an unknown location and snow covered ground conditions at the time of the assessment, a former spill area that was identified along the access road was not investigated as part of the assessment. The access road will be visually assessed during the growing season for signs of a former spill and soil samples will be collected if warranted.

Based on field observations and laboratory analysis, further work is required in order for the wellsite to meet the applicable remediation guidelines.

7 DISCLOSURE

North Shore Environmental Consultants Inc. (North Shore) has prepared this report taking into account government regulations available at the time of the assessment. North Shore has not made an independent verification of historical or analytical results provided by third parties and therefore makes no assurances regarding the accuracy of such information. It has assumed such information is correct. Where indicated or implied the conclusions are based on visual observation and/or analytical testing conducted at the time of the assessment. The conclusions do not apply to any areas of the site not investigated.

This report is intended for the exclusive use of the company, organization, or individual to whom it is addressed and may not be relied upon by any third party without the express written permission of North Shore. The investigation and reporting has been conducted with a reasonable level of attention and skill, in accordance with standards prevailing in the environmental consulting profession at the time of report date in the location in which the report was prepared.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. North Shore accepts no responsibility for damages, if any, suffered by any third party as a result of the use of this report or any decisions made or actions based on this report.

8 CLOSURE

North Shore appreciated the opportunity to work on this project. If we can provide clarification of any part of this report, please contact the undersigned at (780) 467-3354.

This report was prepared by:



Kayle Watson, B.Sc., P.Ag.
Environmental Consultant

Reviewed By:



Brent Walchuk, B.Sc., P.Ag.
Remediation/Reclamation Supervisor

9 REFERENCES

Alberta Environment (AENV). 2012. *Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification*. ISBN: 978-1-4601-0442-2. July 2012.

Alberta Environment (AENV). 2001. Soil Quality Guidelines for Unrestricted Land Use from "Salt Contamination Assessment and Remediation Guidelines. Environmental Sciences Division. Edmonton, Alberta. Publication No. T/606. May 2001.

Alberta Environment and Parks (AEP). 2016a. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 197 pp. February 2, 2016. ISBN:978-1-4601-2695-0. (On-line Edition) Website http://aep.alberta.ca

Canadian Council of Ministers of Environment (CCME) 1993. Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites (CCME 1993).

Canadian Council of Ministers of the Environment (CCME). 2016. Volume 1 Guidance Manual: Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment. PN 1551. ISBN 978-1-77202-026-7 PDF. 2016.

Canadian Council of Ministers of Environment (CCME) 2017. Canadian Environmental Quality Guidelines Summary Table. Accessed On-line March, 2017. (CCME 2017).

Environmental Guidelines for Contaminated Site Remediation (EGCSR). 2003. Department of Environment and Natural Resources – Government of the Northwest Territories. (On-line Edition) Website http://www.enr.gov.nt.ca/sites/default/files/guidelines/siteremediation.pdf

North Shore Environmental Consultants. 2017. *Phase 1 Environmental Site Assessment Para et al Fort Liard I-46* Fort Liard, Northwest Territories. March 2017.

Soil Classification Working Group. 1998. *The Canadian System of Soil Classification*. 3rd edition. Agriculture and Agri-Food Canada. Publication 1646 (revised). 187pp.



TABLES

Paramount Resources Ltd.
Table 1. Soil - BTEX, Petroleum Hydrocarbons (F1-F4) and Grain Size
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	BTEX and PHC (F1-F4)										
			Benzene	Toluene	Ethylbenzene	Total Xylenes	Fraction 1[2]	Fraction 2	Fraction 3	Fraction 4[3]	Chrom. returned to baseline	% Moisture	Grain Size 75 µm Sieve
CCME Surface Soil Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**150**	**1300**	**5600**	**NC**	**NC**	**NC**
CCME Subsurface Soils Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**230**	**3500**	**10000**	**NC**	**NC**	**NC**
BACKGROUND CONTROLS													
17C01	0.8-1.0	01-Feb-17											Fine (31.7)
17C01	3.2-3.4	01-Feb-17											Fine (39.9)
17C01	5.8-6.0	01-Feb-17											Fine (44.5)
17C01	6.2-6.4	01-Feb-17											Coarse (56.1)
17C02	0.3-0.5	01-Feb-17											Fine (35.2)
17C02	0.8-1.0	01-Feb-17											Coarse (58.9)
17C02	3.2-3.4	01-Feb-17											Fine (28)
17C02	4.7-4.9	01-Feb-17											Coarse (76.8)
WELL CENTRE AREA													
17BH01	0.8-1.0	01-Feb-17	<0.005	<0.05	<0.01	<0.05	60	**5460**	**22600**	1280	Yes	13	
17BH01	1.7-1.9	01-Feb-17	**0.027**	<0.05	**0.26**	0.90	20	**864**	**3160**	198	Yes	12	
Dup B	1.7-1.9	01-Feb-17	**0.028**	<0.05	**0.36**	1.21	20	**1420**	**4970**	294	Yes	13	
17BH01	3.2-3.4	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	76	27	Yes	14	
17BH02	0.8-1.0	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	**351**	1240	50	Yes	14	
17BH02	1.7-1.9	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	17	110	11	Yes	10	
17BH03	0.8-1.0	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	19	<10	Yes	13	Fine (42.3)
17BH03	1.7-1.9	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	14	<10	Yes	12	
17BH04	0.8-1.0	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	12	<10	Yes	12	
17BH04	1.7-1.9	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	14	<10	Yes	14	Coarse (66.4)
17BH05	0.8-1.0	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	19	<10	Yes	12	
17BH05	1.7-1.9	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	12	
PRODUCTION FACILITIES AREA													
17BH10	0.8-1.0	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	17	12	Yes	12	
17BH11	0.3-0.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	17	<10	Yes	11	
17BH12	0.8-1.0	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	11	<10	Yes	11	
17BH13	0.8-1.0	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	18	<10	Yes	12	
17BH14	1.3-1.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	13	<10	Yes	11	
17BH15	0.0-0.2	02-Feb-17											Fine (41.9)
17BH15	0.3-0.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	62	27	Yes	15	
17BH16	0.8-1.0	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	63	31	Yes	11	
17BH17	0.8-1.0	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	15	10	Yes	12	
17BH17	2.2-2.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	15	<10	Yes	17	
17BH18	0.3-0.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	21	12	Yes	13	

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Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	BTEX and PHC (F1-F4)										
			Benzene	Toluene	Ethylbenzene	Total Xylenes	Fraction 1[2]	Fraction 2	Fraction 3	Fraction 4[3]	Chrom. returned to baseline	% Moisture	Grain Size 75 µm Sieve
CCME Surface Soil Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**150**	**1300**	**5600**	**NC**	**NC**	**NC**
CCME Subsurface Soils Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**230**	**3500**	**10000**	**NC**	**NC**	**NC**
FLARE AREA													
17BH19	0.3-0.5	02-Feb-17	**0.007**	<0.05	<0.01	<0.05	<10	<10	46	18	Yes	13	
17BH19	1.7-1.9	02-Feb-17	**0.372**	**0.12**	**2.52**	1.59	140	**335**	36	<10	Yes	15	
17BH19	3.2-3.4	02-Feb-17	**0.023**	<0.05	**0.17**	0.55	<10	<10	<10	<10	Yes	14	
17BH20	1.3-1.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	46	20	Yes	14	
17BH20	2.2-2.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	15	<10	Yes	15	
17BH21	0.3-0.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	18	<10	Yes	13	
17BH21	1.3-1.5	02-Feb-17											Fine (35.2)
17BH21	1.7-1.9	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	39	11	Yes	14	
17BH22	0.3-0.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	11	<10	Yes	12	
17BH22	1.7-1.9	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	16	
17BH23	0.3-0.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	26	16	Yes	12	
17BH23	1.7-1.9	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	16	10	Yes	11	
17BH24	0.3-0.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	41	15	Yes	12	
17BH24	1.7-1.9	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	25	12	Yes	14	
LAGOON AREA													
17BH25	0.8-1.0	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	42	13	Yes	13	
17BH25	2.8-3.0	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	34	12	Yes	17	
DRILLING WASTE DISPOSAL AREA													
17BH26	2.5-3.0	03-Feb-17	**0.014**	<0.05	**0.02**	<0.05	<10	<10	29	11	Yes	38	
17BH26	3.0-3.9	03-Feb-17	**0.025**	0.08	**0.06**	0.11	20	19	82	35	Yes	20	
17BH26	5.2-5.4	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	70	29	Yes	13	Fine (23.6)
17BH27	2.5-3.0	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	52	20	Yes	13	
17BH27	3.0-3.9	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	49	20	Yes	13	
17BH28	2.8-3.0	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	39	14	Yes	12	
17BH29	3.2-3.4	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	33	12	Yes	17	
17BH30	2.8-3.0	03-Feb-17	<0.005	<0.05	0.01	<0.05	<10	<10	44	16	Yes	12	Fine (43.6)
17BH31	3.2-3.4	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	32	13	Yes	11	
17BH32	2.5-3.0	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	10	76	29	Yes	13	
17BH32	3.0-3.9	03-Feb-17	**0.018**	0.07	**0.04**	0.08	<10	<10	64	24	Yes	15	
17BH33	2.2-3.0	03-Feb-17	**0.255**	**0.61**	**0.34**	1.06	30	34	130	68	Yes	18	
17BH33	3.0-3.2	03-Feb-17	**0.086**	**0.22**	**0.14**	0.37	10	12	75	31	Yes	12	
Dup F	3.0-3.2	03-Feb-17	**0.036**	**0.09**	**0.05**	0.15	<10	18	84	33	Yes	14	

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Fraction 1 petroleum hydrocarbons (C6-C10) minus benzene, toluene, ethylbenzene and xylene concentrations

[3] - Fraction 4 petroleum hydrocarbons (C34-C50 or >C34) as determined by high temperature gas chromatography

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 2. Soil - Regulated Metals
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Antimony (Sb)	Arsenic (As)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Fusion Barium (Ba) - True Total	Beryllium (Be)	Boron (B) Sat Paste (mg/L)	Cadmium (Cd)	Chromium (Cr) - Total	Hexavalent Chromium (Cr+6)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
CCME Guidelines[1] (mg/kg)			**20**	**12**	**500**	**NC**	**NC**	**4**	**nc**	**10**	**64**	**0.4**	**50**	**63**	**140**	**6.6**	**10**	**45**	**1**	**20**	**1**	**50**	**23**	**130**	**200**
AEP Tier 1 2016 Guidelines[2] (mg/kg)						**250**	**10000**																		
BACKGROUND CONTROLS																									
17C01	0.8-1.0	01-Feb-17	<0.5	9.7	188			0.6	<0.5	<0.5	17.7	<0.3	7.9	14.7	9.6	<0.5	1.7	19.1	<0.5	<0.5	<0.5	0.7	1.0	27.5	58
17C01	3.2-3.4	01-Feb-17	0.6	10.4	222			0.6	<0.5	0.5	16.6	<0.3	8.1	20.3	9.9	<0.5	2.9	22.1	**1.3**	<0.5	<0.5	0.6	2.2	26.1	72
Dup A	3.2-3.4	01-Feb-17	0.6	10.3	189			0.5	<0.5	<0.5	16.9	<0.3	7.0	14.5	9.3	<0.5	2.8	18.7	0.8	<0.5	<0.5	0.6	1.3	26.4	62
17C01	8.8-9.0	01-Feb-17	1.2	8.9	496			0.8	<0.5	0.6	21.5	<0.3	11.4	22.9	12.9	<0.5	2.1	35.3	**1.2**	<0.5	<0.5	0.7	1.4	32.1	95
17C02	1.7-1.9	01-Feb-17	0.6	9.3	230			0.6	<0.5	<0.5	16.0	<0.3	8.6	17.7	10.6	<0.5	2.0	22.2	<0.5	<0.5	<0.5	<0.5	1.4	30.2	105
17C02	4.3-4.5	01-Feb-17	0.7	7.9	221			0.6	<0.5	<0.5	19.5	<0.3	8.0	18.5	10.1	<0.5	1.9	22.2	0.9	<0.5	<0.5	0.6	1.5	27.5	74
WELL CENTRE AREA																									
17BH01	0.8-1.0	01-Feb-17	0.5	9.9	190			0.7	<0.5	<0.5	**145**	<0.3	7.9	17.9	10.7	<0.5	2.0	24.1	<0.5	<0.5	<0.5	0.6	1.3	29.7	63
17BH01	1.7-1.9	01-Feb-17	0.5	10.0	228			0.6	<0.5	<0.5	18.4	<0.3	7.8	14.7	9.9	<0.5	2.5	20.1	0.5	<0.5	<0.5	0.5	1.2	25.8	61
Dup B	1.7-1.9	01-Feb-17	0.6	10.4	304			0.7	<0.5	<0.5	18.6	<0.3	8.3	16.2	10.7	<0.5	2.7	21.7	<0.5	<0.5	<0.5	<0.5	1.2	30.0	69
17BH02	0.8-1.0	01-Feb-17									26.4														
17BH03	0.8-1.0	01-Feb-17									20.8														
17BH04	0.8-1.0	01-Feb-17									21.5														
17BH05	0.8-1.0	01-Feb-17									18.9														
PRODUCTION FACILITIES AREA																									
17BH06	0.0-0.2	01-Feb-17	0.6	9.8	256			0.6	<0.5	<0.5	17.7	<0.3	8.3	17.8	10.6	<0.5	2.2	22.8	0.7	<0.5	<0.5	<0.5	1.2	27.2	72
17BH10	0.0-0.2	01-Feb-17	0.6	10.5	249			0.6	<0.5	<0.5	17.6	<0.3	9.2	17.2	10.7	<0.5	2.4	22.9	0.9	<0.5	<0.5	<0.5	1.6	30.0	74
Dup C	2.2-2.5	01-Feb-17	0.5	10.1	194			0.8	<0.5	<0.5	20.8	<0.3	9.0	14.4	11.1	<0.5	1.7	21.4	0.7	<0.5	<0.5	0.5	1.1	35.3	64
17BH11	0.3-0.5	02-Feb-17	0.5	9.0	239			0.8	<0.5	<0.5	15.6	<0.3	7.1	12.9	9.4	<0.5	2.3	18.8	<0.5	<0.5	<0.5	<0.5	1.2	25.5	66
17BH12	1.3-1.5	02-Feb-17	0.5	8.8	225			0.6	<0.5	<0.5	17.1	<0.3	8.0	16.3	9.6	<0.5	2.3	21.3	0.8	<0.5	<0.5	<0.5	1.4	26.7	70
17BH13	1.3-1.5	02-Feb-17	0.6	10.9	214			0.6	<0.5	<0.5	17.1	<0.3	8.3	16.7	10.5	<0.5	2.3	21.8	0.6	<0.5	<0.5	0.5	1.4	29.9	71
17BH14	1.3-1.5	02-Feb-17	0.6	10.4	234			0.6	<0.5	<0.5	17.5	<0.3	8.3	17.2	12.0	<0.5	2.0	22.0	0.6	<0.5	<0.5	<0.5	1.1	29.9	72
17BH15	0.8-1.0	02-Feb-17	0.6	9.6	240			0.7	<0.5	<0.5	18.6	<0.3	8.7	16.5	11.7	<0.5	1.9	22.3	<0.5	<0.5	<0.5	<0.5	1.2	31.4	77
17BH16	1.3-1.5	02-Feb-17	<0.5	8.0	282			<0.5	<0.5	<0.5	12.4	<0.3	5.9	12.1	7.6	<0.5	1.8	16.0	0.8	<0.5	<0.5	<0.5	1.2	18.7	56
17BH17	0.3-0.5	02-Feb-17	0.6	11.6	223			0.6	<0.5	<0.5	17.3	<0.3	8.3	16.3	10.8	<0.5	2.5	22.3	0.6	<0.5	<0.5	<0.5	1.4	30.5	71
17BH17	2.8-3.0	02-Feb-17	0.6	10.3	148			0.8	<0.5	<0.5	20.4	<0.3	8.0	14.7	10.7	<0.5	1.7	19.9	0.6	<0.5	<0.5	0.5	1.1	31.5	61
17BH18	0.3-0.5	02-Feb-17	0.6	10.9	246			<0.5	<0.5	0.5	20.7	<0.3	8.2	19.6	9.7	<0.5	2.4	25.5	**1.2**	<0.5	<0.5	0.6	1.3	34.4	86

Paramount Resources Ltd.
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Phase 2 Environmental Site Assessment Report F-36
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Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Antimony (Sb)	Arsenic (As)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Fusion Barium (Ba) - True Total	Beryllium (Be)	Boron (B) Sat Paste (mg/L)	Cadmium (Cd)	Chromium (Cr) - Total	Hexavalent Chromium (Cr+6)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
CCME Guidelines[1] (mg/kg)			**20**	**12**	**500**	**NC**	**NC**	**4**	**nc**	**10**	**64**	**0.4**	**50**	**63**	**140**	**6.6**	**10**	**45**	**1**	**20**	**1**	**50**	**23**	**130**	**200**
FLARE AREA																									
17BH19	1.3-1.5	02-Feb-17	0.6	8.9	268			0.7	<0.5	<0.5	18.6	<0.3	8.7	17.0	11.2	<0.5	2.1	22.5	0.8	<0.5	<0.5	0.5	1.5	33.5	73
17BH19	1.7-1.9	02-Feb-17	0.6	11.0	297			<0.5	<0.5	<0.5	21.3	<0.3	9.2	20.0	10.4	<0.5	2.4	25.2	0.9	<0.5	<0.5	0.6	1.2	34.9	88
17BH20	1.3-1.5	02-Feb-17	<0.5	8.2	196			0.7	<0.5	<0.5	14.9	<0.3	7.8	17.4	10.6	<0.5	2.5	20.8	1.0	<0.5	<0.5	<0.5	1.7	23.4	69
17BH20	2.2-2.5	02-Feb-17	0.5	9.7	233			0.6	<0.5	<0.5	16.4	<0.3	7.9	17.2	10.3	<0.5	2.3	22.3	0.7	<0.5	<0.5	<0.5	1.3	26.7	72
17BH21	0.3-0.5	02-Feb-17	0.6	9.3	210			0.6	<0.5	<0.5	16.3	<0.3	7.6	15.0	10.5	<0.5	2.2	19.8	0.5	<0.5	<0.5	0.5	1.2	24.8	64
17BH21	1.7-1.9	02-Feb-17	<0.5	8.2	226			0.6	<0.5	<0.5	16.6	<0.3	7.7	15.7	9.6	<0.5	2.2	20.3	0.7	<0.5	<0.5	<0.5	1.2	24.9	63
17BH22	0.3-0.5	02-Feb-17	<0.5	8.4	183			0.6	<0.5	<0.5	15.7	<0.3	6.9	14.6	10.7	<0.5	2.2	18.5	0.6	<0.5	<0.5	<0.5	1.5	26.7	65
17BH22	1.7-1.9	02-Feb-17	0.6	9.7	208			0.7	<0.5	<0.5	63.3	<0.3	9.0	18.3	13.0	<0.5	2.2	24.6	0.6	<0.5	<0.5	<0.5	1.3	27.0	72
17BH23	0.3-0.5	02-Feb-17	<0.5	9.0	198			0.5	<0.5	<0.5	14.6	<0.3	7.8	14.7	8.9	<0.5	2.2	19.6	0.6	<0.5	<0.5	<0.5	1.1	24.3	64
17BH23	1.7-1.9	02-Feb-17	0.5	9.2	222			0.7	<0.5	<0.5	17.0	<0.3	8.1	15.7	10.3	<0.5	2.2	20.6	0.7	<0.5	<0.5	<0.5	1.2	27.3	69
17BH24	0.3-0.5	02-Feb-17	0.5	9.1	272			0.6	<0.5	<0.5	18.3	<0.3	7.5	16.7	10.0	<0.5	2.3	20.8	0.6	<0.5	<0.5	<0.5	1.3	24.8	67
17BH24	1.7-1.9	02-Feb-17	0.6	9.8	248			0.7	<0.5	<0.5	16.9	<0.3	8.4	16.8	11.2	<0.5	2.3	22.2	0.7	<0.5	<0.5	<0.5	1.3	26.4	74
LAGOON AREA																									
17BH25	1.3-1.5	03-Feb-17	0.6	9.0	198			0.6	<0.5	<0.5	15.1	<0.3	7.4	12.8	10.2	<0.5	2.0	18.6	0.6	<0.5	<0.5	0.6	1.3	27.6	69
Dup E	1.3-1.5	03-Feb-17	0.5	8.9	177			0.5	<0.5	<0.5	14.4	<0.3	6.2	12.9	8.4	<0.5	1.8	16.5	0.6	<0.5	<0.5	<0.5	1.3	23.6	58
17BH25	2.8-3.0	03-Feb-17	0.6	11.2	216			<0.5	<0.5	<0.5	24.2	<0.3	8.8	15.6	11.5	<0.5	1.8	22.9	0.7	<0.5	<0.5	0.6	1.0	38.1	80
DRILLING WASTE DISPOSAL AREA																									
17BH26	0.8-1.0	03-Feb-17		11.1																					
17BH26	2.5-3.0	03-Feb-17	1.5	**17.4**	210			0.6	<0.5	<0.5	20.4	<0.3	4.6	13.0	108	<0.5	1.8	11.7	0.7	<0.5	<0.5	3.5	1.4	22.9	116
17BH26 Re-run	2.5-3.0	03-Feb-17		**20.1**																					
17BH26	3.0-3.9	03-Feb-17	0.6	12.0	**1610**	37	5420	0.6	0.8	<0.5	17.0	<0.3	8.8	21.2	11.6	<0.5	3.4	25.4	0.8	<0.5	<0.5	0.7	1.1	25.2	82
17BH26	5.2-5.4	03-Feb-17		11.1																					
17BH27	2.5-3.0	03-Feb-17	0.5	9.8	259			0.5	<0.5	<0.5	15.4	<0.3	7.6	14.5	9.2	<0.5	2.1	20.7	0.8	<0.5	<0.5	<0.5	1.6	25.5	62
17BH27	3.0-3.9	03-Feb-17	<0.5	8.1	139			<0.5	<0.5	<0.5	12.0	<0.3	6.0	11.0	7.3	<0.5	1.9	16.0	0.8	<0.5	<0.5	<0.5	1.2	20.2	74
17BH28	2.8-3.0	03-Feb-17		11.5																					
17BH29	3.2-3.4	03-Feb-17		7.8																					
17BH30	2.8-3.0	03-Feb-17		9.8																					
17BH31	3.2-3.4	03-Feb-17		**14.4**																					
17BH32	2.5-3.0	03-Feb-17	0.5	9.8	264			0.6	<0.5	<0.5	14.1	<0.3	7.9	17.0	9.6	<0.5	2.3	20.7	0.8	<0.5	<0.5	<0.5	1.6	25.8	71
17BH32	3.0-3.9	03-Feb-17	<0.5	8.8	230			<0.5	<0.5	<0.5	16.8	<0.3	6.6	12.8	12.5	<0.5	1.8	17.8	0.7	<0.5	<0.5	<0.5	1.8	22.5	58
17BH33	2.2-3.0	03-Feb-17	<0.5	8.7	245			0.5	<0.5	<0.5	15.4	<0.3	7.7	15.1	12.3	<0.5	1.6	18.9	0.6	<0.5	<0.5	<0.5	1.2	26.7	62
17BH33	3.0-3.2	03-Feb-17	0.7	10.0	224			0.6	<0.5	0.5	15.8	<0.3	8.2	16.1	10.5	<0.5	3.0	22.4	0.9	<0.5	<0.5	0.6	1.5	25.7	71
Dup F	3.0-3.2	03-Feb-17	0.6	9.7	244			0.6	<0.5	0.6	17.3	<0.3	8.3	16.6	12.3	<0.5	3.5	22.6	1.0	<0.5	<0.5	0.5	1.6	27.2	81

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Alberta Environment and Parks (AEP). 2016. Alberta Tier 1 Soil and Groundwater Remediation Guidelines

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Bold - When the value is rounded to the appropriate number of significant digits, the value meets the applicable guideline

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 3. Soil - Detailed Salinity
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Lab pH (6.0-8.5)[1]	Lab EC (dS/m)	SAR	Saturation %	Soluble Ions						Guideline
							Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO4) mg/kg	
CCME Guidelines[1]					<5								1
EGCSR Guidelines[2]			6-8	<2	<5								2
BACKGROUND CONTROLS													
17C01	0.8-1.0	01-Feb-17	**5.90**	0.18	0.32	45	3	9	2	<2	2	8	1,2
17C01	3.2-3.4	01-Feb-17	7.85	0.84	0.36	50	8	58	11	12	7	132	1,2
Dup A	3.2-3.4	01-Feb-17	7.53	0.66	0.28	48	5	43	8	9	6	87	1,2
17C01	8.8-9.0	01-Feb-17	7.95	0.62	2.79	58	41	21	5	8	5	69	1,2
17C02	0.0-0.2	01-Feb-17	6.59	0.51	0.07	156	5	190	19	16	20	72	1,2
17C02	0.8-1.0	01-Feb-17	7.32	0.41	0.21	39	3	27	4	<2	14	12	1,2
17C02	2.8-3.0	01-Feb-17	7.70	0.62	0.23	45	4	40	8	3	3	73	1,2
17C02	4.7-4.9	01-Feb-17	7.28	0.36	0.47	21	3	9	2	<2	<2	10	1,2
WELL CENTRE AREA													
17BH01	0.8-1.0	01-Feb-17	6.83	0.60	0.19	59	5	64	10	<2	<2	53	1,2
17BH01	1.7-1.9	01-Feb-17	7.28	0.40	1.20	76	24	30	7	<2	27	42	1,2
Dup B	1.7-1.9	01-Feb-17	7.33	0.64	1.37	59	27	38	8	<2	37	99	1,2
PRODUCTION FACILITIES AREA													
17BH10	0.0-0.2	01-Feb-17	7.49	0.17	0.51	45	7	25	5	3	<2	18	1,2
Dup C	2.2-2.5	01-Feb-17	7.00	0.56	0.40	50	8	41	7	<2	<2	72	1,2
17BH11	0.3-0.5	02-Feb-17	7.96	0.47	0.26	41	4	28	5	2	4	21	1,2
17BH12	1.3-1.5	02-Feb-17	7.40	0.52	0.24	46	4	30	6	4	4	21	1,2
17BH13	1.3-1.5	02-Feb-17	7.52	0.52	0.40	41	6	27	7	2	5	34	1,2
17BH14	1.3-1.5	02-Feb-17	7.46	0.46	0.50	43	7	30	5	<2	<2	31	1,2
17BH15	0.8-1.0	02-Feb-17	7.11	0.70	0.41	51	9	59	9	2	4	99	1,2
17BH16	1.3-1.5	02-Feb-17	7.42	**2.80**	0.82	42	34	218	56	8	6	853	1,2
17BH17	0.3-0.5	02-Feb-17	7.49	0.54	0.39	47	7	35	7	2	<2	39	1,2
17BH17	2.8-3.0	02-Feb-17	7.07	0.62	0.25	42	4	40	7	<2	3	39	1,2

Paramount Resources Ltd.
Table 3. Soil - Detailed Salinity
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Lab pH (6.0-8.5)[1]	Lab EC (dS/m)	SAR	Saturation %	Soluble Ions						Guideline
							Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO4) mg/kg	
CCME Guidelines[1]					<5								1
FLARE AREA													
17BH19	1.3-1.5	02-Feb-17	7.68	1.77	0.37	52	15	187	34	6	16	572	1,2
17BH19	1.7-1.9	02-Feb-17	7.70	0.64	0.46	49	8	37	8	3	16	74	1,2
17BH20	1.3-1.5	02-Feb-17	7.42	**2.45**	0.10	52	5	287	53	7	<2	936	1,2
17BH20	2.2-2.5	02-Feb-17	7.42	1.62	0.19	53	7	155	32	4	<2	541	1,2
17BH21	0.3-0.5	02-Feb-17	7.39	0.40	0.26	50	4	27	6	<2	<2	52	1,2
17BH21	1.7-1.9	02-Feb-17	7.49	0.60	0.29	52	6	41	10	2	10	117	1,2
17BH22	0.3-0.5	02-Feb-17	7.38	0.30	0.11	51	<2	21	4	<2	<2	18	1,2
17BH22	1.7-1.9	02-Feb-17	7.26	0.48	0.58	53	11	34	8	<2	3	93	1,2
17BH23	0.3-0.5	02-Feb-17	7.40	0.38	0.24	42	3	20	5	<2	<2	32	1,2
17BH23	1.7-1.9	02-Feb-17	7.47	0.54	0.28	49	5	32	9	2	6	89	1,2
17BH24	0.3-0.5	02-Feb-17	7.45	0.35	0.22	46	3	20	4	<2	<2	35	1,2
17BH24	1.7-1.9	02-Feb-17	7.47	0.54	0.56	47	9	31	6	<2	<2	92	1,2
LAGOON AREA													
17BH25	1.3-1.5	03-Feb-17	7.25	**2.41**	0.15	52	7	287	42	6	<2	832	1,2
Dup E	1.3-1.5	03-Feb-17	7.25	**2.36**	0.17	57	9	296	45	7	<2	827	1,2
17BH25	2.8-3.0	03-Feb-17	7.24	1.68	0.29	50	11	163	25	5	17	489	1,2
DRILLING WASTE DISPOSAL AREA													
17BH26	0.8-1.0	03-Feb-17	7.56	1.81	1.79	46	50	98	19	3	<2	447	3
17BH26	2.5-3.0	03-Feb-17	**12.3**	**7.92**	1.00	113	134	1220	<1	45	945	90	3
17BH26	3.0-3.9	03-Feb-17	**9.77**	3.02	**38.1**	51	378	14	<1	8	154	1320	3
17BH26	5.2-5.4	03-Feb-17	7.70	0.46	0.43	61	7	25	7	6	4	62	3
17BH27	2.5-3.0	03-Feb-17	7.77	0.99	2.05	46	38	42	8	5	6	136	3
17BH27	3.0-3.9	03-Feb-17	7.95	0.90	1.60	39	25	35	7	7	9	118	3
17BH28	2.8-3.0	03-Feb-17	7.69	1.16	0.71	49	16	54	13	6	16	230	3
17BH29	3.2-3.4	03-Feb-17	7.71	0.78	0.41	35	6	29	7	5	4	95	3
17BH30	2.8-3.0	03-Feb-17	7.65	0.99	2.11	40	32	30	8	3	6	145	3
17BH31	3.2-3.4	03-Feb-17	7.65	0.85	0.39	52	8	46	11	7	21	190	3
17BH32	2.5-3.0	03-Feb-17	7.69	0.78	2.25	49	38	33	6	3	6	106	3
17BH32	3.0-3.9	03-Feb-17	7.71	1.40	**15.0**	38	109	8	2	3	11	181	3
17BH33	2.2-3.0	03-Feb-17	**9.62**	4.43	**14.5**	61	502	146	1	14	29	1480	3
17BH33	3.0-3.2	03-Feb-17	7.85	1.46	**16.2**	34	114	8	2	4	13	170	3
Dup F	3.0-3.2	03-Feb-17	**8.02**	0.97	**11.7**	41	103	10	2	4	12	141	3

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Environmental Guidelines for Contaminated Site Remediation (EGCSR). 2003

[3] - 2012 Alberta "Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification" as per Alberta Directive 50 Equivalent Guidelines

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NA - Not Applicable

NS - Not Specified

3.

2012 Alberta "Assessing Drilling Waste Disposal Areas: Compliance Options for Remediation Certification"		
Value Ratings	**Pass**	**Fail**
Topsoil		
EC dS/m	**<2**	**>2**
SAR	**<6**	**>6**
Below Topsoil to 1 metre		
EC dS/m	**<3**	**>3**
SAR	**<8**	**>8**
Below 1 meter		
EC dS/m	**<6**	**>6**
SAR	**<10**	**>10**

Paramount Resources Ltd.
Table 4. Soil - Polycyclic Aromatic Hydrocarbons
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b+j+k)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	B[a]P TPE	IACR (Fine/Coarse)
CCME Guidelines[1] (mg/kg)			**0.013**	**NC**	**0.28**	**0.25**	**0.046**	**2.5**	**20**	**10**	**1**	**6.2**	**1**	**6.2**	**20**	**1**	**1**	**NC**	**5.3**	**≤1**
FLARE AREA																				
17BH19	0.3-0.5	02-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH19	1.7-1.9	02-Feb-17	**1.04**	<0.005	<0.005	0.06	0.04	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH19	3.2-3.4	02-Feb-17	**0.014**	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH20	1.3-1.5	02-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH20	2.2-2.5	02-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH21	1.7-1.9	02-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH22	1.7-1.9	02-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH23	1.7-1.9	02-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH24	1.7-1.9	02-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guideline

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 5. Soil - Glycols and Methanol
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Ethylene Glycol	Diethylene Glycol	Triethylene Glycol	Tetraethylene Glycol	Propylene Glycol	Methanol	% Moisture
CCME Guidelines[1] (mg/kg)			**960**					**NC**	**NC**
AEP Tier 1 2016 Soil Guidelines[2] (mg/kg)			**62**					**37**	
PRODUCTION FACILITIES AREA									
17BH06	0.0-0.2	01-Feb-17	<10	<10	<10	<10	<10	5.2	
17BH10	0.0-0.2	01-Feb-17						4.6	
17BH11	0.0-0.2	02-Feb-17						1.3	
17BH12	0.0-0.2	02-Feb-17						3.0	
17BH13	0.0-0.2	02-Feb-17						8.4	
Dup D	0.0-0.2	02-Feb-17						7.2	
17BH14	0.0-0.2	02-Feb-17						5.6	
17BH15	0.0-0.2	02-Feb-17						14.7	
17BH16	0.0-0.2	02-Feb-17						2.3	
17BH17	0.0-0.2	02-Feb-17						5.5	
17BH18	0.0-0.2	02-Feb-17	<10	<10	<10	<10	<10	4.3	

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Alberta Environment and Parks (AEP). 2016. Alberta Tier 1 Soil and Groundwater Remediation Guidelines

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.

Table 6. Soil - Quality Control - BTEX and Petroleum Hydrocarbons (F1-F4)

Phase 2 Environmental Site Assessment Report F-36

May 2017

Sample ID	Sample Date (dd-mm-yy)	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	Fraction 1 mg/kg	Fraction 2 mg/kg	Fraction 3 (mg/kg)	Fraction 4[3] (mg/kg)
17BH01 1.7-1.9	01-Feb-17	**0.027**	<0.05	**0.26**	0.90	20	**864**	**3160**	198
Dup B 1.7-1.9	01-Feb-17	**0.028**	<0.05	**0.36**	1.21	20	**1420**	**4970**	294
Detection Limit		0.005	0.05	0.01	0.05	10	10	10	10
Difference		-0.001	#VALUE!	-0.1	-0.31	0	-556	-1810	-96
Relative Percent Difference		-3.64	#VALUE!	-32.26	-29.38	0.00	-48.69	-44.53	-39.02
Duplicate Sample Results		Good	---	Good	Good	Good	Good	Good	Good

Sample ID	Sample Date (dd-mm-yy)	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	F1 (C6-C10) mg/kg	F2 (C10-C16) mg/kg	Fraction 3 (mg/kg)	Fraction 4[3] (mg/kg)
17BH33 3.0-3.2	03-Feb-17	**0.086**	**0.22**	**0.14**	0.37	10	12	75	31
Dup F 3.0-3.2	03-Feb-17	**0.036**	**0.09**	**0.05**	0.15	<10	18	84	33
Detection Limit		0.005	0.05	0.01	0.05	10	10	10	10
Difference		0.05	0.13	0.09	0.22	#VALUE!	-6	-9	-2
Relative Percent Difference		81.97	83.87	94.74	84.62	#VALUE!	-40.00	-11.32	-6.25
Duplicate Sample Results		Poor	NA	NA	NA	---	Good	Good	Good

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility

Poor - Evaluation indicates poor reproducibility

Blank - Not analyzed

--- - Not applicable

NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 7. Soil - Quality Control - Regulated Metals
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Date	Antimony (An)	Arsenic (As)	Barium (Ba)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Beryllium (Be)	Boron (B)	Cadmium (Cd)	Chromium (Cr) - Total	Chromium (Cr) - Hex.	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
	(dd-mm-yy)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
17C01 3.2-3.4	01-Feb-17	0.6	10.4	222			0.6	<0.5	0.5	16.6	<0.3	8.1	20.3	9.9	<0.5	2.9	22.1	**1.3**	<0.5	<0.5	0.6	2.2	26.1	72
Dup A 3.2-3.4	01-Feb-17	0.6	10.3	189			0.5	<0.5	<0.5	16.9	<0.3	7.0	14.5	9.3	<0.5	2.8	18.7	0.8	<0.5	<0.5	0.6	1.3	26.4	62
Detection Limit		0.5	0.5	0.5	---	---	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Difference		0.0	-0.1	-33	---	---	-0.1	#VALUE!	#VALUE!	0.3	#VALUE!	-1.1	-5.8	-0.6	#VALUE!	-0.1	-3.4	-0.5	#VALUE!	#VALUE!	0	-0.9	0.3	10
Relative Percent Difference		0.00	-0.97	-16.06	---	---	-18.18	#VALUE!	#VALUE!	1.79	#VALUE!	-14.57	-33.33	-6.25	#VALUE!	-3.51	-16.67	-47.62	#VALUE!	#VALUE!	0.00	-51.43	1.14	14.93
Duplicate Sample Results		Good	Good	Good	---	---	Good	---	---	Good	---	Good	Good	Good	---	Good	Good	Good	---	---	Good	Good	Good	Good

Sample ID	Sample Date	Antimony (An)	Arsenic (As)	Barium (Ba)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Beryllium (Be)	Boron (B)	Cadmium (Cd)	Chromium (Cr) - Total	Chromium (Cr) - Hex.	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
	(dd-mm-yy)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
17BH01 1.7-1.9	01-Feb-17	0.5	10.0	228			0.6	<0.5	<0.5	18.4	<0.3	7.8	14.7	9.9	<0.5	2.5	20.1	0.5	<0.5	<0.5	0.5	1.2	25.8	61
Dup B 1.7-1.9	01-Feb-17	0.6	10.4	304			0.7	<0.5	<0.5	18.6	<0.3	8.3	16.2	10.7	<0.5	2.7	21.7	<0.5	<0.5	<0.5	<0.5	1.2	30.0	69
Detection Limit		0.5	0.5	0.5	---	---	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Difference		0.1	0.4	76	---	---	0.1	#VALUE!	#VALUE!	0.2	#VALUE!	0.5	1.5	0.8	#VALUE!	0.2	1.6	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0	4.2	-8
Relative Percent Difference		18.18	3.92	28.57	---	---	15.38	#VALUE!	#VALUE!	1.08	#VALUE!	6.21	9.71	7.77	#VALUE!	7.69	7.66	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00	15.05	-12.31
Duplicate Sample Results		Good	Good	Good	---	---	Good	---	---	Good	---	Good	Good	Good	---	Good	Good	---	---	---	---	Good	Good	Good

Sample ID	Sample Date	Antimony (An)	Arsenic (As)	Barium (Ba)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Beryllium (Be)	Boron (B)	Cadmium (Cd)	Chromium (Cr) - Total	Chromium (Cr) - Hex.	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
	(dd-mm-yy)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
17BH25 1.3-1.5	03-Feb-17	0.6	9.0	198			0.6	<0.5	<0.5	15.1	<0.3	7.4	12.8	10.2	<0.5	2.0	18.6	0.6	<0.5	<0.5	0.6	1.3	27.6	69
Dup E 1.3-1.5	03-Feb-17	0.5	8.9	177			0.5	<0.5	<0.5	14.4	<0.3	6.2	12.9	8.4	<0.5	1.8	16.5	0.6	<0.5	<0.5	<0.5	1.3	23.6	58
Detection Limit		0.5	0.5	0.5	---	---	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Difference		-0.1	-0.1	-21	---	---	-0.1	#VALUE!	#VALUE!	-0.7	#VALUE!	-1.2	0.1	-1.8	#VALUE!	-0.2	-2.1	0	#VALUE!	#VALUE!	#VALUE!	0	-4	11
Relative Percent Difference		-18.18	-1.12	-11.20	---	---	-18.18	#VALUE!	#VALUE!	-4.75	#VALUE!	-17.65	0.78	-19.35	#VALUE!	-10.53	-11.97	0.00	#VALUE!	#VALUE!	#VALUE!	0.00	-15.63	17.32
Duplicate Sample Results		Good	Good	Good	---	---	Good	---	---	Good	---	Good	Good	Good	---	Good	Good	Good	---	---	---	Good	Good	Good

Sample ID	Sample Date	Antimony (An)	Arsenic (As)	Barium (Ba)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Beryllium (Be)	Boron (B)	Cadmium (Cd)	Chromium (Cr) - Total	Chromium (Cr) - Hex.	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
	(dd-mm-yy)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
17BH33 3.0-3.2	03-Feb-17	0.7	10.0	224			0.6	<0.5	0.5	15.8	<0.3	8.2	16.1	10.5	<0.5	3.0	22.4	0.9	<0.5	<0.5	0.6	1.5	25.7	71
Dup F 3.0-3.2	03-Feb-17	0.6	9.7	244			0.6	<0.5	0.6	17.3	<0.3	8.3	16.6	12.3	<0.5	3.5	22.6	1.0	<0.5	<0.5	0.5	1.6	27.2	81
Detection Limit		0.5	0.5	0.5	---	---	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Difference		-0.1	-0.3	20	---	---	0	#VALUE!	0.1	1.5	#VALUE!	0.1	0.5	1.8	#VALUE!	0.5	0.2	0.1	#VALUE!	#VALUE!	-0.1	0.1	1.5	-10
Relative Percent Difference		-15.38	-3.05	8.55	---	---	0.00	#VALUE!	18.18	9.06	#VALUE!	1.21	3.06	15.79	#VALUE!	15.38	0.89	10.53	#VALUE!	#VALUE!	-18.18	6.45	5.67	-13.16
Duplicate Sample Results		Good	Good	Good	---	---	Good	---	Good	Good	---	Good	Good	Good	---	Good	Good	Good	---	---	Good	Good	Good	Good

Rev: 17.01.25

Notes:
Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 8. Soil - Quality Control - Detailed Salinity
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17C01 3.2-3.4	01-Feb-17	7.85	0.84	0.36	8	58	11	12	7	132
Dup A 3.2-3.4	01-Feb-17	7.53	0.66	0.28	5	43	8	9	6	87
Detection Limit		---	0.05	---	2	1	1	2	2	2
Difference		0.32	0.18	0.08	3	15	3	3	1	45
Relative Percent Difference		4.16	24.00	25.00	46.15	29.70	31.58	28.57	15.38	41.10
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	Good	Good	Good

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17BH01 1.7-1.9	01-Feb-17	7.28	0.40	1.20	24	30	7	<2	27	42
Dup B 1.7-1.9	01-Feb-17	7.33	0.64	1.37	27	38	8	<2	37	99
Detection Limit		---	0.05	---	2	1	1	2	2	2
Difference		0	0	-0.17	-3	8	-1	#VALUE!	-10	-57
Relative Percent Difference		0.68	46.15	-13.23	-11.76	23.53	-13.33	#VALUE!	-31.25	-80.85
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	---	Good	Poor

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17BH25 1.3-1.5	03-Feb-17	7.25	**2.41**	0.15	7	287	42	6	<2	832
Dup E 1.3-1.5	03-Feb-17	7.25	**2.36**	0.17	9	296	45	7	<2	827
Detection Limit		---	0.05	---	2	1	1	2	2	2
Difference		0	0	-0.02	-2	9	-3	-1	#VALUE!	5
Relative Percent Difference		0.00	-2.10	-12.50	-25.00	3.09	-6.90	-15.38	#VALUE!	0.60
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	Good	---	Good

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17BH33 3.0-3.2	03-Feb-17	7.85	1.46	**16.2**	114	8	2	4	13	170
Dup F 3.0-3.2	03-Feb-17	**8.02**	0.97	**11.7**	103	10	2	4	12	141
Detection Limit		---	0.05	---	2	1	1	2	2	2
Difference		0	0	4.5	11	2	0	0	1	29
Relative Percent Difference		2.14	-40.33	32.26	10.14	22.22	0.00	0.00	8.00	18.65
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	Good	Good	Good

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 9. Soil - Quality Control - Glycols
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Date (dd-mm-yy)	Ethylene Glycol	Diethylene Glycol	Triethylene Glycol	Tetraethylene Glycol	Propylene Glycol	Methanol
17BH13 0.0-0.2	02-Feb-17						8.4
Dup D 0.0-0.2	02-Feb-17						7.2
Detection Limit		---	---	---	---	---	0.5
Difference		---	---	---	---	---	1.2
Relative Percent Difference		---	---	---	---	---	15.38
Duplicate Sample Results		---	---	---	---	---	Good

Rev: 17.01.25

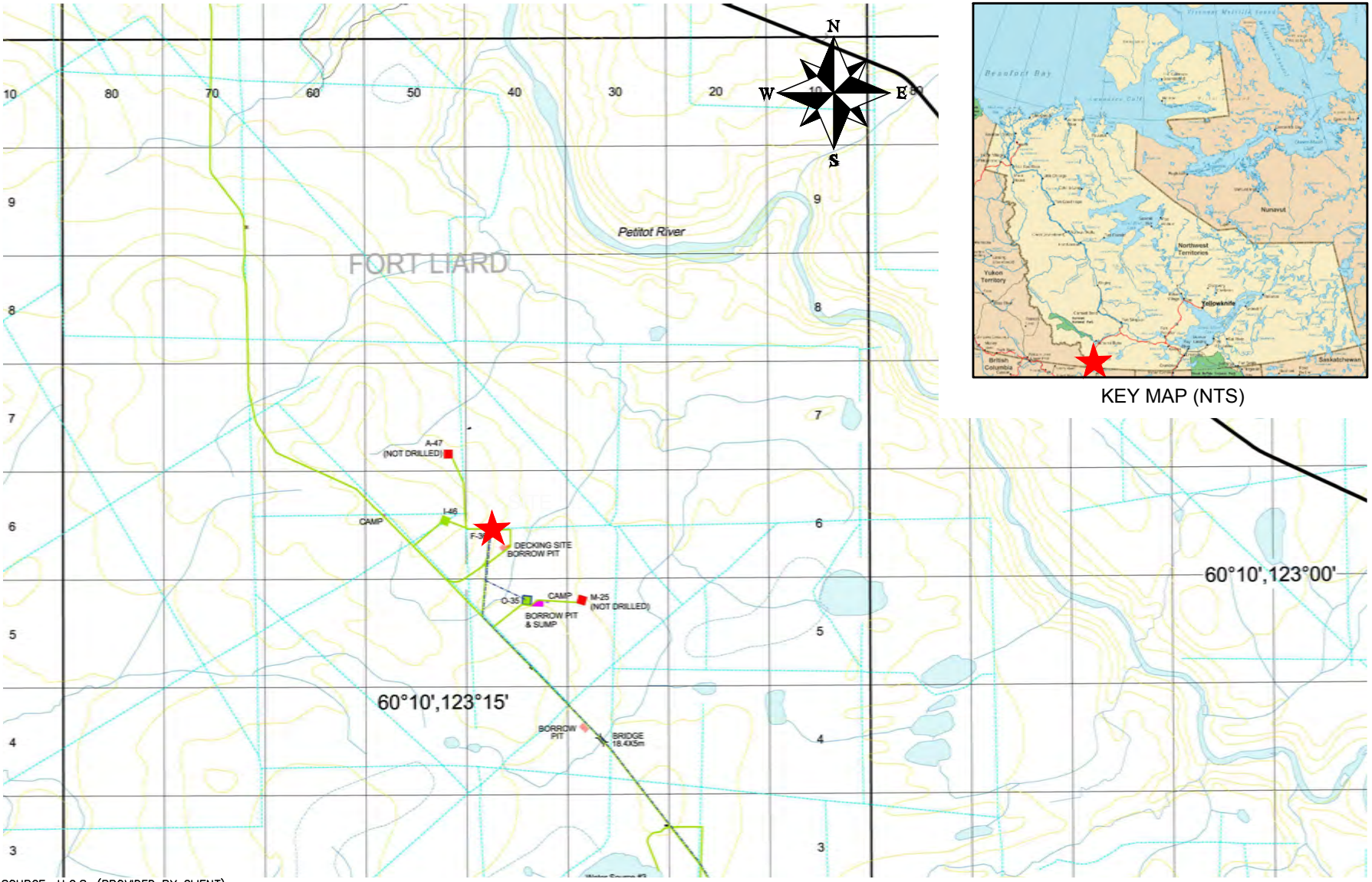
Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply



FIGURES

File: F-36_SLM.dwg Date: March-08-17 10:08:23 AM



KEY MAP (NTS)

SOURCE: U.G.S. (PROVIDED BY CLIENT)

SITE LOCATION MAP

0 1000 2000 000m

Scale 1 : 100 000

NORTH SHORE
Environmental Consultants

Date: 08-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. F-36 (NORTHWEST TERRITORIES)	Figure: 1
File name: F-36_SLM-A.dwg	Requested by: DM		

File: F-36_17PH2.dwg Date: March-13-17 5:01:28 PM



SEPTEMBER 2001 SATELLITE AERIAL PHOTO SOURCE: DIGITALGLOBE (IKONOS)

LEGEND

WELL CENTRE

0 50 100 200m

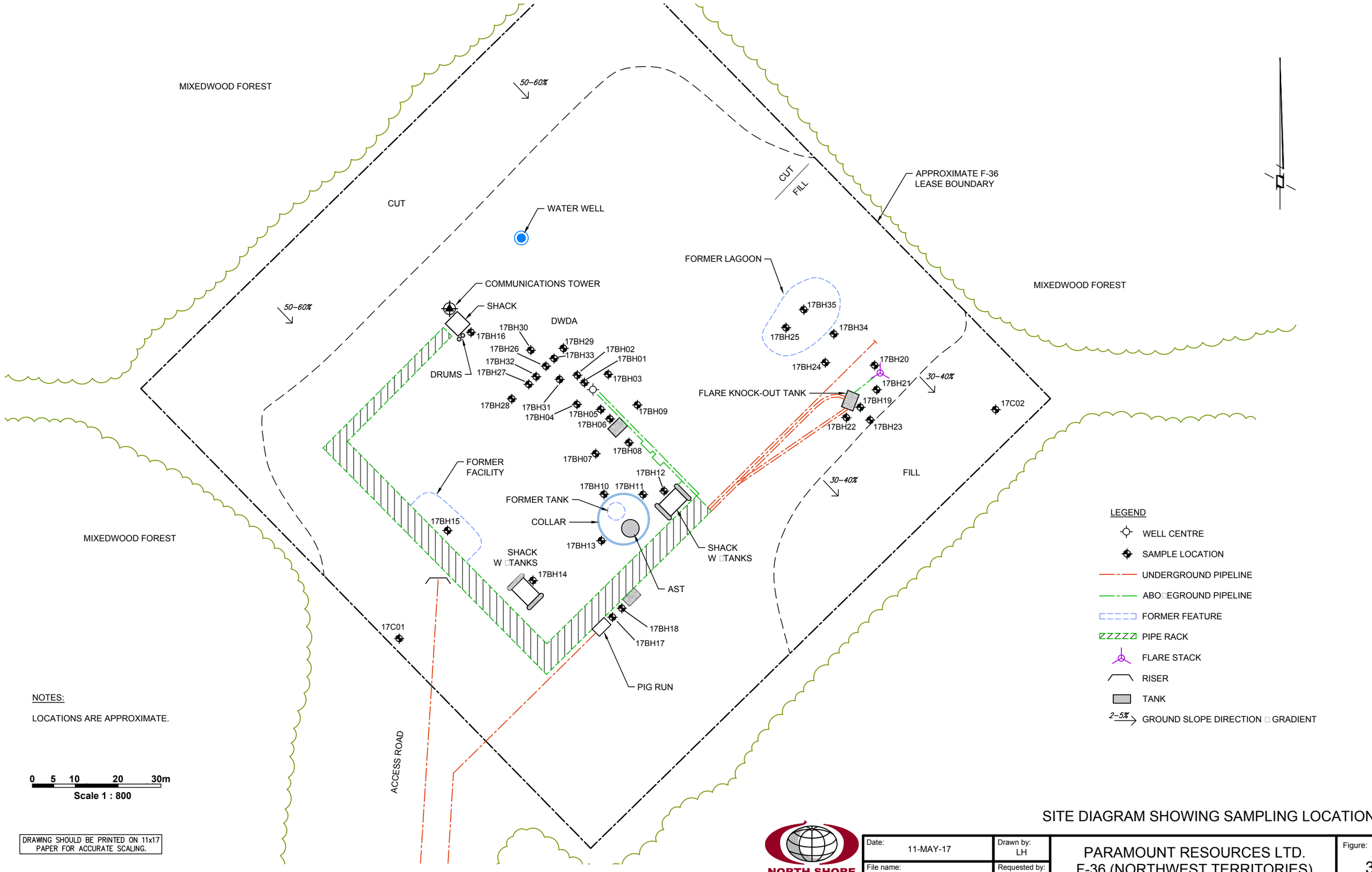
Scale 1 : 5000

AERIAL O□ER□IEW

NORTH SHORE
Environmental Consultants

Date: 24-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. F-36 (NORTHWEST TERRITORIES)	Figure: 2
File name: F-36_17PH2P-A.dwg	Requested by: DM		

File: F-36_17PH2.dwg Date: March-24-17 12:37:12 PM



LEGEND

- WELL CENTRE
- SAMPLE LOCATION
- UNDERGROUND PIPELINE
- ABOVEGROUND PIPELINE
- FORMER FEATURE
- PIPE RACK
- FLARE STACK
- RISER
- TANK
- 2-5% GROUND SLOPE DIRECTION / GRADIENT

NOTES:

LOCATIONS ARE APPROXIMATE.

0 5 10 20 30m

Scale 1 : 800

DRAWING SHOULD BE PRINTED ON 11x17 PAPER FOR ACCURATE SCALING.

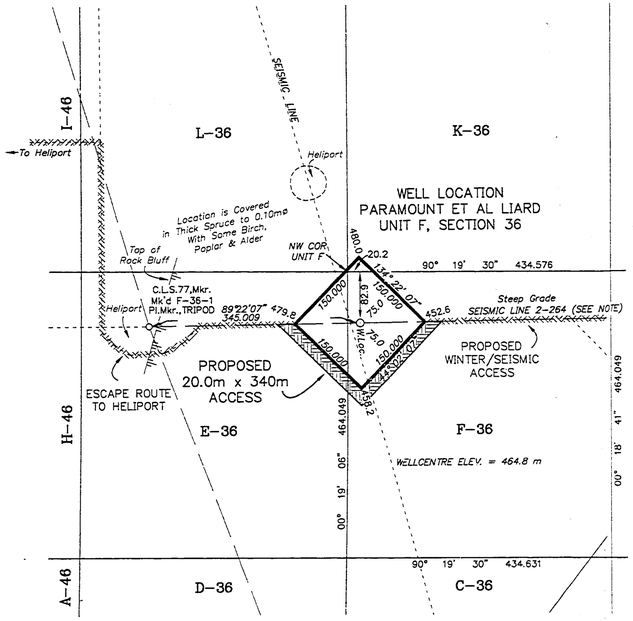
SITE DIAGRAM SHOWING SAMPLING LOCATION

NORTH SHORE Environmental Consultants

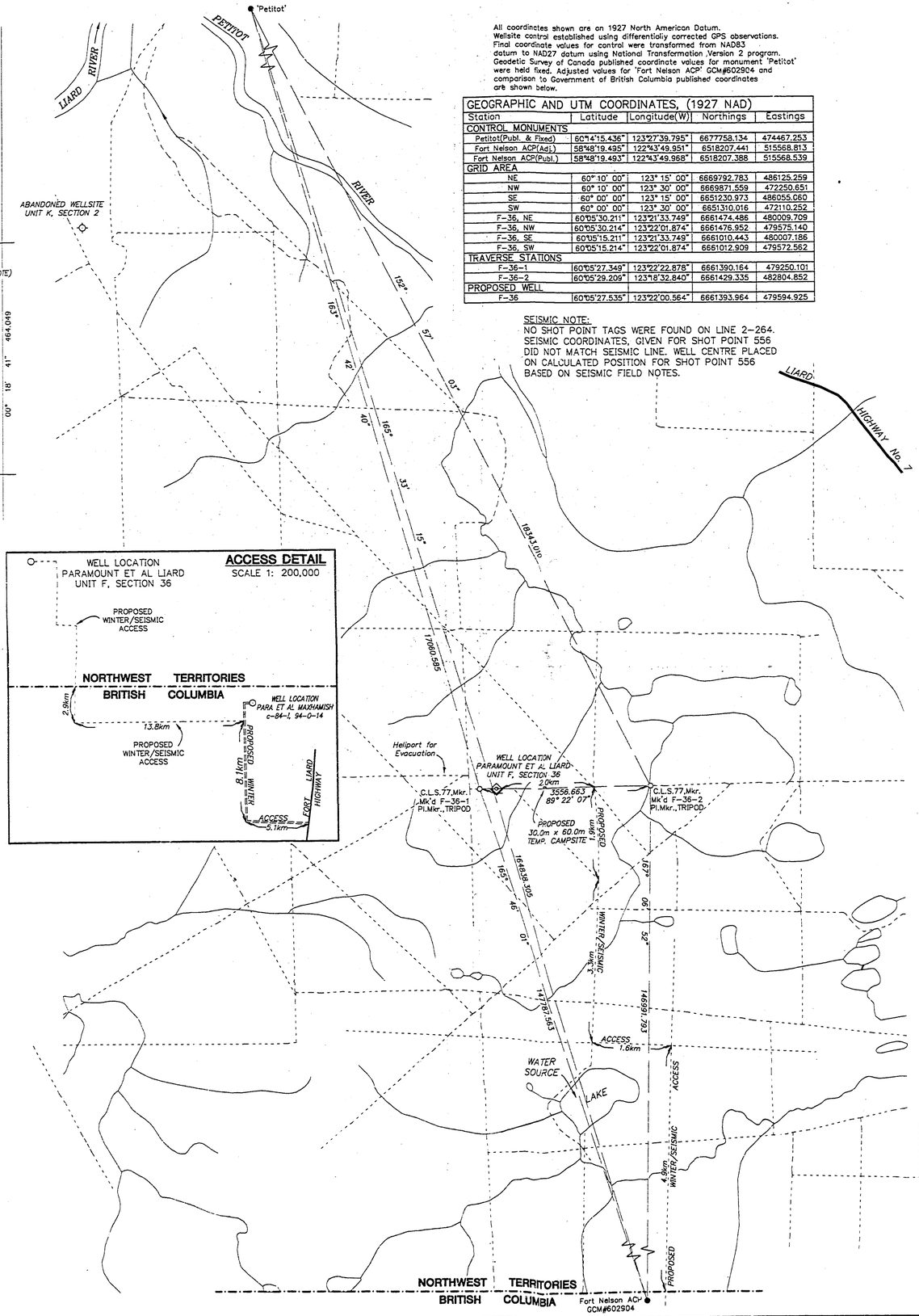
Date: 11-MAY-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. F-36 (NORTHWEST TERRITORIES)	Figure: 3
File name: F-36_17PH2-D.dwg	Requested by: DM		

APPENDIX A

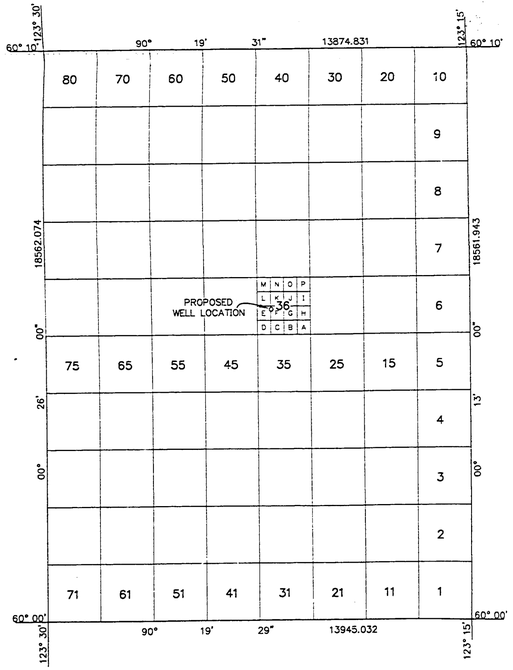
Survey Plan



DETAIL
UNIT F, SECTION 36
SCALE 1:5,000



ACCESS DETAIL
SCALE 1: 200,000



GRID AREA 60°10', 123°15'
SCALE 1:100,000

All coordinates shown are on 1927 North American Datum.
Wellsite control established using differentially corrected GPS observations.
Final coordinate values for control were transformed from NAD83 datum to NAD27 datum using National Transformation Version 2 program, Geodetic Survey of Canada published coordinate values for monument 'Petitot' were held fixed. Adjusted values for 'Fort Nelson ACP' GCM#602904 and comparison to Government of British Columbia published coordinates are shown below.

GEOGRAPHIC AND UTM COORDINATES, (1927 NAD)

Station	Latitude	Longitude(W)	Northings	Eastings
CONTROL MONUMENTS				
Petitot(Publ. & Fixed)	60°14'15.436"	123°27'39.795"	6677758.134	474467.253
Fort Nelson ACP(Adj.)	58°48'19.495"	122°43'49.951"	6518207.441	515568.813
Fort Nelson ACP(Publ.)	58°48'19.493"	122°43'49.968"	6518207.388	515568.539
GRID AREA				
NE	60° 10' 00"	123° 15' 00"	6669792.783	486125.259
NW	60° 10' 00"	123° 30' 00"	6669871.559	472250.651
SE	60° 00' 00"	123° 15' 00"	6651230.973	486055.080
SW	60° 00' 00"	123° 30' 00"	6651310.016	472110.252
F-36, NE	60°05'30.211"	123°21'33.749"	6661474.486	480009.709
F-36, NW	60°05'30.214"	123°22'01.874"	6661476.952	479575.140
F-36, SE	60°05'15.211"	123°21'33.749"	6661010.443	480007.186
F-36, SW	60°05'15.214"	123°22'01.874"	6661012.909	479572.562
TRAVERSE STATIONS				
F-36-1	60°05'27.349"	123°22'22.878"	6661390.164	479250.101
F-36-2	60°05'29.209"	123°18'32.840"	6661429.335	482804.852
PROPOSED WELL				
F-36	60°05'27.535"	123°22'00.564"	6661393.964	479594.925

SEISMIC NOTE:
NO SHOT POINT TAGS WERE FOUND ON LINE 2-264. SEISMIC COORDINATES, GIVEN FOR SHOT POINT 556 DID NOT MATCH SEISMIC LINE. WELL CENTRE PLACED ON CALCULATED POSITION FOR SHOT POINT 556 BASED ON SEISMIC FIELD NOTES.

PLAN AND FIELD NOTES
OF SURVEY OF
PROPOSED EXPLORATORY WELL
PARAMOUNT ET AL LIARD
IN UNIT F, SECTION 36
GRID AREA 60° 10' , 123° 15'
NORTHWEST TERRITORIES
CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50,000
0m 500m 1000m 2000m 3000m 4000m 5000m

SURVEYED FOR
PARAMOUNT RESOURCES LTD.

BY : W.V. JOHNSON, CLS
NOVEMBER, 1997.

LEGEND
UTM coordinates are computed for Zone 10, central meridian 123° W.
Bearings were derived from differentially corrected GPS Observations and are referred to meridian 123° W.
Distances are expressed in metres and decimals thereof.
Distances shown in traverse are measured distances reduced to the horizontal at general ground level.
For the computation of coordinates measured distances have been reduced to the UTM plane by multiplying them by an average combined scale factor of 0.9995232.

Distances shown on grid area subdivisions are UTM plane.
Authorized control monuments found ..... ●
Monuments placed ..... ○
Traverse Hub placed ..... △
Mkr. denotes metal marker post 2.0m long placed 0.30m N.
Elevations were derived from Geodetic Survey of Canada Monument 'Petitot' Elev. = 218.241 m
Survey was completed prior to drilling; therefore well as drilled may not necessarily agree with proposed location.

I, W.V. Johnson, of the City of Fort St. John, British Columbia, Canada Lands Surveyor, make oath and say that I have in my own proper person, according to law and the instructions of the Surveyor General of Canada Lands, faithfully and correctly executed the survey shown by this plan and field notes, and that the said plan and field notes are correct and true to the best of my knowledge and belief.
SO HELP ME GOD

W.V. Johnson, CLS

Sworn before me at Fort St. John, this 23rd day of November, 1997.

THIS SURVEY WAS EXECUTED DURING THE PERIOD
NOVEMBER 14th TO NOVEMBER 17th, 1997. BY W.V. JOHNSON, CLS

PARAMOUNT RESOURCES LTD.

WITNESS

DATE

REV.No.	DESCRIPTION	DATE
1	CHANGED WINTER ACCESS	97/12/10

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Fort St. John, British Columbia
Phone:(250)787-0356, Fax:(250)787-0310
McElhanney

DATE : 97/11/21 JOB No : 3111-06155WS RH

APPENDIX B

Site Photographs



Photograph 1: View from the well centre, facing north.



Photograph 2: View from the well centre, facing east.



Photograph 3: View from the well centre, facing south.



Photograph 4: View of the well centre, facing southwest.



Photograph 5: View of meter shack and facilities, facing south.



Photograph 6: View of the containment cell, facing southwest.



Photograph 7: View of meter shack on the north boundary, facing north.



Photograph 8: View of pilings along the north boundary, facing north.



Photograph 9: View of the cut side of the wellsite, facing north.



Photograph 10: View of former tank area on the west side of wellsite, facing southwest.



Photograph 11: View of the flare knock down area, facing southwest.



Photograph 12: View of a corrosion inhibitor tank, facing south.



Photograph 13: View of meter shack and AST, facing west.



Photograph 14: View of the flare stack, facing northeast.



Photograph 15: View of C01; background borehole.



Photograph 16: View of BH19; flare knockout area.



Photograph 17: View of BH27: DWDA.



Photograph 18: View of BH26: DWDA.

APPENDIX C

Borehole Logs

Borehole Log: 17C01

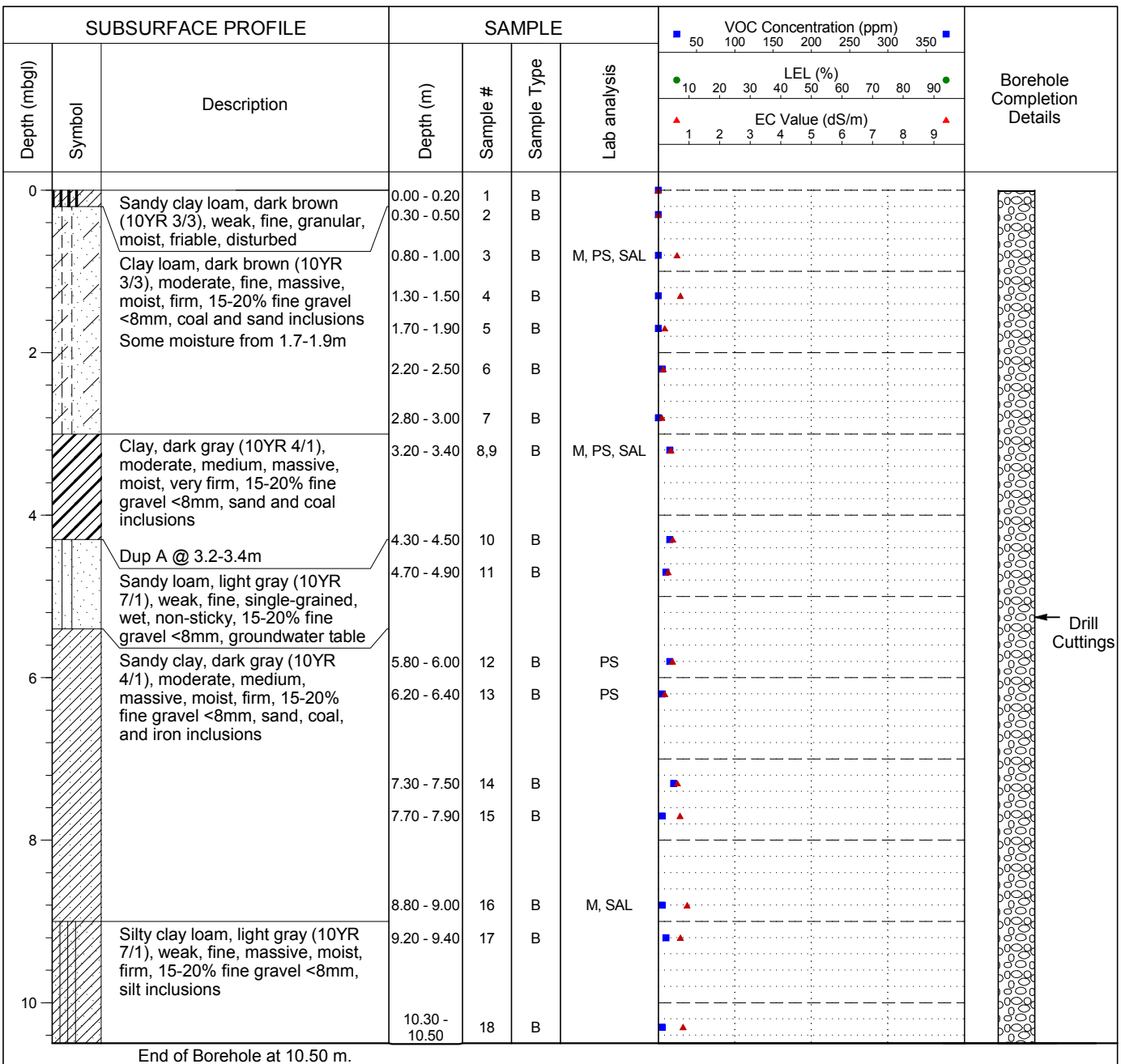
Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Background Control

NORTH SHORE Environmental Consultants



End of Borehole at 10.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661542 E: 479449

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 75m Southwest, 10m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

NORTH SHORE
Environmental Consultants

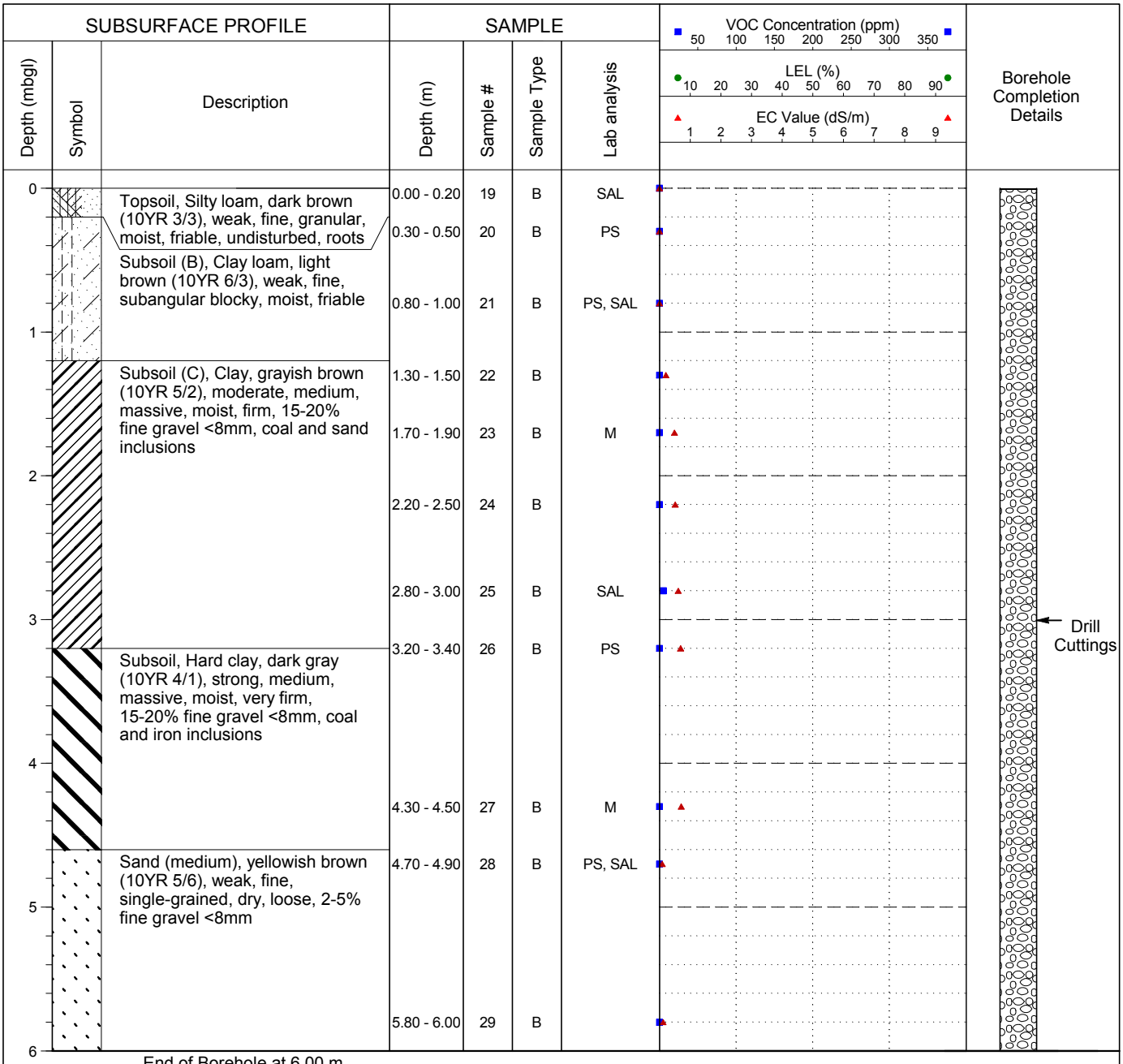
Borehole Log: 17C02

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Background Control



Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661579 E: 479592

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 65m Northeast, 70m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH01

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Well Centre Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, iron inclusions	0.00 - 0.20	30	B			
			0.30 - 0.50	31	B			
			0.80 - 1.00	32	B+J	HC, M, SAL		
1			1.30 - 1.50	33	B			
		Dup B @ 1.7-1.9m	1.70 - 1.90	34,35	B+J	HC, M, SAL		
2			2.20 - 2.50	36	B			Drill Cuttings
			2.80 - 3.00	37	B			
3			3.20 - 3.40	38	B	HC		
4			4.30 - 4.50	39	B			
		End of Borehole at 4.50 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661592 E: 479502

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 3m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH02

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, coal, iron, and sand inclusions	0.00 - 0.20	40	B			
			0.30 - 0.50	41	B			
0.5								
			0.80 - 1.00	42	B+J	HC, M		
1.0								
			1.30 - 1.50	43	B			
1.5								Drill Cuttings
			1.70 - 1.90	44	B+J	HC		
2.0								
			2.20 - 2.50	45	B			
2.5								
			2.80 - 3.00	46	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661599 E: 479499

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 5m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH03

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, disturbed, coal, iron, and sand inclusions	0.00 - 0.20	47	B			
			0.30 - 0.50	48	B			
0.5								
			0.80 - 1.00	49	B+J	HC, M, PS		
1.0								
			1.30 - 1.50	50	B			
1.5								Drill Cuttings
			1.70 - 1.90	51	B+J	HC		
2.0								
			2.20 - 2.50	52	B			
2.5								
			2.80 - 3.00	53	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661596 E: 479505

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 5m Northeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH04

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, and sand inclusions	0.00 - 0.20	54	B			
			0.30 - 0.50	55	B			
0.5								
			0.80 - 1.00	56	B+J	HC, M		
1.0								
			1.30 - 1.50	57	B			
1.5								Drill Cuttings
			1.70 - 1.90	58	B+J	HC, PS		
2.0								
			2.20 - 2.50	59	B			
2.5								
			2.80 - 3.00	60	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661590 E: 479497

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 5m Southwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH05

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, coal, iron, and sand inclusions	0.00 - 0.20	61	B			
			0.30 - 0.50	62	B			
0.5								
			0.80 - 1.00	63	B+J	HC, M		
1.0								
			1.30 - 1.50	64	B			
1.5								Drill Cuttings
			1.70 - 1.90	65	B+J	HC		
2.0								
			2.20 - 2.50	66	B			
2.5								
			2.80 - 3.00	67	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661595 E: 479493

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 2m Southwest, 5m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH06

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, and sand inclusions	0.00 - 0.20	68	B	GLY, M, MTH		
			0.30 - 0.50	69	B			
0.5								
			0.80 - 1.00	70	B			
1.0								
			1.30 - 1.50	71	B			
1.5								Drill Cuttings
			1.70 - 1.90	72	B			
2.0								
			2.20 - 2.50	73	B			
2.5								
			2.80 - 3.00	74	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661584 E: 479510

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 3m Southwest, 8m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH07

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, and sand inclusions	0.00 - 0.20	75	B+J			
			0.30 - 0.50	76	B			
0.5								
			0.80 - 1.00	77	B			
1.0								
			1.30 - 1.50	78	B			
1.5								Drill Cuttings
			1.70 - 1.90	79	B			
2.0								
			2.20 - 2.50	80	B			
2.5								
			2.80 - 3.00	81	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661578 E: 479503

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 10m Southwest, 11m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH08

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, and sand inclusions	0.00 - 0.20	82	B+J			
			0.30 - 0.50	83	B			
0.5								
			0.80 - 1.00	84	B			
1.0								
			1.30 - 1.50	85	B			
1.5								Drill Cuttings
			1.70 - 1.90	86	B			
2.0								
			2.20 - 2.50	87	B			
2.5								
			2.80 - 3.00	88	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661574 E: 479512

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 3m Southwest, 15m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH09

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, and sand inclusions	0.00 - 0.20	89	B			
			0.30 - 0.50	90	B			
0.5								
			0.80 - 1.00	91	B			
1.0								
			1.30 - 1.50	92	B			
1.5								Drill Cuttings
			1.70 - 1.90	93	B			
2.0								
			2.20 - 2.50	94	B			
2.5								
			2.80 - 3.00	95	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661583 E: 479514

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 5m Northeast, 10m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH10

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed	0.00 - 0.20	96	B+J	M, MTH, SAL		
			0.30 - 0.50	97	B			
0.5								
			0.80 - 1.00	98	B+J	HC		
1.0								
			1.30 - 1.50	99	B			
1.5								Drill Cuttings
			1.70 - 1.90	100	B+J			
2.0								
		Dup C @ 2.2-2.5m	2.20 - 2.50	101,102	B			
2.5								
			2.80 - 3.00	103	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661598 E: 479503

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 15m Southwest, 20m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH11

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, and sand inclusions	0.00 - 0.20	104	B+J	MTH		
			0.30 - 0.50	105	B+J	HC, M, SAL		
0.5								
			0.80 - 1.00	106	B			
1.0								
			1.30 - 1.50	107	B			
1.5								Drill Cuttings
			1.70 - 1.90	108	B+J			
2.0								
			2.20 - 2.50	109	B			
2.5		Sandy clay, dark gray (10YR 4/1), moderate, fine, massive, moist, friable, 10-15% fine gravel <8mm, 10-15% coarse gravel 8-64mm, coal inclusions						
			2.80 - 3.00	110	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661569 E: 479509

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 9m Southwest, 26m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH12

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, brown 10YR 4/3 (SC), medium, massive, moist, firm, 10-15% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions	0.00 - 0.20	111	B+J	MTH		
			0.30 - 0.50	112	B			
0.5								
			0.80 - 1.00	113	B+J	HC		
1.0								
			1.30 - 1.50	114	B	M, SAL		
1.5								Drill Cuttings
			1.70 - 1.90	115	B			
2.0								
			2.20 - 2.50	116	B			
2.5								
			2.80 - 3.00	117	B+J			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661569 E: 479514

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 5m Southwest, 28m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH13

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions Dup D @ 0.0-0.2m	0.00 - 0.20	118,119	B+J	MTH		
			0.30 - 0.50	120	B			
0.5								
			0.80 - 1.00	121	B+J	HC		
1.0								
			1.30 - 1.50	122	B	M, SAL		
1.5								Drill Cuttings
			1.70 - 1.90	123	B			
2.0								
		Sandy clay, dark gray (10YR 4/1), weak, fine, massive, moist, friable, 10-15% fine gravel <8mm, coal inclusions	2.20 - 2.50	124	B			
2.5								
			2.80 - 3.00	125	B+J			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661558 E: 479501

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 24m Southwest, 26m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH14

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions	0.00 - 0.20	126	B+J	MTH		
			0.30 - 0.50	127	B			
0.5								
			0.80 - 1.00	128	B			
1.0								
			1.30 - 1.50	129	B+J	HC, M, SAL		
1.5		Sandy clay, dark gray (10YR 4/1), weak, fine, massive, moist, friable, 10-15% fine gravel <8mm, 10-15% coarse gravel 8-64mm, coal and sand inclusions						Drill Cuttings
			1.70 - 1.90	130	B			
2.0								
			2.20 - 2.50	131	B			
2.5								
			2.80 - 3.00	132	B+J			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661542 E: 479488

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 42m Southwest, 23m Sotuhb

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH15

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, sand and silt inclusions	0.00 - 0.20	133	B+J	MTH, PS		
			0.30 - 0.50	134	B+J	HC		
0.5								
			0.80 - 1.00	135	B	M, SAL		
1.0								
		Organic, black (10YR 2/1)	1.30 - 1.50	136	B			
1.5		Sandy clay, dark gray (10YR 4/1), weak, fine, massive, moist, friable, 10-15% fine gravel <8mm, coal and iron inclusions						Drill Cuttings
			1.70 - 1.90	137	B			
2.0								
			2.20 - 2.50	138	B+J			
2.5								
			2.80 - 3.00	139	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661556 E: 479467

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 48m Southwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH16

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron and sand inclusions	0.00 - 0.20	140	B+J	MTH		
			0.30 - 0.50	141	B			
0.5								
			0.80 - 1.00	142	B+J	HC		
1.0								
			1.30 - 1.50	143	B	M, SAL		
1.5		Sandy clay, dark gray (10YR 4/1), moderate, fine, massive, moist, friable, 10-15% fine gravel <8mm, 5-10% coarse gravel 8-64mm, coal and iron inclusions						Drill Cuttings
			1.70 - 1.90	144	B			
2.0								
			2.20 - 2.50	145	B			
2.5								
			2.80 - 3.00	146	B+J			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661598 E: 479467

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 12m Southwest, 30m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH17

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions	0.00 - 0.20	147	B+J	MTH		
			0.30 - 0.50	148	B	M, SAL		
0.5								
			0.80 - 1.00	149	B+J	HC		
1.0								
			1.30 - 1.50	150	B			
1.5								Drill Cuttings
			1.70 - 1.90	151	B			
2.0								
			2.20 - 2.50	152	B+J	HC		
2.5		Sandy clay, dark gray (10YR 4/1), moderate, fine, massive, moist, friable, 5-10% fine gravel <8mm, 10-15% coarse gravel 8-64mm, coal and sand inclusions						
			2.80 - 3.00	153	B	M, SAL		
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661546 E: 479502

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 35m Southwest, 42m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH18

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, friable, 15-20% coarse gravel 8-64mm, coal, iron, and sand inclusions	0.00 - 0.20	154	B+J	GLY, MTH		
			0.30 - 0.50	155	B+J	HC, M		
0.5								
			0.80 - 1.00	156	B			
1.0								
			1.30 - 1.50	157	B			
1.5								Drill Cuttings
			1.70 - 1.90	158	B+J			
2.0								
			2.20 - 2.50	159	B			
2.5		Sandy clay, dark gray (10YR 4/1), moderate, medium, massive, moist, friable, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed, iron and sand inclusions						
			2.80 - 3.00	160	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661547 E: 479507

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 31m Southwest, 42m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH19

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, sand and silt inclusions	0.00 - 0.20	161	B			
			0.30 - 0.50	162	B+J	HC, PAH		
			0.80 - 1.00	163	B			
1			1.30 - 1.50	164	B	M, SAL		
		Fill, Sandy clay, gray (10YR 6/1), weak, fine, massive, wet, slightly sticky, gray and black discolouration	1.70 - 1.90	165	B+J	HC, M, PAH, SAL	590	
2			2.20 - 2.50	166	B			Drill Cuttings
			2.80 - 3.00	167	B			
3		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron and sand inclusions	3.20 - 3.40	168	B+J	HC, PAH		
4			4.30 - 4.50	169	B			

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661584 E: 479549

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 43m Northeast, 46m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH20

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 10-15% fine gravel <8mm, 10-15% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions	0.00 - 0.20	170	B			
			0.30 - 0.50	171	B			
0.5								
			0.80 - 1.00	172	B			
1.0								
			1.30 - 1.50	173	B+J	HC, M, PAH, SAL		
1.5								Drill Cuttings
			1.70 - 1.90	174	B			
2.0								
			2.20 - 2.50	175	B+J	HC, M, PAH, SAL		
2.5								
			2.80 - 3.00	176	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661590 E: 479552

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 53m Northeast, 42m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH21

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
0.5			0.30 - 0.50	177	B+J	HC, M, SAL		
1.0			0.80 - 1.00					
1.5			1.30 - 1.50	178	B	PS		Drill Cuttings
2.0			1.70 - 1.90	179	B+J	HC, M, PAH, SAL		
2.5			2.20 - 2.50					
3.0		End of Borehole at 3.00 m.	2.80 - 3.00					

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661587 E: 479555

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 48m Northeast, 47m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH22

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
0.5			0.30 - 0.50	180	B+J	HC, M, SAL		
1.0			0.80 - 1.00					
1.5			1.30 - 1.50	181	B			Drill Cuttings
2.0			1.70 - 1.90	182	B+J	HC, M, PAH, SAL		
2.5			2.20 - 2.50					
3.0		End of Borehole at 3.00 m.	2.80 - 3.00					

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661575 E: 479551

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 38m Northeast, 47m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH23

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
0.5			0.30 - 0.50	183	B+J	HC, M, SAL		
1.0			0.80 - 1.00					
1.5			1.30 - 1.50	184	B			Drill Cuttings
2.0		Large chunks of coal or burnt wood from 1.7-3.0m	1.70 - 1.90	185	B+J	HC, M, PAH, SAL		
2.5			2.20 - 2.50					
3.0		End of Borehole at 3.00 m.	2.80 - 3.00					

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661582 E: 479556

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 43m Northeast, 47m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH24

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, 2-5% cobbles 64-256mm, disturbed, coal, sand and silt inclusions, large rock @ 0.5m	0.00 - 0.20					
			0.30 - 0.50	186	B+J	HC, M, SAL		
0.5		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50	187	B			
1.5								Drill Cuttings
			1.70 - 1.90	188	B+J	HC, M, PAH, SAL		
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661594 E: 479540

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 44m Northeast, 34m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH25

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Lagoon Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt sand inclusions	0.00 - 0.20	189	B			
			0.30 - 0.50	190	B			
0.5								
			0.80 - 1.00	191	B+J	HC		
1.0								
		Dup E @ 1.3-1.5m	1.30 - 1.50	192,193	B	M, SAL		
1.5								Drill Cuttings
			1.70 - 1.90	194	B			
2.0								
			2.20 - 2.50	195	B			
2.5		Subsoil, Clay, dark gray (10YR 4/1), moderate, fine, massive, moist, friable, 5-10% fine gravel <8mm, coal inclusions						
			2.80 - 3.00	196	B+J	HC, M, SAL		
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661603 E: 479540

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 44m Northeast, 21m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH26

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Drilling Waste Disposal Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	
0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed	0.00 - 0.20	197	B			
			0.30 - 0.50	198	B			
			0.80 - 1.00	199	B	M, SAL		
1			1.30 - 1.50	200	B			
			1.70 - 1.90	201	B			
2			2.20 - 2.50	202	B+J			
		Potential drilling waste, dark gray (10YR 4/1), moderate, medium, massive, wet, slightly sticky, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm	2.50 - 3.00	203	B+J	HC, M, SAL		
3			3.00 - 3.90	204	B+J	HC, M, SAL		Drill Cuttings
4		Silty clay loam, light gray (10YR 7/1), weak, fine, massive, wet, slightly sticky, 5-10% fine gravel <8mm	4.30 - 4.50	205	B			
		Hard clay, light gray (10YR 7/1), moderate, medium, massive, moist, firm, coal inclusions						
5			5.20 - 5.40	206	B+J	HC, M, PS, SAL		
			5.80 - 6.00	207	B			
6		End of Borehole at 6.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661594 E: 479489

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 4m Southwest, 13m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

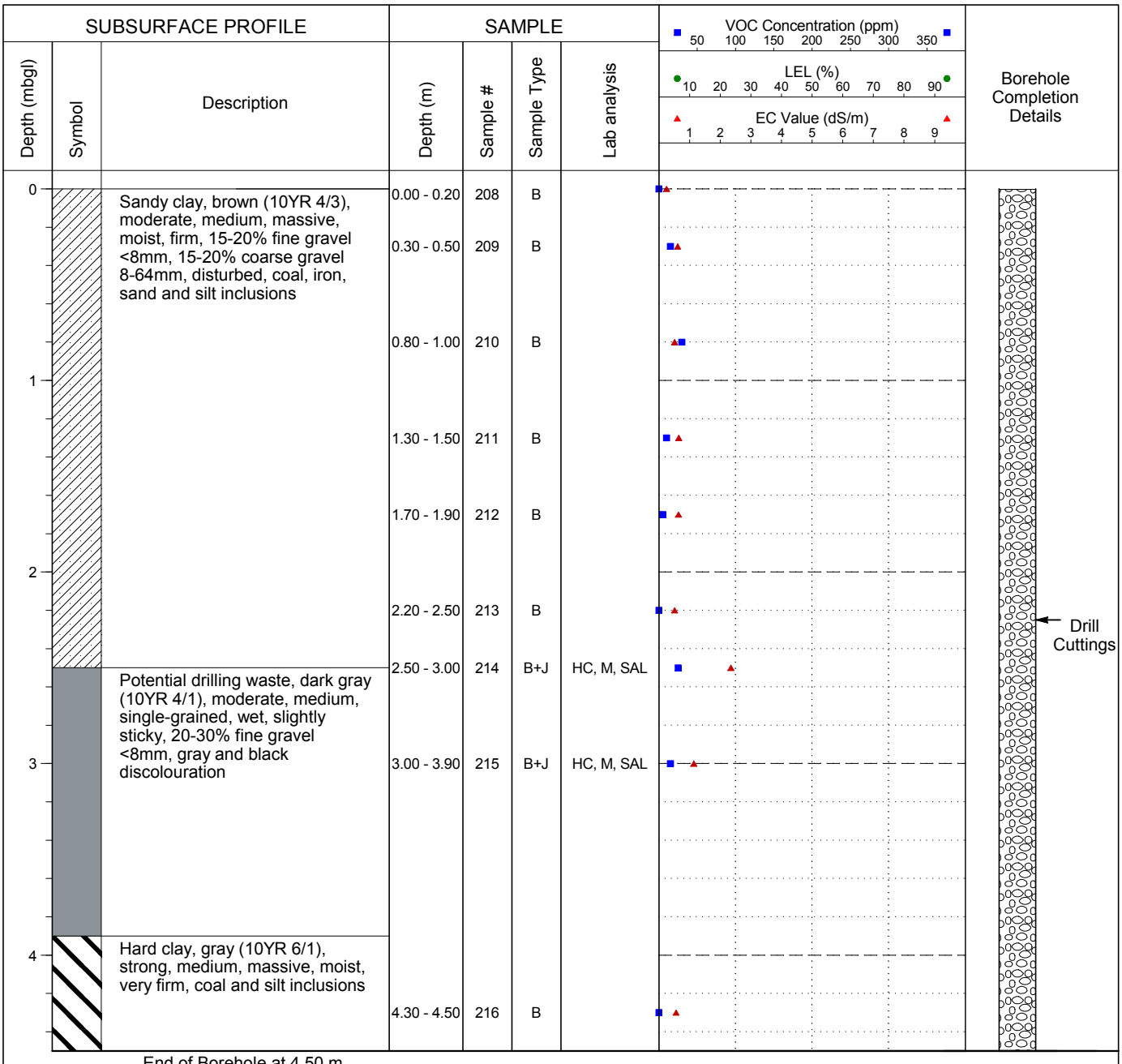
Borehole Log: 17BH27

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Drilling Waste Disposal Area



End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661593 E: 479487

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 10m Southwest, 13m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH28

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Drilling Waste Disposal Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, disturbed	0.00 - 0.20					
			0.30 - 0.50					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1			1.30 - 1.50					
			1.70 - 1.90					
2			2.20 - 2.50					Drill Cuttings
			2.80 - 3.00	217	B+J	HC, M, SAL		
3		Sandy clay loam, grayish brown (10YR 5/2), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, coal and iron inclusions	3.20 - 3.40	218	B+J			
4								

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661593 E: 479481

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 15m Southwest, 13m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH29

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Drilling Waste Disposal Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, disturbed, coal, iron, sand and silt inclusions	0.00 - 0.20					
			0.30 - 0.50					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1			1.30 - 1.50					
			1.70 - 1.90					
2			2.20 - 2.50					Drill Cuttings
			2.80 - 3.00	219	B+J			
3		Sandy loam, light gray (10YR 7/1), weak, fine, single-grained, groundwater table	3.20 - 3.40	220	B+J	HC, M, SAL		
		Hard clay, light gray (10YR 7/1)						
4			4.30 - 4.50					

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661595 E: 479493

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 3m Northeast, 13m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH30

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Drilling Waste Disposal Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, disturbed	0.00 - 0.20					
			0.30 - 0.50					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1			1.30 - 1.50					
			1.70 - 1.90					
2			2.20 - 2.50					Drill Cuttings
			2.80 - 3.00	221	B+J	HC, M, SAL		
3		Sandy loam, light gray (10YR 7/1), weak, fine, single-grained, wet, slightly sticky, 15-20% fine gravel <8mm, groundwater table	3.20 - 3.40	222	B+J			
4		Sandy clay, dark gray (10YR 4/1)						

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661601 E: 479487

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 4m Southwest, 18m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH31

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Drilling Waste Disposal Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Hard clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, coal, iron and sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1			1.30 - 1.50					
			1.70 - 1.90					
2			2.20 - 2.50					Drill Cuttings
			2.80 - 3.00	223	B+J			
3			3.20 - 3.40	224	B+J	HC, M, SAL		
		Sandy clay loam, gray (10YR 6/1), moderate, fine, single-grained, wet, slightly sticky, 20-30% fine gravel <8mm, 15-20% coarse gravel 8-64mm, groundwater table @ 3.4m						
4			4.30 - 4.50					

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661593 E: 479491

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 4m Southwest, 8m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH32

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Drilling Waste Disposal Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0		Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm	0.00 - 0.20	225	B			
			0.30 - 0.50	226	B			
			0.80 - 1.00	227	B			
1			1.30 - 1.50	228	B			
			1.70 - 1.90	229	B			
2			2.20 - 2.50	230	B			Drill Cuttings
		Potential drilling waste, light gray (10YR 7/1), weak, fine, massive, wet, slightly sticky, 1-2% fine gravel <8mm, gray and black discolouration	2.50 - 3.00	231	B+J	HC, M, SAL		
3			3.00 - 3.90	232	B+J	HC, M, SAL		
4		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 15-20% fine gravel <8mm, 10-15% coarse gravel 8-64mm, coal, iron and silt inclusions	4.30 - 4.50	233	B			
		End of Borehole at 4.50 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661594 E: 479487

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 8m Southwest, 13m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH33

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Drilling Waste Disposal Area

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0		Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, coal, iron and sand inclusions	0.00 - 0.20	234	B	
			0.30 - 0.50	235	B	
			0.80 - 1.00	236	B	
1			1.30 - 1.50	237	B	
			1.70 - 1.90	238	B+J	
2			2.20 - 3.00	239	B+J	HC, M, SAL
		Potential drilling waste, light gray (10YR 7/1), moderate, fine, massive, wet, slightly sticky, 1-2% fine gravel <8mm, gray and black discolouration				
3		Dup F @ 3.0-3.2m	3.00 - 3.20	240,241	B+J	HC, M, SAL
		Hard clay, dark gray (10YR 4/1), moderate, medium, massive, moist, very firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, coal and iron inclusions				
4			4.30 - 4.50	242	B+J	

VOC Concentration (ppm): 50 100 150 200 250 300 350

LEL (%): 10 20 30 40 50 60 70 80 90

EC Value (dS/m): 1 2 3 4 5 6 7 8 9

Borehole Completion Details: Drill Cuttings

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661596 E: 479492

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 2m Southwest, 13m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH34

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Potential Flare Pit Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
			0.80 - 1.00					
1.0		*VOC field screening values not obtained due to exploratory sampling						
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661606 E: 479553

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 50m Northeast, 30m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH35

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Potential Flare Pit Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm,	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained due to exploratory sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661604 E: 479540

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 49m Northeast, 21m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

APPENDIX D

Laboratory Certificates of Analyses

AGAT Laboratories

2910 12TH STREET NE
CALGARY, ALBERTA
CANADA T2E 7P7
TEL (403)735-2005
FAX (403)735-2771
http://www.agatlabs.com

CLIENT NAME: PARAMOUNT RESOURCES LTD
4700, 888 3rd ST SW
CALGARY, AB T2P5C5
(403) 290-3600

ATTENTION TO: Larry Yoon

PROJECT: F-36

AGAT WORK ORDER: 17C184581

SOIL ANALYSIS REVIEWED BY: Jennifer Liu, Analyst, Qualified Person

TRACE ORGANICS REVIEWED BY: Alison Sekera, Trace Organics Supervisor

DATE REPORTED: Feb 22, 2017

PAGES (INCLUDING COVER): 70

VERSION*: 6

Should you require any information regarding this analysis please contact your client services representative at (403) 735-2005

*NOTES

VERSION 6:Detailed Salinity added to: 295, 312, 315, 316, 321 and 077. Arsenic added to samples: 295, 312, 315, 316, 321 and 077. Extractable Barium added to sample: 033. Glycol added to samples: 544 and 981. Particle size by sieve added to samples: 854, 869, 024, 088, 860, 233, 316 and 077. (Feb 10/17 GH)

Version 2 supersedes version 1 issued on February 10th 2017. BTEX/F1-F4 to samples: 965, 999, 011, 024, 034, 042, 088, 125, 127, 226, 312, 315, 316, 321 and 077. PAH to samples: 996, 997 and 998. Fusion Barium to sample: 033. (Feb 11/17 SS)

Version 3 supersedes version 2 issued on February 11th 2017. Sample: 1032 was re-prepped and re-ran for arsenic and confirmed original value reported. new value was reported under a new sample id: 781 - February 13th 2017 CS.

Version 4 supersedes version 3 issued on February 13th 2017. Monoethylene glycol has been revised to say: ethylene glycol - February 13th 2017 CS.

Version 5 supersedes version 4 issued on February 13th 2017. Added - total chromium to samples: 999, 024, 042, 125, PAH to samples: 984, 226, 1008, 1016, 416, 425 and ethylene glycol to samples: 544 and 981 - February 22nd 2017 CS.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)
Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Results relate only to the items tested and to all the items tested
All reportable information as specified by ISO 17025:2005 is available from AGAT Laboratories upon request

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals (Soil) - Arsenic

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	SAMPLE DESCRIPTION: 17BH26 0.8-1.0	17BH28 2.8-3.0	17BH29 3.2-3.4	17BH30 2.8-3.0	17BH31 3.2-3.4	17BH26 5.2-5.4
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-03	2017-02-03	2017-02-03	2017-02-03	2017-02-03	2017-02-03
						8178295	8178312	8178315	8178316	8178321	8181077
Arsenic	mg/kg		0.5	2017-02-10	2017-02-10	11.1	11.5	7.8	9.8	14.4	11.1

Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	SAMPLE DESCRIPTION: 17BH26 2.5-3.0 re-run
					SAMPLE TYPE:	Soil
					DATE SAMPLED:	2017-02-03
						8185781
Arsenic	mg/kg		0.5	2017-02-13	2017-02-13	20.1

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

Results relate only to the items tested and to all the items tested

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg (soil)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	SAMPLE DESCRIPTION: 17C01 0.8-1.0	17C01 3.2-3.4	17C01 8.8-9.0	17C02 1.7-1.9	17C02 4.3-4.5	17BH01 0.8-1.0
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-01	2017-02-01	2017-02-01	2017-02-01	2017-02-01	2017-02-01
						8170514	8170515	8170517	8170521	8170525	8170532
Antimony	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	0.6	1.2	0.6	0.7	0.5
Arsenic	mg/kg		0.5	2017-02-07	2017-02-07	9.7	10.4	8.9	9.3	7.9	9.9
Barium	mg/kg		0.5	2017-02-07	2017-02-07	188	222	496	230	221	190
Beryllium	mg/kg		0.5	2017-02-07	2017-02-07	0.6	0.6	0.8	0.6	0.6	0.7
Boron (Saturated Paste)	mg/L		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	0.5	0.6	<0.5	<0.5	<0.5
Chromium	mg/kg		0.5	2017-02-07	2017-02-07	17.7	16.6	21.5	16.0	19.5	145
Chromium, Hexavalent	mg/kg		0.3	2017-02-07	2017-02-07	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Cobalt	mg/kg		0.5	2017-02-07	2017-02-07	7.9	8.1	11.4	8.6	8.0	7.9
Copper	mg/kg		0.5	2017-02-07	2017-02-07	14.7	20.3	22.9	17.7	18.5	17.9
Lead	mg/kg		0.5	2017-02-07	2017-02-07	9.6	9.9	12.9	10.6	10.1	10.7
Mercury	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg		0.5	2017-02-07	2017-02-07	1.7	2.9	2.1	2.0	1.9	2.0
Nickel	mg/kg		0.5	2017-02-07	2017-02-07	19.1	22.1	35.3	22.2	22.2	24.1
Selenium	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	1.3	1.2	<0.5	0.9	<0.5
Silver	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tin	mg/kg		0.5	2017-02-07	2017-02-07	0.7	0.6	0.7	<0.5	0.6	0.6
Uranium	mg/kg		0.5	2017-02-07	2017-02-07	1.0	2.2	1.4	1.4	1.5	1.3
Vanadium	mg/kg		0.5	2017-02-07	2017-02-07	27.5	26.1	32.1	30.2	27.5	29.7
Zinc	mg/kg		1	2017-02-07	2017-02-07	58	72	95	105	74	63

Certified By:

Results relate only to the items tested and to all the items tested

AGAT Laboratories

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FAX (403)735-2771
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg (soil)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH06 0-0.2	17BH10 0-0.2	Dup A 3.2-3.4	Dup B 1.7-1.9	Dup C 2.2-2.5	17BH11 0.3-0.5
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-01	2017-02-01	2017-02-01	2017-02-01	2017-02-01	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170544	8170623	8170630	8170634	8170648	8170655
Antimony	mg/kg		0.5	2017-02-07	2017-02-07	0.6	0.6	0.6	0.6	0.5	0.5
Arsenic	mg/kg		0.5	2017-02-07	2017-02-07	9.8	10.5	10.3	10.4	10.1	9.0
Barium	mg/kg		0.5	2017-02-07	2017-02-07	256	249	189	304	194	239
Beryllium	mg/kg		0.5	2017-02-07	2017-02-07	0.6	0.6	0.5	0.7	0.8	0.8
Cadmium	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg		0.5	2017-02-07	2017-02-07	17.7	17.6	16.9	18.6	20.8	15.6
Cobalt	mg/kg		0.5	2017-02-07	2017-02-07	8.3	9.2	7.0	8.3	9.0	7.1
Copper	mg/kg		0.5	2017-02-07	2017-02-07	17.8	17.2	14.5	16.2	14.4	12.9
Lead	mg/kg		0.5	2017-02-07	2017-02-07	10.6	10.7	9.3	10.7	11.1	9.4
Mercury	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg		0.5	2017-02-07	2017-02-07	2.2	2.4	2.8	2.7	1.7	2.3
Nickel	mg/kg		0.5	2017-02-07	2017-02-07	22.8	22.9	18.7	21.7	21.4	18.8
Selenium	mg/kg		0.5	2017-02-07	2017-02-07	0.7	0.9	0.8	<0.5	0.7	<0.5
Silver	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tin	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	0.6	<0.5	0.5	<0.5
Uranium	mg/kg		0.5	2017-02-07	2017-02-07	1.2	1.6	1.3	1.2	1.1	1.2
Vanadium	mg/kg		0.5	2017-02-07	2017-02-07	27.2	30.0	26.4	30.0	35.3	25.5
Zinc	mg/kg		1	2017-02-07	2017-02-07	72	74	62	69	64	66
Chromium, Hexavalent	mg/kg		0.3	2017-02-07	2017-02-07	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Boron (Saturated Paste)	mg/L		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg (soil)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	SAMPLE DESCRIPTION: 17BH12 1.3-1.5	17BH13 1.3-1.5	17BH14 1.3-1.5	17BH15 0.8-1.0	17BH17 0.3-0.5	17BH17 2.8-3.0
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02
						8170698	8170781	8170857	8170938	8170977	8170980
Antimony	mg/kg		0.5	2017-02-07	2017-02-07	0.5	0.6	0.6	0.6	0.6	0.6
Arsenic	mg/kg		0.5	2017-02-07	2017-02-07	8.8	10.9	10.4	9.6	11.6	10.3
Barium	mg/kg		0.5	2017-02-07	2017-02-07	225	214	234	240	223	148
Beryllium	mg/kg		0.5	2017-02-07	2017-02-07	0.6	0.6	0.6	0.7	0.6	0.8
Cadmium	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg		0.5	2017-02-07	2017-02-07	17.1	17.1	17.5	18.6	17.3	20.4
Cobalt	mg/kg		0.5	2017-02-07	2017-02-07	8.0	8.3	8.3	8.7	8.3	8.0
Copper	mg/kg		0.5	2017-02-07	2017-02-07	16.3	16.7	17.2	16.5	16.3	14.7
Lead	mg/kg		0.5	2017-02-07	2017-02-07	9.6	10.5	12.0	11.7	10.8	10.7
Mercury	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg		0.5	2017-02-07	2017-02-07	2.3	2.3	2.0	1.9	2.5	1.7
Nickel	mg/kg		0.5	2017-02-07	2017-02-07	21.3	21.8	22.0	22.3	22.3	19.9
Selenium	mg/kg		0.5	2017-02-07	2017-02-07	0.8	0.6	0.6	<0.5	0.6	0.6
Silver	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tin	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	0.5	<0.5	<0.5	<0.5	0.5
Uranium	mg/kg		0.5	2017-02-07	2017-02-07	1.4	1.4	1.1	1.2	1.4	1.1
Vanadium	mg/kg		0.5	2017-02-07	2017-02-07	26.7	29.9	29.9	31.4	30.5	31.5
Zinc	mg/kg		1	2017-02-07	2017-02-07	70	71	72	77	71	61
Chromium, Hexavalent	mg/kg		0.3	2017-02-07	2017-02-07	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Boron (Saturated Paste)	mg/L		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg (soil)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	SAMPLE DESCRIPTION: 17BH19 1.3-1.5	17BH25 1.3-1.5	17BH26 2.5-3.0	17BH26 3.0-3.9	17BH27 2.5-3.0	17BH27 3.0-3.9
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-02	2017-02-03	2017-02-03	2017-02-03	2017-02-03	2017-02-03
						8170987	8171030	8171032	8171033	8171035	8171039
Antimony	mg/kg		0.5	2017-02-07	2017-02-07	0.6	0.6	1.5	0.6	0.5	<0.5
Arsenic	mg/kg		0.5	2017-02-07	2017-02-07	8.9	9.0	17.4	12.0	9.8	8.1
Barium	mg/kg		0.5	2017-02-07	2017-02-07	268	198	210	1610	259	139
Beryllium	mg/kg		0.5	2017-02-07	2017-02-07	0.7	0.6	0.6	0.6	0.5	<0.5
Cadmium	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg		0.5	2017-02-07	2017-02-07	18.6	15.1	20.4	17.0	15.4	12.0
Cobalt	mg/kg		0.5	2017-02-07	2017-02-07	8.7	7.4	4.6	8.8	7.6	6.0
Copper	mg/kg		0.5	2017-02-07	2017-02-07	17.0	12.8	13.0	21.2	14.5	11.0
Lead	mg/kg		0.5	2017-02-07	2017-02-07	11.2	10.2	108	11.6	9.2	7.3
Mercury	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg		0.5	2017-02-07	2017-02-07	2.1	2.0	1.8	3.4	2.1	1.9
Nickel	mg/kg		0.5	2017-02-07	2017-02-07	22.5	18.6	11.7	25.4	20.7	16.0
Selenium	mg/kg		0.5	2017-02-07	2017-02-07	0.8	0.6	0.7	0.8	0.8	0.8
Silver	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tin	mg/kg		0.5	2017-02-07	2017-02-07	0.5	0.6	3.5	0.7	<0.5	<0.5
Uranium	mg/kg		0.5	2017-02-07	2017-02-07	1.5	1.3	1.4	1.1	1.6	1.2
Vanadium	mg/kg		0.5	2017-02-07	2017-02-07	33.5	27.6	22.9	25.2	25.5	20.2
Zinc	mg/kg		1	2017-02-07	2017-02-07	73	69	116	82	62	74
Chromium, Hexavalent	mg/kg		0.3	2017-02-07	2017-02-07	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Boron (Saturated Paste)	mg/L		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	0.8	<0.5	<0.5

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Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg (soil)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH32 2.5-3.0	17BH32 3.0-3.9	17BH33 2.2-3.0	17BH33 3.0-3.2	Dup F 3.0-3.2	Dup E 1.3-1.5
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-03	2017-02-03	2017-02-03	2017-02-03	2017-02-03	2017-02-03
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8171049	8171050	8171051	8171052	8171054	8171413
Antimony	mg/kg		0.5	2017-02-07	2017-02-07	0.5	<0.5	<0.5	0.7	0.6	0.5
Arsenic	mg/kg		0.5	2017-02-07	2017-02-07	9.8	8.8	8.7	10.0	9.7	8.9
Barium	mg/kg		0.5	2017-02-07	2017-02-07	264	230	245	224	244	177
Beryllium	mg/kg		0.5	2017-02-07	2017-02-07	0.6	<0.5	0.5	0.6	0.6	0.5
Cadmium	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	0.5	0.6	<0.5
Chromium	mg/kg		0.5	2017-02-07	2017-02-07	14.1	16.8	15.4	15.8	17.3	14.4
Cobalt	mg/kg		0.5	2017-02-07	2017-02-07	7.9	6.6	7.7	8.2	8.3	6.2
Copper	mg/kg		0.5	2017-02-07	2017-02-07	17.0	12.8	15.1	16.1	16.6	12.9
Lead	mg/kg		0.5	2017-02-07	2017-02-07	9.6	12.5	12.3	10.5	12.3	8.4
Mercury	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg		0.5	2017-02-07	2017-02-07	2.3	1.8	1.6	3.0	3.5	1.8
Nickel	mg/kg		0.5	2017-02-07	2017-02-07	20.7	17.8	18.9	22.4	22.6	16.5
Selenium	mg/kg		0.5	2017-02-07	2017-02-07	0.8	0.7	0.6	0.9	1.0	0.6
Silver	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tin	mg/kg		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	0.6	0.5	<0.5
Uranium	mg/kg		0.5	2017-02-07	2017-02-07	1.6	1.8	1.2	1.5	1.6	1.3
Vanadium	mg/kg		0.5	2017-02-07	2017-02-07	25.8	22.5	26.7	25.7	27.2	23.6
Zinc	mg/kg		1	2017-02-07	2017-02-07	71	58	62	71	81	58
Chromium, Hexavalent	mg/kg		0.3	2017-02-07	2017-02-07	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Boron (Saturated Paste)	mg/L		0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8170514-8170532 Results are based on the dry weight of the sample.

8170544 Results are based on the dry weight of the sample.

8170623-8171413 Results are based on the dry weight of the sample.

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH01 1.7-1.9	17BH16 1.3-1.5	17BH20 1.3-1.5	17BH20 2.2-2.5	17BH21 0.3-0.5	17BH21 1.7-1.9
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-01	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170543	8170972	8170997	8170998	8171002	8171008
Antimony	mg/kg	20	0.5	2017-02-07	2017-02-07	0.5	<0.5	<0.5	0.5	0.6	<0.5
Arsenic	mg/kg	17	0.5	2017-02-07	2017-02-07	10.0	8.0	8.2	9.7	9.3	8.2
Barium	mg/kg	750	0.5	2017-02-07	2017-02-07	228	282	196	233	210	226
Beryllium	mg/kg	5	0.5	2017-02-07	2017-02-07	0.6	<0.5	0.7	0.6	0.6	0.6
Boron (Saturated Paste)	mg/L	3.3	0.5	2017-02-08	2017-02-08	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	mg/kg	1.4	0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	64	0.5	2017-02-07	2017-02-07	18.4	12.4	14.9	16.4	16.3	16.6
Chromium, Hexavalent	mg/kg	0.4	0.3	2017-02-08	2017-02-08	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Cobalt	mg/kg	20	0.5	2017-02-07	2017-02-07	7.8	5.9	7.8	7.9	7.6	7.7
Copper	mg/kg	63	0.5	2017-02-07	2017-02-07	14.7	12.1	17.4	17.2	15.0	15.7
Lead	mg/kg	70	0.5	2017-02-07	2017-02-07	9.9	7.6	10.6	10.3	10.5	9.6
Mercury	mg/kg	6.6	0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg	4	0.5	2017-02-07	2017-02-07	2.5	1.8	2.5	2.3	2.2	2.2
Nickel	mg/kg	45	0.5	2017-02-07	2017-02-07	20.1	16.0	20.8	22.3	19.8	20.3
Selenium	mg/kg	1	0.5	2017-02-07	2017-02-07	0.5	0.8	1.0	0.7	0.5	0.7
Silver	mg/kg	20	0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	mg/kg	1	0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tin	mg/kg	5	0.5	2017-02-07	2017-02-07	0.5	<0.5	<0.5	<0.5	0.5	<0.5
Uranium	mg/kg	23	0.5	2017-02-07	2017-02-07	1.2	1.2	1.7	1.3	1.2	1.2
Vanadium	mg/kg	130	0.5	2017-02-07	2017-02-07	25.8	18.7	23.4	26.7	24.8	24.9
Zinc	mg/kg	200	1	2017-02-07	2017-02-07	61	56	69	72	64	63

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Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH22 0.3-0.5	17BH22 1.7-1.9	17BH23 0.3-0.5	17BH23 1.7-1.9	17BH24 0.3-0.5	17BH24 1.7-1.9
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8171012	8171016	8171414	8171416	8171417	8171425
Antimony	mg/kg	20	0.5	2017-02-07	2017-02-07	<0.5	0.6	<0.5	0.5	0.5	0.6
Arsenic	mg/kg	17	0.5	2017-02-07	2017-02-07	8.4	9.7	9.0	9.2	9.1	9.8
Barium	mg/kg	750	0.5	2017-02-07	2017-02-07	183	208	198	222	272	248
Beryllium	mg/kg	5	0.5	2017-02-07	2017-02-07	0.6	0.7	0.5	0.7	0.6	0.7
Boron (Saturated Paste)	mg/L	3.3	0.5	2017-02-08	2017-02-08	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	mg/kg	1.4	0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	64	0.5	2017-02-07	2017-02-07	15.7	63.3	14.6	17.0	18.3	16.9
Chromium, Hexavalent	mg/kg	0.4	0.3	2017-02-08	2017-02-08	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Cobalt	mg/kg	20	0.5	2017-02-07	2017-02-07	6.9	9.0	7.8	8.1	7.5	8.4
Copper	mg/kg	63	0.5	2017-02-07	2017-02-07	14.6	18.3	14.7	15.7	16.7	16.8
Lead	mg/kg	70	0.5	2017-02-07	2017-02-07	10.7	13.0	8.9	10.3	10.0	11.2
Mercury	mg/kg	6.6	0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg	4	0.5	2017-02-07	2017-02-07	2.2	2.2	2.2	2.2	2.3	2.3
Nickel	mg/kg	45	0.5	2017-02-07	2017-02-07	18.5	24.6	19.6	20.6	20.8	22.2
Selenium	mg/kg	1	0.5	2017-02-07	2017-02-07	0.6	0.6	0.6	0.7	0.6	0.7
Silver	mg/kg	20	0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	mg/kg	1	0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tin	mg/kg	5	0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Uranium	mg/kg	23	0.5	2017-02-07	2017-02-07	1.5	1.3	1.1	1.2	1.3	1.3
Vanadium	mg/kg	130	0.5	2017-02-07	2017-02-07	26.7	27.0	24.3	27.3	24.8	26.4
Zinc	mg/kg	200	1	2017-02-07	2017-02-07	65	72	64	69	67	74

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Alberta Tier 1 - Soil - Agricultural - Fine

8170543-8171425 Results are based on the dry weight of the sample.

Certified By:

Results relate only to the items tested and to all the items tested

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Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg + Sat Paste B + Cr6 (Soil)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH18 0.3-0.5	17BH19 1.7-1.9	17BH25 2.8-3.0
					SAMPLE TYPE:	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-02	2017-02-02	2017-02-03
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170982	8170996	8171031
Antimony	mg/kg	20	0.5	2017-02-07	2017-02-07	0.6	0.6	0.6
Arsenic	mg/kg	17	0.5	2017-02-07	2017-02-07	10.9	11.0	11.2
Barium	mg/kg	750	0.5	2017-02-07	2017-02-07	246	297	216
Beryllium	mg/kg	5	0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5
Boron (Saturated Paste)	mg/L	3.3	0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5
Cadmium	mg/kg	1.4	0.5	2017-02-07	2017-02-07	0.5	<0.5	<0.5
Chromium	mg/kg	64	0.5	2017-02-07	2017-02-07	20.7	21.3	24.2
Chromium, Hexavalent	mg/kg	0.4	0.3	2017-02-07	2017-02-07	<0.3	<0.3	<0.3
Cobalt	mg/kg	20	0.5	2017-02-07	2017-02-07	8.2	9.2	8.8
Copper	mg/kg	63	0.5	2017-02-07	2017-02-07	19.6	20.0	15.6
Lead	mg/kg	70	0.5	2017-02-07	2017-02-07	9.7	10.4	11.5
Mercury	mg/kg	6.6	0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5
Molybdenum	mg/kg	4	0.5	2017-02-07	2017-02-07	2.4	2.4	1.8
Nickel	mg/kg	45	0.5	2017-02-07	2017-02-07	25.5	25.2	22.9
Selenium	mg/kg	1	0.5	2017-02-07	2017-02-07	1.2	0.9	0.7
Silver	mg/kg	20	0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5
Thallium	mg/kg	1	0.5	2017-02-07	2017-02-07	<0.5	<0.5	<0.5
Tin	mg/kg	5	0.5	2017-02-07	2017-02-07	0.6	0.6	0.6
Uranium	mg/kg	23	0.5	2017-02-07	2017-02-07	1.3	1.2	1.0
Vanadium	mg/kg	130	0.5	2017-02-07	2017-02-07	34.4	34.9	38.1
Zinc	mg/kg	200	1	2017-02-07	2017-02-07	86	88	80

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Alberta Tier 1 - Soil - Agricultural - Fine

8170982 Note: Results(Se) were verified by repeat analysis

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Particle Size by Sieve

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17C01 0.8-1.0	17C01 3.2-3.4	17C01 6.2-6.4	17C02 0.8-1.0	17C02 3.2-3.4	17C02 4.7-4.9
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-01	2017-02-01	2017-02-01	2017-02-01	2017-02-01	2017-02-01
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170514	8170515	8170516	8170519	8170523	8170526
Sieve Analysis - 75 microns	%		0.2	2017-02-07	2017-02-07	31.7	39.9	56.1	58.9	28.0	76.8
Sieve Texture						Fine	Fine	Coarse	Coarse	Fine	Coarse

					SAMPLE DESCRIPTION:	17BH15 0-0.2	17C01 5.8-6.0	17C02 0.3-0.5	17BH03 0.8-1.0	17BH04 1.7-1.9	17BH21 1.3-1.5
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-02	2017-02-01	2017-02-01	2017-02-01	2017-02-01	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170860	8177854	8177869	8178024	8178088	8178233
Sieve Analysis - 75 microns	%		0.2	2017-02-10	2017-02-10	41.9	44.5	35.2	42.3	66.4	35.2
Sieve Texture						Fine	Fine	Fine	Fine	Coarse	Fine

					SAMPLE DESCRIPTION:	17BH30 2.8-3.0	17BH26 5.2-5.4
					SAMPLE TYPE:	Soil	Soil
					DATE SAMPLED:	2017-02-03	2017-02-03
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8178316	8181077
Sieve Analysis - 75 microns	%		0.2	2017-02-10	2017-02-10	43.6	23.6
Sieve Texture						Fine	Fine

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8170514-8170519 Value reported is amount of sample retained on sieve after wash with water and represents proportion by weight particles larger than indicated sieve size.

8170523 Value reported is amount of sample retained on a 75 micron sieve after wash with water and represents proportion by weight particles larger than indicated sieve size.

8170526-8181077 Value reported is amount of sample retained on sieve after wash with water and represents proportion by weight particles larger than indicated sieve size.

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Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	SAMPLE DESCRIPTION: 17BH01 1.7-1.9	17BH16 1.3-1.5	17BH20 1.3-1.5	17BH20 2.2-2.5	17BH21 0.3-0.5	17BH21 1.7-1.9
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-01	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02
						8170543	8170972	8170997	8170998	8171002	8171008
pH (CaCl2 Extraction)	pH Units		N/A	2017-02-08	2017-02-08	7.28	7.42	7.42	7.42	7.39	7.49
Electrical Conductivity (Sat. Paste)	dS/m		0.05	2017-02-08	2017-02-08	0.40	2.80	2.45	1.62	0.40	0.60
Sodium Adsorption Ratio	N/A			2017-02-08	2017-02-08	1.20	0.82	0.10	0.19	0.26	0.29
Saturation Percentage	%		1	2017-02-08	2017-02-08	76	42	52	53	50	52
Chloride, Soluble	mg/L		5	2017-02-08	2017-02-08	35	15	<5	<5	<5	19
Calcium, Soluble	mg/L		1	2017-02-08	2017-02-08	39	520	552	292	53	78
Potassium, Soluble	mg/L		2	2017-02-08	2017-02-08	<2	19	13	7	3	4
Magnesium, Soluble	mg/L		1	2017-02-08	2017-02-08	9	133	101	61	11	20
Sodium, Soluble	mg/L		2	2017-02-08	2017-02-08	32	81	10	14	8	11
Sulfate, Soluble	mg/L		2	2017-02-08	2017-02-08	55	2030	1800	1020	104	225
Theoretical Gypsum Requirement	tonnes/ha		N/A	2017-02-08	2017-02-08	0	0	0	0	0	0
Calcium, Soluble (meq/L)	meq/L		0.05			1.95	25.9	27.5	14.6	2.64	3.89
Calcium, Soluble (mg/kg)	mg/kg		1			30	218	287	155	27	41
Chloride, Soluble (meq/L)	meq/L		0.06			0.99	0.42	<0.06	<0.06	<0.06	0.54
Chloride, Soluble (mg/kg)	mg/kg		2			27	6	<2	<2	<2	10
Magnesium, Soluble (meq/L)	meq/L		0.08			0.74	10.9	8.31	5.02	0.91	1.65
Magnesium, Soluble (mg/kg)	mg/kg		1			7	56	53	32	6	10
Potassium, Soluble (meq/L)	meq/L		0.05			<0.05	0.49	0.33	0.18	0.08	0.10
Potassium, Soluble (mg/kg)	mg/kg		2			<2	8	7	4	<2	2
Sodium, Soluble (meq/L)	meq/L		0.09			1.39	3.52	0.43	0.61	0.35	0.48
Sodium, Soluble (mg/kg)	mg/kg		2			24	34	5	7	4	6
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04			1.15	42.3	37.5	21.2	2.17	4.68
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2			42	853	936	541	52	117

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Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	SAMPLE DESCRIPTION: 17BH22 0.3-0.5 SAMPLE TYPE: Soil DATE SAMPLED: 2017-02-02 8171012	17BH22 1.7-1.9 Soil 2017-02-02 8171016	17BH23 0.3-0.5 Soil 2017-02-02 8171414	17BH23 1.7-1.9 Soil 2017-02-02 8171416	17BH24 0.3-0.5 Soil 2017-02-02 8171417
pH (CaCl2 Extraction)	pH Units		N/A	2017-02-08	2017-02-08	7.38	7.26	7.40	7.47	7.45
Electrical Conductivity (Sat. Paste)	dS/m		0.05	2017-02-08	2017-02-08	0.30	0.48	0.38	0.54	0.35
Sodium Adsorption Ratio	N/A			2017-02-08	2017-02-08	0.11	0.58	0.24	0.28	0.22
Saturation Percentage	%		1	2017-02-08	2017-02-08	51	53	42	49	46
Chloride, Soluble	mg/L		5	2017-02-08	2017-02-08	<5	6	<5	13	<5
Calcium, Soluble	mg/L		1	2017-02-08	2017-02-08	42	64	48	66	43
Potassium, Soluble	mg/L		2	2017-02-08	2017-02-08	3	<2	4	4	4
Magnesium, Soluble	mg/L		1	2017-02-08	2017-02-08	8	15	11	18	9
Sodium, Soluble	mg/L		2	2017-02-08	2017-02-08	3	20	7	10	6
Sulfate, Soluble	mg/L		2	2017-02-08	2017-02-08	36	176	76	182	77
Theoretical Gypsum Requirement	tonnes/ha		N/A	2017-02-08	2017-02-08	0	0	0	0	0
Calcium, Soluble (meq/L)	meq/L		0.05			2.10	3.19	2.40	3.29	2.15
Calcium, Soluble (mg/kg)	mg/kg		1			21	34	20	32	20
Chloride, Soluble (meq/L)	meq/L		0.06			<0.06	0.17	<0.06	0.37	<0.06
Chloride, Soluble (mg/kg)	mg/kg		2			<2	3	<2	6	<2
Magnesium, Soluble (meq/L)	meq/L		0.08			0.66	1.23	0.91	1.48	0.74
Magnesium, Soluble (mg/kg)	mg/kg		1			4	8	5	9	4
Potassium, Soluble (meq/L)	meq/L		0.05			0.08	<0.05	0.10	0.10	0.10
Potassium, Soluble (mg/kg)	mg/kg		2			<2	<2	<2	2	<2
Sodium, Soluble (meq/L)	meq/L		0.09			0.13	0.87	0.30	0.43	0.26
Sodium, Soluble (mg/kg)	mg/kg		2			<2	11	3	5	3
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04			0.75	3.66	1.58	3.79	1.60
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2			18	93	32	89	35

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH24 1.7-1.9
					SAMPLE TYPE:	Soil
					DATE SAMPLED:	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8171425
pH (CaCl2 Extraction)	pH Units		N/A	2017-02-08	2017-02-08	7.47
Electrical Conductivity (Sat. Paste)	dS/m		0.05	2017-02-08	2017-02-08	0.54
Sodium Adsorption Ratio	N/A			2017-02-08	2017-02-08	0.56
Saturation Percentage	%		1	2017-02-08	2017-02-08	47
Chloride, Soluble	mg/L		10	2017-02-08	2017-02-08	<10
Calcium, Soluble	mg/L		1	2017-02-08	2017-02-08	65
Potassium, Soluble	mg/L		2	2017-02-08	2017-02-08	4
Magnesium, Soluble	mg/L		1	2017-02-08	2017-02-08	13
Sodium, Soluble	mg/L		2	2017-02-08	2017-02-08	19
Sulfate, Soluble	mg/L		20	2017-02-08	2017-02-08	196
Theoretical Gypsum Requirement	tonnes/ha		N/A	2017-02-08	2017-02-08	0
Calcium, Soluble (meq/L)	meq/L		0.05			3.24
Calcium, Soluble (mg/kg)	mg/kg		1			31
Chloride, Soluble (meq/L)	meq/L		0.06			<0.06
Chloride, Soluble (mg/kg)	mg/kg		2			<2
Magnesium, Soluble (meq/L)	meq/L		0.08			1.07
Magnesium, Soluble (mg/kg)	mg/kg		1			6
Potassium, Soluble (meq/L)	meq/L		0.05			0.10
Potassium, Soluble (mg/kg)	mg/kg		2			<2
Sodium, Soluble (meq/L)	meq/L		0.09			0.83
Sodium, Soluble (mg/kg)	mg/kg		2			9
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04			4.08
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2			92

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8170543-8171425 If sodium results in mg/L are less than detection, SAR is non-calculable and is reported as 0.
Sodium Adsorption Ratio is a calculated parameter. The calculated value is the ratio of the sodium concentration in mmol/L over the square rooted sum of the calcium and magnesium concentrations in mmol/L.
Theoretical Gypsum Requirement is a calculated parameter. The calculation is from “A Comparison of Methods for Gypsum Requirement of Brine-Contaminated Soils”, Canadian Journal of Soil Science, 1998.

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Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Barium by Fusion ICP

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH26 3.0-3.9
					SAMPLE TYPE:	Soil
					DATE SAMPLED:	2017-02-03
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8171033
True Barium by Fusion ICP	mg/kg		50	2017-02-11	2017-02-11	5420

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8171033 Result is based on the dry weight of the sample.

Certified By:

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Chromium

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH02 0.8-1.0	17BH03 0.8-1.0	17BH04 0.8-1.0	17BH05 0.8-1.0
					SAMPLE TYPE:	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-01	2017-02-01	2017-02-01	2017-02-01
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8177999	8178024	8178042	8178125
Chromium	mg/kg		0.5	2017-02-14	2017-02-14	26.4	20.8	21.5	18.9

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Extractable Barium (AB)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH26 3.0-3.9
					SAMPLE TYPE:	Soil
					DATE SAMPLED:	2017-02-03
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8171033
Barium, Extractable (AB)	mg/kg		2	2017-02-10	2017-02-10	37

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8171033 Result is based on the dry weight of the sample.

Certified By:

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17C01 0.8-1.0	17C01 3.2-3.4	17C01 8.8-9.0	17C02 0-0.2	17C02 0.8-1.0	17C02 2.8-3.0
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-01	2017-02-01	2017-02-01	2017-02-01	2017-02-01	2017-02-01
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170514	8170515	8170517	8170518	8170519	8170522
pH (CaCl2 Extraction)	pH Units		N/A	2017-02-07	2017-02-07	5.90	7.85	7.95	6.59	7.32	7.70
Electrical Conductivity (Sat. Paste)	dS/m		0.05	2017-02-07	2017-02-07	0.18	0.84	0.62	0.51	0.41	0.62
Sodium Adsorption Ratio	N/A			2017-02-07	2017-02-07	0.32	0.36	2.79	0.07	0.21	0.23
Saturation Percentage	%		1	2017-02-07	2017-02-07	45	50	58	156	39	45
Chloride, Soluble	mg/L		5	2017-02-07	2017-02-07	5	14	9	13	36	6
Calcium, Soluble	mg/L		1	2017-02-07	2017-02-07	20	116	36	122	69	88
Potassium, Soluble	mg/L		2	2017-02-07	2017-02-07	2	24	14	10	<2	7
Magnesium, Soluble	mg/L		1	2017-02-07	2017-02-07	4	22	8	12	11	17
Sodium, Soluble	mg/L		2	2017-02-07	2017-02-07	6	16	71	3	7	9
Sulfur (as Sulfate), Soluble	mg/L		2	2017-02-07	2017-02-07	17	264	119	46	30	162
Calcium, Soluble (meq/L)	meq/L		0.05			1.00	5.79	1.80	6.09	3.44	4.39
Calcium, Soluble (mg/kg)	mg/kg		1			9	58	21	190	27	40
Chloride, Soluble (meq/L)	meq/L		0.14			0.14	0.39	0.25	0.37	1.02	0.17
Chloride, Soluble (mg/kg)	mg/kg		2			2	7	5	20	14	3
Magnesium, Soluble (meq/L)	meq/L		0.08			0.33	1.81	0.66	0.99	0.91	1.40
Magnesium, Soluble (mg/kg)	mg/kg		1			2	11	5	19	4	8
Potassium, Soluble (meq/L)	meq/L		0.05			0.05	0.61	0.36	0.26	<0.05	0.18
Potassium, Soluble (mg/kg)	mg/kg		2			<2	12	8	16	<2	3
Sodium, Soluble (meq/L)	meq/L		0.09			0.26	0.70	3.09	0.13	0.30	0.39
Sodium, Soluble (mg/kg)	mg/kg		2			3	8	41	5	3	4
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04			0.35	5.50	2.48	0.96	0.62	3.37
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2			8	132	69	72	12	73
Theoretical Gypsum Requirement	tonnes/ha		0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

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Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17C02 4.7-4.9	17BH01 0.8-1.0	17BH10 0-0.2	Dup A 3.2-3.4	Dup B 1.7-1.9	Dup C 2.2-2.5
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-01	2017-02-01	2017-02-01	2017-02-01	2017-02-01	2017-02-01
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170526	8170532	8170623	8170630	8170634	8170648
pH (CaCl2 Extraction)	pH Units		N/A	2017-02-07	2017-02-07	7.28	6.83	7.49	7.53	7.33	7.00
Electrical Conductivity (Sat. Paste)	dS/m		0.05	2017-02-07	2017-02-07	0.36	0.60	0.17	0.66	0.64	0.56
Sodium Adsorption Ratio	N/A			2017-02-07	2017-02-07	0.47	0.19	0.51	0.28	1.37	0.40
Saturation Percentage	%		1	2017-02-07	2017-02-07	21	59	45	48	59	50
Chloride, Soluble	mg/L		5	2017-02-07	2017-02-07	<5	<5	<5	13	62	<5
Calcium, Soluble	mg/L		1	2017-02-07	2017-02-07	42	108	55	90	64	82
Potassium, Soluble	mg/L		2	2017-02-07	2017-02-07	3	<2	6	19	2	3
Magnesium, Soluble	mg/L		1	2017-02-07	2017-02-07	9	17	12	17	13	14
Sodium, Soluble	mg/L		2	2017-02-07	2017-02-07	13	8	16	11	46	15
Sulfur (as Sulfate), Soluble	mg/L		2	2017-02-07	2017-02-07	46	89	41	181	168	143
Calcium, Soluble (meq/L)	meq/L		0.05			2.10	5.39	2.74	4.49	3.19	4.09
Calcium, Soluble (mg/kg)	mg/kg		1			9	64	25	43	38	41
Chloride, Soluble (meq/L)	meq/L		0.14			<0.14	<0.14	<0.14	0.37	1.75	<0.14
Chloride, Soluble (mg/kg)	mg/kg		2			<2	<2	<2	6	37	<2
Magnesium, Soluble (meq/L)	meq/L		0.08			0.74	1.40	0.99	1.40	1.07	1.15
Magnesium, Soluble (mg/kg)	mg/kg		1			2	10	5	8	8	7
Potassium, Soluble (meq/L)	meq/L		0.05			0.08	<0.05	0.15	0.49	0.05	0.08
Potassium, Soluble (mg/kg)	mg/kg		2			<2	<2	3	9	<2	<2
Sodium, Soluble (meq/L)	meq/L		0.09			0.57	0.35	0.70	0.48	2.00	0.65
Sodium, Soluble (mg/kg)	mg/kg		2			3	5	7	5	27	8
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04			0.96	1.85	0.85	3.77	3.50	2.98
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2			10	53	18	87	99	72
Theoretical Gypsum Requirement	tonnes/ha		0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH11 0.3-0.5	17BH12 1.3-1.5	17BH13 1.3-1.5	17BH14 1.3-1.5	17BH15 0.8-1.0	17BH17 0.3-0.5
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170655	8170698	8170781	8170857	8170938	8170977
pH (CaCl2 Extraction)	pH Units		N/A	2017-02-07	2017-02-07	7.96	7.40	7.52	7.46	7.11	7.49
Electrical Conductivity (Sat. Paste)	dS/m		0.05	2017-02-07	2017-02-07	0.47	0.52	0.52	0.46	0.70	0.54
Sodium Adsorption Ratio	N/A			2017-02-07	2017-02-07	0.26	0.24	0.40	0.50	0.41	0.39
Saturation Percentage	%		1	2017-02-07	2017-02-07	41	46	41	43	51	47
Chloride, Soluble	mg/L		5	2017-02-07	2017-02-07	10	9	11	<5	7	<5
Calcium, Soluble	mg/L		1	2017-02-07	2017-02-07	69	65	66	69	115	74
Potassium, Soluble	mg/L		2	2017-02-07	2017-02-07	5	8	5	3	4	5
Magnesium, Soluble	mg/L		1	2017-02-07	2017-02-07	12	13	16	11	18	14
Sodium, Soluble	mg/L		2	2017-02-07	2017-02-07	9	8	14	17	18	14
Sulfur (as Sulfate), Soluble	mg/L		2	2017-02-07	2017-02-07	50	46	84	73	195	83
Calcium, Soluble (meq/L)	meq/L		0.05			3.44	3.24	3.29	3.44	5.74	3.69
Calcium, Soluble (mg/kg)	mg/kg		1			28	30	27	30	59	35
Chloride, Soluble (meq/L)	meq/L		0.14			0.28	0.25	0.31	<0.14	0.20	<0.14
Chloride, Soluble (mg/kg)	mg/kg		2			4	4	5	<2	4	<2
Magnesium, Soluble (meq/L)	meq/L		0.08			0.99	1.07	1.32	0.91	1.48	1.15
Magnesium, Soluble (mg/kg)	mg/kg		1			5	6	7	5	9	7
Potassium, Soluble (meq/L)	meq/L		0.05			0.13	0.20	0.13	0.08	0.10	0.13
Potassium, Soluble (mg/kg)	mg/kg		2			2	4	2	<2	2	2
Sodium, Soluble (meq/L)	meq/L		0.09			0.39	0.35	0.61	0.74	0.78	0.61
Sodium, Soluble (mg/kg)	mg/kg		2			4	4	6	7	9	7
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04			1.04	0.96	1.75	1.52	4.06	1.73
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2			21	21	34	31	99	39
Theoretical Gypsum Requirement	tonnes/ha		0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	SAMPLE DESCRIPTION: 17BH17 2.8-3.0	17BH19 1.3-1.5	17BH19 1.7-1.9	17BH25 1.3-1.5	17BH25 2.8-3.0
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-02	2017-02-02	2017-02-02	2017-02-03	2017-02-03
						8170980	8170987	8170996	8171030	8171031
pH (CaCl2 Extraction)	pH Units		N/A	2017-02-07	2017-02-07	7.07	7.68	7.70	7.25	7.24
Electrical Conductivity (Sat. Paste)	dS/m		0.05	2017-02-07	2017-02-07	0.62	1.77	0.64	2.41	1.68
Sodium Adsorption Ratio	N/A			2017-02-07	2017-02-07	0.25	0.37	0.46	0.15	0.29
Saturation Percentage	%		1	2017-02-07	2017-02-07	42	52	49	52	50
Chloride, Soluble	mg/L		5	2017-02-07	2017-02-07	8	31	33	<5	34
Calcium, Soluble	mg/L		1	2017-02-07	2017-02-07	96	359	75	551	325
Potassium, Soluble	mg/L		2	2017-02-07	2017-02-07	4	12	7	11	10
Magnesium, Soluble	mg/L		1	2017-02-07	2017-02-07	17	66	17	81	50
Sodium, Soluble	mg/L		2	2017-02-07	2017-02-07	10	29	17	14	21
Sulfur (as Sulfate), Soluble	mg/L		2	2017-02-07	2017-02-07	94	1100	151	1600	978
Calcium, Soluble (meq/L)	meq/L		0.05			4.79	17.9	3.74	27.5	16.2
Calcium, Soluble (mg/kg)	mg/kg		1			40	187	37	287	163
Chloride, Soluble (meq/L)	meq/L		0.14			0.23	0.87	0.93	<0.14	0.96
Chloride, Soluble (mg/kg)	mg/kg		2			3	16	16	<2	17
Magnesium, Soluble (meq/L)	meq/L		0.08			1.40	5.43	1.40	6.67	4.11
Magnesium, Soluble (mg/kg)	mg/kg		1			7	34	8	42	25
Potassium, Soluble (meq/L)	meq/L		0.05			0.10	0.31	0.18	0.28	0.26
Potassium, Soluble (mg/kg)	mg/kg		2			<2	6	3	6	5
Sodium, Soluble (meq/L)	meq/L		0.09			0.43	1.26	0.74	0.61	0.91
Sodium, Soluble (mg/kg)	mg/kg		2			4	15	8	7	11
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04			1.96	22.9	3.14	33.3	20.4
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2			39	572	74	832	489
Theoretical Gypsum Requirement	tonnes/ha		0.01			<0.01	<0.01	<0.01	<0.01	<0.01

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PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

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SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH26 2.5-3.0		17BH26 3.0-3.9		17BH27 2.5-3.0	17BH27 3.0-3.9
					SAMPLE TYPE:	Soil		Soil		Soil	Soil
					DATE SAMPLED:	2017-02-03		2017-02-03		2017-02-03	2017-02-03
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8171032	RDL	8171033	RDL	8171035	8171039
pH (CaCl2 Extraction)	pH Units		N/A	2017-02-07	2017-02-07	12.3	N/A	9.77	N/A	7.77	7.95
Electrical Conductivity (Sat. Paste)	dS/m		0.05	2017-02-07	2017-02-07	7.92	0.05	3.02	0.05	0.99	0.90
Sodium Adsorption Ratio	N/A			2017-02-07	2017-02-07	1.00		38.1		2.05	1.60
Saturation Percentage	%		1	2017-02-07	2017-02-07	113	1	51	1	46	39
Chloride, Soluble	mg/L		25	2017-02-07	2017-02-07	836	10	122	5	13	22
Calcium, Soluble	mg/L		1	2017-02-07	2017-02-07	1080	1	27	1	91	90
Potassium, Soluble	mg/L		2	2017-02-07	2017-02-07	40	2	16	2	10	18
Magnesium, Soluble	mg/L		1	2017-02-07	2017-02-07	<1	1	1	1	18	19
Sodium, Soluble	mg/L		2	2017-02-07	2017-02-07	119	2	741	2	82	64
Sulfur (as Sulfate), Soluble	mg/L		2	2017-02-07	2017-02-07	80	2	1130	2	295	302
Calcium, Soluble (meq/L)	meq/L		0.05			53.9	0.05	1.35	0.05	4.54	4.49
Calcium, Soluble (mg/kg)	mg/kg		1			1220	1	14	1	42	35
Chloride, Soluble (meq/L)	meq/L		0.14			23.6	0.14	3.44	0.14	0.37	0.62
Chloride, Soluble (mg/kg)	mg/kg		2			945	2	62	2	6	9
Magnesium, Soluble (meq/L)	meq/L		0.08			<0.08	0.08	0.08	0.08	1.48	1.56
Magnesium, Soluble (mg/kg)	mg/kg		1			<1	1	<1	1	8	7
Potassium, Soluble (meq/L)	meq/L		0.05			1.02	0.05	0.41	0.05	0.26	0.46
Potassium, Soluble (mg/kg)	mg/kg		2			45	2	8	2	5	7
Sodium, Soluble (meq/L)	meq/L		0.09			5.18	0.09	32.2	0.09	3.57	2.78
Sodium, Soluble (mg/kg)	mg/kg		2			134	2	378	2	38	25
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04			1.67	0.04	23.5	0.04	6.14	6.29
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2			90	2	576	2	136	118
Theoretical Gypsum Requirement	tonnes/ha		0.01			<0.01	0.01	3.50	0.01	<0.01	<0.01

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH32 2.5-3.0	17BH32 3.0-3.9	17BH33 2.2-3.0	17BH33 3.0-3.2	Dup F 3.0-3.2	Dup E 1.3-1.5
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-03	2017-02-03	2017-02-03	2017-02-03	2017-02-03	2017-02-03
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8171049	8171050	8171051	8171052	8171054	8171413
pH (CaCl2 Extraction)	pH Units		N/A	2017-02-07	2017-02-07	7.69	7.71	9.62	7.85	8.02	7.25
Electrical Conductivity (Sat. Paste)	dS/m		0.05	2017-02-07	2017-02-07	0.78	1.40	4.43	1.46	0.97	2.36
Sodium Adsorption Ratio	N/A			2017-02-07	2017-02-07	2.25	15.0	14.5	16.2	11.7	0.17
Saturation Percentage	%		1	2017-02-07	2017-02-07	49	38	61	34	41	57
Chloride, Soluble	mg/L		5	2017-02-07	2017-02-07	12	29	48	39	29	<5
Calcium, Soluble	mg/L		1	2017-02-07	2017-02-07	67	21	239	24	25	520
Potassium, Soluble	mg/L		2	2017-02-07	2017-02-07	6	8	23	12	9	12
Magnesium, Soluble	mg/L		1	2017-02-07	2017-02-07	13	4	2	5	6	79
Sodium, Soluble	mg/L		2	2017-02-07	2017-02-07	77	286	823	334	251	16
Sulfur (as Sulfate), Soluble	mg/L		2	2017-02-07	2017-02-07	216	477	2420	501	343	1450
Calcium, Soluble (meq/L)	meq/L		0.05			3.34	1.05	11.9	1.20	1.25	25.9
Calcium, Soluble (mg/kg)	mg/kg		1			33	8	146	8	10	296
Chloride, Soluble (meq/L)	meq/L		0.14			0.34	0.82	1.35	1.10	0.82	<0.14
Chloride, Soluble (mg/kg)	mg/kg		2			6	11	29	13	12	<2
Magnesium, Soluble (meq/L)	meq/L		0.08			1.07	0.33	0.16	0.41	0.49	6.50
Magnesium, Soluble (mg/kg)	mg/kg		1			6	2	1	2	2	45
Potassium, Soluble (meq/L)	meq/L		0.05			0.15	0.20	0.59	0.31	0.23	0.31
Potassium, Soluble (mg/kg)	mg/kg		2			3	3	14	4	4	7
Sodium, Soluble (meq/L)	meq/L		0.09			3.35	12.4	35.8	14.5	10.9	0.70
Sodium, Soluble (mg/kg)	mg/kg		2			38	109	502	114	103	9
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04			4.50	9.93	50.4	10.4	7.14	30.2
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2			106	181	1480	170	141	827
Theoretical Gypsum Requirement	tonnes/ha		0.01			<0.01	0.31	4.11	0.40	0.21	<0.01

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	SAMPLE DESCRIPTION: 17BH26 0.8-1.0	17BH28 2.8-3.0	17BH29 3.2-3.4	17BH30 2.8-3.0	17BH31 3.2-3.4	17BH26 5.2-5.4
SAMPLE TYPE:						Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:						2017-02-03	2017-02-03	2017-02-03	2017-02-03	2017-02-03	2017-02-03
						8178295	8178312	8178315	8178316	8178321	8181077
pH (CaCl2 Extraction)	pH Units		N/A	2017-02-10	2017-02-10	7.56	7.69	7.71	7.65	7.65	7.70
Electrical Conductivity (Sat. Paste)	dS/m		0.05	2017-02-10	2017-02-10	1.81	1.16	0.78	0.99	0.85	0.46
Sodium Adsorption Ratio	N/A			2017-02-10	2017-02-10	1.79	0.71	0.41	2.11	0.39	0.43
Saturation Percentage	%		1	2017-02-10	2017-02-10	46	49	35	40	52	61
Chloride, Soluble	mg/L		5	2017-02-10	2017-02-10	<5	32	11	15	41	7
Calcium, Soluble	mg/L		1	2017-02-10	2017-02-10	213	110	83	75	88	41
Potassium, Soluble	mg/L		2	2017-02-10	2017-02-10	6	12	15	8	14	10
Magnesium, Soluble	mg/L		1	2017-02-10	2017-02-10	41	27	21	19	22	11
Sodium, Soluble	mg/L		2	2017-02-10	2017-02-10	109	32	16	79	16	12
Sulfur (as Sulfate), Soluble	mg/L		2	2017-02-10	2017-02-10	971	470	270	362	366	102
Calcium, Soluble (meq/L)	meq/L		0.05			10.6	5.49	4.14	3.74	4.39	2.05
Calcium, Soluble (mg/kg)	mg/kg		1			98	54	29	30	46	25
Chloride, Soluble (meq/L)	meq/L		0.14			<0.14	0.90	0.31	0.42	1.16	0.20
Chloride, Soluble (mg/kg)	mg/kg		2			<2	16	4	6	21	4
Magnesium, Soluble (meq/L)	meq/L		0.08			3.37	2.22	1.73	1.56	1.81	0.91
Magnesium, Soluble (mg/kg)	mg/kg		1			19	13	7	8	11	7
Potassium, Soluble (meq/L)	meq/L		0.05			0.15	0.31	0.38	0.20	0.36	0.26
Potassium, Soluble (mg/kg)	mg/kg		2			3	6	5	3	7	6
Sodium, Soluble (meq/L)	meq/L		0.09			4.74	1.39	0.70	3.44	0.70	0.52
Sodium, Soluble (mg/kg)	mg/kg		2			50	16	6	32	8	7
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04			20.2	9.79	5.62	7.54	7.62	2.12
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2			447	230	95	145	190	62
Theoretical Gypsum Requirement	tonnes/ha		0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8170514-8171031 If sodium results in mg/L are less than detection, SAR is non-calculable and is reported as 0.

8171032-8171033 If sodium results in mg/L are less than detection, SAR is non-calculable and is reported as 0.

8171035-8181077 If sodium results in mg/L are less than detection, SAR is non-calculable and is reported as 0.

Certified By:

Results relate only to the items tested and to all the items tested

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Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Alcohol Analysis in Soil

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH06 0-0.2	17BH18 0-0.2
					SAMPLE TYPE:	Soil	Soil
					DATE SAMPLED:	2017-02-01	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170544	8170981
Methanol	mg/kg		0.5	2017-02-06	2017-02-07	5.2	4.3
Ethanol	mg/kg		10	2017-02-06	2017-02-07	<10	<10
Propanol	mg/kg		10	2017-02-06	2017-02-07	<10	<10
Isopropanol	mg/kg		10	2017-02-06	2017-02-07	<10	<10
Butanol	mg/kg		10	2017-02-06	2017-02-07	<10	<10
Pentanol	mg/kg		10	2017-02-06	2017-02-07	<10	<10
Surrogate	Unit	Acceptable Limits					
4-Methyl-2-pentanone	%	50-150		2017-02-06	2017-02-07	78	74

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8170544-8170981 Analysis by GC/FID.
Results are based on the dry weight of the sample.

Certified By: Alison Sekera

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Glycols Analysis in Soil

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH06 0-0.2	17BH18 0-0.2
					SAMPLE TYPE:	Soil	Soil
					DATE SAMPLED:	2017-02-01	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170544	8170981
Propylene Glycol	mg/kg		10	2017-02-10	2017-02-10	<10	<10
Ethylene Glycol	mg/kg		10	2017-02-10	2017-02-10	<10	<10
Diethylene Glycol	mg/kg		10	2017-02-10	2017-02-10	<10	<10
Triethylene Glycol	mg/kg		10	2017-02-10	2017-02-10	<10	<10
Tetraethylene Glycol	mg/kg		10	2017-02-10	2017-02-10	<10	<10
Surrogate	Unit	Acceptable Limits					
Heptanol	%	50-150		2017-02-10	2017-02-10	106	108

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8170544-8170981 Analysis by GC/FID.
Results are based on the dry weight of the sample.

Certified By: Alison Sekera

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Methanol Analysis - Soil

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH10 0-0.2	17BH11 0-0.2	17BH12 0-0.2	17BH13 0-0.2	17BH14 0-0.2	17BH15 0-0.2
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-01	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170623	8170649	8170667	8170700	8170856	8170860
Methanol	mg/kg		0.5	2017-02-06	2017-02-07	4.6	1.3	3.0	8.4	5.6	14.7
Surrogate	Unit	Acceptable Limits									
4-Methyl-2-pentanone	%	50-150		2017-02-06	2017-02-07	58	74	81	82	75	75

					SAMPLE DESCRIPTION:	17BH16 0-0.2	17BH17 0-0.2	Dup D 0-0.2
					SAMPLE TYPE:	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-02	2017-02-02	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170939	8170974	8171025
Methanol	mg/kg		0.5	2017-02-06	2017-02-07	2.3	5.5	7.2
Surrogate	Unit	Acceptable Limits						
4-Methyl-2-pentanone	%	50-150		2017-02-06	2017-02-07	76	75	75

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8170623-8171025 Analysis by GC/FID.
Results are based on the dry weight of the sample.

Certified By: Alison Sekera

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1) in Soil

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH20 1.3-1.5	17BH20 2.2-2.5	17BH21 0.3-0.5	17BH21 1.7-1.9	17BH22 0.3-0.5	17BH22 1.7-1.9
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170997	8170998	8171002	8171008	8171012	8171016
Benzene	mg/kg		0.005	2017-02-07	2017-02-07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	2017-02-07	2017-02-07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	2017-02-07	2017-02-07	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	2017-02-07	2017-02-07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	2017-02-07	2017-02-07	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	2017-02-07	2017-02-07	<10	<10	<10	<10	<10	<10
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		2017-02-07	2017-02-07	92	91	106	107	106	105
Ethylbenzene-d10 (BTEX)	%	50-150		2017-02-07	2017-02-07	72	73	83	80	90	82

					SAMPLE DESCRIPTION:	17BH23 0.3-0.5	17BH23 1.7-1.9	17BH24 0.3-0.5	17BH24 1.7-1.9
					SAMPLE TYPE:	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-02	2017-02-02	2017-02-02	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8171414	8171416	8171417	8171425
Benzene	mg/kg		0.005	2017-02-07	2017-02-07	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	2017-02-07	2017-02-07	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	2017-02-07	2017-02-07	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	2017-02-07	2017-02-07	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	2017-02-07	2017-02-07	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	2017-02-07	2017-02-07	<10	<10	<10	<10
Surrogate	Unit	Acceptable Limits							
Toluene-d8 (BTEX)	%	50-150		2017-02-07	2017-02-07	106	106	106	106
Ethylbenzene-d10 (BTEX)	%	50-150		2017-02-07	2017-02-07	89	82	95	77

Certified By: Alison Sekera

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1) in Soil

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8170997-8171425 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
Total C6 - C10 results are corrected for BTEX.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
Linearity is within 15%.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH01 0.8-1.0	17BH01 1.7-1.9	17BH10 0.8-1.0	Dup B 1.7-1.9	17BH11 0.3-0.5	17BH12 0.8-1.0
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-01	2017-02-01	2017-02-01	2017-02-01	2017-02-02	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170532	8170543	8170624	8170634	8170655	8170676
Benzene	mg/kg		0.005	2017-02-01	2017-02-07	<0.005	0.027	<0.005	0.028	<0.005	<0.005
Toluene	mg/kg		0.05	2017-02-01	2017-02-07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	2017-02-01	2017-02-07	<0.01	0.26	<0.01	0.36	<0.01	<0.01
Xylenes	mg/kg		0.05	2017-02-01	2017-02-07	<0.05	0.90	<0.05	1.21	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	2017-02-01	2017-02-07	60	20	<10	30	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	2017-02-01	2017-02-07	60	20	<10	20	<10	<10
C10 - C16 (F2)	mg/kg		10	2017-02-06	2017-02-07	5460	864	<10	1420	<10	<10
C16 - C34 (F3)	mg/kg		10	2017-02-06	2017-02-07	22600	3160	17	4970	17	11
C34 - C50 (F4)	mg/kg		10	2017-02-06	2017-02-07	1280	198	12	294	<10	<10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	2017-02-06	2017-02-07	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	2017-02-06	2017-02-07	13	12	12	13	11	11
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		2017-02-01	2017-02-07	90	98	102	97	102	102
o-Terphenyl (F2-F4)	%	50-150		2017-02-06	2017-02-07	108	111	108	108	100	102

Certified By: Alison Sekera

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH13 0.8-1.0	17BH14 1.3-1.5	17BH15 0.3-0.5	17BH16 0.8-1.0	17BH17 0.8-1.0	17BH17 2.2-2.5
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170705	8170857	8170863	8170940	8170978	8170979
Benzene	mg/kg		0.005	2017-02-02	2017-02-07	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	2017-02-02	2017-02-07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	2017-02-02	2017-02-07	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	2017-02-02	2017-02-07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	2017-02-02	2017-02-07	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	2017-02-02	2017-02-07	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	2017-02-06	2017-02-07	<10	<10	<10	<10	<10	<10
C16 - C34 (F3)	mg/kg		10	2017-02-06	2017-02-07	18	13	62	63	15	15
C34 - C50 (F4)	mg/kg		10	2017-02-06	2017-02-07	<10	<10	27	31	10	<10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	2017-02-06	2017-02-07	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	2017-02-06	2017-02-07	12	11	15	11	12	17
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		2017-02-02	2017-02-07	102	96	102	96	98	99
o-Terphenyl (F2-F4)	%	50-150		2017-02-06	2017-02-07	108	102	104	103	110	101

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH18 0.3-0.5	17BH19 0.3-0.5	17BH19 1.7-1.9	17BH25 0.8-1.0	17BH25 2.8-3.0	17BH26 2.5-3.0
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-02	2017-02-02	2017-02-02	2017-02-03	2017-02-03	2017-02-03
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170982	8170984	8170996	8171026	8171031	8171032
Benzene	mg/kg		0.005	2017-02-02	2017-02-07	<0.005	0.007	0.372	<0.005	<0.005	0.014
Toluene	mg/kg		0.05	2017-02-02	2017-02-07	<0.05	<0.05	0.12	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	2017-02-02	2017-02-07	<0.01	<0.01	2.52	<0.01	<0.01	0.02
Xylenes	mg/kg		0.05	2017-02-02	2017-02-07	<0.05	<0.05	1.59	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	2017-02-02	2017-02-07	<10	<10	150	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	2017-02-02	2017-02-07	<10	<10	140	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	2017-02-06	2017-02-07	<10	<10	335	<10	<10	<10
C16 - C34 (F3)	mg/kg		10	2017-02-06	2017-02-07	21	46	36	42	34	29
C34 - C50 (F4)	mg/kg		10	2017-02-06	2017-02-07	12	18	<10	13	12	11
Gravimetric Heavy Hydrocarbons	mg/kg		1000	2017-02-06	2017-02-07	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	2017-02-06	2017-02-07	13	13	15	13	17	38
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		2017-02-02	2017-02-07	100	97	104	98	100	92
o-Terphenyl (F2-F4)	%	50-150		2017-02-06	2017-02-07	106	103	104	102	106	100

Certified By: Alison Sekera

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Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH26 3.0-3.9	17BH27 2.5-3.0	17BH27 3.0-3.9	17BH32 2.5-3.0	17BH32 3.0-3.9	17BH33 2.2-3.0
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-03	2017-02-03	2017-02-03	2017-02-03	2017-02-03	2017-02-03
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8171033	8171035	8171039	8171049	8171050	8171051
Benzene	mg/kg		0.005	2017-02-03	2017-02-07	0.025	<0.005	<0.005	<0.005	0.018	0.255
Toluene	mg/kg		0.05	2017-02-03	2017-02-07	0.08	<0.05	<0.05	<0.05	0.07	0.61
Ethylbenzene	mg/kg		0.01	2017-02-03	2017-02-07	0.06	<0.01	<0.01	<0.01	0.04	0.34
Xylenes	mg/kg		0.05	2017-02-03	2017-02-07	0.11	<0.05	<0.05	<0.05	0.08	1.06
C6 - C10 (F1)	mg/kg		10	2017-02-03	2017-02-07	20	<10	<10	<10	<10	30
C6 - C10 (F1 minus BTEX)	mg/kg		10	2017-02-03	2017-02-07	20	<10	<10	<10	<10	30
C10 - C16 (F2)	mg/kg		10	2017-02-06	2017-02-07	19	<10	<10	10	<10	34
C16 - C34 (F3)	mg/kg		10	2017-02-06	2017-02-07	82	52	49	76	64	130
C34 - C50 (F4)	mg/kg		10	2017-02-06	2017-02-07	35	20	20	29	24	68
Gravimetric Heavy Hydrocarbons	mg/kg		1000	2017-02-06	2017-02-07	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	2017-02-06	2017-02-07	20	13	13	13	15	18
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		2017-02-03	2017-02-07	100	97	102	96	98	100
o-Terphenyl (F2-F4)	%	50-150		2017-02-06	2017-02-07	103	104	103	102	108	107

Certified By: Alison Sekera

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH33 3.0-3.2	Dup F 3.0-3.2	17BH01 3.2-3.4	17BH02 0.8-1.0	17BH02 1.7-1.9	17BH03 0.8-1.0
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-03	2017-02-03	2017-02-01	2017-02-01	2017-02-01	2017-02-01
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8171052	8171054	8177965	8177999	8178011	8178024
Benzene	mg/kg		0.005	2017-02-03	2017-02-07	0.086	0.036	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	2017-02-03	2017-02-07	0.22	0.09	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	2017-02-03	2017-02-07	0.14	0.05	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	2017-02-03	2017-02-07	0.37	0.15	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	2017-02-03	2017-02-07	10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	2017-02-03	2017-02-07	10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	2017-02-06	2017-02-07	12	18	<10	351	17	<10
C16 - C34 (F3)	mg/kg		10	2017-02-06	2017-02-07	75	84	76	1240	110	19
C34 - C50 (F4)	mg/kg		10	2017-02-06	2017-02-07	31	33	27	50	11	<10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	2017-02-06	2017-02-07	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	2017-02-06	2017-02-07	12	14	14	14	10	13
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		2017-02-03	2017-02-07	104	102	101	98	102	104
o-Terphenyl (F2-F4)	%	50-150		2017-02-06	2017-02-07	104	103	87	90	91	89

Certified By: Alison Sekera

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AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH03 1.7-1.9	17BH04 0.8-1.0	17BH04 1.7-1.9	17BH05 0.8-1.0	17BH05 1.7-1.9	17BH19 3.2-3.4
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-01	2017-02-01	2017-02-01	2017-02-01	2017-02-01	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8178034	8178042	8178088	8178125	8178127	8178226
Benzene	mg/kg		0.005	2017-02-01	2017-02-11	<0.005	<0.005	<0.005	<0.005	<0.005	0.023
Toluene	mg/kg		0.05	2017-02-01	2017-02-11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	2017-02-01	2017-02-11	<0.01	<0.01	<0.01	<0.01	<0.01	0.17
Xylenes	mg/kg		0.05	2017-02-01	2017-02-11	<0.05	<0.05	<0.05	<0.05	<0.05	0.55
C6 - C10 (F1)	mg/kg		10	2017-02-01	2017-02-11	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	2017-02-01	2017-02-11	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	2017-02-10	2017-02-11	<10	<10	<10	<10	<10	<10
C16 - C34 (F3)	mg/kg		10	2017-02-10	2017-02-11	14	12	14	19	<10	<10
C34 - C50 (F4)	mg/kg		10	2017-02-10	2017-02-11	<10	<10	<10	<10	<10	<10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	2017-02-10	2017-02-11	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	2017-02-10	2017-02-11	12	12	14	12	12	14
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		2017-02-01	2017-02-11	101	100	100	100	99	102
o-Terphenyl (F2-F4)	%	50-150		2017-02-10	2017-02-11	89	88	89	89	87	88

Certified By: Alison Sekera

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH28 2.8-3.0	17BH29 3.2-3.4	17BH30 2.8-3.0	17BH31 3.2-3.4	17BH26 5.2-5.4
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-03	2017-02-03	2017-02-03	2017-02-03	2017-02-03
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8178312	8178315	8178316	8178321	8181077
Benzene	mg/kg		0.005	2017-02-03	2017-02-11	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	2017-02-03	2017-02-11	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	2017-02-03	2017-02-11	<0.01	<0.01	0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	2017-02-03	2017-02-11	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	2017-02-03	2017-02-11	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	2017-02-03	2017-02-11	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	2017-02-10	2017-02-11	<10	<10	<10	<10	<10
C16 - C34 (F3)	mg/kg		10	2017-02-10	2017-02-11	39	33	44	32	70
C34 - C50 (F4)	mg/kg		10	2017-02-10	2017-02-11	14	12	16	13	29
Gravimetric Heavy Hydrocarbons	mg/kg		1000	2017-02-10	2017-02-11	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	2017-02-10	2017-02-11	12	17	12	11	13
Surrogate	Unit	Acceptable Limits								
Toluene-d8 (BTEX)	%	50-150		2017-02-03	2017-02-11	100	102	99	98	100
o-Terphenyl (F2-F4)	%	50-150		2017-02-10	2017-02-11	86	87	90	88	87

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8170532-8181077 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
C>10 – C16 (F2- Napthalene) is a calculated parameter. The calculated value is F2 - Napthalene (if requested).
C>16 - C34 (F3-PAH) is a calculated parameter. The calculated value is F3-PAH (if requested).
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.
Extraction and holding times were met for this sample.

Certified By: Alison Sekera

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (F2-F4) in Soil

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH20 1.3-1.5	17BH20 2.2-2.5	17BH21 0.3-0.5	17BH21 1.7-1.9	17BH22 0.3-0.5	17BH22 1.7-1.9
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170997	8170998	8171002	8171008	8171012	8171016
C10 - C16 (F2)	mg/kg	150	10	2017-02-06	2017-02-06	<10	<10	<10	<10	<10	<10
C16 - C34 (F3)	mg/kg	1300	10	2017-02-06	2017-02-06	46	15	18	39	11	<10
C34 - C50 (F4)	mg/kg	5600	10	2017-02-06	2017-02-06	20	<10	<10	11	<10	<10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	2017-02-06	2017-02-06	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	2017-02-06	2017-02-06	14	15	13	14	12	16
Surrogate	Unit	Acceptable Limits									
o-Terphenyl (F2-F4)	%	50-150		2017-02-06	2017-02-06	103	104	105	104	100	105

					SAMPLE DESCRIPTION:	17BH23 0.3-0.5	17BH23 1.7-1.9	17BH24 0.3-0.5	17BH24 1.7-1.9
					SAMPLE TYPE:	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-02	2017-02-02	2017-02-02	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8171414	8171416	8171417	8171425
C10 - C16 (F2)	mg/kg	150	10	2017-02-06	2017-02-06	<10	<10	<10	<10
C16 - C34 (F3)	mg/kg	1300	10	2017-02-06	2017-02-06	26	16	41	25
C34 - C50 (F4)	mg/kg	5600	10	2017-02-06	2017-02-06	16	10	15	12
Gravimetric Heavy Hydrocarbons	mg/kg		1000	2017-02-06	2017-02-06	N/A	N/A	N/A	N/A
Moisture Content	%		1	2017-02-06	2017-02-06	12	11	12	14
Surrogate	Unit	Acceptable Limits							
o-Terphenyl (F2-F4)	%	50-150		2017-02-06	2017-02-06	104	105	105	98

Certified By: Alison Sekera

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Certificate of Analysis

AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (F2-F4) in Soil

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Alberta Tier 1 - Soil - Agricultural - Fine

8170997-8171425 Results are based on the dry weight of the sample.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
C>10 – C16 (F2- Napthalene) is a calculated parameter. The calculated value is F2 - Napthalene (if requested).
C>16 - C34 (F3-PAH) is a calculated parameter. The calculated value is F3-PAH (if requested).
Extraction and holding times were met for this sample.

Certified By: Alison Sekera

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbon Analysis - Soil

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH19 0.3-0.5	17BH19 1.7-1.9	17BH20 1.3-1.5	17BH20 2.2-2.5	17BH21 1.7-1.9	17BH22 1.7-1.9
					SAMPLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8170984	8170996	8170997	8170998	8171008	8171016
Acridine	mg/kg		0.05	2017-02-14	2017-02-15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Quinoline	mg/kg		0.05	2017-02-14	2017-02-15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	mg/kg		0.005	2017-02-14	2017-02-15	<0.005	1.04	<0.005	<0.005	<0.005	<0.005
2-Methylnaphthalene	mg/kg		0.005	2017-02-14	2017-02-15	<0.005	1.94	0.006	<0.005	<0.005	<0.005
Acenaphthylene	mg/kg		0.005	2017-02-14	2017-02-15	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthene	mg/kg		0.005	2017-02-14	2017-02-15	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluorene	mg/kg		0.02	2017-02-14	2017-02-15	<0.02	0.06	<0.02	<0.02	<0.02	<0.02
Phenanthrene	mg/kg		0.02	2017-02-14	2017-02-15	<0.02	0.04	<0.02	<0.02	<0.02	<0.02
Anthracene	mg/kg		0.004	2017-02-14	2017-02-15	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Fluoranthene	mg/kg		0.01	2017-02-14	2017-02-15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	mg/kg		0.01	2017-02-14	2017-02-15	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Benzo[a]anthracene	mg/kg		0.02	2017-02-14	2017-02-15	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chrysene	mg/kg		0.05	2017-02-14	2017-02-15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[b+j]fluoranthene	mg/kg		0.03	2017-02-14	2017-02-15	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Benzo[k]fluoranthene	mg/kg		0.02	2017-02-14	2017-02-15	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo[a]pyrene	mg/kg		0.03	2017-02-14	2017-02-15	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Indeno[1,2,3-cd]pyrene	mg/kg		0.02	2017-02-14	2017-02-15	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Dibenzo[ah]anthracene	mg/kg		0.005	2017-02-14	2017-02-15	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo[ghi]perylene	mg/kg		0.05	2017-02-14	2017-02-15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
B[a]P TPE	mg/kg		0.023	2017-02-14	2017-02-15	0.023	0.023	0.023	0.023	0.023	0.023
IACR (Coarse Soil)			0.05	2017-02-14	2017-02-15	0.05	0.05	0.05	0.05	0.05	0.05
IACR (Fine Soil)			0.11	2017-02-14	2017-02-15	0.11	0.11	0.11	0.11	0.11	0.11
Surrogate	Unit	Acceptable Limits									
2-Fluorobiphenyl (PAH)	%	50-150		2017-02-14	2017-02-15	113	118	111	122	114	118
p-Terphenyl-d14 (PAH)	%	50-150		2017-02-14	2017-02-15	125	135	125	128	126	134

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbon Analysis - Soil

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

					SAMPLE DESCRIPTION:	17BH23 1.7-1.9	17BH24 1.7-1.9	17BH19 3.2-3.4
					SAMPLE TYPE:	Soil	Soil	Soil
					DATE SAMPLED:	2017-02-02	2017-02-02	2017-02-02
Parameter	Unit	G / S	RDL	Date Prepared	Date Analyzed	8171416	8171425	8178226
Acridine	mg/kg		0.05	2017-02-14	2017-02-15	<0.05	<0.05	<0.05
Quinoline	mg/kg		0.05	2017-02-14	2017-02-15	<0.05	<0.05	<0.05
Naphthalene	mg/kg		0.005	2017-02-14	2017-02-15	<0.005	<0.005	0.014
2-Methylnaphthalene	mg/kg		0.005	2017-02-14	2017-02-15	<0.005	<0.005	0.011
Acenaphthylene	mg/kg		0.005	2017-02-14	2017-02-15	<0.005	<0.005	<0.005
Acenaphthene	mg/kg		0.005	2017-02-14	2017-02-15	<0.005	<0.005	<0.005
Fluorene	mg/kg		0.02	2017-02-14	2017-02-15	<0.02	<0.02	<0.02
Phenanthrene	mg/kg		0.02	2017-02-14	2017-02-15	<0.02	<0.02	<0.02
Anthracene	mg/kg		0.004	2017-02-14	2017-02-15	<0.004	<0.004	<0.004
Fluoranthene	mg/kg		0.01	2017-02-14	2017-02-15	<0.01	<0.01	<0.01
Pyrene	mg/kg		0.01	2017-02-14	2017-02-15	<0.01	<0.01	<0.01
Benzo[a]anthracene	mg/kg		0.02	2017-02-14	2017-02-15	<0.02	<0.02	<0.02
Chrysene	mg/kg		0.05	2017-02-14	2017-02-15	<0.05	<0.05	<0.05
Benzo[b+j]fluoranthene	mg/kg		0.03	2017-02-14	2017-02-15	<0.03	<0.03	<0.03
Benzo[k]fluoranthene	mg/kg		0.02	2017-02-14	2017-02-15	<0.02	<0.02	<0.02
Benzo[a]pyrene	mg/kg		0.03	2017-02-14	2017-02-15	<0.03	<0.03	<0.03
Indeno[1,2,3-cd]pyrene	mg/kg		0.02	2017-02-14	2017-02-15	<0.02	<0.02	<0.02
Dibenzo[ah]anthracene	mg/kg		0.005	2017-02-14	2017-02-15	<0.005	<0.005	<0.005
Benzo[ghi]perylene	mg/kg		0.05	2017-02-14	2017-02-15	<0.05	<0.05	<0.05
B[a]P TPE	mg/kg		0.023	2017-02-14	2017-02-15	0.023	0.023	0.023
IACR (Coarse Soil)			0.05	2017-02-14	2017-02-15	0.05	0.05	0.05
IACR (Fine Soil)			0.11	2017-02-14	2017-02-15	0.11	0.11	0.11
Surrogate	Unit	Acceptable Limits						
2-Fluorobiphenyl (PAH)	%	50-150		2017-02-14	2017-02-15	123	109	114
p-Terphenyl-d14 (PAH)	%	50-150		2017-02-14	2017-02-15	139	122	129

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbon Analysis - Soil

DATE RECEIVED: 2017-02-06

DATE REPORTED: 2017-02-22

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8170984-8178226 Results are based on the dry weight of the sample.
Based on GC/MS target ion analysis.
Isomers Benzo(b)fluoranthene and Benzo(j)fluoranthene have the same GC retention time and are reported as the sum based on the Benzo(b)fluoranthene response.
B[a]P TPE, IACR (Coarse) and IACR (Fine) are calculated parameters. They are calculated according to the Alberta Tier 1 Soil and Groundwater remediation Guidelines, May 23, 2014. Note that if the analysis returns non-detects for a parameter, ½ the detection limit is entered into the formulas.

Certified By: Alison Sekera

Results relate only to the items tested and to all the items tested

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD
AGAT WORK ORDER: 17C184581
PROJECT: F-36
ATTENTION TO: Larry Yoon
SAMPLING SITE:
SAMPLED BY:

Soil Analysis

RPT Date: Feb 22, 2017

PARAMETER	Batch	Sample Id	DUPLICATE Dup #1	DUPLICATE Dup #2	DUPLICATE RPD	Method Blank	REFERENCE MATERIAL Measured Value	REFERENCE MATERIAL Acceptable Limits Lower	REFERENCE MATERIAL Acceptable Limits Upper	METHOD BLANK SPIKE Recovery	METHOD BLANK SPIKE Acceptable Limits Lower	METHOD BLANK SPIKE Acceptable Limits Upper	MATRIX SPIKE Recovery	MATRIX SPIKE Acceptable Limits Lower	MATRIX SPIKE Acceptable Limits Upper
Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)															
pH (CaCl2 Extraction)	2341	0522	7.70	7.58	1.6%	N/A	100%	90%	110%						
Electrical Conductivity (Sat. Paste)	8170522	0522	0.62	0.61	1.6%	< 0.05	101%	90%	110%						
Saturation Percentage	8170522	0522	45	45	0.0%	< 1	102%	80%	120%						
Chloride, Soluble	8170522	8170522	6	8	NA	< 5	118%	80%	120%						
Calcium, Soluble	8170522	8170522	88	89	1.3%	< 1	98%	80%	120%						
Potassium, Soluble	8170522	8170522	7	7	NA	< 2	91%	80%	120%						
Magnesium, Soluble	8170522	8170522	17	17	0.0%	< 1	96%	80%	120%						
Sodium, Soluble	8170522	8170522	9	9	NA	< 2	95%	80%	120%						
Sulfur (as Sulfate), Soluble	8170522	8170522	162	165	1.9%	< 2	93%	80%	120%						

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

PARAMETER	Batch	Sample Id	DUPLICATE Dup #1	DUPLICATE Dup #2	DUPLICATE RPD	Method Blank	REFERENCE MATERIAL Measured Value	REFERENCE MATERIAL Acceptable Limits Lower	REFERENCE MATERIAL Acceptable Limits Upper	METHOD BLANK SPIKE Recovery	METHOD BLANK SPIKE Acceptable Limits Lower	METHOD BLANK SPIKE Acceptable Limits Upper	MATRIX SPIKE Recovery	MATRIX SPIKE Acceptable Limits Lower	MATRIX SPIKE Acceptable Limits Upper
Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)															
pH (CaCl2 Extraction)	2341	1413	7.25	7.27	0.3%	N/A	100%	90%	110%						
Electrical Conductivity (Sat. Paste)	8141413	1413	2.36	2.39	1.3%	< 0.05	98%	90%	110%						
Saturation Percentage	8141413	1413	57	56	1.8%	< 1	100%	80%	120%						
Chloride, Soluble	8171413	8171413	<5	<5	NA	< 5	109%	80%	120%						
Calcium, Soluble	8171413	8171413	520	548	5.2%	< 1	104%	80%	120%						
Potassium, Soluble	8171413	8171413	12	12	0.0%	< 2	94%	80%	120%						
Magnesium, Soluble	8171413	8171413	79	81	1.7%	< 1	94%	80%	120%						
Sodium, Soluble	8171413	8171413	16	16	6.0%	< 2	94%	80%	120%						
Sulfur (as Sulfate), Soluble	8171413	8171413	1450	1560	7.1%	< 2	94%	80%	120%						

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

PARAMETER	Batch	Sample Id	DUPLICATE Dup #1	DUPLICATE Dup #2	DUPLICATE RPD	Method Blank	REFERENCE MATERIAL Measured Value	REFERENCE MATERIAL Acceptable Limits Lower	REFERENCE MATERIAL Acceptable Limits Upper	METHOD BLANK SPIKE Recovery	METHOD BLANK SPIKE Acceptable Limits Lower	METHOD BLANK SPIKE Acceptable Limits Upper	MATRIX SPIKE Recovery	MATRIX SPIKE Acceptable Limits Lower	MATRIX SPIKE Acceptable Limits Upper
Particle Size by Sieve															
Sieve Analysis - 75 microns	8170515	8170515	39.9	39.4	1.3%	< 0.2	99%	80%	120%						

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

PARAMETER	Batch	Sample Id	DUPLICATE Dup #1	DUPLICATE Dup #2	DUPLICATE RPD	Method Blank	REFERENCE MATERIAL Measured Value	REFERENCE MATERIAL Acceptable Limits Lower	REFERENCE MATERIAL Acceptable Limits Upper	METHOD BLANK SPIKE Recovery	METHOD BLANK SPIKE Acceptable Limits Lower	METHOD BLANK SPIKE Acceptable Limits Upper	MATRIX SPIKE Recovery	MATRIX SPIKE Acceptable Limits Lower	MATRIX SPIKE Acceptable Limits Upper
CCME / Tier 1 Metals + Hg (soil)															
Antimony	8170521	8170521	0.7	0.7	NA	< 0.5	100%	80%	120%				NA	80%	120%
Arsenic	8170521	8170521	13.0	12.7	2.6%	< 0.5	99%	80%	120%				NA	80%	120%
Barium	8170521	8170521	360	346	4.1%	< 0.5	94%	80%	120%				NA	80%	120%
Beryllium	8170521	8170521	0.7	0.6	NA	< 0.5	99%	80%	120%				89%	80%	120%
Boron (Saturated Paste)	8170522	8170522	<0.5	<0.5	NA	< 0.5	99%	80%	120%						
Cadmium	8170521	8170521	0.5	0.5	NA	< 0.5	97%	80%	120%				NA	80%	120%
Chromium	8170521	8170521	23.2	22.8	2.0%	< 0.5	101%	80%	120%				113%	80%	120%
Chromium, Hexavalent	8170514	8170514	<0.3	<0.3	NA	< 0.3	102%	80%	120%	105%	80%	120%	92%	80%	120%
Cobalt	8170521	8170521	11.7	11.4	2.7%	< 0.5	102%	80%	120%				NA	80%	120%

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17C184581

PROJECT: F-36

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Feb 22, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Copper	8170521	8170521	29.2	28.8	1.4%	< 0.5	100%	80%	120%				NA	80%	120%
Lead	8170521	8170521	13.2	13.1	0.8%	< 0.5	93%	80%	120%				NA	80%	120%
Mercury	8170521	8170521	<0.5	<0.5	NA	< 0.5	104%	80%	120%				NA	80%	120%
Molybdenum	8170521	8170521	2.3	2.2	NA	< 0.5	94%	80%	120%				NA	80%	120%
Nickel	8170521	8170521	31.1	29.9	3.9%	< 0.5	99%	80%	120%				112%	80%	120%
Selenium	8170521	8170521	1.9	1.3	NA	< 0.5	113%	80%	120%				NA	80%	120%
Silver	8170521	8170521	<0.5	<0.5	NA	< 0.5	84%	80%	120%				NA	80%	120%
Thallium	8170521	8170521	<0.5	<0.5	NA	< 0.5	95%	80%	120%				NA	80%	120%
Tin	8170521	8170521	0.7	0.6	NA	< 0.5	101%	80%	120%				105%	80%	120%
Uranium	8170521	8170521	1.5	1.5	NA	< 0.5	97%	80%	120%				NA	80%	120%
Vanadium	8170521	8170521	40.0	37.7	5.9%	< 0.5	101%	80%	120%				95%	80%	120%
Zinc	8170521	8170521	155	153	1.4%	< 1	82%	80%	120%				NA	80%	120%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

CCME / Tier 1 Metals + Hg (soil)															
Antimony	38	8171033	0.6	0.6	NA	< 0.5	99%	80%	120%				115%	80%	120%
Arsenic	38	8171033	12.0	12.1	0.8%	< 0.5	91%	80%	120%				82%	80%	120%
Barium	38	8171033	1610	1320	19.8%	< 0.5	101%	80%	120%				NA	80%	120%
Beryllium	38	8171033	0.6	0.6	NA	< 0.5	115%	80%	120%				107%	80%	120%
Cadmium	38	8171033	<0.5	0.5	NA	< 0.5	96%	80%	120%				102%	80%	120%
Chromium	38	8171033	17.0	15.7	8.0%	< 0.5	96%	80%	120%				93%	80%	120%
Cobalt	38	8171033	8.8	8.3	5.8%	< 0.5	96%	80%	120%				96%	80%	120%
Copper	38	8171033	21.2	21.5	1.4%	< 0.5	90%	80%	120%				92%	80%	120%
Lead	38	8171033	11.6	10.8	7.1%	< 0.5	104%	80%	120%				96%	80%	120%
Mercury	38	8171033	<0.5	<0.5	NA	< 0.5	103%	80%	120%				91%	80%	120%
Molybdenum	38	8171033	3.4	3.5	2.9%	< 0.5	98%	80%	120%				110%	80%	120%
Nickel	38	8171033	25.4	24.3	4.4%	< 0.5	92%	80%	120%				88%	80%	120%
Selenium	38	8171033	0.8	0.8	NA	< 0.5	98%	80%	120%				95%	80%	120%
Silver	38	8171033	<0.5	<0.5	NA	< 0.5	90%	80%	120%				101%	80%	120%
Thallium	38	8171033	<0.5	<0.5	NA	< 0.5	106%	80%	120%				99%	80%	120%
Tin	38	8171033	0.7	0.6	NA	< 0.5	101%	80%	120%				107%	80%	120%
Uranium	38	8171033	1.1	1.1	NA	< 0.5	105%	80%	120%				97%	80%	120%
Vanadium	38	8171033	25.2	23.5	7.0%	< 0.5	94%	80%	120%				101%	80%	120%
Zinc	38	8171033	82	85	3.6%	< 1	97%	80%	120%				97%	80%	120%
Chromium, Hexavalent	8170996		< 0.3	< 0.3	NA	< 0.3	100%	80%	120%	105%	80%	120%	92%	80%	120%
Boron (Saturated Paste)	8170522	8170522	< 0.5	< 0.5	NA	< 0.5	99%	80%	120%						

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Soil Analysis (Continued)

RPT Date: Feb 22, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
CCME / Tier 1 Metals + Hg + Sat Paste B + Cr6 (Soil)															
Antimony	8170521	8170521	0.7	0.7	NA	< 0.5	100%	80%	120%				NA	80%	120%
Arsenic	8170521	8170521	13.0	12.7	2.6%	< 0.5	99%	80%	120%				NA	80%	120%
Barium	8170521	8170521	360	346	4.1%	< 0.5	94%	80%	120%				NA	80%	120%
Beryllium	8170521	8170521	0.7	0.6	NA	< 0.5	99%	80%	120%				89%	80%	120%
Boron (Saturated Paste)	8170522	8170522	<0.5	<0.5	NA	< 0.5	99%	80%	120%						
Cadmium	8170521	8170521	0.5	0.5	NA	< 0.5	97%	80%	120%				NA	80%	120%
Chromium	8170521	8170521	23.2	22.8	2.0%	< 0.5	101%	80%	120%				113%	80%	120%
Chromium, Hexavalent	8170996	8170996	<0.3	<0.3	NA	< 0.3	98%	80%	120%	105%	80%	120%	92%	80%	120%
Cobalt	8170521	8170521	11.7	11.4	2.7%	< 0.5	102%	80%	120%				NA	80%	120%
Copper	8170521	8170521	29.2	28.8	1.4%	< 0.5	100%	80%	120%				NA	80%	120%
Lead	8170521	8170521	13.2	13.1	0.8%	< 0.5	93%	80%	120%				NA	80%	120%
Mercury	8170521	8170521	<0.5	<0.5	NA	< 0.5	104%	80%	120%				NA	80%	120%
Molybdenum	8170521	8170521	2.3	2.2	NA	< 0.5	94%	80%	120%				NA	80%	120%
Nickel	8170521	8170521	31.1	29.9	3.9%	< 0.5	99%	80%	120%				112%	80%	120%
Selenium	8170521	8170521	1.9	1.3	NA	< 0.5	113%	80%	120%				NA	80%	120%
Silver	8170521	8170521	<0.5	<0.5	NA	< 0.5	84%	80%	120%				NA	80%	120%
Thallium	8170521	8170521	<0.5	<0.5	NA	< 0.5	95%	80%	120%				NA	80%	120%
Tin	8170521	8170521	0.7	0.6	NA	< 0.5	101%	80%	120%				105%	80%	120%
Uranium	8170521	8170521	1.5	1.5	NA	< 0.5	97%	80%	120%				NA	80%	120%
Vanadium	8170521	8170521	40.0	37.7	5.9%	< 0.5	101%	80%	120%				95%	80%	120%
Zinc	8170521	8170521	155	153	1.4%	< 1	82%	80%	120%				NA	80%	120%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

CCME / Tier 1 Metals + Hg + Sat Paste B + Cr6 (Soil)															
Antimony	8170623	8170623	0.8	0.8	NA	< 0.5	100%	80%	120%				NA	80%	120%
Arsenic	8170623	8170623	17.0	15.5	9.2%	< 0.5	99%	80%	120%				NA	80%	120%
Barium	8170623	8170623	368	334	9.9%	< 0.5	94%	80%	120%				NA	80%	120%
Beryllium	8170623	8170623	0.6	0.6	NA	< 0.5	99%	80%	120%				94%	80%	120%
Boron (Saturated Paste)	8171413	8171413	<0.5	<0.5	NA	< 0.5	100%	80%	120%				NA		
Cadmium	8170623	8170623	0.6	0.6	NA	< 0.5	97%	80%	120%				NA	80%	120%
Chromium	8170623	8170623	26.4	23.4	12.1%	< 0.5	101%	80%	120%				96%	80%	120%
Cobalt	8170623	8170623	12.4	11.7	5.8%	< 0.5	102%	80%	120%				NA	80%	120%
Copper	8170623	8170623	30.2	27.5	9.4%	< 0.5	100%	80%	120%				NA	80%	120%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

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Soil Analysis (Continued)

RPT Date: Feb 22, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Lead	8170623	8170623	14.4	13.4	7.3%	< 0.5	93%	80%	120%				NA	80%	120%
Mercury	8170623	8170623	<0.5	<0.5	NA	< 0.5	104%	80%	120%				NA	80%	120%
Molybdenum	8170623	8170623	3.2	3.1	5.6%	< 0.5	94%	80%	120%				NA	80%	120%
Nickel	8170623	8170623	32.8	31.3	4.9%	< 0.5	99%	80%	120%				114%	80%	120%
Selenium	8170623	8170623	2.8	2.8	1.5%	< 0.5	113%	80%	120%				NA	80%	120%
Silver	8170623	8170623	<0.5	<0.5	NA	< 0.5	84%	80%	120%				NA	80%	120%
Thallium	8170623	8170623	<0.5	<0.5	NA	< 0.5	95%	80%	120%				NA	80%	120%
Tin	8170623	8170623	0.8	0.7	NA	< 0.5	101%	80%	120%				NA	80%	120%
Uranium	8170623	8170623	1.9	1.6	NA	< 0.5	97%	80%	120%				NA	80%	120%
Vanadium	8170623	8170623	42.3	38.2	10.2%	< 0.5	101%	80%	120%				96%	80%	120%
Zinc	8170623	8170623	124	114	8.1%	< 1	82%	80%	120%				NA	80%	120%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)

Antimony	38	8170543	0.5	0.6	NA	< 0.5	102%	80%	120%				99%	80%	120%
Arsenic	38	8170543	10.0	10.4	3.9%	< 0.5	93%	80%	120%				101%	80%	120%
Barium	38	8170543	228	234	2.6%	< 0.5	103%	80%	120%				107%	80%	120%
Beryllium	38	8170543	0.6	0.7	NA	< 0.5	NA	80%	120%				NA	80%	120%
Boron (Saturated Paste)	39	8171016	<0.5	<0.5	NA	< 0.5	112%	80%	120%				101%	80%	120%
Cadmium	38	8170543	<0.5	<0.5	NA	< 0.5	97%	80%	120%				97%	80%	120%
Chromium	38	8170543	18.4	20.1	8.8%	< 0.5	95%	80%	120%				102%	80%	120%
Cobalt	38	8170543	7.8	8.5	8.6%	< 0.5	92%	80%	120%				100%	80%	120%
Copper	38	8170543	14.7	17.3	16.3%	< 0.5	91%	80%	120%				96%	80%	120%
Lead	38	8170543	9.9	11.0	10.5%	< 0.5	105%	80%	120%				103%	80%	120%
Mercury	38	8170543	<0.5	<0.5	NA	< 0.5	99%	80%	120%				96%	80%	120%
Molybdenum	38	8170543	2.5	2.8	11.3%	< 0.5	95%	80%	120%				103%	80%	120%
Nickel	38	8170543	20.1	22.5	11.3%	< 0.5	93%	80%	120%				99%	80%	120%
Selenium	38	8170543	0.5	0.5	NA	< 0.5	100%	80%	120%				94%	80%	120%
Silver	38	8170543	<0.5	<0.5	NA	< 0.5	85%	80%	120%				95%	80%	120%
Thallium	38	8170543	<0.5	<0.5	NA	< 0.5	106%	80%	120%				105%	80%	120%
Tin	38	8170543	0.5	0.5	NA	< 0.5	100%	80%	120%				95%	80%	120%
Uranium	38	8170543	1.2	1.3	NA	< 0.5	105%	80%	120%				108%	80%	120%
Vanadium	38	8170543	25.8	28.3	9.2%	< 0.5	92%	80%	120%				102%	80%	120%
Zinc	38	8170543	61	73	17.9%	< 1	97%	80%	120%				116%	80%	120%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD
AGAT WORK ORDER: 17C184581
PROJECT: F-36
ATTENTION TO: Larry Yoon
SAMPLING SITE:
SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Feb 22, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)															
pH (CaCl2 Extraction)	39	8173049	7.67	7.64	0.4%	N/A	100%	90%	110%						
Electrical Conductivity (Sat. Paste)	39	8171016	0.48	0.57	17.4%	< 0.05	92%	90%	110%						
Saturation Percentage	39	8171016	68	69	1.5%	< 1	101%	80%	120%						
Chloride, Soluble	1798	8171016	6	7	NA	< 5	103%	80%	120%				106%	80%	120%
Calcium, Soluble	39	8171016	64	66	3.1%	< 1	92%	80%	120%				89%	80%	120%
Potassium, Soluble	39	8171016	<2	<2	NA	< 2	93%	80%	120%				94%	80%	120%
Magnesium, Soluble	39	8171016	15	16	6.5%	< 1	93%	80%	120%				91%	80%	120%
Sodium, Soluble	39	8171016	20	20	0.0%	< 2	94%	80%	120%				94%	80%	120%
Sulfate, Soluble	39	8171016	176	181	2.8%	< 2	103%	80%	120%				107%	80%	120%
Particle Size by Sieve															
Sieve Analysis - 75 microns	8178088	8178088	66.4	64.5	2.9%	< 0.2	99%	80%	120%						
Soil Analysis - Extractable Barium (AB)															
Barium, Extractable (AB)	8171033	8171033	37	37	0.0%	< 2	108%	80%	120%	108%	80%	120%	NA	80%	120%
Soil Analysis - Barium by Fusion ICP															
Barium by Fusion ICP-OES	8169900		880	1050	17.6%	< 40	107%	80%	120%				NA	80%	120%
CCME / Tier 1 Metals (Soil) - Arsenic															
Arsenic	8178295	8178295	11.1	10.0	10.1%	< 0.5	95%	80%	120%				NA	80%	120%
Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)															
pH (CaCl2 Extraction)	2345	8295	7.56	7.56	0.0%	N/A	100%	90%	110%						
Electrical Conductivity (Sat. Paste)	8178312	8178312	1.16	1.14	1.7%	< 0.05	104%	90%	110%						
Saturation Percentage	8178312	8178312	49	48	2.1%	< 1	102%	80%	120%						
Chloride, Soluble	8178312	8178312	32	35	8.1%	< 5	88%	80%	120%						
Calcium, Soluble	8178312	8178312	110	115	4.8%	< 1	101%	80%	120%						
Potassium, Soluble	8178312	8178312	12	12	0.0%	< 2	101%	80%	120%						
Magnesium, Soluble	8178312	8178312	27	28	3.6%	< 1	102%	80%	120%						

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated
If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD
AGAT WORK ORDER: 17C184581
PROJECT: F-36
ATTENTION TO: Larry Yoon
SAMPLING SITE:
SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Feb 22, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Sodium, Soluble	8178312	8178312	32	34	3.6%	< 2	102%	80%	120%						
Sulfur (as Sulfate), Soluble	8178312	8178312	470	495	5.2%	< 2	99%	80%	120%						

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Soil Analysis - Chromium															
Chromium	8177999	8177999	26.4	26.0	1.7%	< 0.5	103%	80%	120%				107%	80%	120%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By:

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17C184581

PROJECT: F-36

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Feb 22, 2017			DUPLICATE				REFERENCE MATERIAL				METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)															
Benzene	1763	8170065	<0.005	<0.005	NA	< 0.005	92%	80%	120%	85%	80%	120%	96%	60%	140%
Toluene	1763	8170065	<0.05	<0.05	NA	< 0.05	101%	80%	120%	114%	80%	120%	127%	60%	140%
Ethylbenzene	1763	8170065	<0.01	<0.01	NA	< 0.01	89%	80%	120%	106%	80%	120%	115%	60%	140%
Xylenes	1763	8170065	<0.05	<0.05	NA	< 0.05	85%	80%	120%	114%	80%	120%	123%	60%	140%
C6 - C10 (F1)	1763	8170065	<10	<10	NA	< 10	114%	80%	120%	94%	80%	120%	102%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)															
Benzene	1764	8170117	<0.005	<0.005	NA	< 0.005	94%	80%	120%	89%	80%	120%	88%	60%	140%
Toluene	1764	8170117	<0.05	<0.05	NA	< 0.05	88%	80%	120%	118%	80%	120%	122%	60%	140%
Ethylbenzene	1764	8170117	<0.01	<0.01	NA	< 0.01	91%	80%	120%	108%	80%	120%	110%	60%	140%
Xylenes	1764	8170117	<0.05	<0.05	NA	< 0.05	93%	80%	120%	116%	80%	120%	120%	60%	140%
C6 - C10 (F1)	1764	8170117	<10	<10	NA	< 10	96%	80%	120%	104%	80%	120%	91%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)															
Benzene	1765	8171416	<0.005	<0.005	NA	< 0.005	94%	80%	120%	89%	80%	120%	95%	60%	140%
Toluene	1765	8171416	<0.05	<0.05	NA	< 0.05	97%	80%	120%	118%	80%	120%	124%	60%	140%
Ethylbenzene	1765	8171416	<0.01	<0.01	NA	< 0.01	99%	80%	120%	108%	80%	120%	113%	60%	140%
Xylenes	1765	8171416	<0.05	<0.05	NA	< 0.05	99%	80%	120%	116%	80%	120%	122%	60%	140%
C6 - C10 (F1)	1765	8171416	<10	<10	NA	< 10	105%	80%	120%	104%	80%	120%	94%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (F2-F4) in Soil															
C10 - C16 (F2)	6028	8171002	<10	<10	NA	< 10	104%	80%	120%	104%	80%	120%	103%	60%	140%
C16 - C34 (F3)	6028	8171002	18	15	NA	< 10	104%	80%	120%	104%	80%	120%	103%	60%	140%
C34 - C50 (F4)	6028	8171002	<10	<10	NA	< 10	104%	80%	120%	103%	80%	120%	102%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (F2-F4) in Soil															
C10 - C16 (F2)	6027	8171416	<10	<10	NA	< 10	106%	80%	120%	107%	80%	120%	111%	60%	140%
C16 - C34 (F3)	6027	8171416	16	17	NA	< 10	106%	80%	120%	104%	80%	120%	110%	60%	140%
C34 - C50 (F4)	6027	8171416	10	<10	NA	< 10	106%	80%	120%	104%	80%	120%	108%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Alcohol Analysis in Soil															
Methanol	5220	8170544	5.2	5.8	10.9%	< 0.5	97%	80%	120%	93%	70%	130%	106%	60%	140%
Ethanol	5220	8170544	<10	<10	NA	< 10	96%	80%	120%	90%	70%	130%	98%	60%	140%
Propanol	5220	8170544	<10	<10	NA	< 10	97%	80%	120%	95%	70%	130%	103%	60%	140%
Isopropanol	5220	8170544	<10	<10	NA	< 10	98%	80%	120%	94%	70%	130%	102%	60%	140%
Butanol	5220	8170544	<10	<10	NA	< 10	100%	80%	120%	98%	70%	130%	104%	60%	140%

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AGAT WORK ORDER: 17C184581
PROJECT: F-36
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Trace Organics Analysis (Continued)

RPT Date: Feb 22, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Pentanol	5220	8170544	<10	<10	NA	< 10	96%	80%	120%	96%	70%	130%	98%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Methanol Analysis - Soil															
Methanol	5220	8170544	5.2	5.8	10.9%	< 0.5	97%	80%	120%	93%	70%	130%	106%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1) in Soil															
Benzene	1276	8170997	<0.005	<0.005	NA	< 0.005	87%	80%	120%	96%	80%	120%	82%	60%	140%
Toluene	1276	8170997	<0.05	<0.05	NA	< 0.05	96%	80%	120%	102%	80%	120%	87%	60%	140%
Ethylbenzene	1276	8170997	<0.01	<0.01	NA	< 0.01	92%	80%	120%	92%	80%	120%	78%	60%	140%
Xylenes	1276	8170997	<0.05	<0.05	NA	< 0.05	105%	80%	120%	101%	80%	120%	86%	60%	140%
C6 - C10 (F1)	1276	8170997	<10	<10	NA	< 10	92%	80%	120%	98%	80%	120%	79%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Glycols Analysis in Soil															
Propylene Glycol	20	8170544	<10	<10	NA	< 10	101%	70%	130%	109%	70%	130%	107%	60%	140%
Ethylene Glycol	20	8170544	<10	<10	NA	< 10	112%	70%	130%	127%	70%	130%	123%	60%	140%
Diethylene Glycol	20	8170544	<10	<10	NA	< 10	113%	70%	130%	124%	70%	130%	122%	60%	140%
Triethylene Glycol	20	8170544	<10	<10	NA	< 10	116%	70%	130%	122%	70%	130%	120%	60%	140%
Tetraethylene Glycol	20	8170544	<10	<10	NA	< 10	75%	70%	130%	89%	70%	130%	86%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Polyaromatic Hydrocarbon Analysis - Soil															
Acridine	1188	8181480	<0.05	<0.05	NA	< 0.05	101%	70%	130%	124%	70%	130%	123%	70%	130%
Quinoline	1188	8181480	<0.05	<0.05	NA	< 0.05	100%	70%	130%	121%	70%	130%	124%	70%	130%
Naphthalene	1188	8181480	<0.005	<0.005	NA	< 0.005	111%	70%	130%	98%	70%	130%	110%	70%	130%
2-Methylnaphthalene	1188	8181480	<0.005	<0.005	NA	< 0.005	104%	70%	130%	89%	70%	130%	102%	70%	130%
Acenaphthylene	1188	8181480	<0.005	<0.005	NA	< 0.005	93%	70%	130%	86%	70%	130%	101%	70%	130%
Acenaphthene	1188	8181480	<0.005	<0.005	NA	< 0.005	101%	70%	130%	93%	70%	130%	104%	70%	130%
Fluorene	1188	8181480	<0.02	<0.02	NA	< 0.02	95%	70%	130%	86%	70%	130%	100%	70%	130%
Phenanthrene	1188	8181480	<0.02	<0.02	NA	< 0.02	104%	70%	130%	96%	70%	130%	107%	70%	130%
Anthracene	1188	8181480	<0.004	<0.004	NA	< 0.004	91%	70%	130%	84%	70%	130%	98%	70%	130%
Fluoranthene	1188	8181480	<0.01	<0.01	NA	< 0.01	91%	70%	130%	97%	70%	130%	111%	70%	130%
Pyrene	1188	8181480	<0.01	<0.01	NA	< 0.01	113%	70%	130%	107%	70%	130%	124%	70%	130%
Benzo[a]anthracene	1188	8181480	<0.02	<0.02	NA	< 0.02	90%	70%	130%	95%	70%	130%	105%	70%	130%
Chrysene	1188	8181480	<0.05	<0.05	NA	< 0.05	104%	70%	130%	96%	70%	130%	109%	70%	130%
Benzo[b+j]fluoranthene	1188	8181480	<0.03	<0.03	NA	< 0.03	87%	70%	130%	88%	70%	130%	103%	70%	130%
Benzo[k]fluoranthene	1188	8181480	<0.02	<0.02	NA	< 0.02	92%	70%	130%	90%	70%	130%	101%	70%	130%
Benzo[a]pyrene	1188	8181480	<0.03	<0.03	NA	< 0.03	80%	70%	130%	83%	70%	130%	94%	70%	130%
Indeno[1,2,3-cd]pyrene	1188	8181480	<0.02	<0.02	NA	< 0.02	72%	70%	130%	73%	70%	130%	91%	70%	130%

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ATTENTION TO: Larry Yoon
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 22, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Dibenzo[ah]anthracene	1188	8181480	<0.005	<0.005	NA	< 0.005	82%	70%	130%	76%	70%	130%	98%	70%	130%
Benzo[ghi]perylene	1188	8181480	<0.05	<0.05	NA	< 0.05	93%	70%	130%	89%	70%	130%	103%	70%	130%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)															
Benzene	1771	8178011	<0.005	<0.005	NA	< 0.005	96%	80%	120%	88%	80%	120%	103%	60%	140%
Toluene	1771	8178011	<0.05	<0.05	NA	< 0.05	94%	80%	120%	108%	80%	120%	128%	60%	140%
Ethylbenzene	1771	8178011	<0.01	<0.01	NA	< 0.01	92%	80%	120%	98%	80%	120%	109%	60%	140%
Xylenes	1771	8178011	<0.05	<0.05	NA	< 0.05	90%	80%	120%	104%	80%	120%	115%	60%	140%
C6 - C10 (F1)	1771	8178011	<10	<10	NA	< 10	105%	80%	120%	93%	80%	120%	112%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)															
C10 - C16 (F2)	6035	8177965	<10	<10	NA	< 10	113%	80%	120%	99%	80%	120%	119%	60%	140%
C16 - C34 (F3)	6035	8177965	76	77	1.3%	< 10	113%	80%	120%	100%	80%	120%	136%	60%	140%
C34 - C50 (F4)	6035	8177965	27	29	NA	< 10	113%	80%	120%	96%	80%	120%	93%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Polyaromatic Hydrocarbon Analysis - Soil															
Acridine	1192	8171008	<0.05	<0.05	NA	< 0.05	98%	70%	130%	124%	70%	130%	112%	70%	130%
Quinoline	1192	8171008	<0.05	<0.05	NA	< 0.05	99%	70%	130%	124%	70%	130%	116%	70%	130%
Naphthalene	1192	8171008	<0.005	<0.005	NA	< 0.005	107%	70%	130%	102%	70%	130%	100%	70%	130%
2-Methylnaphthalene	1192	8171008	<0.005	<0.005	NA	< 0.005	101%	70%	130%	94%	70%	130%	95%	70%	130%
Acenaphthylene	1192	8171008	<0.005	<0.005	NA	< 0.005	94%	70%	130%	90%	70%	130%	93%	70%	130%
Acenaphthene	1192	8171008	<0.005	<0.005	NA	< 0.005	98%	70%	130%	95%	70%	130%	95%	70%	130%
Fluorene	1192	8171008	<0.02	<0.02	NA	< 0.02	93%	70%	130%	90%	70%	130%	91%	70%	130%
Phenanthrene	1192	8171008	<0.02	<0.02	NA	< 0.02	98%	70%	130%	99%	70%	130%	97%	70%	130%
Anthracene	1192	8171008	<0.004	<0.004	NA	< 0.004	87%	70%	130%	88%	70%	130%	91%	70%	130%
Fluoranthene	1192	8171008	<0.01	<0.01	NA	< 0.01	86%	70%	130%	99%	70%	130%	102%	70%	130%
Pyrene	1192	8171008	<0.01	0.01	NA	< 0.01	113%	70%	130%	113%	70%	130%	114%	70%	130%
Benzo[a]anthracene	1192	8171008	<0.02	<0.02	NA	< 0.02	90%	70%	130%	93%	70%	130%	100%	70%	130%
Chrysene	1192	8171008	<0.05	<0.05	NA	< 0.05	101%	70%	130%	100%	70%	130%	101%	70%	130%
Benzo[b+j]fluoranthene	1192	8171008	<0.03	<0.03	NA	< 0.03	87%	70%	130%	90%	70%	130%	91%	70%	130%
Benzo[k]fluoranthene	1192	8171008	<0.02	<0.02	NA	< 0.02	95%	70%	130%	97%	70%	130%	95%	70%	130%
Benzo[a]pyrene	1192	8171008	<0.03	<0.03	NA	< 0.03	83%	70%	130%	89%	70%	130%	90%	70%	130%
Indeno[1,2,3-cd]pyrene	1192	8171008	<0.02	<0.02	NA	< 0.02	72%	70%	130%	76%	70%	130%	81%	70%	130%
Dibenzo[ah]anthracene	1192	8171008	<0.005	<0.005	NA	< 0.005	73%	70%	130%	78%	70%	130%	83%	70%	130%
Benzo[ghi]perylene	1192	8171008	<0.05	<0.05	NA	< 0.05	92%	70%	130%	93%	70%	130%	92%	70%	130%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17C184581

PROJECT: F-36

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 22, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Certified By: Alison Sekera

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Arsenic	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Antimony	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Arsenic	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Barium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Beryllium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Boron (Saturated Paste)	INST 0140	CARTER & GREGORICH 2007	ICP/OES
Cadmium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Chromium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP/MS
Cobalt	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Copper	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Chromium, Hexavalent	SOIL 0600	BARTLETT, R.J., JAMES, B.R. (1996) S	SPECTROPHOTOMETER
Lead	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Mercury	INOR-171-6006, -6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Molybdenum	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Nickel	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Selenium	INORG-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Silver	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Thallium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Tin	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Uranium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Vanadium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Zinc	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Boron (Saturated Paste)	INOR-171-6002, 171-6201	CARTER & GREGORICH 2007	ICP/OES
Chromium, Hexavalent	INOR-171-6215	ASA 20-4.3; REISENAUER 1982	SPECTROPHOTOMETER
Antimony	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Barium	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Beryllium	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Cadmium	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Chromium	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP/MS

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Method Summary

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AGAT WORK ORDER: 17C184581

PROJECT: F-36

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SAMPLING SITE:

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Cobalt	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Copper	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Lead	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Mercury	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Molybdenum	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Nickel	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Selenium	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Silver	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Thallium	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Tin	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Uranium	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP/MS
Vanadium	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Zinc	SOIL 0390; SOIL 0110; SOIL 0120; INST 0141	EPA SW 846-3050; SM 3125 B	ICP-MS
Sieve Analysis - 75 microns	SOIL 0540; SOIL 0110	KROETSCH 2007; SHEPPARD 2007	SIEVE
pH (CaCl2 Extraction)	INOR-171-6207	SHEPPARD 2007; HENDERSHOT 2008	PH METER
Electrical Conductivity (Sat. Paste)	INO-171-6206	SHEPPARD 2007; MILLER 2007	CONDUCTIVITY METER
Sodium Adsorption Ratio	INOR-171-6201 & INOR-171-6002	McKeague 3.26	CALCULATION
Saturation Percentage	SOIL 0140; SOIL 0110; SOIL 0120	MILLER 2007; SHEPPARD 2007	GRAVIMETRIC
Chloride, Soluble			COLORIMETER
Calcium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Potassium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Magnesium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Sodium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Sulfate, Soluble	INOR-171-6201 & INOR-171-6002	SHEPPARD 2007; EATON 2005; MILLER 2007, SM 3120B	ICP/OES
Theoretical Gypsum Requirement	SOIL 0260	USDA HDBK 60, 22D	N/A
True Barium by Fusion ICP	SOIL- 0620, INST- 0140	ASTM D4503.08 S	ICP/OES
Barium, Extractable (AB)	SOIL 0390; SOIL 0110; SOIL 0120 & INST 0140	EPA SW - 846-3050/6010; SHEPPARD S	ICP/OES
pH (CaCl2 Extraction)	SOIL 0110; SOIL 0120; INST 0104	CARTER & GREGORICH 2007-pH	PH METER
Electrical Conductivity (Sat. Paste)	SOIL 0110; SOIL 0120; INST 0120	SHEPPARD 2007; MILLER 2007-S	CONDUCTIVITY METER
Sodium Adsorption Ratio	SOIL 200	CARTER & GREGORICH 2007-SAR	CALCULATION
Saturation Percentage	SOIL 0140; SOIL 0110; SOIL 0120	CARTER & GREGORICH 2007	GRAVIMETRIC

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Chloride, Soluble	SOIL 0110; SOIL 0120; INST 0330	Carter & Gregorich 2007; SM 4500E	COLORIMETER
Calcium, Soluble	SOIL 0110; SOIL 0120; SOIL 0140; INST 0140	CARTER & GREGORICH 2007, SM 3120B-S	ICP/OES
Potassium, Soluble	SOIL 0110; SOIL 0120; SOIL 0140; INST 0140	CARTER & GREGORICH 2007, SM 3120B-S	ICP/OES
Magnesium, Soluble	SOIL 0110; SOIL 0120; SOIL 0140; INST 0140	CARTER & GREGORICH 2007, SM 3120B-S	ICP/OES
Sodium, Soluble	SOIL 0110; SOIL 0120; SOIL 0140; INST 0140	CARTER & GREGORICH 2007, SM 3120B-S	ICP/OES
Sulfur (as Sulfate), Soluble	SOIL 0110; SOIL 0120; SOIL 0140; INST 0140	CARTER & GREGORICH 2007, SM 3120B-S	ICP/OES

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Trace Organics Analysis			
Methanol	TO 1420	EPA 8015	GC/FID
Ethanol	TO 1420	EPA 8015	GC/FID
Propanol	TO 1420	EPA 8015	GC/FID
Isopropanol	TO 1420	EPA 8015	GC/FID
Butanol	TO 1420	EPA 8015	GC/FID
Pentanol	TO 1420	EPA 8015	GC/FID
4-Methyl-2-pentanone	TO 1420	EPA 8015	GC/FID
Propylene Glycol	TO-1410	EPA SW-846 8015	GC/FID
Ethylene Glycol	TO-1410	EPA SW-846 8015	GC/FID
Diethylene Glycol	TO-1410	EPA SW-846 8015	GC/FID
Triethylene Glycol	TO-1410	EPA SW-846 8015	GC/FID
Tetraethylene Glycol	TO-1410	EPA SW-846 8015	GC/FID
Heptanol	TO-1410	EPA SW-846 8015	GC/FID
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Benzene	TO 0570	EPA SW-846 8260-S	GC/MS
Toluene	TO 0570	EPA SW-846 8260-S	GC/MS
Ethylbenzene	TO 0570	EPA SW-846 8260-S	GC/MS
Xylenes	TO 0570	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	TO 0570	CCME Tier 1 Method-S L	GC/FID
C6 - C10 (F1 minus BTEX)	TO 0570	CCME Tier 1 Method-S L	GC/FID
C10 - C16 (F2)	TO-0560	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	TO-0560	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	TO-0560	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	TO-0560	CCME Tier 1 Method-S H	GC/FID
Moisture Content	TO-0560	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	TO 0570	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	TO 0560	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	TO-0560	CCME Tier 1 Method-S H	GRAVIMETRIC
o-Terphenyl (F2-F4)	TO-0560	CCME Tier 1 Method-S H	GC/FID
Acridine	TO 0210	EPA SW-846 3570/8270-S	GC/MS
Quinoline	TO 0210	EPA SW-846 3570/8270-S	GC/MS
Naphthalene	TO 0210	EPA SW-846 3570/8270-S	GC/MS
2-Methylnaphthalene	TO 0210	EPA SW-846 3570/8270-S	GC/MS
Acenaphthylene	TO 0210	EPA SW-846 3570/8270-S	GC/MS
Acenaphthene	TO 0210	EPA SW-846 3570/8270-S	GC/MS
Fluorene	TO 0210	EPA SW-846 3570/8270-S	GC/MS

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Phenanthrene	TO 0210	EPA SW-846 3570/8270-S	GC/MS
Anthracene	TO 0210	EPA SW-846 3570/8270-S	GC/MS
Fluoranthene	TO 0210	EPA SW-846 3570/8270-S	GC/MS
Pyrene	TO 0210	EPA SW-846 3570/8270-S	GC/MS
Benzo[a]anthracene	TO 0210	EPA SW-846 3570/8270-S	GC/MS
Chrysene	TO 0210	EPA SW-846 3570/8270-S	GC/MS
Benzo[b+j]fluoranthene	TO 0210	EPA SW-846 3570/8270-S	GC/MS
Benzo[k]fluoranthene	TO 0210	EPA SW-846 3570/8270-S	GC/MS
Benzo[a]pyrene	TO 0210	EPA SW-846 3570/8270-S	GC/MS
Indeno[1,2,3-cd]pyrene	TO 0210	EPA SW-846 3570/8270-S	GC/MS
Dibenzo[ah]anthracene	TO 0210	EPA SW-846 3570/8270-S	GC/MS
Benzo[ghi]perylene	TO 0210	EPA SW-846 3570/8270-S	GC/MS
2-Fluorobiphenyl (PAH)	TO 0210	EPA SW-846 3570/8270	GC/MS
p-Terphenyl-d14 (PAH)	TO 0210	EPA SW-846 3570/8270	GC/MS
B[a]P TPE		CCME	GC/MS
IACR (Coarse Soil)		CCME	GC/MS
IACR (Fine Soil)		CCME	GC/MS

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Desk Top Remediation Report

PARA ET AL FORT LIARD
300/F-36 60-10-123-15 /00
Fort Liard Field
WID# 1841

Prepared for:
Paramount Resources Ltd

SYNERGYASPEN PROJECT No. PAR6207

July 29, 2021



EXECUTIVE SUMMARY

On behalf of Paramount Resources Limited (Paramount), SynergyAspen Environmental Inc. (SynergyAspen) completed a Desktop Remediation (DTR) review of analytical data for former well site: *Fort Liard F-36* (the Site), with Well Identification (WID) number 1841. The Site is in a remote forested area in the South Liard field, southwest of Fort Liard, Northwest Territories (NT).

The DTR reviewed and assessed data from the 2017 Phase 2 Environmental Site Assessment (ESA) at the Site by North Shore Environmental Consultants (North Shore). Data from the Phase 2 ESA were compared to guidelines provided by the Government of the Northwest Territories in the *Environmental Guidelines for Site Remediation* (Environmental Guidelines), Canadian Council of the Ministers of the Environment (CCME) *Canadian Environmental Soil Quality guidelines* (CESQG), and British Columbia *Contaminated Sites Regulation* (CSR) standards.

The Phase 2 ESA showed five (5) areas of environmental concern (AECs) at the Site: the Well Centre area; the Flare Area; the Production Facilities area; the Lagoon Area; and the drilling waste disposal area (DWDA) (North Shore, 2017b). From the 2017 Phase 2 ESA, the contaminants of concern (COCs) at the surface of the Well Center area were an instance of chromium and Fraction 2 (F2) and Fraction 3 (F3) petroleum hydrocarbons (PHC); and benzene, ethylbenzene, F2 and F3 PHC in the subsurface. The surface of the Production Facilities Area and the Lagoon Area showed elevated electrical conductivity (EC). The Flare Area had exceedances of Benzene and EC in the surface; and benzene, toluene, ethylbenzene, F2 PHC, naphthalene, and EC in the subsurface. The DWDA had subsurface exceedances of benzene, toluene, ethylbenzene, arsenic, pH, EC, and sodium adsorption ratio (SAR) (North Shore 2017b).

Soil stratigraphy at the background boreholes at the Site consisted of silt-loam topsoil overlying clay loam subsoil to 1.2 or 3.0 meters below ground (mbg) followed by firm clay to 4.5mbg, and sandy clay or medium sand to 10.0mbg. Boreholes on the Site were consistent with sandy clay fill from surface to 3.0mbg. A layer of organic material was noted at 1.2-1.4mbg at the Production Facilities Area. In the DWDA, a cap of sandy-clay fill from surface to 2.2 or 2.5mbg, followed by a layer of potential drilling waste to 3.2 or 3.9mbg, followed by hard clay to 6.0mbg, the maximum depth of assessment (North Shore, 2017b).

Based on comparison of the Phase 2 ESA results to the applicable CCME, NT, and BC CSR guidelines, several parameters in the Phase 2 ESA were found to be below applicable guidelines, particularly the Environmental Guidelines. Re-evaluation of the data showed that no risk to receptors at the Site was expected for arsenic, chromium, or salinity (pH, EC, SAR) parameters.

Comparison of benzene, ethylbenzene, and toluene results to the Environmental Guidelines showed the results were below the applicable guidelines for the Site except one sample from the subsurface of the Flare Area was still above the guideline for ethylbenzene.

Results for surface F2 and F3 PHC were compared to the Environmental Guidelines with the potable groundwater pathway removed. All results for F2 and F3 PHC surface samples at the Well Center were above the Environment and Natural Resources (ENR) guideline limit for soil ingestion. Based on the elevated surface concentrations of F2 and F3 PHC, delineation is recommended for the surface of the Well Center area.

Samples from the subsurface at the Well Center area, and one sample from the Flare Area showed F2 PHC above guideline limits. The results were compared to the EG with the groundwater pathway removed, for ecological soil contact; all samples were below the applicable guideline and were not expected to pose a risk to receptors at the Site.

One sample and its duplicate from the subsurface at the Well Center area showed F3 PHC above guideline limits. The results were compared to the EG with the groundwater pathway removed, for ecological soil contact and the duplicate sample was above the applicable guideline. The sample was from >1.7mbg and was below the guideline for soil dermal contact. Therefore, the result was not expected to pose a risk to receptors at the Site.

One sample from the subsurface (>1.7mbg) of the Flare Area had naphthalene above the Environmental Guidelines limits for Residential land use. The result was below the Commercial/Industrial guideline limit, below the guideline for soil and food ingestion, and below a site-specific standard calculated for the Site. Therefore, the sample result was not expected to present a risk to receptors at the Site.

Based on a review of results from the 2017 Stage 2 ESA at the Site, SynergyAspen determined that the naphthalene, arsenic, chromium and salinity exceedances were reasonably expected to pose no risk to receptors at the Site. Rationale for the determination was based on the applicable guideline limits with receptor pathways removed; naturally occurring metals in the soil profile; low regional soil infiltration rates; the lack of associated contaminant impacts; and the depths of the samples. The rationale regarding exceedances were considered to meet the ENR and CCME requirements for determining the risk to receptors at the Site.

Delineation is recommended for surface F2 and F3 PHC concentrations in soil that were above the applicable ENR guideline for Ecological Soil Contact (F2 PHC) and Soil Ingestion (F3 PHC). During delineation, a background borehole to a depth of 6.0 mbg for calculation of hydraulic conductivity is also recommended.

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1. INTRODUCTION

At the request of Paramount Resources Limited (Paramount), SynergyAspen completed a Desktop Remediation™ (DTR) review of historical environmental site assessment information and data for the Paramount former wellsite *PARA ET AL* F-36 - 60-10-123-15, with Well Identification number 1841 (the Site). The Site is in the Fort Liard field of the Northwest Territories.

The scope of work for the DTR involved reviewing and assessing available analytical data to determine the applicability of various guidelines based on land uses and receptors at the Site. Recommendations for remediation at the Site will be provided based on regulatory requirements.

The areas of potential environmental concern (APECs) identified in the 2017 Phase 1 Environmental Site Assessment (ESA) for the Site by North Shore Environmental Limited (North Shore) were the well centre; production facilities and spill area; flare stack area; former drilling waste disposal area (DWDA); and a drilling flare pit/lagoon (North Shore, 2017). The areas of environmental concern (AECs) identified in North Shore's 2017 Phase 2 ESA for the Site were the Well Center, flare stack and flare knockout tank areas for petroleum hydrocarbons, and the DWDA for petroleum hydrocarbons and naphthalene (North Shore 2017b).

2. CURRENT SITE DESCRIPTION

The well was drilled to a depth of 2110 meters in two events, March 3 to 28, 1998, and December 23, 1998 to February 5, 1999. on November 2 and December 4, 1999. The well produced natural gas, condensate, and produced water from 2000 to 2005 and was abandoned in April 2008. The Site was winter-access, in the South Liard field, approximately 17 kilometres (km) southwest of Fort Liard, Northwest Territories (NT). The Site location is presented on Drawing PAR6207-001, in the Drawings Appendix.

The Site was approximately 150m x 150m, with a proposed 30m x 60m campsite east of the Site. Site details and surrounding land uses are shown on Drawing PAR6207-002, in the Drawings Appendix. Table A below summarizes general information regarding the Site's location, topography, hydrogeology, and surrounding land uses.

TABLE A: Summary of General Information

Item	Description
Site Latitude & Longitude	60° 05' 27.12" N; 123° 22' 07.54" W
NTS Map	F-36 - 60°-10'-123°-15'
Well ID #	1841
Land Owner(s)	Crown
Drilling Dates	March 3 to 28, 1998; and December 23, 1998 to February 5, 1999
Total Depth	2110m
Site Description & Size	Site dimensions are approximately 150 m x 150 m square, with a corner oriented to the North, and 20 m x 340 m access from the southwest.
Site Facilities	Wellhead was located at the centre of the Site; 30x60m campsite east of the remote sump area along seismic line
Topography:	
Regional Surface Grade	The regional grade is gently sloping northeast towards a tributary of the Liard River
On Site Drainage	The lease slopes southeast (0-1%) based on the survey details
Surface Cover	In 2017 snow-covered vegetation included willow, spruce, birch, willow, cattail, fescue, brome and dock, which appeared consistent with off-site vegetation
Geology	Bedrock geology consists of Fort Saint John Group, which is comprised of mudstone, siltstone, Shale and fine clastic sedimentary rocks, silty mud, sandstone, coal and conglomerates [BCGS online map resource].
Hydrology & Hydrogeology:	
Nearest Surface Water	Government of NWT ATLAS website shows no water bodies within 500m of the Site. A wetland is visible ~450m southeast of the Site.

Item	Description
Water Wells	Government of NWT ATLAS website shows no water wells within 500m of the Site (Appendix III).
Depth to Groundwater	Unknown
Groundwater Flow	Unknown but likely to the northeast towards the unnamed tributary of the Liard River
Surrounding Land Use (Site)	
North	Mixed wood Boreal forest
East	Mixed wood Boreal Forest
South	Mixed wood Boreal Forest
West	Mixed wood Boreal Forest

3. HISTORICAL REVIEW

The scope of this report included a review of available historical environmental site assessment (ESA) information for the Site. Findings from the review of the available reports are summarized below.

3.1 Phase 1 ESA - 2017

North Shore Environmental Consultants Inc. (North Shore) completed a Phase 1 ESA on the Site, published in March of 2017. The Phase 1 ESA indicated the well produced from 2000 to 2005. Infrastructure at the Site included the wellhead, methanol tank in containment, flare knockout drum with vent; fuel tank and chemical drums; pig launcher and surface piping. A campsite was located east of the Site. Based on Compliance Option #2, the on-site DWDA failed for drilling waste disposal during the final entry of the well, due to salt calculations and unknown disposal of drill stem test returns (North Shore, 2017a).

Five spills were associated with the Site between 2001 and 2003: Cumulatively, 1200L of condensate and produced water, 10L of methanol, and 12L of glycol were released. An assessment in 2004 indicated surface staining at the wellhead and flare stack areas. In 2000, 800L of drilling waste was spilled on the access road, with the location undetermined. In 2013, the berm around the fuel containment showed evidence of a release (North Shore, 2017a). Areas of Potential Environmental Concern noted in the Phase 1 ESA were the well centre; production facility/former spill areas; flare stack area; DWDA on-site and northwest portion of Site; and the drilling flare pit area noted in the well file (North Shore, 2017a).

3.2 Phase 2 ESA - 2017

North Shore completed a Phase 2 ESA on the Site, published in May of 2017. The Phase 2 ESA investigated the APECs identified in the Phase 1 ESA, and consisted of 37 boreholes advanced at the Site. Analytical results from the Phase 2 ESA were compared to the following guidelines: Canadian Council of Ministers of the Environment (CCME) 2017 Tier 1 Soil Remediation Guidelines: the 2003 Northwest Territories Environmental Guidelines for Contaminated Site Remediation; and the 2016 Alberta Tier 1 Soil and Groundwater Remediation Guidelines (North Shore, 2017b). Results showed impacts within the surface and subsurface at the Site: hydrocarbons at the Well centre, Flare area, and DWDA; chromium in one sample from the Well centre; arsenic in 3 samples from the DWDA; pH, electrical conductivity (EC), and sodium adsorption ratio (SAR) in the Lagoon area and DWDA; and polycyclic aromatic hydrocarbon (PAH) naphthalene noted in two samples from the Flare area. Elevated EC noted in the production facility area, the flare stack/knockout tank area, and the lagoon area were attributed to naturally occurring variation in

the soil profile. An historic spill along the access road was not investigated as snow cover prevented identification of the location of the spill. North Shore concluded that further work was required for the Site to meet Alberta remediation guidelines (North Shore, 2017b).

4. SUMMARY OF SITE SOIL CONDITIONS

Based on a review of historical reports, SynergyAspen developed a list of areas of environmental concern (AECs) for the Site. The AECs, along with contaminants of concern (COCs) and associated regulated parameters, are shown on Table B below. The AEC and Site investigation plan are shown in Drawing PAR6207-002, and PAR6207-003.

TABLE B: AECs and associated COCs in Soil*

AEC Label	AECs	Impacted Borehole(s)	COCs (depth)
A	Well centre	17BH01, 17BH02	Benzene, Ethylbenzene, F2 and F3 petroleum hydrocarbon (PHC) (0.8-1.9mbg) Chromium (0.8-1.0mbg)
B	DWDA	17BH26, 17BH32, 17BH31, 17BH33	Benzene, Ethylbenzene, and Toluene (2.2-3.9mbg) Arsenic (2.5-3.4mbg) Barium (3.0-3.9mbg) pH, EC, SAR (2.5-3.2mbg)
C	Flare Area	17BH19, 17BH20	Benzene (0.3-0.5mbg) Benzene, Toluene Ethylbenzene, and F2 PHC (1.7-1.9mbg) Benzene and Ethylbenzene (3.2-3.4mbg) Naphthalene (1.7-1.9 mbg and 3.2-3.4mbg) EC (1.3-1.5 mbg)
D	Lagoon Area	17BH25	EC (1.3-1.5 mbg)
E	Production Facilities Area	17BH16	EC (1.3-1.5 mbg)

*From: North Shore, 2017b.

Soil Stratigraphy

Two background boreholes were assessed at the Site in the North Shore 2017 Phase 2 ESA. Soil stratigraphy at background borehole 17C01 was sandy-clay loam topsoil overlying clay loam to 2.5mbg, overlying hard clay to 4.2mbg, overlying sandy loam and sandy clay to 8.5mbg, and silty clay loam to 10.5mbg, the depth of investigation. Borehole 17C02 showed silty-loam topsoil overlying clay loam to 1.2mbg, overlying clay and hard clay to 4.8mbg, followed by a sand layer to 6.0mbg, the total depth of investigation (North Shore, 2017b).

The stratigraphy at the Well centre area APEC was shown in boreholes 17BH01 through 17BH05. Stratigraphy was similar for all boreholes with firm sandy-clay to 4.5mbg, the maximum depth of assessment.

The stratigraphy at the Flare area APEC was shown in boreholes 17BH19 through 17BH24. Stratigraphy was similar for all boreholes with firm sandy-clay to 4.5mbg, the maximum depth of assessment.

The stratigraphy at the DWDA APEC was shown in boreholes 17BH26 through 17BH33. Stratigraphies in 17BH26, 17BH27, 17BH32 and 17BH33 were similar with sandy-clay to 2.5mbg, overlying a layer of un-mixed drilling waste to 3.9mbg, overlying hard clay to 6.0mbg, the maximum depth of assessment. Boreholes 17BH28, 17BH29, and 17BH30 were similar with sandy-clay to around 3.2mbg, overlying clay or sandy-clay to 4.5mbg. Borehole 17BH31 had hard clay to 3.2mbg, overlying sandy-clay to 4.5mbg (North Shore, 2017b).

Hydrogeology

There were 14 soil samples collected at varying depths from the boreholes across the Site for grain size analysis by sieve pan. The sieve method provides the percentage split between coarse and fine-grained material based on retention on a 75µm mesh screen sieve. The grain size analysis results showed all but four samples were fine-grained, indicating fine-grained material was dominant at the Site (North Shore, 2017b).

The shallow subsurface regional geology of the area north of Maxhamish Lake was reviewed through borehole logs from Phase 2 ESAs completed at four sites in the region. The borehole logs from the following sites were reviewed:

- PARA ET AL MAXHAMISH B- 21-K/094-O-14 (WA#03717) (North shore, 2017c)
- PARA ET AL MAXHAMISH B- 043-K/094-O-14 (WA#12563) (North shore, 2017d)
- PARA ET AL MAXHAMISH B- 083-K/094-O-14 (WA#13773) (North shore, 2017e)
- PARA ET AL MAXHAMISH A-96-J/094-O-14 (WA#13772) (North shore, 2017f)

The sites were located respectively approximately 17 kilometres (km) south-southeast, 15km south-southeast, 11.5km south-southeast, and 13.5km southeast of the O-35 Site. Soil stratigraphy at the b-21-K/94-O-14 site was topsoil and silty-clay overlying clay subsurface. Delineation boreholes around the

site showed clay overlying hard clay, with minor occurrences of sandy loam. Hydraulic conductivity testing was completed at the site from 3 groundwater monitoring wells installed during the Phase 2 ESA: hydraulic conductivity values ranged from $1.0x10^{-9}$ meters per second (m/s) to $2.0x10^{-10}$ m/s, as expected from the soil type at the site (2017c).

The soil profile at background locations at the b-043-K site showed loam surface soil to 0.2m, overlying clay-loam soil to approximately 3.0mbg, followed by silty-clay-loam to 4.5mbg, and silty-loam to 6.0mbg. All samples from various depths submitted for grain-size analysis through sieve analysis showed fine-grained soils dominant in the soil profile at the site (North Shore, 2017d).

The borehole logs from background locations at the b-083-K and A-96-J sites showed consistent profiles with loam surface soil to 0.2mbg, followed by clay to approximately 3.0 mbg, overlying "hard clay" to 6.0mbg, the maximum depth of investigation; a layer of silty-clay was noted in one borehole from the a-069-J site. A sand layer was noted in one borehole from 2.4-2.8 mbg at the b-083-K site. All samples submitted for grain-size analysis through sieve analysis from both sites showed fine-grained soils dominant in the soil profile at the sites (North Shore, 2017e,f). Copies of the reviewed borehole logs and figures are provided in Appendix I and II.

From the Phase 2 ESA for the Site and hydraulic conductivity information the region, there was a sufficient minimum confining layer present between the Site and a deeper regional aquifer. Hydraulic conductivity values of the deeper soils at the Site would be expected to be low due to the hard clay soil at the Site. Therefore, drinking water (DW) standards would not apply at the Site within the shallow soils, but would apply in the deeper aquifer unit, if present. At the time of the assessments there were no water wells, water bodies, or residences within 500m of the Site.

5. ENVIRONMENTAL REGULATORY FRAMEWORK

Numerical soil standards for evaluating the results of the Phase 2 ESA were based on the CCME 2018 Canadian Environmental Soil Quality Guidelines (the CESQ), and the Northwest Territories Environmental Guidelines for Contaminated Site Remediation (the Environmental Guidelines) (Minister of the Environment and Natural Resources [ENR], 2003). The selection of applicable guideline limits in both documents are dependent upon site conditions, applicable receptors at a site, and relevant exposure pathways. From the land use definitions and soil depth considerations in the guideline documents, the Residential/Parkland land use was used to evaluate the 2017 Phase 2 ESA results for the Site.

For assessment of the available data for the F-36 Site, the *Tier 1 – Criteria-based Approach* described in the Environmental Guidelines and the CESQ guidelines were used to determine the applicable hydrocarbon and PAH concentration limits for the Site. Reference to British Columbia's *Contaminated Sites Regulation* (BC CSR) (Ministry of Environment and Climate Change Strategy [MECCS], 2021) is provided for comparison of a site-specific modelling approach described in *Protocol 2 for Contaminated Sites – Site-Specific Numerical Soil Standards (Version 2)* (MECCS, 2017).

For the evaluation of receptors and pathways related to groundwater protection, water use considered proximity to potable water and aquatic receptors, current and potential future use of groundwater aquifers as water sources, and the potential for groundwater extraction based on the hydraulic conductivity of the shallow regional soils.

From the Site information in Section 2, there were no groundwater wells, water bodies, or residences within 500m of the Site. Based on the rationale in Section 4 regarding low hydraulic conductivity due to fine-grained soil in the region, and the lack of water bodies, water wells or residences in proximity to the Site, the Protection of Potable Groundwater, Protection of Freshwater Aquatic Life, and Protection of Livestock Watering pathways would not be operative at the Site.

The following receptor pathways were determined to be applicable at the Site:

For analytical results from soil samples <1.5mbg:	For analytical results from soil samples >1.5mbg:
• Direct Contact; and • Ecological Soil Contact.	• Ecological Soil Contact; • Nutrient and Energy Cycling.

5.1 Guideline Derivation

From the evaluation of receptor pathways at the Site, as described in the ENR guidelines *Tier 1 Criteria-based Approach,* the Protection of Potable Groundwater pathway was not applicable at the Site. Therefore, the guideline limits for F2 and F3 PHC in fine-grained surface soil for Residential land use were determined to be 900 milligrams per kilogram (mg/kg) and 800mg/kg respectively, based on the Ecological Soil Contact pathway. The guideline limits for F2 and F3 PHC in fine-grained subsurface soil (>1.5mbg) for Residential land use were determined to be 2200mg/kg and 3500mg/kg respectively, based on the Ecological Soil Contact pathway. The guideline limit for benzene was 0.5mg/kg; for toluene was 0.8mg/kg; and for ethylbenzene was 1.2 mg/kg (ENR, 2003).

Guideline limits for PAHs at the Site were determined through the CCME 2010 *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health – Polycyclic Aromatic Hydrocarbons* (CCME, 2010). The CCME 2010 guidelines instruct reference to guidelines in other jurisdictions, in this case, the ENR 2003 guidelines for Residential land use were referenced. The ENR guideline limit at the Site for Naphthalene was determined to be 0.6mg/kg, based on the soil contact pathway (ENR, 2003).

6. COMPARISON OF DATA

Based on the 2017 Phase 2 ESA, soil analytical results were compared to the applicable guideline limits with respect to the operative receptor pathways at the Site. Following Section 4 above, the pathway for potable groundwater at the Site was removed. Table C below shows the historic Site soil data compared to applicable soil guidelines at the Site:

TABLE C: Soil Quality Guidelines for Fine-Grained Surface (<1.5mbg) soil (mg/kg)

Parameter	2017 Analytical Results (North Shore, 2017b)	ENR 2003 Residential/ Parkland	ENR 2003 Residential/ Parkland	ENR 2003 Residential/ Parkland	CCME	
Chromium	145	64	-	-	220 [c]	-
Benzene	0.007	0.5	-	-	-	-
F2	351-5460	900	8000[a]	>30,000[b]	6800[d]	>30,000[e]
F3	22600	800	18000 [a]	>30,000 [b]	15,000[d]	>1x10^{6} [e]

a ENR Guideline – Soil Ingestion pathway
b ENR Guideline – Dermal Contact pathway
c CCME 1997 guideline for Human Health-Soil Ingestion pathway
d CCME 2007 *Canada Wide Standards for PHC in Soil*: Guideline for Direct Contact (Ingestion and Dermal Contact) pathway
e CCME 2007 *Canada Wide Standards for PHC in Soil*: Guideline for Protection of Aquatic Life pathway

TABLE D: Sub-Surface Soil (>1.5mbg) Quality Guidelines Applicable at the Site (mg/kg)

Parameter	2017 Analytical Results (North Shore, 2017b)	ENR 2003 Residential/ Parkland	ENR 2003 Residential/ Parkland
Arsenic	14.4-20.1	12	-
Barium	1610	500	-
Benzene	0.014-0.372	0.5	-
Ethylbenzene	0.02-2.52	1.2	-
Toluene	0.09-0.61	0.8	-
F2	335-1420	2200	-
F3	3160-4970	3500	>30,000*
Naphthalene	0.014-1.04	0.6	-
pH	9.77-12.3	6.0-8.0	-
EC	7.92	2.0	-
SAR	11.7-38.1	5.0	-

*Guideline for Soil Ingestion & Dermal Contact pathway - Ecological Soil Contact pathway removed

As well, further discussion regarding the applicability of various guidelines with respect to expected land uses, available receptors, and site-specific conditions is included in the next section.

7. RESULTS AND CONCLUSIONS

Analytical soil data from the 2017 North Shore Phase 2 ESA were compared to current ENR and CCME guidelines applicable to the Site. A discussion of the results is presented below.

7.1 Soil Results

7.1.1 Arsenic

Three subsurface samples from the DWDA had concentrations of arsenic marginally above the guideline limit. The results from >2.5mbg ranged from 14.4 to 20.1mg/kg, above the CCME guideline of 12mg/kg (North Shore, 2017b). The CCME Residential/Parkland guideline for arsenic in soils was based on protection of human health from soil ingestion with a limit of 12mg/kg, and the protection of environmental health, with a soil contact limit of 19mg/kg (CCME, 1997). The 1991 CCME interim guideline for arsenic was 50mg/kg.

Referring to fact sheets and guidance from the CCME and ENR, a discussion regarding application of guidelines for arsenic with respect to the site-specific conditions follows:

- If a spill or release led to the exceedances for arsenic, contamination from other chemicals, including hydrocarbons, salinity, and metals would be expected. As no residual hydrocarbon, salinity, or metals parameters were indicated in the analytical results for the three samples, it was unlikely that the elevated arsenic concentrations were the result of a spill or release.
- The Site is not currently occupied by humans and is unlikely to be occupied by humans in the future. While the arsenic concentrations in one sample was above the guideline limit for soil contact, the depth of the impacts at >2.5mbg was below the depth that would require mechanical excavation to expose impacted soil for contact or ingestion. Therefore, soil ingestion and soil contact pathways would not be operative at that depth at the Site.
- If removal of the marginal arsenic exceedances in the three samples was undertaken, the heavy equipment used to excavate the soil would likely cause significant impacts to the reclaimed condition at the Site compared to the minimal risk to humans and the environment that may be imposed by the arsenic remaining *in-situ*.

- ENR Guidelines for soil in and around the Yellowknife area noted natural occurrences of arsenic up to 300mg/kg, with the average in and around the Yellowknife area of 150mg/kg (ENR, 2003). The ENR determined a remediation objective of 160mg/kg for Residential land use in Yellowknife area soils, based on accessibility (soil ingestion and soil contact) to the yard for 2 hours per day, 5 months of the year (ENR, 2003). The Site is in a remote setting where access is limited to helicopter transport or winter roads, and toddlers or the public are not expected on a regular basis at the Site. For the Site, access by the public is currently less than 5 months of the year for the CCME maximum concentration of 12.0mg/kg in soil.

In addition, arsenic concentrations in the background/control boreholes show increasing arsenic with increasing depth. Based on the above rationale, the arsenic exceedances detected at the DWDA did not pose a risk to human and ecological receptors at the Site.

7.1.2 Barium

One sample from the subsurface of the DWDA showed a concentration of barium at 1610mg/kg, above the guideline limit of 500mg/kg (North Shore, 2017b). The CCME Residential/Parkland guideline for barium in soil was based on the nutrient and energy cycling for environmental health, with a limit of 500mg/kg.

True total barium which refers to the barium results of using fusion-XRF or fusion-ICP method (AENV, 2009) was measured for the only soil sample with barium exceedance. The guideline for true total barium at Barite Sites for residential/parkland land use is 10,000 mg/kg. Therefore, the barium exceedances detected at DWDA meet the standard and did not pose a risk to human and ecological receptors at the Site.

Besides, barite was used in the mud additive at the Site. Barite contains barium in the form of barium sulphate, a non-soluble and non-toxic form of barium. Northshore requested the analysis of the soil sample for barium concentrations with the calcium chloride ($CaCl_2$) extraction method (MECCS Analytical Method 9). The $CaCl_2$ method is not as aggressive as the Strong Acid Leachable Metals (SALM) method and removes only the more soluble and more toxic barium compounds from the soil. The $CaCl_2$ extraction method is more representative of actual risks to human health and livestock receptors than the SALM method. The resulting barium concentration of 37mg/kg was well below the CCME standard of 500 µg/g.

7.1.3 Chromium

One sample from the surface of the Well Center showed a concentration of chromium (total) at 145mg/kg, above the guideline limit of 60mg/kg (North Shore, 2017b). The exceedance was delineated with the sample below which showed chromium below guidelines. The CCME Residential/Parkland guideline for chromium (total) in soil was based on the nutrient and energy cycling for environmental health, with a limit of 60mg/kg, and the protection of human health from soil ingestion, with a limit of 220mg/kg (CCME, 1997).

Referring to fact sheets and guidance from the CCME and ENR, a discussion regarding application of guidelines for chromium with respect to the site-specific conditions follows:

- The Site is not currently occupied by humans and is unlikely to be occupied by humans in the future. While the Chromium concentration was above the guideline limit for environmental health (nutrient and energy cycling), the result was below the guideline for human health (soil ingestion).
- The depth of the impact at >0.8mbg was below the depth that would require mechanical excavation to expose impacted soil for contact or ingestion. Therefore, soil ingestion and soil contact pathways would not be regularly operative at that depth at the Site.
- If removal of the single chromium exceedance was undertaken, the heavy equipment used to excavate the soil would likely cause significant impacts to the reclaimed condition at the Site compared to the minimal risk to humans and the environment that may be imposed by the chromium remaining *in-situ*.

While the single sample at the Well Center showed chromium above the generic guideline for the Site based on nutrient and energy cycling, the exceedance was below the soil ingestion pathway for human health. Based on the above rationale, the single chromium exceedance detected at Well Center does not pose a risk to human and ecological receptors at the Site.

7.1.4 Benzene, Ethylbenzene, and Toluene

One sample from the surface of the Flare Area, and subsurface samples at the Well Center area, Flare Area, and DWDA had exceedances for benzene: at 0.007mg/kg in the surface and ranging from 0.014-0.372 mg/kg in the subsurface (North Shore, 2017b). The results were compared to the ENR 2003 guideline limits for benzene in fine-grained soil. The guideline limit for benzene was 0.5mg/kg (ENR, 2003); all samples were below the ENR guideline limit, and did not pose a risk to receptors at the Site.

Subsurface samples from the Well Center area, Flare Area, and DWDA showed exceedances for Ethylbenzene, ranging from 0.02 to 2.52 mg/kg (North Shore, 2017b). The results were compared to the ENR 2003 guideline limits for ethylbenzene in fine-grained soil. The guideline limit for ethylbenzene was 1.20mg/kg (ENR, 2003); all samples except one sample from the Flare Area at 1.7-1.9mbg, were below the ENR guideline limit for the Site, and did not pose a risk to receptors at the Site.

One sample from the subsurface of the Flare Area, and two subsurface samples plus one duplicate from the DWDA had exceedances for toluene (North Shore, 2017b). The results were compared to the ENR 2003 guideline limits for toluene in fine-grained soil. The guideline limit for toluene was 0.8mg/kg (ENR, 2003). All samples from the Flare Area and DWDA were below the ENR guideline limit for the Site, and do not pose a risk to receptors.

7.1.5 F2 and F3 PHC

Exceedances for F2 and F3 PHC were noted in the surface at the Well Center, with the highest concentrations <1.0mbg. (North Shore, 2017b). Following Section 4, sample results were compared to the ENR 2003 guidelines for PHC in fine-grained soil, with the protection of potable water pathway removed. All results for F2 and F3 PHC surface samples at the Well Center were above the ENR guideline limit for soil ingestion. Based on the elevated surface concentrations of F2 and F3 PHC, delineation is recommended for the surface of the Well Center area.

Exceedances for F2 PHC were noted in one sample and its duplicate from the subsurface at the Well Center, and in one sample from the subsurface of the Flare Area (North Shore, 2017b). Based on the summary of site conditions in Section 4, the F2 PHC results were compared with the ENR guideline for F2 PHC in fine-grained subsurface soils (>1.5mbg) with the Protection of Groundwater pathway removed, giving a guideline limit of 2200mg/kg for ecological soil contact. All sample results for F2 PHC were below the ENR guideline for ecological soil contact. Therefore, the F2 PHC in the subsurface does not present a risk to human or ecological receptors at the Site.

Exceedances for F3 PHC were noted in one sample and its duplicate from the subsurface at the Well Center (North Shore, 2017b). Based on the summary of site conditions in Section 4, the F3 PHC results were compared with the ENR guideline for F2 PHC in fine-grained subsurface soils (>1.5mbg) with the protection of groundwater pathway removed, giving a guideline limit of 3500mg/kg for ecological soil contact. The sample had a result below the ecological soil contact guideline, however the duplicate sample was above the guideline, with a result of 4500mg/kg. As the sample was collected from >1.7mbg, the result was compared to the ENR guideline with the ecological soil contact pathway removed, giving a guideline for dermal contact of >30,000mg/kg. The depth of the sample was below the depth that would require mechanical excavation to expose impacted soil for dermal contact. All sample results for F3 PHC were below the ENR guideline for dermal contact. Therefore, the F3 PHC in the subsurface does not present a risk to human or ecological receptors at the Site.

Delineation is recommended for surface F2 and F3 PHC concentrations above the Ecological Soil Contact guideline. As well, while the F3 surface concentration was below the residential guideline for Dermal Contact, the concentration in the single sample was above the guideline for the Soil Ingestion pathway.

7.1.6 Naphthalene

Two subsurface samples from the Flare Area showed naphthalene above the guideline limits ranging from 0.014 to 1.04mg/kg. The results were compared to the ENR 2003 guideline limits for naphthalene in fine-grained soil of 0.6mg/kg for Residential land use. For comparison, Commercial/Industrial guideline limit was 22mg/kg (ENR, 2003). One sample, collected from 1.7-1.9mbg was above the ENR guideline for Residential land uses.

7.1.7 Salinity

Four surface samples, from the Production Facilities Area, the Flare Area and Lagoon Area showed EC marginally above the guideline of 2 deciSiemens per meter (dS/m). The increase in EC, with results ranging from 2.36 to 2.80 dS/m, appear to be driven by an increase in calcium sulphate at a depth of 1.3-1.5mbg. Considering the following: the marginal increase in EC; the depth of the exceedances at 1.3mbg, below the rooting zone of most plants; and the presence of naturally occurring calcium sulphate in the soil profile at the Site, the marginal exceedance in EC did not present a risk to receptors at the Site.

Six subsurface samples from the DWDA showed exceedances for pH, EC, and SAR, at depths from 2.5mbg to 3.9mbg. Three samples had pH results above the guideline limit of 8.5. One sample showed EC above the guideline limit of 6.0dS/m. Five samples, including one duplicate, had results for SAR above the guideline limit of 10.0.

Three of the samples were above the CCME guideline limit for pH of 8.5, with results of 9.62, 9.77, and 12.3. The pH exceedances were at a depth of 2.5 to 3.9mbg, below the rooting depth of most plants, and below the depth that would require mechanical equipment for excavation. Therefore, the pH does not present a risk to receptors at the Site.

One sample showed an EC of 7.93dS/m, marginally above the guideline limit of 6.0dS/m for samples >1.0mbg. The increase in EC appears to be related mainly to the large increase in calcium in the sample; a corresponding increase in chloride was noted in the sample. While the increase in EC was driven by the increase in calcium, calcium sulphates were present in the soil profile at the Site, and the exceedance, at 2.5-3.0mbg, was below the depth of most rooting plants. Therefore, the increase in EC in the subsurface at the DWDA does not present a risk to receptors at the Site.

Five subsurface samples, including one duplicate, showed SAR above the guideline limit of 10.0 for the Site. The samples were taken at 2.2-3.9mbg from the DWDA. The increases in SAR appear to be driven by increases in sodium and a lack of magnesium in the samples: sodium ranged from 103 to 502mg/kg in the samples; magnesium ranged from <1.0 to 2.0mg/kg. Chloride in the samples ranged from 11 to 29mg/kg, with chloride of 145 mg/kg in one sample.

The increase in sodium was correlated with an increase in sulphates in the samples. SAR exceedances ranged mainly from 11.7-16.2 in the DWDA; one sample had an SAR of 38.1. The SAR of 38.1 was collected at 3.0-3.9mbg; the sample had minimal calcium of 14.0mg/kg, and no/little magnesium <1.0mg/kg, which skewed the SAR results higher. Based on the depth of the samples at more than 2.2mbg, the lack of magnesium skewing the SAR calculation, and the minimal amount of chloride in the samples, the SAR does not pose a risk to receptors at the Site. SAR does not correlate well with toxicity to receptors, however it can affect water infiltration through the soil profile. A higher SAR correlates well with poorer water infiltration. The depth and limited extent of the elevated SAR will not negatively affect water infiltration at the Site. Surface conditions and vegetative growth have not been affected by the elevated SAR at the Site.

8. CONCLUSIONS

Based on a review of results from the 2017 Stage 2 ESA at the Site, SynergyAspen determined that the PAH, arsenic, chromium and salinity exceedances at the Site were reasonably expected to pose no risk to receptors at the Site. Rationale for the determination was based on the applicable guideline limits with receptor pathways removed; the lack of associated contaminant impacts; low regional soil infiltration rates; naturally occurring metals in the soil profile; and the depths of the samples. The rationale regarding exceedances at the Site were considered to meet the ENR and CCME requirements for determining the risk to receptors at the Site.

Delineation is recommended for surface F2 and F3 PHC concentrations in soil that were above the applicable ENR guideline for Ecological Soil Contact (F2 PHC) and Soil Ingestion (F3 PHC). During delineation, a background borehole to a depth of 6.0 mbg for calculation of hydraulic conductivity is also recommended.

9. CLOSURE

Based on the evaluation of the available historic data, further environmental work is required at the Site prior to submission of the report to the ENR.

Thank you for the opportunity to conduct the work presented herein. If you have any questions or comments, please do not hesitate to contact the undersigned at 250-785-1030.

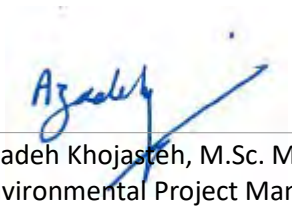
Respectfully Submitted,

SYNERGYASPEN ENVIRONMENTAL INC.

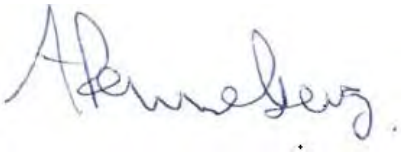
Written by:

Jason Richl, B.Sc.,
Environmental Client Manager

Reviewed by:



Azadeh Khojasteh, M.Sc. M.Eng.,
Environmental Project Manager



Adrian Renneberg, M.Sc., P.Ag.,.
Environmental Client Manager

10. REFERENCES

BC MECCS. 2019. *Contaminated Sites Regulation. BC Reg 375-96*. Environmental Management Act. Amended January 24, 2019. Victoria, BC. March 19, 2019. 266 pp.

Canadian Council of Ministers of the Environment (CCME). 2018. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health: Zinc. In: Canadian Environmental Quality Guidelines. 8pp. Online: Accessed February 15, 2021.

Minister of the Environment and Natural Resources (ENR). 2003 Environmental Guidelines for Contaminated Site Remediation. Government of the Northwest Territories. November, 2003. 39pp.

North Shore Environmental Consultants Limited (North Shore). 2017a. Paramount Resources Ltd. Para et al Fort Liard O-35 60˚10' 123˚ 15'. Phase 1 Environmental Site Assessment – March 2017. March [], 2017. 46pp.

North Shore. 2017b. Paramount Resources Ltd. Para et al Fort Liard O-35 60˚10' 123˚ 15'. Phase 2 Environmental Site Assessment – May 2017. May 10, 2017. 174pp.

North Shore. 2017c. Paramount Resources Limited. 200/B-21-K/94-O-14 Stage II Preliminary Site Investigation – November 2017. November 28, 2017. 237pp.

North Shore. 2017d. Paramount Resources Limited. 200/B-43-K/94-O-14 Stage II Preliminary Site Investigation – May 2017. May 24, 2017. 114pp.

North Shore. 2017e. Paramount Resources Limited. 200/B-83-K/94-O-14 Stage II Preliminary Site Investigation – May 2017. May 30, 2017. 115pp.

North Shore. 2017f. Paramount Resources Limited. 200/A-69-J/94-O-14 Stage II Preliminary Site Investigation – March 2017. March 31, 2017. 93pp.

11. USER RELIANCE AND GENERAL LIMITATIONS

11.1 User Reliance

SynergyAspen Environmental Inc. (SynergyAspen) prepared this report for the sole use of Paramount Resources Limited (the Client). The Client was privy to the establishment of this project's scope and is aware of its terms and conditions.

Should the Client submit this report to a regulatory authority, the regulatory authority may rely on the results within the context of the document's General Limitations for the purpose of determining whether the Client is meeting (has met) its requirements concerning applicable environmental regulations.

Third party reliance is subject to the scope of work agreed upon by SynergyAspen and the Client and is only suitable within the limitations of the project/document. The activities detailed herein were performed for the Client and this document may not be appropriate for the purposes of a relying party. Application of this document for aims beyond those practically intended by the Client and SynergyAspen is at the exclusive risk of the user. SynergyAspen does not accept legal responsibility for any damages toward any third party as a result of the application, use of, or any conclusion drawn based on this report.

As far as the nature of these investigative activities involves professional opinion, SynergyAspen offers no assurance that the results contained herein support a particular course of action. The investigative activities may have included the application of judgment to scientific principles; hence certain results of this work may be based on subjective interpretation. Professional opinions expressed herein are derived from the specifics currently available within the confines of the existing information, scope of work, budget, and schedule.

11.2 General Limitations

The results and conclusions herein were developed according to the degree of care and skill generally exercised by contemporary environmental professionals within similar conditions and localities. The findings herein are somewhat reliant upon information provided by others. If any of the information is erroneous, amendments to the results, conclusions, and recommendations may be required.

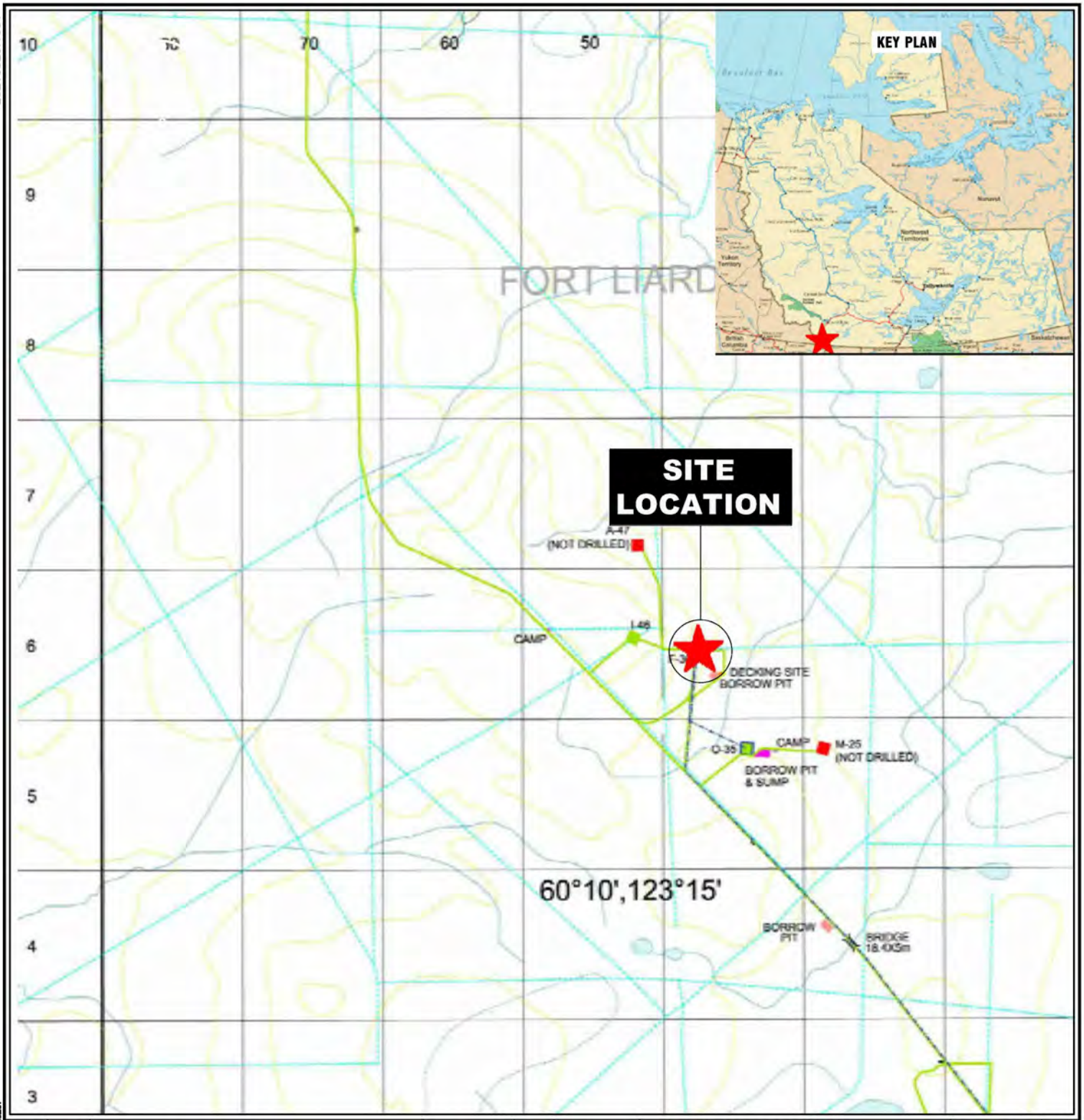
The results, conclusions and recommendations SynergyAspen presents herein represent SynergyAspen's best professional judgement according to the site conditions and on available information during preparation of this report. They were determined explicitly for this site and are somewhat reliant upon visual observation of the site, subsurface investigation at specific locations and depths, and select analysis of specific materials (as detailed herein).

While this assessment has attempted to identify all areas of potential environmental concern at the Site, it is possible that other areas of potential environmental concern may have escaped detection due to imprecise government records, undocumented historical environmental accidents, or other undocumented activities that resulted in contamination.

DRAWINGS

- PAR6207-001 – Site Location Plan
- PAR6207-002 – Site Plan and Areas of Potential Environmental Concern
- PAR6207-003 – Site Investigation Plan
- Wellsite Survey

20210525.1051



CHK	BY	REVISION DESCRIPTION	DATE	REV.	DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
AK	GA	ISSUED TO CLIENT	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–

LEGEND

- DRAINAGE LINE
- ROADS
- WETLAND/MUSKEG
- OIL AND GAS WELLS
- PARA ET AL FORT LIARD 300/F-36 60-10-123-15 /00

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. DATA COMPILED BY SYNGIS: SYNERGYASPEN GEOGRAPHIC INFORMATION SYSTEM.
3. NORTH SHORE ENVIRONMENTAL FIGURES
4. ORIGINAL DRAWING PAPER SIZE 8.5x11 INCHES.

SynergyAspen ENVIRONMENTAL

TITLE:

SITE LOCATION PLAN
(60° 05' 27.12" N, 123° 22' 07.54" W)

CLIENT NAME: Paramount Resources Ltd.			
SITE LOCATION:	DATE: 2021-05-25	PAR6207	
PARA ET AL F-36-60-10-123-15 Well ID #1841	SCALE: 1:20,000	DWG No:	001
	DWN: GA CHK'D: AK		

PATH: C:\USERS\GAQUILO\APPDATA\LOCAL\TEMP\ACPUBLISH_16944\PAR6207

PLOT: 20210525.1049

N
W E
S

SCALE 1:1,200



APEC Label	APECs	COCs (depth)
A	Well Centre	Benzene, Ethylbenzene, F2 and F3 PHC (0.8-1.9mbg) Chromium (0.8-1.0mbg)
B	DWDA	Benzene, Ethylbenzene, and Toluene (2.2-3.9mbg) Arsenic (2.5-3.4mbg) Barium (3.0-3.9mbg) pH, EC, SAR (2.5-3.2mbg)
C	Flare Area	Benzene (0.3-0.5mbg) Benzene, Toluene Ethylbenzene, and F2 PHC (1.7-1.9mbg) Benzene and Ethylbenzene (3.2-3.4mbg) Naphthalene (1.7-1.9 mbg and 3.2-3.4mbg) EC (1.3-1.5 mbg)
D	Lagoon Area	EC (1.3-1.5 mbg)
E	Production Facilities Area	EC (1.3-1.5 mbg)

CHK	BY	REVISION DESCRIPTION	DATE	REV.
AK	GA	ISSUED TO CLIENT	–	0

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
–	SURVEY PLAN OF WELLSITE	–	–
–	NORTH SHORE ENVIRONMENTAL	–	–
–	–	–	–

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM SURVEY PLAN. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
3. ORIGINAL DRAWING PAPER SIZE 17x11 INCHES
4. PLEASE REFER TO SUMMARY OF AECS ASSOCIATED WITH FORMER ACTIVITIES TABLE.

LEGEND

- WELLBORE
- APPROXIMATE LEASE BOUNDARY

SynergyAspen ENVIRONMENTAL

TITLE:

SITE PLAN AND AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

CLIENT NAME: Paramount Resources Ltd.

SITE LOCATION: PARA ET AL F-36-60-10-123-15 Well ID #1841

DATE: 2021-05-25

SCALE: 1:1,200

DWN: GA CHK'D: AK

PAR6207

DWG No: 002

FILE: C:\USERS\GAQUILO\APPDATA\LOCAL\TEMP\ACPUBLISH_16844\PAR6207



CHK	BY	REVISION DESCRIPTION	DATE	REV.
AK	GA	ISSUED TO CLIENT	–	0

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
–	SURVEY PLAN OF WELLSITE	–	–
–	NORTH SHORE ENVIRONMENTAL	–	–
–	–	–	–

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM SURVEY PLAN. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
3. ORIGINAL DRAWING PAPER SIZE 17x11 INCHES
4. PLEASE REFER TO SUMMARY OF AECS ASSOCIATED WITH FORMER ACTIVITIES TABLE.

SynergyAspen ENVIRONMENTAL

TITLE:

SITE INVESTIGATION PLAN

CLIENT NAME: Paramount Resources Ltd.

SITE LOCATION: PARA ET AL F-36-60-10-123-15 Well ID #1841

DATE: 2021-05-25 | SCALE: 1:800 | DWN: GA | CHK'D: AK

PAR6207

DWG No: 003

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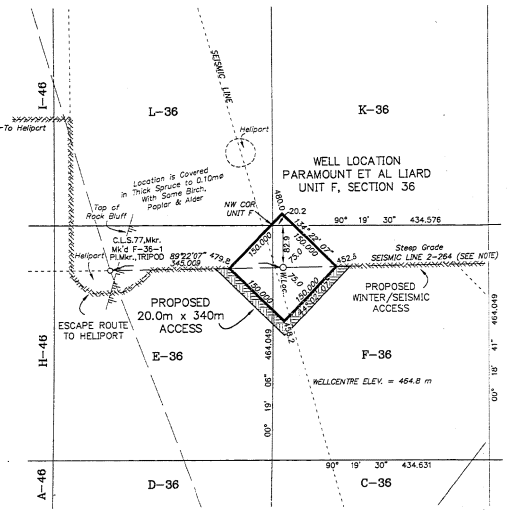
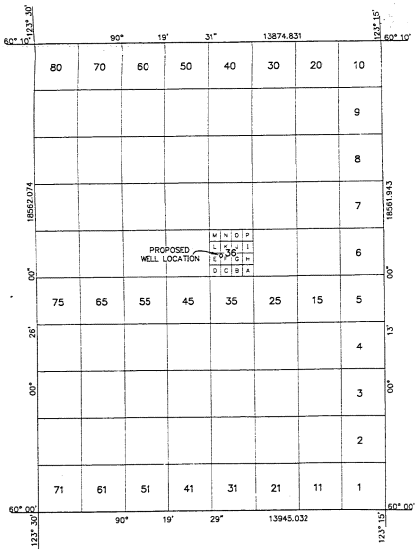
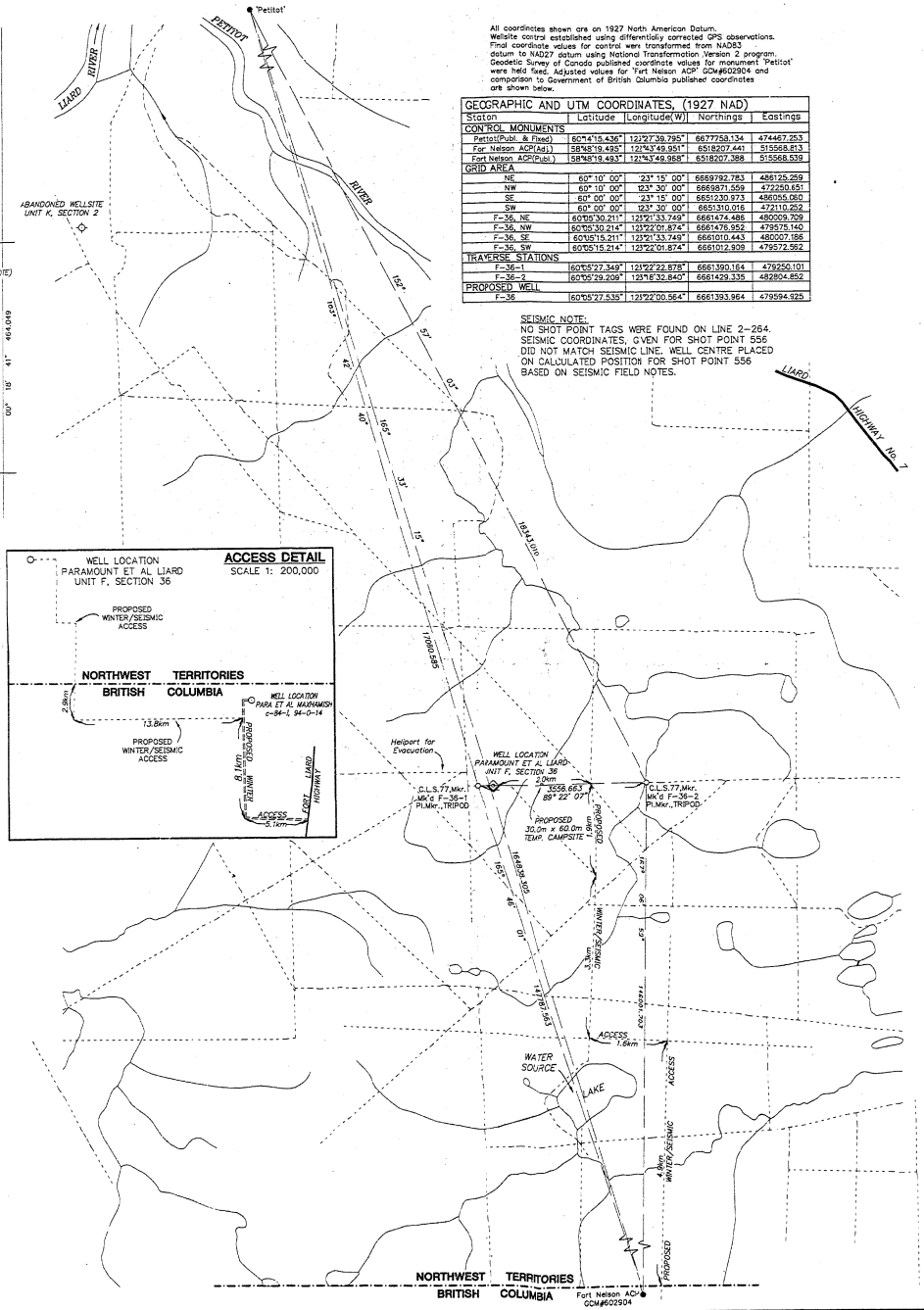


DETAIL
UNIT F, SECTION 36
SCALE 1:5,000



GRID AREA 60°10', 123°15'
SCALE 1:100,000



All coordinates shown are on 1927 North American Datum.
Wellsite control established using differentially corrected GPS observations.
Final coordinate values for control were transformed from NAD83 datum to NAD27 datum using National Transformation Version 2 program.
Geodetic Survey of Canada published coordinate values for monument 'Petitot' were held fixed. Adjusted values for 'Fort Nelson ACP' CGM#602904 and comparison to Government of British Columbia published coordinates are shown below.

GEOGRAPHIC AND UTM COORDINATES, (1927 NAD)

Staton	Latitude	Longitude(W)	Northings	Eastings
CONTROL MONUMENTS				
Petitot(Publ. & Fixed)	60°44'15.436"	121°27'39.795"	6677758.134	474467.253
For. Nelson ACP(Adj.)	58°48'19.495"	121°43'49.951"	6518207.441	515568.813
Fort Nelson ACP(Publ.)	58°48'19.493"	121°43'49.958"	6518207.388	515568.539
GRID AREA				
NE	60° 10' 00"	123° 15' 00"	6669792.783	486125.259
NW	60° 10' 00"	123° 30' 00"	6669871.559	472250.651
SE	60° 00' 00"	123° 15' 00"	6651230.973	486055.050
SW	60° 00' 00"	123° 30' 00"	6651310.016	472110.252
F-36, NE	60°05'30.211"	121°21'33.749"	6661474.486	480009.709
F-36, NW	60°05'30.214"	123°22'01.874"	6661476.952	479575.140
F-36, SE	60°05'15.211"	123°21'33.749"	6661010.443	480007.186
F-36, SW	60°05'15.214"	123°22'01.874"	6661012.909	479572.562
TRAVERSE STATIONS				
F-36-1	60°05'27.349"	123°22'22.878"	6661390.164	479250.101
F-36-2	60°05'29.209"	123°16'32.840"	6661429.335	482804.852
PROPOSED WELL				
F-36	60°05'27.535"	123°22'00.564"	6661393.964	479594.925

SEISMIC NOTE:
NO SHOT POINT TAGS WERE FOUND ON LINE 2-264. SEISMIC COORDINATES, GIVEN FOR SHOT POINT 556 DID NOT MATCH SEISMIC LINE. WELL CENTRE PLACED ON CALCULATED POSITION FOR SHOT POINT 556 BASED ON SEISMIC FIELD NOTES.

LEGEND
UTM coordinates are computed for Zone 10, central meridian 123° W.
Bearings were derived from differentially corrected GPS Observations and are referred to meridian 123° W.
Distances are expressed in metres and decimals thereof.
Distances shown in traverse are measured distances reduced to the horizontal at general ground level.
For the computation of coordinates measured distances have been reduced to the UTM plane by multiplying them by an average combined scale factor of 0.9995232.

Distances shown on grid area subdivisions are UTM plane.
Authorized control monuments found ..... ●
Monuments placed ..... ○
Traverse Hub placed ..... △
Mkr. denotes metal marker post 2.0m long placed 0.30m N.
Elevations were derived from Geodetic Survey of Canada Monument 'Petitot' Elev. = 218.241 m
Survey was completed prior to drilling; therefore well as drilled may not necessarily agree with proposed location.

PLAN AND FIELD NOTES
OF SURVEY OF
PROPOSED EXPLORATORY WELL
PARAMOUNT ET AL LIARD
IN UNIT F, SECTION 36
GRID AREA 60° 10' , 123° 15'
NORTHWEST TERRITORIES
CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50,000
0m 500m 1000m 2000m 3000m 4000m 5000m

SURVEYED FOR
PARAMOUNT RESOURCES LTD.

BY : W.V. JOHNSON, CLS
NOVEMBER, 1997.

I, W.V. Johnson, of the City of Fort St. John, British Columbia, Canada Lands Surveyor, make oath and say that I have in my own proper person, according to law and the instructions of the Surveyor General of Canada Lands, faithfully and correctly executed the survey shown by this plan and field notes, and that the said plan and field notes are correct and true to the best of my knowledge and belief.
SO HELP ME GOD

W.V. Johnson, CLS

Sworn before me at Fort St. John, this 23rd day of November, 1997.

THIS SURVEY WAS EXECUTED DURING THE PERIOD
NOVEMBER 14th TO NOVEMBER 17th, 1997. BY W.V. JOHNSON, CLS

PARAMOUNT RESOURCES LTD.

WITNESS

DATE

REV.No.	DESCRIPTION	DATE
1	CHANGED WINTER ACCESS	97/12/10

McELHANNEY ASSOCIATES
PROFESSIONAL LAND SURVEYORS
10014 - 97th Ave., Suite 202
Fort St. John, British Columbia
Phone:(250)787-0356, Fax:(250)787-0310

DATE : 97/11/21 JOB No.: 3111-06155WS

APPENDIX I

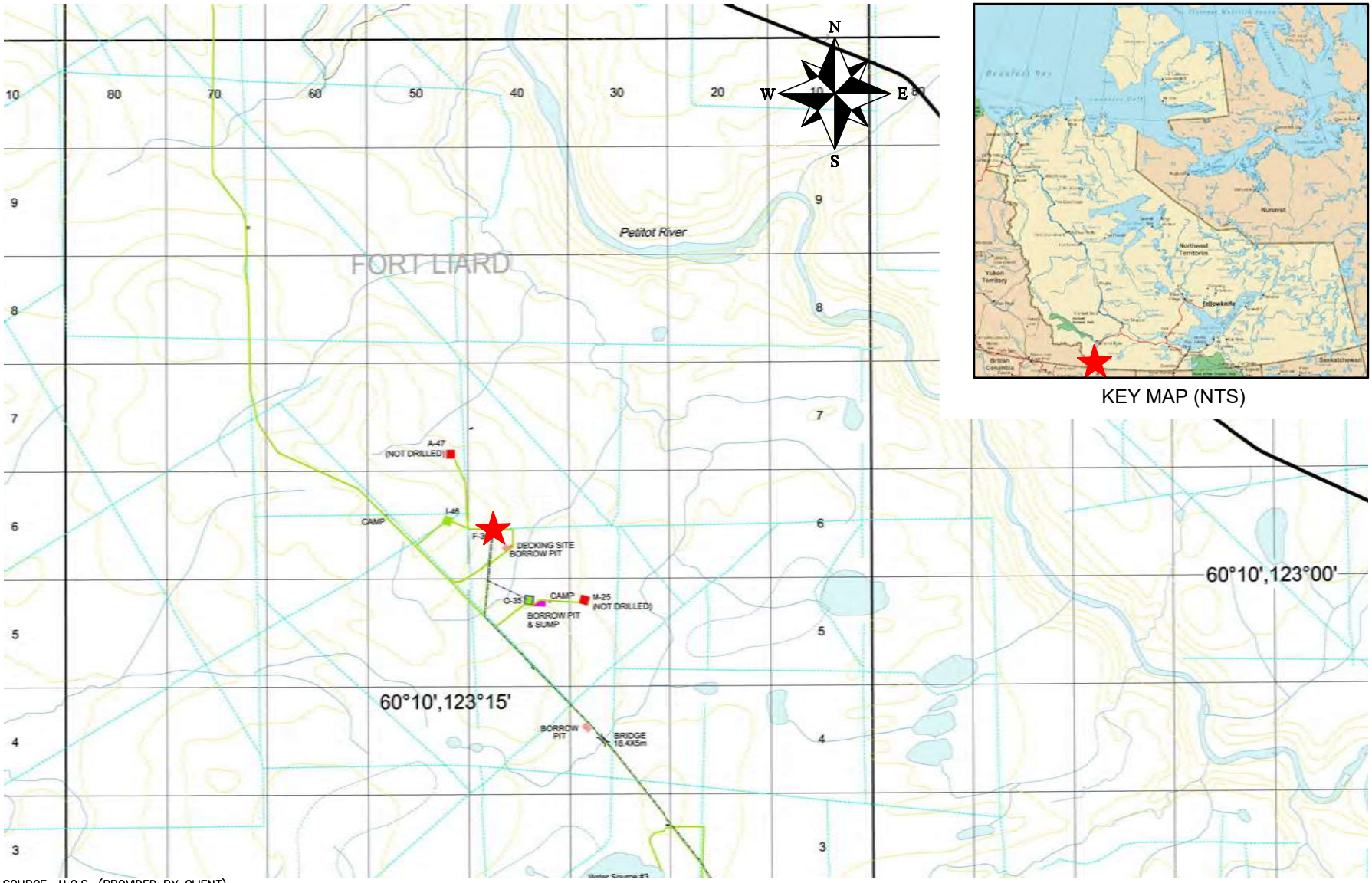
Borehole Logs, Tables and Drawings from North Shore Preliminary Stage 2 Report
(See Stage 2 report)

APPENDIX II

Historical Borehole Logs

- 200/B-43-K/94-O-14 Stage II Preliminary Site Investigation (North Shore. 2017b)
- 200/B-83-K/94-O-14 Stage II Preliminary Site Investigation (North Shore. 2017c)
- 200/A-69-J/94-O-14 Stage II Preliminary Site Investigation (North Shore. 2017d)

File: F-36_SLM.dwg Date: March-08-17 10:08:23 AM



KEY MAP (NTS)

SOURCE: U.G.S. (PROVIDED BY CLIENT)

SITE LOCATION MAP

0 1000 2000 4000m

Scale 1 : 100 000

NORTH SHORE
Environmental Consultants

Date: 08-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. F-36 (NORTHWEST TERRITORIES)	Figure: 1
File name: F-36_SLM-A.dwg	Requested by: DM		

File: F-36_17PH2.dwg Date: March-13-17 5:01:28 PM



SEPTEMBER 2001 SATELLITE AERIAL PHOTO SOURCE: DIGITALGLOBE (IKONOS)

LEGEND

WELL CENTRE

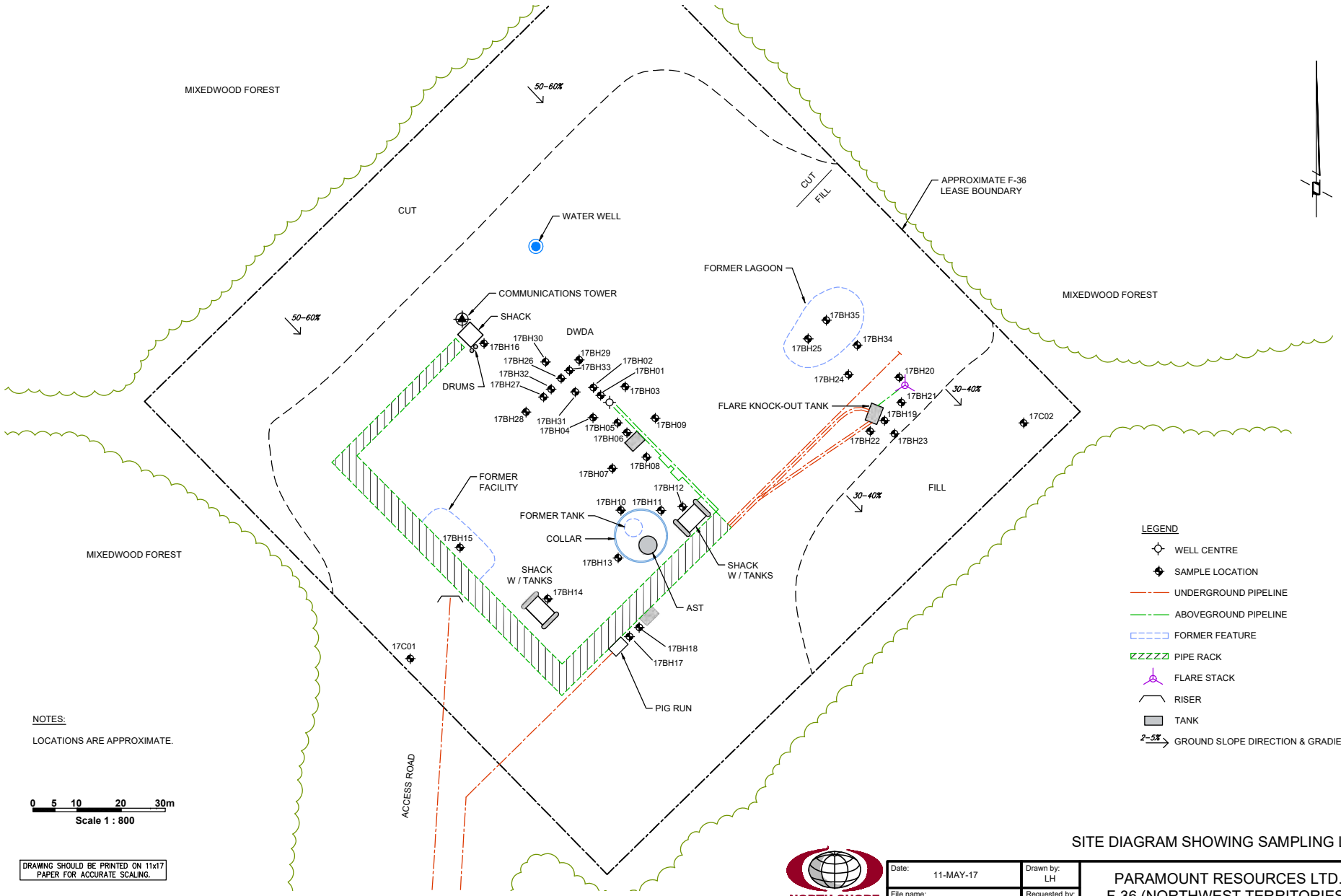
0 50 100 200m

Scale 1 : 5000

AERIAL OVERVIEW

NORTH SHORE Environmental Consultants

Date: 24-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. F-36 (NORTHWEST TERRITORIES)	Figure: 2
File name: F-36_17PH2P-A.dwg	Requested by: DM		



NOTES:

LOCATIONS ARE APPROXIMATE.

0 5 10 20 30m

Scale 1 : 800

DRAWING SHOULD BE PRINTED ON 11x17 PAPER FOR ACCURATE SCALING.

SITE DIAGRAM SHOWING SAMPLING LOCATION

NORTH SHORE Environmental Consultants

Date: 11-MAY-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. F-36 (NORTHWEST TERRITORIES)	Figure: 3
File name: F-36_17PH2-D.dwg	Requested by: DM		

Borehole Log: 17C01

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0		Sandy clay loam, dark brown (10YR 3/3), weak, fine, granular, moist, friable, disturbed	0.00 - 0.20	1	B	
			0.30 - 0.50	2	B	
		Clay loam, dark brown (10YR 3/3), moderate, fine, massive, moist, firm, 15-20% fine gravel <8mm, coal and sand inclusions	0.80 - 1.00	3	B	M, PS, SAL
			1.30 - 1.50	4	B	
			1.70 - 1.90	5	B	
2		Some moisture from 1.7-1.9m	2.20 - 2.50	6	B	
			2.80 - 3.00	7	B	
		Clay, dark gray (10YR 4/1), moderate, medium, massive, moist, very firm, 15-20% fine gravel <8mm, sand and coal inclusions	3.20 - 3.40	8,9	B	M, PS, SAL
4			4.30 - 4.50	10	B	
		Dup A @ 3.2-3.4m	4.70 - 4.90	11	B	
		Sandy loam, light gray (10YR 7/1), weak, fine, single-grained, wet, non-sticky, 15-20% fine gravel <8mm, groundwater table				
6		Sandy clay, dark gray (10YR 4/1), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, sand, coal, and iron inclusions	5.80 - 6.00	12	B	PS
			6.20 - 6.40	13	B	PS
			7.30 - 7.50	14	B	
8			7.70 - 7.90	15	B	
			8.80 - 9.00	16	B	M, SAL
		Silty clay loam, light gray (10YR 7/1), weak, fine, massive, moist, firm, 15-20% fine gravel <8mm, silt inclusions	9.20 - 9.40	17	B	
10			10.30 - 10.50	18	B	

End of Borehole at 10.50 m.

VOC Concentration (ppm): 50 100 150 200 250 300 350

LEL (%): 10 20 30 40 50 60 70 80 90

EC Value (dS/m): 1 2 3 4 5 6 7 8 9

Borehole Completion Details: Drill Cuttings

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661542 E: 479449

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 75m Southwest, 10m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

NORTH SHORE
Environmental Consultants

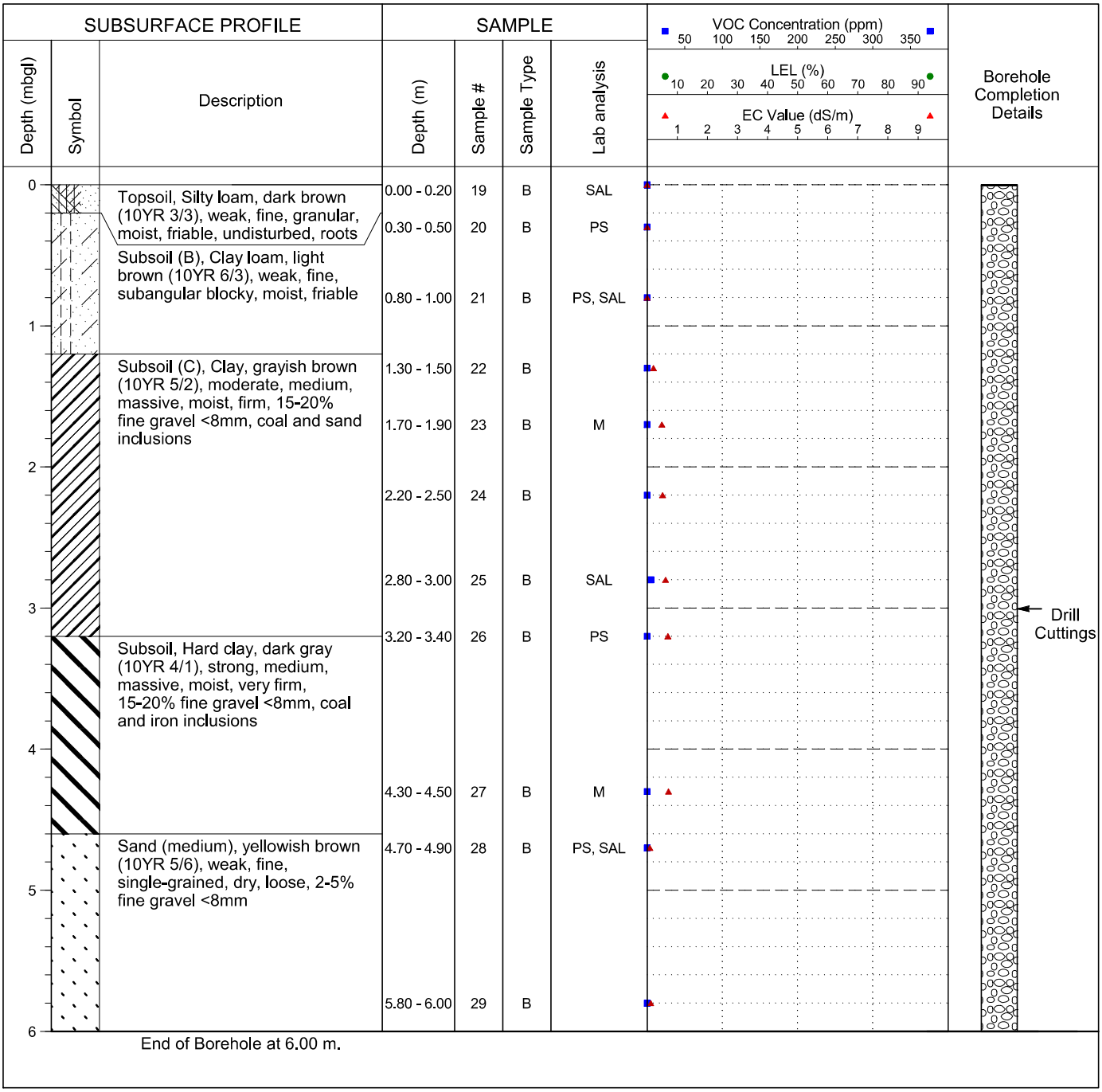
Borehole Log: 17C02

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Background Control



Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661579 E: 479592

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 65m Northeast, 70m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH01

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, iron inclusions	0.00 - 0.20	30	B			
			0.30 - 0.50	31	B			
			0.80 - 1.00	32	B+J	HC, M, SAL		
1			1.30 - 1.50	33	B			
		Dup B @ 1.7-1.9m	1.70 - 1.90	34,35	B+J	HC, M, SAL		
2			2.20 - 2.50	36	B			Drill Cuttings
			2.80 - 3.00	37	B			
3			3.20 - 3.40	38	B	HC		
4			4.30 - 4.50	39	B			
		End of Borehole at 4.50 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661592 E: 479502

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 3m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH02

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, coal, iron, and sand inclusions	0.00 - 0.20	40	B			
			0.30 - 0.50	41	B			
0.5								
			0.80 - 1.00	42	B+J	HC, M		
1.0								
			1.30 - 1.50	43	B			
1.5								Drill Cuttings
			1.70 - 1.90	44	B+J	HC		
2.0								
			2.20 - 2.50	45	B			
2.5								
			2.80 - 3.00	46	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661599 E: 479499

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 5m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

NORTH SHORE
Environmental Consultants

Borehole Log: 17BH03

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Well Centre Area

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, disturbed, coal, iron, and sand inclusions	0.00 - 0.20	47	B			
			0.30 - 0.50	48	B			
0.5								
			0.80 - 1.00	49	B+J	HC, M, PS		
1.0								
			1.30 - 1.50	50	B			
1.5								Drill Cuttings
			1.70 - 1.90	51	B+J	HC		
2.0								
			2.20 - 2.50	52	B			
2.5								
			2.80 - 3.00	53	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661596 E: 479505

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 5m Northeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH04

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, and sand inclusions	0.00 - 0.20	54	B			
			0.30 - 0.50	55	B			
0.5								
			0.80 - 1.00	56	B+J	HC, M		
1.0								
			1.30 - 1.50	57	B			
1.5								Drill Cuttings
			1.70 - 1.90	58	B+J	HC, PS		
2.0								
			2.20 - 2.50	59	B			
2.5								
			2.80 - 3.00	60	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661590 E: 479497

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 5m Southwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH05

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, coal, iron, and sand inclusions	0.00 - 0.20	61	B			
			0.30 - 0.50	62	B			
0.5								
			0.80 - 1.00	63	B+J	HC, M		
1.0								
			1.30 - 1.50	64	B			
1.5								Drill Cuttings
			1.70 - 1.90	65	B+J	HC		
2.0								
			2.20 - 2.50	66	B			
2.5								
			2.80 - 3.00	67	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661595 E: 479493

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 2m Southwest, 5m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH06

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, and sand inclusions	0.00 - 0.20	68	B	GLY, M, MTH		
			0.30 - 0.50	69	B			
0.5								
			0.80 - 1.00	70	B			
1.0								
			1.30 - 1.50	71	B			
1.5								Drill Cuttings
			1.70 - 1.90	72	B			
2.0								
			2.20 - 2.50	73	B			
2.5								
			2.80 - 3.00	74	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661584 E: 479510

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 3m Southwest, 8m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH07

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, and sand inclusions	0.00 - 0.20	75	B+J			
			0.30 - 0.50	76	B			
0.5								
			0.80 - 1.00	77	B			
1.0								
			1.30 - 1.50	78	B			
1.5								Drill Cuttings
			1.70 - 1.90	79	B			
2.0								
			2.20 - 2.50	80	B			
2.5								
			2.80 - 3.00	81	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661578 E: 479503

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 10m Southwest, 11m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH08

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, and sand inclusions	0.00 - 0.20	82	B+J			
			0.30 - 0.50	83	B			
0.5								
			0.80 - 1.00	84	B			
1.0								
			1.30 - 1.50	85	B			
1.5								Drill Cuttings
			1.70 - 1.90	86	B			
2.0								
			2.20 - 2.50	87	B			
2.5								
			2.80 - 3.00	88	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661574 E: 479512

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 3m Southwest, 15m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH09

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, and sand inclusions	0.00 - 0.20	89	B			
			0.30 - 0.50	90	B			
0.5								
			0.80 - 1.00	91	B			
1.0								
			1.30 - 1.50	92	B			
1.5								Drill Cuttings
			1.70 - 1.90	93	B			
2.0								
			2.20 - 2.50	94	B			
2.5								
			2.80 - 3.00	95	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661583 E: 479514

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 5m Northeast, 10m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH10

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed	0.00 - 0.20	96	B+J	M, MTH, SAL		
			0.30 - 0.50	97	B			
0.5								
			0.80 - 1.00	98	B+J	HC		
1.0								
			1.30 - 1.50	99	B			
1.5								Drill Cuttings
			1.70 - 1.90	100	B+J			
2.0								
		Dup C @ 2.2-2.5m	2.20 - 2.50	101,102	B			
2.5								
			2.80 - 3.00	103	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661598 E: 479503

Drill Date: 2/1/2017 (mm/dd/yy)

From Benchmark: 15m Southwest, 20m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH11

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, and sand inclusions	0.00 - 0.20	104	B+J	MTH		
			0.30 - 0.50	105	B+J	HC, M, SAL		
0.5								
			0.80 - 1.00	106	B			
1.0								
			1.30 - 1.50	107	B			
1.5								Drill Cuttings
			1.70 - 1.90	108	B+J			
2.0								
			2.20 - 2.50	109	B			
2.5		Sandy clay, dark gray (10YR 4/1), moderate, fine, massive, moist, friable, 10-15% fine gravel <8mm, 10-15% coarse gravel 8-64mm, coal inclusions						
			2.80 - 3.00	110	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661569 E: 479509

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 9m Southwest, 26m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH12

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Fill, brown 10YR 4/3 (SC), medium, massive, moist, firm, 10-15% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions	0.00 - 0.20	111	B+J	MTH		
			0.30 - 0.50	112	B			
0.5								
			0.80 - 1.00	113	B+J	HC		
1.0								
			1.30 - 1.50	114	B	M, SAL		
1.5								Drill Cuttings
			1.70 - 1.90	115	B			
2.0								
			2.20 - 2.50	116	B			
2.5								
			2.80 - 3.00	117	B+J			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661569 E: 479514

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 5m Southwest, 28m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH13

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions Dup D @ 0.0-0.2m	0.00 - 0.20	118,119	B+J	MTH		
			0.30 - 0.50	120	B			
0.5								
			0.80 - 1.00	121	B+J	HC		
1.0								
			1.30 - 1.50	122	B	M, SAL		
1.5								Drill Cuttings
			1.70 - 1.90	123	B			
2.0								
		Sandy clay, dark gray (10YR 4/1), weak, fine, massive, moist, friable, 10-15% fine gravel <8mm, coal inclusions	2.20 - 2.50	124	B			
2.5								
			2.80 - 3.00	125	B+J			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661558 E: 479501

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 24m Southwest, 26m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH14

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions	0.00 - 0.20	126	B+J	MTH		
			0.30 - 0.50	127	B			
0.5								
			0.80 - 1.00	128	B			
1.0								
			1.30 - 1.50	129	B+J	HC, M, SAL		
1.5		Sandy clay, dark gray (10YR 4/1), weak, fine, massive, moist, friable, 10-15% fine gravel <8mm, 10-15% coarse gravel 8-64mm, coal and sand inclusions						Drill Cuttings
			1.70 - 1.90	130	B			
2.0								
			2.20 - 2.50	131	B			
2.5								
			2.80 - 3.00	132	B+J			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661542 E: 479488

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 42m Southwest, 23m Sotuhb

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH15

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, sand and silt inclusions	0.00 - 0.20	133	B+J	MTH, PS		
			0.30 - 0.50	134	B+J	HC		
0.5								
			0.80 - 1.00	135	B	M, SAL		
1.0								
		Organic, black (10YR 2/1)	1.30 - 1.50	136	B			
1.5		Sandy clay, dark gray (10YR 4/1), weak, fine, massive, moist, friable, 10-15% fine gravel <8mm, coal and iron inclusions						Drill Cuttings
			1.70 - 1.90	137	B			
2.0								
			2.20 - 2.50	138	B+J			
2.5								
			2.80 - 3.00	139	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661556 E: 479467

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 48m Southwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH16

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron and sand inclusions	0.00 - 0.20	140	B+J	MTH		
0.5			0.30 - 0.50	141	B			
1.0			0.80 - 1.00	142	B+J	HC		
1.5		Sandy clay, dark gray (10YR 4/1), moderate, fine, massive, moist, friable, 10-15% fine gravel <8mm, 5-10% coarse gravel 8-64mm, coal and iron inclusions	1.30 - 1.50	143	B	M, SAL		Drill Cuttings
2.0			1.70 - 1.90	144	B			
2.5			2.20 - 2.50	145	B			
3.0		End of Borehole at 3.00 m.	2.80 - 3.00	146	B+J			

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661598 E: 479467

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 12m Southwest, 30m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH17

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions	0.00 - 0.20	147	B+J	MTH		
			0.30 - 0.50	148	B	M, SAL		
0.5								
			0.80 - 1.00	149	B+J	HC		
1.0								
			1.30 - 1.50	150	B			
1.5								Drill Cuttings
			1.70 - 1.90	151	B			
2.0								
			2.20 - 2.50	152	B+J	HC		
2.5		Sandy clay, dark gray (10YR 4/1), moderate, fine, massive, moist, friable, 5-10% fine gravel <8mm, 10-15% coarse gravel 8-64mm, coal and sand inclusions						
			2.80 - 3.00	153	B	M, SAL		
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661546 E: 479502

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 35m Southwest, 42m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH18

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, friable, 15-20% coarse gravel 8-64mm, coal, iron, and sand inclusions	0.00 - 0.20	154	B+J	GLY, MTH		
			0.30 - 0.50	155	B+J	HC, M		
0.5								
			0.80 - 1.00	156	B			
1.0								
			1.30 - 1.50	157	B			
1.5								Drill Cuttings
			1.70 - 1.90	158	B+J			
2.0								
			2.20 - 2.50	159	B			
2.5		Sandy clay, dark gray (10YR 4/1), moderate, medium, massive, moist, friable, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed, iron and sand inclusions						
			2.80 - 3.00	160	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661547 E: 479507

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 31m Southwest, 42m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH19

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, sand and silt inclusions	0.00 - 0.20	161	B			
			0.30 - 0.50	162	B+J	HC, PAH		
			0.80 - 1.00	163	B			
1			1.30 - 1.50	164	B	M, SAL		
		Fill, Sandy clay, gray (10YR 6/1), weak, fine, massive, wet, slightly sticky, gray and black discolouration	1.70 - 1.90	165	B+J	HC, M, PAH, SAL	590	
2			2.20 - 2.50	166	B			Drill Cuttings
			2.80 - 3.00	167	B			
3		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron and sand inclusions	3.20 - 3.40	168	B+J	HC, PAH		
4			4.30 - 4.50	169	B			

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661584 E: 479549

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 43m Northeast, 46m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH20

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 10-15% fine gravel <8mm, 10-15% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions	0.00 - 0.20	170	B			
			0.30 - 0.50	171	B			
0.5								
			0.80 - 1.00	172	B			
1.0								
			1.30 - 1.50	173	B+J	HC, M, PAH, SAL		
1.5								Drill Cuttings
			1.70 - 1.90	174	B			
2.0								
			2.20 - 2.50	175	B+J	HC, M, PAH, SAL		
2.5								
			2.80 - 3.00	176	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661590 E: 479552

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 53m Northeast, 42m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH21

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
			0.30 - 0.50	177	B+J	HC, M, SAL		
0.5								
			0.80 - 1.00					
1.0								
			1.30 - 1.50	178	B	PS		
1.5								Drill Cuttings
			1.70 - 1.90	179	B+J	HC, M, PAH, SAL		
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661587 E: 479555

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 48m Northeast, 47m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH22

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
			0.30 - 0.50	180	B+J	HC, M, SAL		
0.5			0.80 - 1.00					
1.0			1.30 - 1.50	181	B			
1.5			1.70 - 1.90	182	B+J	HC, M, PAH, SAL		Drill Cuttings
2.0			2.20 - 2.50					
2.5			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661575 E: 479551

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 38m Northeast, 47m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH23

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions	0.00 - 0.20					
			0.30 - 0.50	183	B+J	HC, M, SAL		
0.5		*VOC field screening values not obtained at all sampling depths due to delineation sampling						
			0.80 - 1.00					
1.0								
			1.30 - 1.50	184	B			
1.5								Drill Cuttings
		Large chunks of coal or burnt wood from 1.7-3.0m	1.70 - 1.90	185	B+J	HC, M, PAH, SAL		
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661582 E: 479556

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 43m Northeast, 47m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH24

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, 2-5% cobbles 64-256mm, disturbed, coal, sand and silt inclusions, large rock @ 0.5m *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
0.5			0.30 - 0.50	186	B+J	HC, M, SAL		
1.0			0.80 - 1.00					
1.5			1.30 - 1.50	187	B			Drill Cuttings
2.0			1.70 - 1.90	188	B+J	HC, M, PAH, SAL		
2.5			2.20 - 2.50					
3.0		End of Borehole at 3.00 m.	2.80 - 3.00					

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661594 E: 479540

Drill Date: 2/2/2017 (mm/dd/yy)

From Benchmark: 44m Northeast, 34m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH25

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Lagoon Area

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt sand inclusions	0.00 - 0.20	189	B	
			0.30 - 0.50	190	B	
0.5						
			0.80 - 1.00	191	B+J	HC
1.0						
		Dup E @ 1.3-1.5m	1.30 - 1.50	192,193	B	M, SAL
1.5						
			1.70 - 1.90	194	B	
2.0						
			2.20 - 2.50	195	B	
2.5		Subsoil, Clay, dark gray (10YR 4/1), moderate, fine, massive, moist, friable, 5-10% fine gravel <8mm, coal inclusions				
			2.80 - 3.00	196	B+J	HC, M, SAL
3.0		End of Borehole at 3.00 m.				

SUBSURFACE PROFILE

SAMPLE

VOC Concentration (ppm): 50 100 150 200 250 300 350

LEL (%): 10 20 30 40 50 60 70 80 90

EC Value (dS/m): 1 2 3 4 5 6 7 8 9

Borehole Completion Details

Drill Cuttings

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661603 E: 479540

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 44m Northeast, 21m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH26

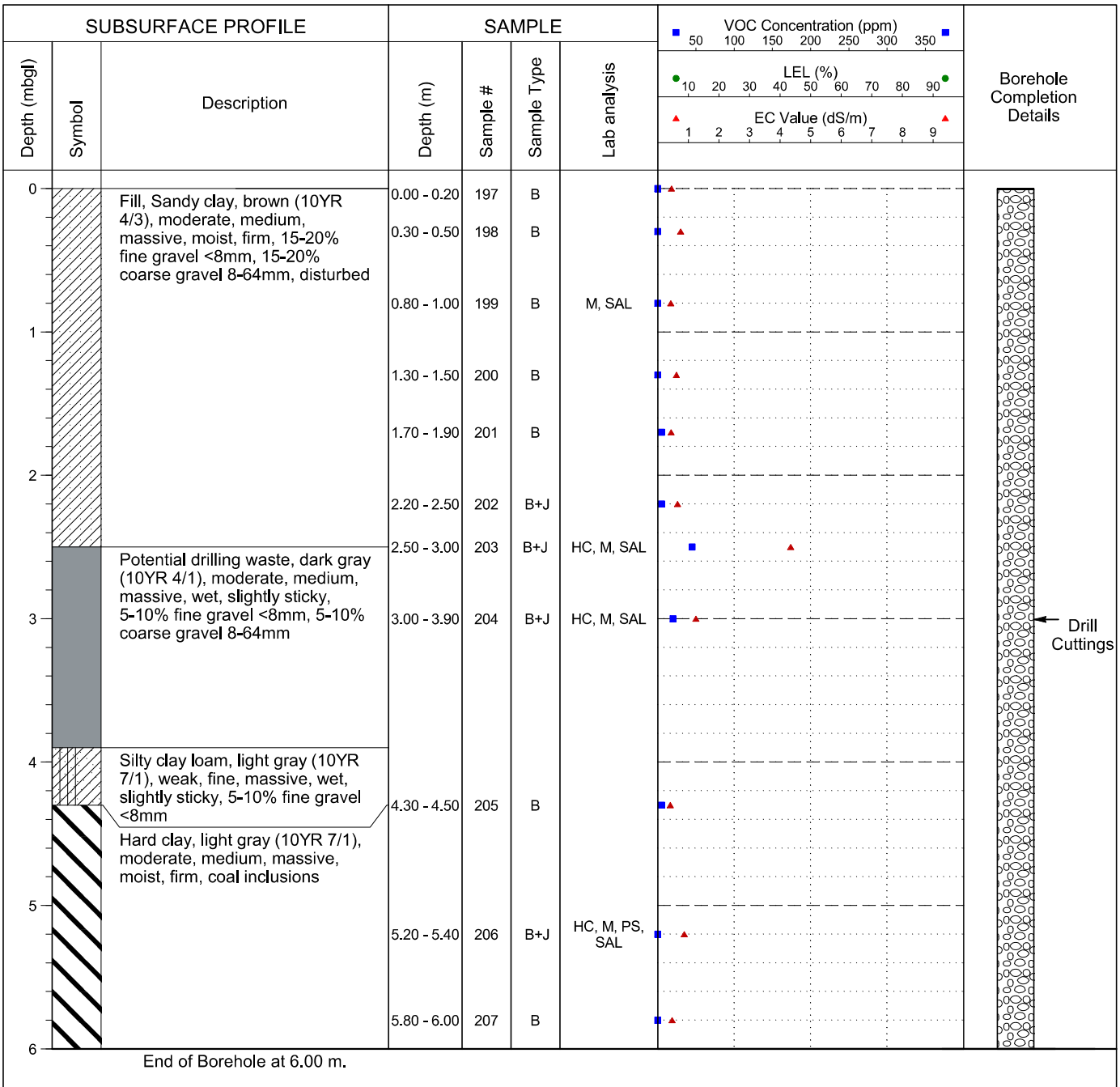
Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Drilling Waste Disposal Area

NORTH SHORE Environmental Consultants



Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661594 E: 479489

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 4m Southwest, 13m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH27

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Drilling Waste Disposal Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	
0		Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions	0.00 - 0.20	208	B			
			0.30 - 0.50	209	B			
			0.80 - 1.00	210	B			
1			1.30 - 1.50	211	B			
			1.70 - 1.90	212	B			
2			2.20 - 2.50	213	B			Drill Cuttings
		Potential drilling waste, dark gray (10YR 4/1), moderate, medium, single-grained, wet, slightly sticky, 20-30% fine gravel <8mm, gray and black discolouration	2.50 - 3.00	214	B+J	HC, M, SAL		
3			3.00 - 3.90	215	B+J	HC, M, SAL		
4		Hard clay, gray (10YR 6/1), strong, medium, massive, moist, very firm, coal and silt inclusions	4.30 - 4.50	216	B			

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661593 E: 479487

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 10m Southwest, 13m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH28

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Drilling Waste Disposal Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, disturbed	0.00 - 0.20					
			0.30 - 0.50					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1			1.30 - 1.50					
			1.70 - 1.90					
2			2.20 - 2.50					Drill Cuttings
			2.80 - 3.00	217	B+J	HC, M, SAL		
3		Sandy clay loam, grayish brown (10YR 5/2), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, coal and iron inclusions	3.20 - 3.40	218	B+J			
4								

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661593 E: 479481

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 15m Southwest, 13m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH29

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Drilling Waste Disposal Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, disturbed, coal, iron, sand and silt inclusions	0.00 - 0.20					
			0.30 - 0.50					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1			1.30 - 1.50					
			1.70 - 1.90					
2			2.20 - 2.50					Drill Cuttings
			2.80 - 3.00	219	B+J			
3			3.20 - 3.40	220	B+J	HC, M, SAL		
		Sandy loam, light gray (10YR 7/1), weak, fine, single-grained, groundwater table						
		Hard clay, light gray (10YR 7/1)						
4			4.30 - 4.50					

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661595 E: 479493

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 3m Northeast, 13m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH30

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Drilling Waste Disposal Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	
0		Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, disturbed	0.00 - 0.20					
			0.30 - 0.50					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1			1.30 - 1.50					
			1.70 - 1.90					
2			2.20 - 2.50					Drill Cuttings
			2.80 - 3.00	221	B+J	HC, M, SAL		
3		Sandy loam, light gray (10YR 7/1), weak, fine, single-grained, wet, slightly sticky, 15-20% fine gravel <8mm, groundwater table	3.20 - 3.40	222	B+J			
4		Sandy clay, dark gray (10YR 4/1)						

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661601 E: 479487

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 4m Southwest, 18m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH31

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Drilling Waste Disposal Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0		Hard clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, coal, iron and sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
			0.30 - 0.50					
			0.80 - 1.00					
1			1.30 - 1.50					
			1.70 - 1.90					
2			2.20 - 2.50					Drill Cuttings
			2.80 - 3.00	223	B+J			
3			3.20 - 3.40	224	B+J	HC, M, SAL		
		Sandy clay loam, gray (10YR 6/1), moderate, fine, single-grained, wet, slightly sticky, 20-30% fine gravel <8mm, 15-20% coarse gravel 8-64mm, groundwater table @ 3.4m						
4			4.30 - 4.50					

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661593 E: 479491

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 4m Southwest, 8m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH32

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Drilling Waste Disposal Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0		Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm	0.00 - 0.20	225	B			
			0.30 - 0.50	226	B			
			0.80 - 1.00	227	B			
1			1.30 - 1.50	228	B			
			1.70 - 1.90	229	B			
2			2.20 - 2.50	230	B			Drill Cuttings
		Potential drilling waste, light gray (10YR 7/1), weak, fine, massive, wet, slightly sticky, 1-2% fine gravel <8mm, gray and black discolouration	2.50 - 3.00	231	B+J	HC, M, SAL		
3			3.00 - 3.90	232	B+J	HC, M, SAL		
4		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 15-20% fine gravel <8mm, 10-15% coarse gravel 8-64mm, coal, iron and silt inclusions	4.30 - 4.50	233	B			
		End of Borehole at 4.50 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661594 E: 479487

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 8m Southwest, 13m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH33

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Drilling Waste Disposal Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	
0		Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, coal, iron and sand inclusions	0.00 - 0.20	234	B			
			0.30 - 0.50	235	B			
			0.80 - 1.00	236	B			
1			1.30 - 1.50	237	B			
			1.70 - 1.90	238	B+J			
2		Potential drilling waste, light gray (10YR 7/1), moderate, fine, massive, wet, slightly sticky, 1-2% fine gravel <8mm, gray and black discolouration	2.20 - 3.00	239	B+J	HC, M, SAL		Drill Cuttings
3		Dup F @ 3.0-3.2m	3.00 - 3.20	240,241	B+J	HC, M, SAL		
		Hard clay, dark gray (10YR 4/1), moderate, medium, massive, moist, very firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, coal and iron inclusions						
4			4.30 - 4.50	242	B+J			

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661596 E: 479492

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 2m Southwest, 13m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH34

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Potential Flare Pit Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron, sand and silt inclusions	0.00 - 0.20					
0.5		*Exploratory borehole; no samples obtained	0.30 - 0.50					
1.0		*VOC field screening values not obtained due to exploratory sampling	0.80 - 1.00					
1.5			1.30 - 1.50					Drill Cuttings
2.0			1.70 - 1.90					
2.5			2.20 - 2.50					
3.0		End of Borehole at 3.00 m.	2.80 - 3.00					

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661606 E: 479553

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 50m Northeast, 30m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH35

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: F-36

Area of Concern: Potential Flare Pit Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Fill, Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm,	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained due to exploratory sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6661604 E: 479540

Drill Date: 2/3/2017 (mm/dd/yy)

From Benchmark: 49m Northeast, 21m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Paramount Resources Ltd.
Table 1. Soil - BTEX, Petroleum Hydrocarbons (F1-F4) and Grain Size
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	BTEX and PHC (F1-F4)										
			Benzene	Toluene	Ethylbenzene	Total Xylenes	Fraction 1[2]	Fraction 2	Fraction 3	Fraction 4[3]	Chrom. returned to baseline	% Moisture	Grain Size 75 µm Sieve
CCME Surface Soil Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**150**	**1300**	**5600**	**NC**	**NC**	**NC**
CCME Subsurface Soils Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**230**	**3500**	**10000**	**NC**	**NC**	**NC**
BACKGROUND CONTROLS													
17C01	0.8-1.0	01-Feb-17											Fine (31.7)
17C01	3.2-3.4	01-Feb-17											Fine (39.9)
17C01	5.8-6.0	01-Feb-17											Fine (44.5)
17C01	6.2-6.4	01-Feb-17											Coarse (56.1)
17C02	0.3-0.5	01-Feb-17											Fine (35.2)
17C02	0.8-1.0	01-Feb-17											Coarse (58.9)
17C02	3.2-3.4	01-Feb-17											Fine (28)
17C02	4.7-4.9	01-Feb-17											Coarse (76.8)
WELL CENTRE AREA													
17BH01	0.8-1.0	01-Feb-17	<0.005	<0.05	<0.01	<0.05	60	**5460**	**22600**	1280	Yes	13	
17BH01	1.7-1.9	01-Feb-17	**0.027**	<0.05	**0.26**	0.90	20	**864**	**3160**	198	Yes	12	
Dup B	1.7-1.9	01-Feb-17	**0.028**	<0.05	**0.36**	1.21	20	**1420**	**4970**	294	Yes	13	
17BH01	3.2-3.4	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	76	27	Yes	14	
17BH02	0.8-1.0	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	**351**	1240	50	Yes	14	
17BH02	1.7-1.9	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	17	110	11	Yes	10	
17BH03	0.8-1.0	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	19	<10	Yes	13	Fine (42.3)
17BH03	1.7-1.9	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	14	<10	Yes	12	
17BH04	0.8-1.0	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	12	<10	Yes	12	
17BH04	1.7-1.9	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	14	<10	Yes	14	Coarse (66.4)
17BH05	0.8-1.0	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	19	<10	Yes	12	
17BH05	1.7-1.9	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	12	
PRODUCTION FACILITIES AREA													
17BH10	0.8-1.0	01-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	17	12	Yes	12	
17BH11	0.3-0.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	17	<10	Yes	11	
17BH12	0.8-1.0	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	11	<10	Yes	11	
17BH13	0.8-1.0	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	18	<10	Yes	12	
17BH14	1.3-1.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	13	<10	Yes	11	
17BH15	0.0-0.2	02-Feb-17											Fine (41.9)
17BH15	0.3-0.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	62	27	Yes	15	
17BH16	0.8-1.0	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	63	31	Yes	11	
17BH17	0.8-1.0	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	15	10	Yes	12	
17BH17	2.2-2.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	15	<10	Yes	17	
17BH18	0.3-0.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	21	12	Yes	13	

Paramount Resources Ltd.
Table 1. Soil - BTEX, Petroleum Hydrocarbons (F1-F4) and Grain Size
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	BTEX and PHC (F1-F4)										
			Benzene	Toluene	Ethylbenzene	Total Xylenes	Fraction 1[2]	Fraction 2	Fraction 3	Fraction 4[3]	Chrom. returned to baseline	% Moisture	Grain Size 75 µm Sieve
CCME Surface Soil Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**150**	**1300**	**5600**	**NC**	**NC**	**NC**
CCME Subsurface Soils Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**230**	**3500**	**10000**	**NC**	**NC**	**NC**
FLARE AREA													
17BH19	0.3-0.5	02-Feb-17	**0.007**	<0.05	<0.01	<0.05	<10	<10	46	18	Yes	13	
17BH19	1.7-1.9	02-Feb-17	**0.372**	**0.12**	**2.52**	1.59	140	**335**	36	<10	Yes	15	
17BH19	3.2-3.4	02-Feb-17	**0.023**	<0.05	**0.17**	0.55	<10	<10	<10	<10	Yes	14	
17BH20	1.3-1.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	46	20	Yes	14	
17BH20	2.2-2.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	15	<10	Yes	15	
17BH21	0.3-0.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	18	<10	Yes	13	
17BH21	1.3-1.5	02-Feb-17											Fine (35.2)
17BH21	1.7-1.9	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	39	11	Yes	14	
17BH22	0.3-0.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	11	<10	Yes	12	
17BH22	1.7-1.9	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	16	
17BH23	0.3-0.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	26	16	Yes	12	
17BH23	1.7-1.9	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	16	10	Yes	11	
17BH24	0.3-0.5	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	41	15	Yes	12	
17BH24	1.7-1.9	02-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	25	12	Yes	14	
LAGOON AREA													
17BH25	0.8-1.0	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	42	13	Yes	13	
17BH25	2.8-3.0	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	34	12	Yes	17	
DRILLING WASTE DISPOSAL AREA													
17BH26	2.5-3.0	03-Feb-17	**0.014**	<0.05	**0.02**	<0.05	<10	<10	29	11	Yes	38	
17BH26	3.0-3.9	03-Feb-17	**0.025**	0.08	**0.06**	0.11	20	19	82	35	Yes	20	
17BH26	5.2-5.4	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	70	29	Yes	13	Fine (23.6)
17BH27	2.5-3.0	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	52	20	Yes	13	
17BH27	3.0-3.9	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	49	20	Yes	13	
17BH28	2.8-3.0	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	39	14	Yes	12	
17BH29	3.2-3.4	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	33	12	Yes	17	
17BH30	2.8-3.0	03-Feb-17	<0.005	<0.05	0.01	<0.05	<10	<10	44	16	Yes	12	Fine (43.6)
17BH31	3.2-3.4	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	32	13	Yes	11	
17BH32	2.5-3.0	03-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	10	76	29	Yes	13	
17BH32	3.0-3.9	03-Feb-17	**0.018**	0.07	**0.04**	0.08	<10	<10	64	24	Yes	15	
17BH33	2.2-3.0	03-Feb-17	**0.255**	**0.61**	**0.34**	1.06	30	34	130	68	Yes	18	
17BH33	3.0-3.2	03-Feb-17	**0.086**	**0.22**	**0.14**	0.37	10	12	75	31	Yes	12	
Dup F	3.0-3.2	03-Feb-17	**0.036**	**0.09**	**0.05**	0.15	<10	18	84	33	Yes	14	

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Fraction 1 petroleum hydrocarbons (C6-C10) minus benzene, toluene, ethylbenzene and xylene concentrations

[3] - Fraction 4 petroleum hydrocarbons (C34-C50 or >C34) as determined by high temperature gas chromatography

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 2. Soil - Regulated Metals
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Antimony (Sb)	Arsenic (As)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Fusion Barium (Ba) - True Total	Beryllium (Be)	Boron (B) Sat Paste (mg/L)	Cadmium (Cd)	Chromium (Cr) - Total	Hexavalent Chromium (Cr+6)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
CCME Guidelines[1] (mg/kg)			**20**	**12**	**500**	**NC**	**NC**	**4**	**nc**	**10**	**64**	**0.4**	**50**	**63**	**140**	**6.6**	**10**	**45**	**1**	**20**	**1**	**50**	**23**	**130**	**200**
AEP Tier 1 2016 Guidelines[2] (mg/kg)						**250**	**10000**																		
BACKGROUND CONTROLS																									
17C01	0.8-1.0	01-Feb-17	<0.5	9.7	188			0.6	<0.5	<0.5	17.7	<0.3	7.9	14.7	9.6	<0.5	1.7	19.1	<0.5	<0.5	<0.5	0.7	1.0	27.5	58
17C01	3.2-3.4	01-Feb-17	0.6	10.4	222			0.6	<0.5	0.5	16.6	<0.3	8.1	20.3	9.9	<0.5	2.9	22.1	**1.3**	<0.5	<0.5	0.6	2.2	26.1	72
Dup A	3.2-3.4	01-Feb-17	0.6	10.3	189			0.5	<0.5	<0.5	16.9	<0.3	7.0	14.5	9.3	<0.5	2.8	18.7	0.8	<0.5	<0.5	0.6	1.3	26.4	62
17C01	8.8-9.0	01-Feb-17	1.2	8.9	496			0.8	<0.5	0.6	21.5	<0.3	11.4	22.9	12.9	<0.5	2.1	35.3	**1.2**	<0.5	<0.5	0.7	1.4	32.1	95
17C02	1.7-1.9	01-Feb-17	0.6	9.3	230			0.6	<0.5	<0.5	16.0	<0.3	8.6	17.7	10.6	<0.5	2.0	22.2	<0.5	<0.5	<0.5	<0.5	1.4	30.2	105
17C02	4.3-4.5	01-Feb-17	0.7	7.9	221			0.6	<0.5	<0.5	19.5	<0.3	8.0	18.5	10.1	<0.5	1.9	22.2	0.9	<0.5	<0.5	0.6	1.5	27.5	74
WELL CENTRE AREA																									
17BH01	0.8-1.0	01-Feb-17	0.5	9.9	190			0.7	<0.5	<0.5	**145**	<0.3	7.9	17.9	10.7	<0.5	2.0	24.1	<0.5	<0.5	<0.5	0.6	1.3	29.7	63
17BH01	1.7-1.9	01-Feb-17	0.5	10.0	228			0.6	<0.5	<0.5	18.4	<0.3	7.8	14.7	9.9	<0.5	2.5	20.1	0.5	<0.5	<0.5	0.5	1.2	25.8	61
Dup B	1.7-1.9	01-Feb-17	0.6	10.4	304			0.7	<0.5	<0.5	18.6	<0.3	8.3	16.2	10.7	<0.5	2.7	21.7	<0.5	<0.5	<0.5	<0.5	1.2	30.0	69
17BH02	0.8-1.0	01-Feb-17									26.4														
17BH03	0.8-1.0	01-Feb-17									20.8														
17BH04	0.8-1.0	01-Feb-17									21.5														
17BH05	0.8-1.0	01-Feb-17									18.9														
PRODUCTION FACILITIES AREA																									
17BH06	0.0-0.2	01-Feb-17	0.6	9.8	256			0.6	<0.5	<0.5	17.7	<0.3	8.3	17.8	10.6	<0.5	2.2	22.8	0.7	<0.5	<0.5	<0.5	1.2	27.2	72
17BH10	0.0-0.2	01-Feb-17	0.6	10.5	249			0.6	<0.5	<0.5	17.6	<0.3	9.2	17.2	10.7	<0.5	2.4	22.9	0.9	<0.5	<0.5	<0.5	1.6	30.0	74
Dup C	2.2-2.5	01-Feb-17	0.5	10.1	194			0.8	<0.5	<0.5	20.8	<0.3	9.0	14.4	11.1	<0.5	1.7	21.4	0.7	<0.5	<0.5	0.5	1.1	35.3	64
17BH11	0.3-0.5	02-Feb-17	0.5	9.0	239			0.8	<0.5	<0.5	15.6	<0.3	7.1	12.9	9.4	<0.5	2.3	18.8	<0.5	<0.5	<0.5	<0.5	1.2	25.5	66
17BH12	1.3-1.5	02-Feb-17	0.5	8.8	225			0.6	<0.5	<0.5	17.1	<0.3	8.0	16.3	9.6	<0.5	2.3	21.3	0.8	<0.5	<0.5	<0.5	1.4	26.7	70
17BH13	1.3-1.5	02-Feb-17	0.6	10.9	214			0.6	<0.5	<0.5	17.1	<0.3	8.3	16.7	10.5	<0.5	2.3	21.8	0.6	<0.5	<0.5	0.5	1.4	29.9	71
17BH14	1.3-1.5	02-Feb-17	0.6	10.4	234			0.6	<0.5	<0.5	17.5	<0.3	8.3	17.2	12.0	<0.5	2.0	22.0	0.6	<0.5	<0.5	<0.5	1.1	29.9	72
17BH15	0.8-1.0	02-Feb-17	0.6	9.6	240			0.7	<0.5	<0.5	18.6	<0.3	8.7	16.5	11.7	<0.5	1.9	22.3	<0.5	<0.5	<0.5	<0.5	1.2	31.4	77
17BH16	1.3-1.5	02-Feb-17	<0.5	8.0	282			<0.5	<0.5	<0.5	12.4	<0.3	5.9	12.1	7.6	<0.5	1.8	16.0	0.8	<0.5	<0.5	<0.5	1.2	18.7	56
17BH17	0.3-0.5	02-Feb-17	0.6	11.6	223			0.6	<0.5	<0.5	17.3	<0.3	8.3	16.3	10.8	<0.5	2.5	22.3	0.6	<0.5	<0.5	<0.5	1.4	30.5	71
17BH17	2.8-3.0	02-Feb-17	0.6	10.3	148			0.8	<0.5	<0.5	20.4	<0.3	8.0	14.7	10.7	<0.5	1.7	19.9	0.6	<0.5	<0.5	0.5	1.1	31.5	61
17BH18	0.3-0.5	02-Feb-17	0.6	10.9	246			<0.5	<0.5	0.5	20.7	<0.3	8.2	19.6	9.7	<0.5	2.4	25.5	**1.2**	<0.5	<0.5	0.6	1.3	34.4	86

Paramount Resources Ltd.
Table 2. Soil - Regulated Metals
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Antimony (Sb)	Arsenic (As)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Fusion Barium (Ba) - True Total	Beryllium (Be)	Boron (B) Sat Paste (mg/L)	Cadmium (Cd)	Chromium (Cr) - Total	Hexavalent Chromium (Cr+6)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
CCME Guidelines[1] (mg/kg)			**20**	**12**	**500**	**NC**	**NC**	**4**	**nc**	**10**	**64**	**0.4**	**50**	**63**	**140**	**6.6**	**10**	**45**	**1**	**20**	**1**	**50**	**23**	**130**	**200**
FLARE AREA																									
17BH19	1.3-1.5	02-Feb-17	0.6	8.9	268			0.7	<0.5	<0.5	18.6	<0.3	8.7	17.0	11.2	<0.5	2.1	22.5	0.8	<0.5	<0.5	0.5	1.5	33.5	73
17BH19	1.7-1.9	02-Feb-17	0.6	11.0	297			<0.5	<0.5	<0.5	21.3	<0.3	9.2	20.0	10.4	<0.5	2.4	25.2	0.9	<0.5	<0.5	0.6	1.2	34.9	88
17BH20	1.3-1.5	02-Feb-17	<0.5	8.2	196			0.7	<0.5	<0.5	14.9	<0.3	7.8	17.4	10.6	<0.5	2.5	20.8	1.0	<0.5	<0.5	<0.5	1.7	23.4	69
17BH20	2.2-2.5	02-Feb-17	0.5	9.7	233			0.6	<0.5	<0.5	16.4	<0.3	7.9	17.2	10.3	<0.5	2.3	22.3	0.7	<0.5	<0.5	<0.5	1.3	26.7	72
17BH21	0.3-0.5	02-Feb-17	0.6	9.3	210			0.6	<0.5	<0.5	16.3	<0.3	7.6	15.0	10.5	<0.5	2.2	19.8	0.5	<0.5	<0.5	0.5	1.2	24.8	64
17BH21	1.7-1.9	02-Feb-17	<0.5	8.2	226			0.6	<0.5	<0.5	16.6	<0.3	7.7	15.7	9.6	<0.5	2.2	20.3	0.7	<0.5	<0.5	<0.5	1.2	24.9	63
17BH22	0.3-0.5	02-Feb-17	<0.5	8.4	183			0.6	<0.5	<0.5	15.7	<0.3	6.9	14.6	10.7	<0.5	2.2	18.5	0.6	<0.5	<0.5	<0.5	1.5	26.7	65
17BH22	1.7-1.9	02-Feb-17	0.6	9.7	208			0.7	<0.5	<0.5	63.3	<0.3	9.0	18.3	13.0	<0.5	2.2	24.6	0.6	<0.5	<0.5	<0.5	1.3	27.0	72
17BH23	0.3-0.5	02-Feb-17	<0.5	9.0	198			0.5	<0.5	<0.5	14.6	<0.3	7.8	14.7	8.9	<0.5	2.2	19.6	0.6	<0.5	<0.5	<0.5	1.1	24.3	64
17BH23	1.7-1.9	02-Feb-17	0.5	9.2	222			0.7	<0.5	<0.5	17.0	<0.3	8.1	15.7	10.3	<0.5	2.2	20.6	0.7	<0.5	<0.5	<0.5	1.2	27.3	69
17BH24	0.3-0.5	02-Feb-17	0.5	9.1	272			0.6	<0.5	<0.5	18.3	<0.3	7.5	16.7	10.0	<0.5	2.3	20.8	0.6	<0.5	<0.5	<0.5	1.3	24.8	67
17BH24	1.7-1.9	02-Feb-17	0.6	9.8	248			0.7	<0.5	<0.5	16.9	<0.3	8.4	16.8	11.2	<0.5	2.3	22.2	0.7	<0.5	<0.5	<0.5	1.3	26.4	74
LAGOON AREA																									
17BH25	1.3-1.5	03-Feb-17	0.6	9.0	198			0.6	<0.5	<0.5	15.1	<0.3	7.4	12.8	10.2	<0.5	2.0	18.6	0.6	<0.5	<0.5	0.6	1.3	27.6	69
Dup E	1.3-1.5	03-Feb-17	0.5	8.9	177			0.5	<0.5	<0.5	14.4	<0.3	6.2	12.9	8.4	<0.5	1.8	16.5	0.6	<0.5	<0.5	<0.5	1.3	23.6	58
17BH25	2.8-3.0	03-Feb-17	0.6	11.2	216			<0.5	<0.5	<0.5	24.2	<0.3	8.8	15.6	11.5	<0.5	1.8	22.9	0.7	<0.5	<0.5	0.6	1.0	38.1	80
DRILLING WASTE DISPOSAL AREA																									
17BH26	0.8-1.0	03-Feb-17		11.1																					
17BH26	2.5-3.0	03-Feb-17	1.5	**17.4**	210			0.6	<0.5	<0.5	20.4	<0.3	4.6	13.0	108	<0.5	1.8	11.7	0.7	<0.5	<0.5	3.5	1.4	22.9	116
17BH26 Re-run	2.5-3.0	03-Feb-17		**20.1**																					
17BH26	3.0-3.9	03-Feb-17	0.6	12.0	**1610**	37	5420	0.6	0.8	<0.5	17.0	<0.3	8.8	21.2	11.6	<0.5	3.4	25.4	0.8	<0.5	<0.5	0.7	1.1	25.2	82
17BH26	5.2-5.4	03-Feb-17		11.1																					
17BH27	2.5-3.0	03-Feb-17	0.5	9.8	259			0.5	<0.5	<0.5	15.4	<0.3	7.6	14.5	9.2	<0.5	2.1	20.7	0.8	<0.5	<0.5	<0.5	1.6	25.5	62
17BH27	3.0-3.9	03-Feb-17	<0.5	8.1	139			<0.5	<0.5	<0.5	12.0	<0.3	6.0	11.0	7.3	<0.5	1.9	16.0	0.8	<0.5	<0.5	<0.5	1.2	20.2	74
17BH28	2.8-3.0	03-Feb-17		11.5																					
17BH29	3.2-3.4	03-Feb-17		7.8																					
17BH30	2.8-3.0	03-Feb-17		9.8																					
17BH31	3.2-3.4	03-Feb-17		**14.4**																					
17BH32	2.5-3.0	03-Feb-17	0.5	9.8	264			0.6	<0.5	<0.5	14.1	<0.3	7.9	17.0	9.6	<0.5	2.3	20.7	0.8	<0.5	<0.5	<0.5	1.6	25.8	71
17BH32	3.0-3.9	03-Feb-17	<0.5	8.8	230			<0.5	<0.5	<0.5	16.8	<0.3	6.6	12.8	12.5	<0.5	1.8	17.8	0.7	<0.5	<0.5	<0.5	1.8	22.5	58
17BH33	2.2-3.0	03-Feb-17	<0.5	8.7	245			0.5	<0.5	<0.5	15.4	<0.3	7.7	15.1	12.3	<0.5	1.6	18.9	0.6	<0.5	<0.5	<0.5	1.2	26.7	62
17BH33	3.0-3.2	03-Feb-17	0.7	10.0	224			0.6	<0.5	0.5	15.8	<0.3	8.2	16.1	10.5	<0.5	3.0	22.4	0.9	<0.5	<0.5	0.6	1.5	25.7	71
Dup F	3.0-3.2	03-Feb-17	0.6	9.7	244			0.6	<0.5	0.6	17.3	<0.3	8.3	16.6	12.3	<0.5	3.5	22.6	1.0	<0.5	<0.5	0.5	1.6	27.2	81

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Alberta Environment and Parks (AEP). 2016. Alberta Tier 1 Soil and Groundwater Remediation Guidelines

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Bold - When the value is rounded to the appropriate number of significant digits, the value meets the applicable guideline

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 3. Soil - Detailed Salinity
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Lab pH (6.0-8.5)[1]	Lab EC (dS/m)	SAR	Saturation %	Soluble Ions						Guideline
							Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO4) mg/kg	
CCME Guidelines[1]					<5								1
EGCSR Guidelines[2]			6-8	<2	<5								2
BACKGROUND CONTROLS													
17C01	0.8-1.0	01-Feb-17	**5.90**	0.18	0.32	45	3	9	2	<2	2	8	1,2
17C01	3.2-3.4	01-Feb-17	7.85	0.84	0.36	50	8	58	11	12	7	132	1,2
Dup A	3.2-3.4	01-Feb-17	7.53	0.66	0.28	48	5	43	8	9	6	87	1,2
17C01	8.8-9.0	01-Feb-17	7.95	0.62	2.79	58	41	21	5	8	5	69	1,2
17C02	0.0-0.2	01-Feb-17	6.59	0.51	0.07	156	5	190	19	16	20	72	1,2
17C02	0.8-1.0	01-Feb-17	7.32	0.41	0.21	39	3	27	4	<2	14	12	1,2
17C02	2.8-3.0	01-Feb-17	7.70	0.62	0.23	45	4	40	8	3	3	73	1,2
17C02	4.7-4.9	01-Feb-17	7.28	0.36	0.47	21	3	9	2	<2	<2	10	1,2
WELL CENTRE AREA													
17BH01	0.8-1.0	01-Feb-17	6.83	0.60	0.19	59	5	64	10	<2	<2	53	1,2
17BH01	1.7-1.9	01-Feb-17	7.28	0.40	1.20	76	24	30	7	<2	27	42	1,2
Dup B	1.7-1.9	01-Feb-17	7.33	0.64	1.37	59	27	38	8	<2	37	99	1,2
PRODUCTION FACILITIES AREA													
17BH10	0.0-0.2	01-Feb-17	7.49	0.17	0.51	45	7	25	5	3	<2	18	1,2
Dup C	2.2-2.5	01-Feb-17	7.00	0.56	0.40	50	8	41	7	<2	<2	72	1,2
17BH11	0.3-0.5	02-Feb-17	7.96	0.47	0.26	41	4	28	5	2	4	21	1,2
17BH12	1.3-1.5	02-Feb-17	7.40	0.52	0.24	46	4	30	6	4	4	21	1,2
17BH13	1.3-1.5	02-Feb-17	7.52	0.52	0.40	41	6	27	7	2	5	34	1,2
17BH14	1.3-1.5	02-Feb-17	7.46	0.46	0.50	43	7	30	5	<2	<2	31	1,2
17BH15	0.8-1.0	02-Feb-17	7.11	0.70	0.41	51	9	59	9	2	4	99	1,2
17BH16	1.3-1.5	02-Feb-17	7.42	**2.80**	0.82	42	34	218	56	8	6	853	1,2
17BH17	0.3-0.5	02-Feb-17	7.49	0.54	0.39	47	7	35	7	2	<2	39	1,2
17BH17	2.8-3.0	02-Feb-17	7.07	0.62	0.25	42	4	40	7	<2	3	39	1,2

Paramount Resources Ltd.
Table 3. Soil - Detailed Salinity
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Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Lab pH (6.0-8.5)[1]	Lab EC (dS/m)	SAR	Saturation %	Soluble Ions						Guideline
							Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO4) mg/kg	
CCME Guidelines[1]					<5								1
FLARE AREA													
17BH19	1.3-1.5	02-Feb-17	7.68	1.77	0.37	52	15	187	34	6	16	572	1,2
17BH19	1.7-1.9	02-Feb-17	7.70	0.64	0.46	49	8	37	8	3	16	74	1,2
17BH20	1.3-1.5	02-Feb-17	7.42	**2.45**	0.10	52	5	287	53	7	<2	936	1,2
17BH20	2.2-2.5	02-Feb-17	7.42	1.62	0.19	53	7	155	32	4	<2	541	1,2
17BH21	0.3-0.5	02-Feb-17	7.39	0.40	0.26	50	4	27	6	<2	<2	52	1,2
17BH21	1.7-1.9	02-Feb-17	7.49	0.60	0.29	52	6	41	10	2	10	117	1,2
17BH22	0.3-0.5	02-Feb-17	7.38	0.30	0.11	51	<2	21	4	<2	<2	18	1,2
17BH22	1.7-1.9	02-Feb-17	7.26	0.48	0.58	53	11	34	8	<2	3	93	1,2
17BH23	0.3-0.5	02-Feb-17	7.40	0.38	0.24	42	3	20	5	<2	<2	32	1,2
17BH23	1.7-1.9	02-Feb-17	7.47	0.54	0.28	49	5	32	9	2	6	89	1,2
17BH24	0.3-0.5	02-Feb-17	7.45	0.35	0.22	46	3	20	4	<2	<2	35	1,2
17BH24	1.7-1.9	02-Feb-17	7.47	0.54	0.56	47	9	31	6	<2	<2	92	1,2
LAGOON AREA													
17BH25	1.3-1.5	03-Feb-17	7.25	**2.41**	0.15	52	7	287	42	6	<2	832	1,2
Dup E	1.3-1.5	03-Feb-17	7.25	**2.36**	0.17	57	9	296	45	7	<2	827	1,2
17BH25	2.8-3.0	03-Feb-17	7.24	1.68	0.29	50	11	163	25	5	17	489	1,2
DRILLING WASTE DISPOSAL AREA													
17BH26	0.8-1.0	03-Feb-17	7.56	1.81	1.79	46	50	98	19	3	<2	447	3
17BH26	2.5-3.0	03-Feb-17	**12.3**	**7.92**	1.00	113	134	1220	<1	45	945	90	3
17BH26	3.0-3.9	03-Feb-17	**9.77**	3.02	**38.1**	51	378	14	<1	8	154	1320	3
17BH26	5.2-5.4	03-Feb-17	7.70	0.46	0.43	61	7	25	7	6	4	62	3
17BH27	2.5-3.0	03-Feb-17	7.77	0.99	2.05	46	38	42	8	5	6	136	3
17BH27	3.0-3.9	03-Feb-17	7.95	0.90	1.60	39	25	35	7	7	9	118	3
17BH28	2.8-3.0	03-Feb-17	7.69	1.16	0.71	49	16	54	13	6	16	230	3
17BH29	3.2-3.4	03-Feb-17	7.71	0.78	0.41	35	6	29	7	5	4	95	3
17BH30	2.8-3.0	03-Feb-17	7.65	0.99	2.11	40	32	30	8	3	6	145	3
17BH31	3.2-3.4	03-Feb-17	7.65	0.85	0.39	52	8	46	11	7	21	190	3
17BH32	2.5-3.0	03-Feb-17	7.69	0.78	2.25	49	38	33	6	3	6	106	3
17BH32	3.0-3.9	03-Feb-17	7.71	1.40	**15.0**	38	109	8	2	3	11	181	3
17BH33	2.2-3.0	03-Feb-17	**9.62**	4.43	**14.5**	61	502	146	1	14	29	1480	3
17BH33	3.0-3.2	03-Feb-17	7.85	1.46	**16.2**	34	114	8	2	4	13	170	3
Dup F	3.0-3.2	03-Feb-17	**8.02**	0.97	**11.7**	41	103	10	2	4	12	141	3

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Environmental Guidelines for Contaminated Site Remediation (EGCSR). 2003

[3] - 2012 Alberta "Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification" as per Alberta Directive 50 Equivalent Guidelines

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NA - Not Applicable

NS - Not Specified

3.

2012 Alberta "Assessing Drilling Waste Disposal Areas: Compliance Options for Remediation Certification"		
Value Ratings	**Pass**	**Fail**
Topsoil		
EC dS/m	**<2**	**>2**
SAR	**<6**	**>6**
Below Topsoil to 1 metre		
EC dS/m	**<3**	**>3**
SAR	**<8**	**>8**
Below 1 meter		
EC dS/m	**<6**	**>6**
SAR	**<10**	**>10**

Paramount Resources Ltd.
Table 4. Soil - Polycyclic Aromatic Hydrocarbons
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b+j+k)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	B[a]P TPE	IACR (Fine/Coarse)
CCME Guidelines[1] (mg/kg)			**0.013**	**NC**	**0.28**	**0.25**	**0.046**	**2.5**	**20**	**10**	**1**	**6.2**	**1**	**6.2**	**20**	**1**	**1**	**NC**	**5.3**	**≤1**
FLARE AREA																				
17BH19	0.3 -0.5	02-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH19	1.7-1.9	02-Feb-17	**1.04**	<0.005	<0.005	0.06	0.04	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH19	3.2-3.4	02-Feb-17	**0.014**	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH20	1.3-1.5	02-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH20	2.2-2.5	02-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH21	1.7-1.9	02-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH22	1.7-1.9	02-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH23	1.7-1.9	02-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH24	1.7-1.9	02-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guideline

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 5. Soil - Glycols and Methanol
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Ethylene Glycol	Diethylene Glycol	Triethylene Glycol	Tetraethylene Glycol	Propylene Glycol	Methanol	% Moisture
CCME Guidelines[1] (mg/kg)			**960**					**NC**	**NC**
AEP Tier 1 2016 Soil Guidelines[2] (mg/kg)			**62**					**37**	
PRODUCTION FACILITIES AREA									
17BH06	0.0-0.2	01-Feb-17	<10	<10	<10	<10	<10	5.2	
17BH10	0.0-0.2	01-Feb-17						4.6	
17BH11	0.0-0.2	02-Feb-17						1.3	
17BH12	0.0-0.2	02-Feb-17						3.0	
17BH13	0.0-0.2	02-Feb-17						8.4	
Dup D	0.0-0.2	02-Feb-17						7.2	
17BH14	0.0-0.2	02-Feb-17						5.6	
17BH15	0.0-0.2	02-Feb-17						14.7	
17BH16	0.0-0.2	02-Feb-17						2.3	
17BH17	0.0-0.2	02-Feb-17						5.5	
17BH18	0.0-0.2	02-Feb-17	<10	<10	<10	<10	<10	4.3	

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Alberta Environment and Parks (AEP). 2016. Alberta Tier 1 Soil and Groundwater Remediation Guidelines

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.

Table 6. Soil - Quality Control - BTEX and Petroleum Hydrocarbons (F1-F4)

Phase 2 Environmental Site Assessment Report F-36

May 2017

Sample ID	Sample Date (dd-mm-yy)	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	Fraction 1 mg/kg	Fraction 2 mg/kg	Fraction 3 (mg/kg)	Fraction 4[3] (mg/kg)
17BH01 1.7-1.9	01-Feb-17	**0.027**	<0.05	**0.26**	0.90	20	**864**	**3160**	198
Dup B 1.7-1.9	01-Feb-17	**0.028**	<0.05	**0.36**	1.21	20	**1420**	**4970**	294
Detection Limit		0.005	0.05	0.01	0.05	10	10	10	10
Difference		-0.001	#VALUE!	-0.1	-0.31	0	-556	-1810	-96
Relative Percent Difference		-3.64	#VALUE!	-32.26	-29.38	0.00	-48.69	-44.53	-39.02
Duplicate Sample Results		Good	---	Good	Good	Good	Good	Good	Good

Sample ID	Sample Date (dd-mm-yy)	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	F1 (C6-C10) mg/kg	F2 (C10-C16) mg/kg	Fraction 3 (mg/kg)	Fraction 4[3] (mg/kg)
17BH33 3.0-3.2	03-Feb-17	**0.086**	**0.22**	**0.14**	0.37	10	12	75	31
Dup F 3.0-3.2	03-Feb-17	**0.036**	**0.09**	**0.05**	0.15	<10	18	84	33
Detection Limit		0.005	0.05	0.01	0.05	10	10	10	10
Difference		0.05	0.13	0.09	0.22	#VALUE!	-6	-9	-2
Relative Percent Difference		81.97	83.87	94.74	84.62	#VALUE!	-40.00	-11.32	-6.25
Duplicate Sample Results		Poor	NA	NA	NA	---	Good	Good	Good

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility

Poor - Evaluation indicates poor reproducibility

Blank - Not analyzed

--- - Not applicable

NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 7. Soil - Quality Control - Regulated Metals
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Date	Antimony (An)	Arsenic (As)	Barium (Ba)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Beryllium (Be)	Boron (B)	Cadmium (Cd)	Chromium (Cr) - Total	Chromium (Cr) - Hex.	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
	(dd-mm-yy)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
17C01 3.2-3.4	01-Feb-17	0.6	10.4	222			0.6	<0.5	0.5	16.6	<0.3	8.1	20.3	9.9	<0.5	2.9	22.1	**1.3**	<0.5	<0.5	0.6	2.2	26.1	72
Dup A 3.2-3.4	01-Feb-17	0.6	10.3	189			0.5	<0.5	<0.5	16.9	<0.3	7.0	14.5	9.3	<0.5	2.8	18.7	0.8	<0.5	<0.5	0.6	1.3	26.4	62
Detection Limit		0.5	0.5	0.5	---	---	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Difference		0.0	-0.1	-33	---	---	-0.1	#VALUE!	#VALUE!	0.3	#VALUE!	-1.1	-5.8	-0.6	#VALUE!	-0.1	-3.4	-0.5	#VALUE!	#VALUE!	0	-0.9	0.3	10
Relative Percent Difference		0.00	-0.97	-16.06	---	---	-18.18	#VALUE!	#VALUE!	1.79	#VALUE!	-14.57	-33.33	-6.25	#VALUE!	-3.51	-16.67	-47.62	#VALUE!	#VALUE!	0.00	-51.43	1.14	14.93
Duplicate Sample Results		Good	Good	Good	---	---	Good	---	---	Good	---	Good	Good	Good	---	Good	Good	Good	---	---	Good	Good	Good	Good

Sample ID	Sample Date	Antimony (An)	Arsenic (As)	Barium (Ba)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Beryllium (Be)	Boron (B)	Cadmium (Cd)	Chromium (Cr) - Total	Chromium (Cr) - Hex.	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
	(dd-mm-yy)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
17BH01 1.7-1.9	01-Feb-17	0.5	10.0	228			0.6	<0.5	<0.5	18.4	<0.3	7.8	14.7	9.9	<0.5	2.5	20.1	0.5	<0.5	<0.5	0.5	1.2	25.8	61
Dup B 1.7-1.9	01-Feb-17	0.6	10.4	304			0.7	<0.5	<0.5	18.6	<0.3	8.3	16.2	10.7	<0.5	2.7	21.7	<0.5	<0.5	<0.5	<0.5	1.2	30.0	69
Detection Limit		0.5	0.5	0.5	---	---	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Difference		0.1	0.4	76	---	---	0.1	#VALUE!	#VALUE!	0.2	#VALUE!	0.5	1.5	0.8	#VALUE!	0.2	1.6	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0	4.2	-8
Relative Percent Difference		18.18	3.92	28.57	---	---	15.38	#VALUE!	#VALUE!	1.08	#VALUE!	6.21	9.71	7.77	#VALUE!	7.69	7.66	#VALUE!	#VALUE!	#VALUE!	#VALUE!	0.00	15.05	-12.31
Duplicate Sample Results		Good	Good	Good	---	---	Good	---	---	Good	---	Good	Good	Good	---	Good	Good	---	---	---	---	Good	Good	Good

Sample ID	Sample Date	Antimony (An)	Arsenic (As)	Barium (Ba)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Beryllium (Be)	Boron (B)	Cadmium (Cd)	Chromium (Cr) - Total	Chromium (Cr) - Hex.	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
	(dd-mm-yy)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
17BH25 1.3-1.5	03-Feb-17	0.6	9.0	198			0.6	<0.5	<0.5	15.1	<0.3	7.4	12.8	10.2	<0.5	2.0	18.6	0.6	<0.5	<0.5	0.6	1.3	27.6	69
Dup E 1.3-1.5	03-Feb-17	0.5	8.9	177			0.5	<0.5	<0.5	14.4	<0.3	6.2	12.9	8.4	<0.5	1.8	16.5	0.6	<0.5	<0.5	<0.5	1.3	23.6	58
Detection Limit		0.5	0.5	0.5	---	---	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Difference		-0.1	-0.1	-21	---	---	-0.1	#VALUE!	#VALUE!	-0.7	#VALUE!	-1.2	0.1	-1.8	#VALUE!	-0.2	-2.1	0	#VALUE!	#VALUE!	#VALUE!	0	-4	11
Relative Percent Difference		-18.18	-1.12	-11.20	---	---	-18.18	#VALUE!	#VALUE!	-4.75	#VALUE!	-17.65	0.78	-19.35	#VALUE!	-10.53	-11.97	0.00	#VALUE!	#VALUE!	#VALUE!	0.00	-15.63	17.32
Duplicate Sample Results		Good	Good	Good	---	---	Good	---	---	Good	---	Good	Good	Good	---	Good	Good	Good	---	---	---	Good	Good	Good

Sample ID	Sample Date	Antimony (An)	Arsenic (As)	Barium (Ba)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Beryllium (Be)	Boron (B)	Cadmium (Cd)	Chromium (Cr) - Total	Chromium (Cr) - Hex.	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
	(dd-mm-yy)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
17BH33 3.0-3.2	03-Feb-17	0.7	10.0	224			0.6	<0.5	0.5	15.8	<0.3	8.2	16.1	10.5	<0.5	3.0	22.4	0.9	<0.5	<0.5	0.6	1.5	25.7	71
Dup F 3.0-3.2	03-Feb-17	0.6	9.7	244			0.6	<0.5	0.6	17.3	<0.3	8.3	16.6	12.3	<0.5	3.5	22.6	1.0	<0.5	<0.5	0.5	1.6	27.2	81
Detection Limit		0.5	0.5	0.5	---	---	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Difference		-0.1	-0.3	20	---	---	0	#VALUE!	0.1	1.5	#VALUE!	0.1	0.5	1.8	#VALUE!	0.5	0.2	0.1	#VALUE!	#VALUE!	-0.1	0.1	1.5	-10
Relative Percent Difference		-15.38	-3.05	8.55	---	---	0.00	#VALUE!	18.18	9.06	#VALUE!	1.21	3.06	15.79	#VALUE!	15.38	0.89	10.53	#VALUE!	#VALUE!	-18.18	6.45	5.67	-13.16
Duplicate Sample Results		Good	Good	Good	---	---	Good	---	Good	Good	---	Good	Good	Good	---	Good	Good	Good	---	---	Good	Good	Good	Good

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 8. Soil - Quality Control - Detailed Salinity
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17C01 3.2-3.4	01-Feb-17	7.85	0.84	0.36	8	58	11	12	7	132
Dup A 3.2-3.4	01-Feb-17	7.53	0.66	0.28	5	43	8	9	6	87
Detection Limit		---	0.05	---	2	1	1	2	2	2
Difference		0.32	0.18	0.08	3	15	3	3	1	45
Relative Percent Difference		4.16	24.00	25.00	46.15	29.70	31.58	28.57	15.38	41.10
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	Good	Good	Good

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17BH01 1.7-1.9	01-Feb-17	7.28	0.40	1.20	24	30	7	<2	27	42
Dup B 1.7-1.9	01-Feb-17	7.33	0.64	1.37	27	38	8	<2	37	99
Detection Limit		---	0.05	---	2	1	1	2	2	2
Difference		0	0	-0.17	-3	8	-1	#VALUE!	-10	-57
Relative Percent Difference		0.68	46.15	-13.23	-11.76	23.53	-13.33	#VALUE!	-31.25	-80.85
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	---	Good	Poor

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17BH25 1.3-1.5	03-Feb-17	7.25	**2.41**	0.15	7	287	42	6	<2	832
Dup E 1.3-1.5	03-Feb-17	7.25	**2.36**	0.17	9	296	45	7	<2	827
Detection Limit		---	0.05	---	2	1	1	2	2	2
Difference		0	0	-0.02	-2	9	-3	-1	#VALUE!	5
Relative Percent Difference		0.00	-2.10	-12.50	-25.00	3.09	-6.90	-15.38	#VALUE!	0.60
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	Good	---	Good

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17BH33 3.0-3.2	03-Feb-17	7.85	1.46	**16.2**	114	8	2	4	13	170
Dup F 3.0-3.2	03-Feb-17	**8.02**	0.97	**11.7**	103	10	2	4	12	141
Detection Limit		---	0.05	---	2	1	1	2	2	2
Difference		0	0	4.5	11	2	0	0	1	29
Relative Percent Difference		2.14	-40.33	32.26	10.14	22.22	0.00	0.00	8.00	18.65
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	Good	Good	Good

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 9. Soil - Quality Control - Glycols
Phase 2 Environmental Site Assessment Report F-36
May 2017

Sample ID	Sample Date (dd-mm-yy)	Ethylene Glycol	Diethylene Glycol	Triethylene Glycol	Tetraethylene Glycol	Propylene Glycol	Methanol
17BH13 0.0-0.2	02-Feb-17						8.4
Dup D 0.0-0.2	02-Feb-17						7.2
Detection Limit		---	---	---	---	---	0.5
Difference		---	---	---	---	---	1.2
Relative Percent Difference		---	---	---	---	---	15.38
Duplicate Sample Results		---	---	---	---	---	Good

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

APPENDIX III

Water Well and Water Body Search Results

ATLAS
Government of Northwest Territories

Paramount F-36
Waterbody Search results



May 25, 2021

Legend

- Block Land Transfer Boundaries
- Development Areas
- Surveyed Parcels
- Line Approximately 31m from O.H.W.M.
- Municipal Boundaries
- Condominium Units
- Building Footprints

Scale 1: 10,000

250 metres

UTM Zone: 10

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APPENDIX IV

Site-Specific Standard

Groundwater Protection Transport Model

Site-specific Factors

- ☑ Groundwater used for drinking water
- ☑ Groundwater flow to surface water used by aquatic life
- ☐ Groundwater used for livestock watering
- ☐ Groundwater used for irrigation

Substance Ethylbenzene

Substance Properties

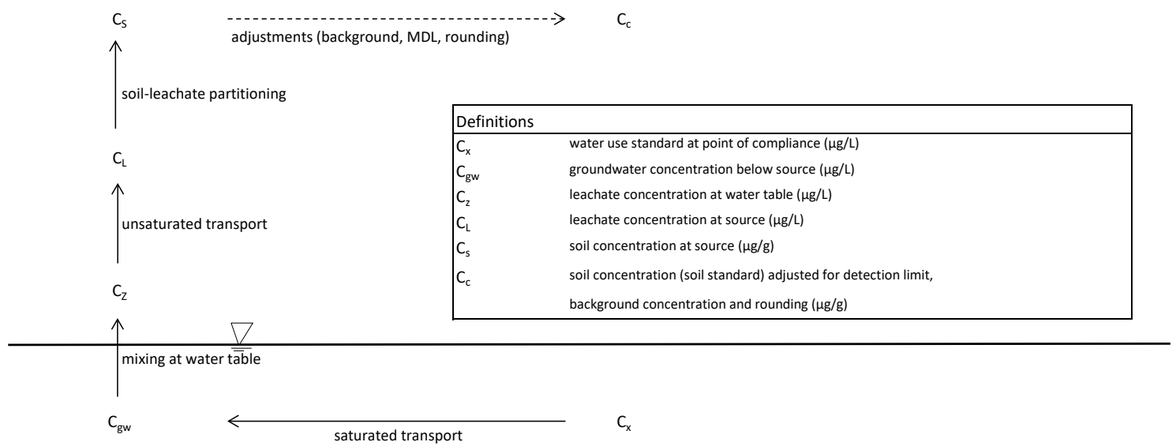
			Units	Source
K_{oc}	organic carbon partitioning coefficient	4.46E+02	L/kg	Lookup tables
K_d	distribution coefficient	2.23E+00	L/kg	Lookup tables
R_f	retardation factor in saturated zone	1.15E+01	[/]	$1 + (K_d \cdot \rho_b) / n$
R_u	retardation factor in unsaturated zone	3.29E+01	[/]	$1 + (K_d \cdot \rho_b) / n_w$
$t_{½S}$	half-life in saturated zone	290	days	Lookup tables
$t_{½U}$	half-life in unsaturated zone	145	days	Lookup tables
H'	dimensionless Henry's law constant	3.22E-01	[/]	Lookup tables
C_b	background concentration in soil	Not available	µg/g	Lookup tables
C_{dl}	analytical method detection limit	Not available	µg/g	Lookup tables
S	solubility limit	8.45E+01	mg/L	Lookup tables

Site-specific Parameters

			Units	Source	Defaults
X	source length	10	m	User input	10
Y	source width	30	m	User input	30
Z	source depth	3	m	User input	3
I	infiltration rate	0.08	m/yr	User input	0.55
f_{oc}	fraction of organic carbon	0.005	[/]	User input	0.005
n_w	water-filled porosity	0.119	[/]	User input	0.119
x	distance to point of compliance	10	m	User input	10
d_a	aquifer thickness	5	m	User input	5
d	depth to water table	3	m	User input	3
n	total porosity	0.36	[/]	User input	0.36
n_e	effective porosity	0.25	[/]	User input	0.25
K	hydraulic conductivity	3.00E-05	m/s	User input	3.00E-05
i	hydraulic gradient	0.008	[/]	User input	0.008
V	Darcy flux	7.57	m/yr	K·i	7.57
pH_{soil}	pH of soil	6.5	[/]	User input	6.5
pH_{water}	pH of groundwater	6.5	[/]	User input	6.5
ρ_b	dry bulk density of soil	1.7	g/cm^3	User input	1.7
H	water hardness	200	mg/L	User input	200
D_{fr}	number of days of frozen ground	0	days	User input	0
n_a	air-filled porosity	0.241	[/]	$n - n_w$	0.241
∂_x	longitudinal dispersivity	1	[/]	0.1 x	1
∂_y	transverse dispersivity	0.1	[/]	0.1 ∂_x	0.1
∂_u	dispersivity in unsaturated zone	0	[/]	0.1 b	0
v_U	leachate velocity in unsaturated zone	0.67	m/yr	I / n_w	2.72
v	average linear groundwater velocity in saturated zone	30.27	m/yr	V / n_e	30.27
d_m	mixing zone thickness	1.10	m	Protocol 28	1.68
DF	dilution factor	11.45	[/]	Protocol 28	3.31
b	vertical distance between base of source and water table	0	m	max (0, d-Z)	0

Conceptual Model

(arrows indicate order of calculations)



Definitions	
C_x	water use standard at point of compliance (µg/L)
C_{gw}	groundwater concentration below source (µg/L)
C_z	leachate concentration at water table (µg/L)
C_L	leachate concentration at source (µg/L)
C_s	soil concentration at source (µg/g)
C_c	soil concentration (soil standard) adjusted for detection limit, background concentration and rounding (µg/g)

Model Type: ◉ SSS ○ SLRA

Site-specific Factors	C_x µg/L	C_{gw} µg/L	C_z µg/L	C_L µg/L	C_s µg/g	C_c µg/g
Groundwater used for drinking water	1.40E+02	1.94E+03	2.23E+04	2.23E+04	5.22E+01	5.00E+01
Groundwater flow to surface water used by aquatic life						
freshwater	2.00E+03	2.78E+04	3.18E+05	8.45E+04	1.98E+02	2.00E+02
marine and/or estuarine	2.50E+03	3.47E+04	3.97E+05	8.45E+04	1.98E+02	2.00E+02
any aquatic receiving environment						
Groundwater used for livestock watering						
Groundwater used for irrigation						

Site Details

Site ID	PAR 6207
Site Address	F-36 60-10-123-15
User Name	Jason Richl
User Organization	SynergyAspen Environmental

Groundwater Protection Transport Model

Site-specific Factors

- ☑ Groundwater used for drinking water
- ☑ Groundwater flow to surface water used by aquatic life
- ☐ Groundwater used for livestock watering
- ☐ Groundwater used for irrigation

Substance Naphthalene

Substance Properties

			Units	Source
K_{oc}	organic carbon partitioning coefficient	1.54E+03	L/kg	Lookup tables
K_d	distribution coefficient	7.70E+00	L/kg	Lookup tables
R_f	retardation factor in saturated zone	3.74E+01	[/]	$1 + (K_d \cdot \rho_b) / n$
R_u	retardation factor in unsaturated zone	1.11E+02	[/]	$1 + (K_d \cdot \rho_b) / n_w$
$t_{½S}$	half-life in saturated zone	350	days	Lookup tables
$t_{½U}$	half-life in unsaturated zone	175	days	Lookup tables
H'	dimensionless Henry's law constant	1.80E-02	[/]	Lookup tables
C_b	background concentration in soil	Not available	µg/g	Lookup tables
C_{dl}	analytical method detection limit	Not available	µg/g	Lookup tables
S	solubility limit	1.55E+01	mg/L	Lookup tables

Site-specific Parameters

			Units	Source	Defaults
X	source length	10	m	User input	10
Y	source width	30	m	User input	30
Z	source depth	3	m	User input	3
I	infiltration rate	0.08	m/yr	User input	0.55
f_{oc}	fraction of organic carbon	0.005	[/]	User input	0.005
n_w	water-filled porosity	0.119	[/]	User input	0.119
x	distance to point of compliance	10	m	User input	10
d_a	aquifer thickness	5	m	User input	5
d	depth to water table	3	m	User input	3
n	total porosity	0.36	[/]	User input	0.36
n_e	effective porosity	0.25	[/]	User input	0.25
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V	Darcy flux	7.57	m/yr	K·i	7.57
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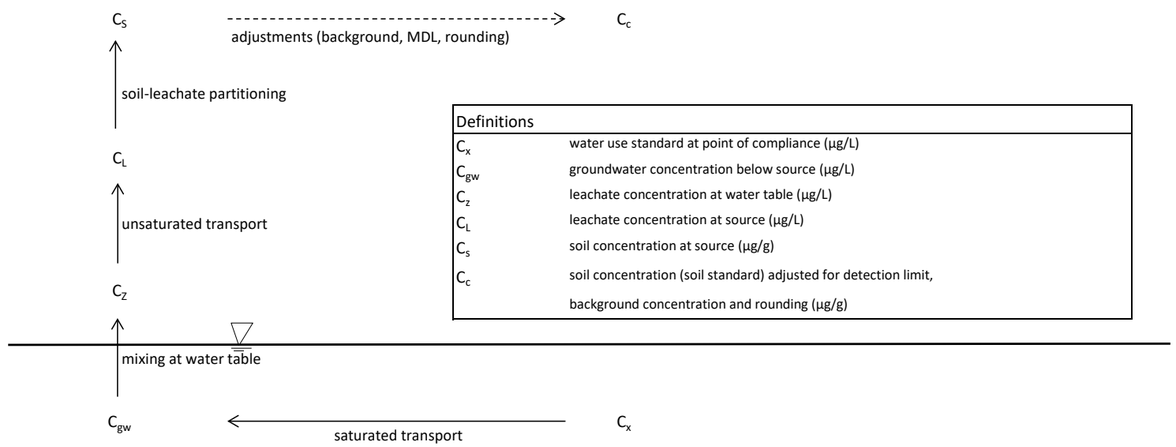
∂_u	dispersivity in unsaturated zone	0	[/]	0.1 b	0
v_U	leachate velocity in unsaturated zone	0.67	m/yr	I / n_w	2.72
v	average linear groundwater velocity in saturated zone	30.27	m/yr	V / n_e	30.27
d_m	mixing zone thickness	1.10	m	Protocol 28	1.68
DF	dilution factor	11.45	[/]	Protocol 28	3.31
b	vertical distance between base of source and water table	0	m	max (0, d-Z)	0

Conceptual Model

(arrows indicate order of calculations)



Definitions	
C_x	water use standard at point of compliance (µg/L)
C_{gw}	groundwater concentration below source (µg/L)
C_z	leachate concentration at water table (µg/L)
C_L	leachate concentration at source (µg/L)
C_s	soil concentration at source (µg/g)
C_c	soil concentration (soil standard) adjusted for detection limit, background concentration and rounding (µg/g)

Model Type: (•) SSS ( ) SLRA

Site-specific Factors	C_x µg/L	C_{gw} µg/L	C_z µg/L	C_L µg/L	C_s µg/g	C_c µg/g
Groundwater used for drinking water	8.00E+01	2.36E+04	2.70E+05	1.55E+04	1.20E+02	1.00E+02
Groundwater flow to surface water used by aquatic life						
freshwater						
marine and/or estuarine						
any aquatic receiving environment	1.00E+01	2.95E+03	3.38E+04	1.55E+04	1.20E+02	1.00E+02
Groundwater used for livestock watering						
Groundwater used for irrigation						

Site Details

Site ID	PAR 6207
Site Address	F-36 60-10-123-15
User Name	Jason Richl
User Organization	SynergyAspen Environmental

SUPPLEMENTAL SITE INVESTIGATION

Lease Site: 300/F-36 60-10-123-15-00
Fort Liard Field
WID # 1841

Prepared for:
PARAMOUNT RESOURCES LIMITED

SYNERGYASPEN PROJECT No. PAR6207
PERMIT NUMBER: 1001717

May 4, 2022



EXECUTIVE SUMMARY

On behalf of Paramount Resources Limited (Paramount), SynergyAspen Environmental Inc. (SynergyAspen) has completed a Supplemental Site Investigation (SSI) and a remedial excavation for Paramount wellsite Fort Liard F-36 60-10-123-15 (hereafter referred to as the "Site") located in the forested area in the South Liard field, southwest of Fort Liard, in the Northwest Territories (NT). The well was drilled to a depth of 2110.0 m in two events, March 3 to 28, 1998, and December 23, 1998, to February 5, 1999. The well produced natural gas, condensate, and produced water from 2000 to 2005 and was abandoned in April 2008.

The purpose of the SSI was to review historical documentation, in particular a Phase I Environmental Site Assessment (ESA) completed by North Shore Environmental Consultants (North Shore) in March 2017, a Phase II (ESA) completed by North Shore in May 2017, and the Desktop Remediation completed by SynergyAspen Environmental (SynergyAspen) in July of 2021 to determine if further work was required at the Site to satisfy the requirements of application for closure to the Office of the Regulator of Oil and Gas Regulations (OROGO) in the Northwest Territories. The results of SynergyAspen's supplemental investigation indicated the following:

- Five (5) Areas of Potential Environmental Concern (APECs) were investigated by North Shore, that SynergyAspen has redefined to simplify the discussion: Wellbore Area, Drilling Waste Disposal Area (DWDA), Flare Area, Production Facilities Area, and Lagoon Area.
- North Shore completed fieldwork at the Site in February 2017; thirty-seven (37) boreholes were advanced for the purpose of soil sample collection and soil characterization. Analytical results from North Shore ESA were reviewed by SynergyAspen to confirm the areas of concern for further investigation or delineation and they are presented in the Table C below.
- The data from North Shore was reviewed by SynergyAspen in July of 2021 and compared to the Environmental Guidelines for Site Remediation (Environmental Guidelines), Canadian Council of the Ministers of the Environment (CCME) Canadian Environmental Soil Quality guidelines (CESQG), and British Columbia Contaminated Sites Regulation (CSR) standards. All metal, salinity, and PAH exceedances were determined unlikely to pose a risk to receptors Minister of the Environment and Natural Resources ([ENR], 2003).

- The Site was drilled by SynergyAspen in October of 2021 and remediation work took place in January of 2022 to further delineate the remaining potential contaminants of concern (PCOCs) and remove surface contamination at the Wellbore Area. The data obtained was compared to the Alberta Tier 1, Tier 2, Subsoil, and Green Zone Area standards like the initial Phase II ESA report completed in May 2017 (North Shore, 2017b). However, the freshwater aquatic life (FAL) pathway was also removed. Petroleum hydrocarbon fraction F2, benzene, ethylbenzene, xylene, and naphthalene concentrations from Northshore's 2017 report exceeded the applicable standards in the Flare Area, and F2, F3, and xylene exceeded the applicable standards in the Wellbore Area.

Based on the results of this SSI, SynergyAspen concludes the F2, benzene, ethylbenzene, xylene and naphthalene exceedances identified by North Shore in the Flare Area were not reproducible; furthermore, due to the removal of the FAL pathway, the naphthalene was no longer exceeding the guidelines and does not pose a risk to receptors. The F2, F3, and xylene exceedances identified in the Wellbore Area by North Shore remained; therefore, the Wellbore Area was excavated in January 2022. The general limitations of this document are included in Section 10.

Based on the results from the remediation work completed in January 2022, SynergyAspen concluded that the Flare Area doesn't require remediation as the North Shore results were not reproducible. Soil was removed from the Flare Area, sampled, and used for backfilling the excavation as the concentrations of analytical results were less than the applicable guidelines.

The Wellbore Area remediation work consisted of mechanically excavating 295.56 tonnes of soil and disposing it at the approved Secure Energy Northern Rockies landfill (Facility UWI: A-77-G/94-J-10). The concentrations of regulated parameters in samples collected from the walls and the base of the Wellbore Area were below the applicable guidelines, and the Wellbore Area was backfilled prior to leaving the Site.

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- PAR6207-002 – Site Plan and Areas of Potential Environmental Concern
- PAR6207-003 – Detailed Soil Analytical Results – Wellbore Area (SynergyAspen, 2021-2022)
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I. Site Photographs
II. Water Well Search
III. Quality Assurance / Quality Control (QA/QC) Program
IV. Borehole, Test Pit, and Excavation Soil Logs
V. Excavation Load Summary
VI. Laboratory Analytical Reports
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<u>This Report Is Subject to a Disclaimer by Paramount Resources Limited</u>

1. INTRODUCTION

On behalf of Paramount Resources Limited (Paramount), SynergyAspen Environmental Inc. (SynergyAspen) has completed a Supplemental Site Investigation (SSI) for Paramount's former wellsite *PARA ET AL* F-36 60-10-123-15, with Well Identification # 1841. The Site is located in the Fort Liard Field, approximately 100 km north of Fort Nelson, in the Northwest Territories. The well was drilled to a depth of 2,110.0 meters in two events, March 3 to 28, 1998, and December 23, 1998, to February 5, 1999. The wellsite produced natural gas, condensate, and produced water from 2000 to 2005 and was abandoned in April 2008.

SynergyAspen completed this SSI to determine if further work was required at the Site prior to the submission of an application for closure to the Office of the Regulator of Oil and Gas Regulations (OROGO) in the Northwest Territories. The findings of SynergyAspen's review and discussion of the additional work that was completed are presented in this report.

2. SITE DESCRIPTION

The Site location is shown on Drawing PAR6207-001 in the Drawings Appendix. The Site, including areas of potential environmental concern and current borehole locations, is shown on Drawing PAR6207-002 in the Drawings Appendix. Site photographs are presented in Appendix I.

General information regarding the Site's location, topography, hydrogeology, former infrastructure, production history, and surrounding land uses is summarized for convenience in Table A, below.

TABLE A: Summary of General Site Information

Item	Description
Site Latitude & Longitude	60° 05' 27.12" N; 123° 22' 07.54" W
Legal Location	F-36 60-10-123-15
Well Identification #	1841
Landowner	Crown
Spud Date / Rig Release	March 3 to 28, 1998; and December 23, 1998, to February 5, 1999
Cut and Cap Date	Wellbore was cut and capped on January 15, 2022.
Fluid Type	Gas
Operation Type	Production
Depth of Well	2,110.0 m
Site Description & Size	The lease dimensions are 150 m x 150 m square with a corner oriented to the North, and 20 m x 340 m access from the southwest end of the Site.
ALR Status	The Site is not located in the ALR.
Current On-Site Facilities	Wellhead, riser, and pilings.
Former On-Site Facilities	Wellhead, two pipe racks, radio tower, meter building, two separator skids, methanol tank, above ground storage tank (AST) flare knockout drum, pig launcher, piping, risers, and above ground chemical tanks.
Former Off-Site Facilities	None.
Production History	The well was drilled to a depth of 2,110.0 meters in two events, March 3 to 28, 1998, and December 23, 1998, to February 5, 1999. The well produced natural gas, condensate, and produced water from 2000 to 2005 and was abandoned in April 2008.
Topography:	
Regional Surface Grade	The regional grade is gently sloping northeast towards a tributary of the Liard River.
On Site Drainage	Some standing water on the west/southwest side of the Site with soft and wet areas indicating some drainage issues on Site. The lease slopes southeast ~1%, a drainage ditch is in the southeast corner. The Site is bermed on north, east and west sides. According to the Survey Plan, the Site is also a cut/fill Site with a 27.2 m elevation change along the west edge of the Site.

Item	Description
Surface Cover	On-Site: Red clover, yarrow, white spruce, trembling aspen, brome, willow, and timothy. Noxious weeds: sow thistle, sweet clover. Off-Site: white spruce, trembling aspen, and alfalfa.
Geology	Bedrock geology consists of Fort St. John Group, which is comprised of mudstone, siltstone, Shale and fine clastic sedimentary rocks, silty mud, sandstone, coal, and conglomerates [BCGS online MapPlace 2 resource].
Hydrology & Hydrogeology:	
Nearest Surface Water	Government of NT ATLAS website shows a wetland is visible ~450 m southeast of the Site.
Water Wells	Government of NT ATLAS website shows no water wells within 300m of the Site (Appendix II).
Depth to Groundwater	Unknown.
Groundwater Flow	Unknown but estimated to flow to the northeast following regional topography towards the unnamed tributary of the Liard River.
Surrounding Land Use (Site)	
North	Mixed wood Boreal Forest
South	Mixed wood Boreal Forest
East	Mixed wood Boreal Forest
West	Mixed wood Boreal Forest
Utilities	
Peace Valley Line Locating Ltd. completed a line locate of the site prior to environmental work and outlined the presence of two pipelines exiting the lease to the south. No other underground facilities were located within the worksite or surrounding area. As built diagrams provided by Paramount were reviewed prior to the onset of the work.	
Directions to Site	
Site is available via helicopter or winter road access only. Depart from Fort Nelson airport and fly approximately 45 minutes due north to Site. Winter road access turns northwest off HWY 77 near Maxhamish Lake and crosses the British Columbia/Northwest Territories border on the winter road, exact directions are not currently available.	

3. PREVIOUS ENVIRONMENTAL ASSESSMENTS

3.1. North Shore Environmental Consultants, Phase I ESA (2017)

North Shore Environmental Consultants Inc. (North Shore) completed a Phase I Environmental Site Assessment (ESA) on the Site, published in March of 2017. The Phase I ESA indicated the following:

- The well produced from 2000 to 2005. Infrastructure identified by North Shore included: the wellhead, methanol tank in containment, flare knockout drum with vent, fuel tank, chemical drums, pig launcher, and surface piping. A proposed campsite measuring 30 m by 60 m was noted on the survey located 2.0 km east of the Site.

- Based on Compliance of the Drilling Waste Disposal Checklist #2, the on-site DWDA failed for drilling waste disposal during the final entry of the well, due to salt calculations and unknown disposal of drill stem test returns (North Shore, 2017a).

- In 2000, 0.8 m^3 of drilling waste was spilled on the access road, with the location undetermined. Records show that impacted snow was windrowed to the road center, cleaned up, and taken to the remote drilling waste lined sump at site location O-35.

- Five additional spills were associated with the Site between 2001 and 2003, locations were unknown. Cumulatively, 1.2 m^3 of condensate and produced water, 0.010 m^3 of methanol, and 0.12 m^3 of glycol were released.

Table B below summarizes the spill information for the five additional spills reported between 2001 and 2003.

TABLE B: Summary of Spill Information for F-36 60-10-123-15

Spill No.	Date	Spill location	Product Released	Volume	Source
2003739	December 10, 2003	F-36 Pipeline ROW	Condensate water	0.04 m^3	Pipe or Line
2003662	November 3, 2003	F-36 Wellsite	Condensate & produced water	1 m^3	Storage Tank <4 m^3
2001359	November 21, 2001	F-36 Wellsite	Condensate Water	0.15 m^3	Storage Tank <4 m^3
2001099	April 1, 2001	F-36 Wellsite for 4" Pipeline	Methanol Water	0.010 m^3	Pipe or Line
2001071	March 8, 2001	F-36 Wellsite	Glycol	0.012 m^3	Drum or barrel

- An assessment in 2004 visually indicated a small amount of minor surface staining at the wellhead and flare stack areas.

- In 2013, the berm located around the fuel containment showed visual evidence of a release (North Shore, 2017a).

- Areas of Potential Environmental Concern (APECs) identified by North Shore in the Phase I ESA included: the well centre; production facility/former spill areas; flare stack area; DWDA on-site and northwest portion of Site; and the drilling flare area noted in the well file (North Shore, 2017a).

3.2. North Shore Environmental Consultants, Phase II ESA (2017)

North Shore Environmental Consultants Inc. (North Shore) completed a Phase II ESA on the Site, published in May of 2017. The Phase II ESA indicated the following:

- Investigated of the APECs identified in the Phase I ESA consisted of thirty-seven (37) boreholes advanced at the Site.

- Analytical results from the Phase II ESA were compared to the following guidelines: Canadian Council of Ministers of the Environment (CCME) 2017 Tier 1 Soil Remediation Guidelines: the 2003 Northwest Territories Environmental Guidelines for Contaminated Site Remediation; and the 2016 Alberta Tier 1 Soil and Groundwater Remediation Guidelines (North Shore, 2017b).

- Results showed impacts within the surface and subsurface soils in the following areas at the Site:
    - Hydrocarbons at the Well Centre, Flare Area, and DWDA;
    - Chromium found in one sample from the Well Centre;
    - Arsenic found in three samples from the DWDA;
    - pH, Electrical Conductivity (EC), and Sodium Adsorption Ratio (SAR) in the Lagoon Area and DWDA;
    - Polycyclic Aromatic Hydrocarbon (PAH) Naphthalene noted in two samples from the Flare Area;
- Elevated EC noted in the Production Facility Area, the Flare Area, and the Lagoon Area were attributed to naturally occurring variation in the soil profile.
- The location of the historic spills on site outlined in the Phase I were unknown; NorthShore targeted their boreholes located in the production facilities to investigate the most likely locations of these spills. No evidence was found of contamination at any borehole.
- The historic spill along the access road was not investigated as snow cover prevented identification of the location of the spill. NorthShore intended to visually assess the access road during the following growing season and collect soil samples from any suspect areas if warranted. However, it is unknown to SynergyAspen whether this work was conducted, as documentation was not provided for review.

3.3. SynergyAspen Environmental Inc., Desktop Remediation Report (2021)

After reviewing the previous reports written by North Shore, SynergyAspen completed a Desktop Remediation (DTR) Report to determine any data gaps. SynergyAspen's DTR report indicated the following:

- All metal, salinity, and PAH exceedances in the soil were determined not to pose a risk to receptors. Rationale for the determination was based on the applicable guideline limits with

receptor pathways removed; the lack of associated contaminant impacts; low regional soil infiltration rates; naturally occurring metals in the soil profile; and the depths of the samples.

- The F2, F3, benzene, and ethylbenzene exceedances seen in the North Shore Phase II ESA required further environmental investigation.
- The unknown historic spill along the access road, initially identified by North Shore in the Phase I ESA, required further investigation.

3.4. Summary of APECs

North Shore identified five (5) APECs at the Site. Following review of all available information, SynergyAspen agrees on this number, but has renamed the five APECs to group similar features more appropriately. Table C, below, summarizes the APECs that SynergyAspen has identified at the Site and the associated Potential Contaminants of Concern (PCOCs), which are also presented on Drawing PAR6207-002 in the Drawings Appendix.

TABLE C: Summary of APECs Associated with Activities at F-36 60-10-123-15

ID	APECs	Contaminants	PCOCs
A	Wellbore Area	Drilling Mud, Petroleum Hydrocarbons, Condensate, Metals, and Produced Water	BTEX, PHCs Fraction 1 to 4 (F1-F4)
B	DWDA	Drilling Mud, Petroleum Hydrocarbons, Condensate, Metals, and Produced Water	BTEX, PHCs Fraction 1 to 4 (F1-F4), PAHs, Metals, Salinity
C	Flare Area	Petroleum Hydrocarbons, Condensate, Metals, and Produced Water	BTEX, PHCs Fraction 1 to 4 (F1-F4)
D	Lagoon Area	Petroleum Hydrocarbons, Condensate, Metals, and Produced Water	BTEX, PHCs Fraction 1 to 4 (F1-F4), PAHs, Metals, Salinity
E	Production Infrastructure and Pipelines	Petroleum Hydrocarbons, Condensate, Metals, and Produced Water	BTEX, PHCs Fraction 1 to 4 (F1-F4), PAHs, Metals, Salinity

Notes:

* BTEX: Benzene, Toluene, Ethylbenzene, Xylene
* PHCs: Petroleum Hydrocarbons
* Testing for all identified analytical parameters is not necessarily considered mandatory to confirm environmental quality. The necessity for groundwater and soil vapour analyses is subject to the results of the soil analyses.

3.5. Data Gaps

Based on SynergyAspen's review of the historical reports and files, all APECs have been identified and assessed for the PCOCs that are applicable. Additional supplemental site investigations are not required to address any gaps in the initial investigation.

4. REGULATORY SUMMARY

The Northwest Territories (NT) Environmental Guidelines for Contaminated Site Remediation (Government of the Northwest Territories (GNWT), 2003) follows and references standards from the CCME documentation. These documents have limited selection of land use criteria, which does not include natural areas. As the Site is located in a remote forested area, it is considered that the following Alberta regulatory standards are applicable at the time this report was prepared:

- Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Alberta Tier 1 Guidelines) (Alberta Environment and Parks (AEP), 2019)
- Alberta Tier 2 Soil and Groundwater Remediation Guidelines (Alberta Tier 2 Guidelines) (Alberta Environment and Parks (AEP), 2019)
- Alberta – Subsoil Petroleum Guidelines for Remote Forested Sites in the Green Area (Alberta Subsoil Guidelines) (Alberta Environment and Sustainable Resource Development (ERSD), 2014).
- Alberta – Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification (Alberta Energy Regulator (AER), 2014).

For this Site, it was determined that the freshwater aquatic life (FAL) pathway can be removed due to the following:

- The Site is located on Crown land in a remote forested area and there are no water wells or surface bodies found within 300 m of the Site.
- The borehole logs and laboratory particle size analysis indicated that the underlying soil is predominately fine-grained soils.

SynergyAspen also attempted to determine the applicability of the Domestic Use Aquifer (DUA) pathway for this site. Test pit particle size analysis results showed a layer of sand underlying the site from 4.8 to 6.5 mbg, which does not support the presence of a 5 m confining layer present on the site. As such, SynergyAspen concludes that the DUA pathway cannot be eliminated at this time.

The determination of the applicable groundwater use directly affects the site-specific factors used in determining active soil pathways and subsequently soil guidelines. Water use determination must take into consideration not only the current use, but also the future use of the groundwater aquifers as drinking water sources.

Thus, soil analysis results were compared to the Alberta Tier 1 and Tier 2 Soil Remediation Guidelines for Natural Land Use: fine-grained soils with the FAL pathway removed, Subsoil Petroleum Guidelines for Remote Forested Sites in the Green Area, and all other receptors and pathways applicable.

During the SSI completed by SynergyAspen in 2021/2022, SynergyAspen used the following guidelines to evaluate the analytical data:

- For depths above 1.5 meters below grade (mbg): AB Tier 1 and Tier 2 Natural Area Surface – Natural Fine-Grained Soils
- For depths below 1.5 mbg: AB Tier 1 and Tier 2 Natural Area Sub-Surface – Natural Fine-Grained Soils

During the Phase II ESA completed by North Shore in May of 2017, North Shore used the following guidelines to evaluate their analytical data:

- CCME 2017 Tier 1 Soil Remediation Guidelines
- 2003 Northwest Territories Environmental Guidelines for Contaminated Site Remediation
- 2016 Alberta Tier 1 Soil and Groundwater Remediation Guidelines (North Shore, 2017b).

4.1. Quality Assurance/Quality Control

SynergyAspen follows Quality Assurance/Quality Control protocols for all sampling and analysis and ensures that all data is handled appropriately. Details of the QA/QC program are outlined in Appendix III.

5. RESULTS OF SUPPLEMENTAL INVESTIGATION

5.1. Soil Stratigraphy

The borehole, excavation, and test pit logs, attached in Appendix IV, provide details on the soil stratigraphy at the Site. SynergyAspen has made the following observations based on the field observations:

- Three (3) soil samples at varying depths at the background location (BH21-01) and six (6) samples at varying depths at another background location were analyzed for particle size analysis to determine soil texture. The results of the analyses indicated that the underlying geology is fine-grained and has clay loam and sandy clay loam, with a sandy layer beginning at 4.8 mbg. Table 1, in the Tables Appendix, lists the results of the soil particle size analyses.

- Soil stratigraphy in the background borehole at the Site consisted of silty, sandy clay and trace gravel from surface to 1.2 mbg, overlying some gravel to the maximum explored depth of 4.3 mbg.

- Soil stratigraphy in the background test pit at the Site consisted of silty, sandy clay and trace gravel from surface to 1.2 mbg, overlying some gravel to the maximum explored depth of 4.3 mbg. Laboratory results indicated a sandy layer from 4.8 mbg to a maximum explored depth of 6.5 mbg.

- Boreholes on the Site were consistent with silty, sandy clay and trace gravel from surface to the maximum explored depth of 3.0 mbg; trace black staining was found between 1.2 – 1.9 mbg in the flare area and wellbore delineation boreholes, but concentrations of regulated parameters did not exceed the applicable Guideline in any delineation boreholes.

5.2. Soil Analytical Results

SynergyAspen reviewed the soil analytical results presented in North Shore's Phase II ESA report to determine the extent of the impacted soil, and to ascertain the additional environmental investigation required for the Site. The concentrations of regulated parameters reported in soil samples collected during the North Shore Phase II ESA that were greater than the applicable guidelines are presented in Table D, below.

TABLE D: Summary of Exceedances Identified by North Shore in the 2017 Phase II ESA

APEC	Sample ID	Depth (m)	F2	F3	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
Wellbore Area	17BH01	0.8-1.0	**5,060**	**22,600**	<0.005	<0.05	<0.01	<0.05	-
		1.7-2.9	**864**	**3,160**	0.027	<0.05	0.026	0.90	-
		DUP (1.7-2.9)	**1,420**	**4,970**	0.028	<0.05	0.036	**1.21**	-
Flare Area	17BH19	0.3-0.5	<10	48	0.007	<0.05	<0.01	<0.05	<0.005
		1.7-1.9	335	36	**0.372**	0.12	**2.52**	**1.59**	1.04
		3.2-3.4	<10	<10	0.023	<0.05	0.17	0.55	0.014
Alberta Tier 1 Guidelines (surface)			*150*	*1,300*	*0.046*	*0.52*	*0.073*	*0.99*	*0.014*
Alberta Tier 1 Guidelines (sub-surface)			*300*	*2,600*	*0.046*	*0.52*	*0.073*	*0.99*	*0.014*
Alberta Tier 2 Guidelines (surface)			*150*	*1,300*	*0.046*	*0.52*	*0.073*	*0.99*	*28*
Alberta Tier 2 Guidelines (sub-surface)			*1,500*	*3,500*	*0.046*	*0.52*	*0.073*	*0.99*	*28*

All units reported in µg/g unless otherwise specified.
Underlined – denotes concentrations that exceed the applicable Alberta Tier 1 Guidelines.
Bold – denotes concentrations that exceed applicable Alberta Tier 2 Guidelines.

SynergyAspen determined that the freshwater aquatic life pathway was not applicable to this Site (see Section 4 for more information). The concentrations of the regulated parameters reported in soil samples collected during the North Shore Phase II ESA after this pathway was removed are presented in Table E, below.

TABLE E: Summary of Exceedances After FAL Pathway Removed

APEC	Sample ID	Depth (m)	F2	F3	Benzene	Ethylbenzene	Xylenes
Wellbore Area	17BH01	0.8-1.0	**5,060**	**22,600**	<0.005	<0.01	<0.05
		1.7-2.9	**864**	**3,160**	0.027	0.026	0.90
		DUP (1.7-2.9)	**1,420**	**4,970**	0.028	0.036	**1.21**
Flare Area	17BH19	1.7-1.9	335	36	**0.372**	**2.52**	**1.59**
Alberta Tier 1 Guidelines (surface)			*150*	*1,300*	*0.046*	*0.073*	*0.99*
Alberta Tier 1 Guidelines (sub-surface)			*300*	*2,600*	*0.046*	*0.073*	*0.99*
Alberta Tier 2 Guidelines (surface)			*150*	*1,300*	*0.046*	*0.073*	*0.99*
Alberta Tier 2 Guidelines (sub-surface)			*1,000*	*3,500*	*120*	*240*	*130*

All units reported in µg/g unless otherwise specified.
Underlined – denotes concentrations that exceed the applicable Alberta Tier 1 Guidelines.
Bold – denotes concentrations that exceed applicable Alberta Tier 2 Guidelines.

In October of 2021, SynergyAspen drilled an additional seven (7) boreholes to delineate the impacted soil in the Wellbore and Flare Areas, as well as to provide data for a grain-size analysis to determine the applicability of FAL and DUA pathways (See section 4). There were no concentrations of regulated parameters reported in soil samples that were greater than the applicable Alberta Tier 1 guidelines. In January of 2022, SynergyAspen excavated the Wellbore and Flare Areas and sent the samples collected from the walls and base of the excavation to the lab for testing. The concentrations reported by the lab for the regulated parameters in soil samples collected from the walls and the base of the Wellbore Area were below the applicable guidelines. The Wellbore Area was backfilled with imported fill prior to the excavation equipment mobilizing of the Site. The analytical laboratory reports for these samples can be found in Appendix V. A visual representation of the environmental work completed by SynergyAspen in 2021/2022 is presented on Drawings PAR6207-003 and PAR6207-004.

6. DISCUSSION

SynergyAspen reviewed North Shore Environmental Consultants' Phase I ESA and Phase II ESA Reports from March and May of 2017, respectively, and SynergyAspen's Desktop Remediation Report from July of 2021. The soil analytical data was reviewed to determine the additional environmental work required to investigate the Site. SynergyAspen then completed the SSI and drilled an additional seven (7) boreholes at the Wellbore and Flare Areas to delineate the impacted soil and obtain grain size analysis data in October of 2021 and completed a test pit for particle size analysis and excavations of the Wellbore and Flare Areas in January of 2022. A discussion of the results that exceed the applicable standards applied by SynergyAspen are included below.

6.1. Wellbore Area

North Shore Environmental Consultants (North Shore) completed a Phase II ESA in May of 2017. This Phase II ESA indicated further environmental investigation of the Wellbore Area, specifically around borehole 17BH01, was required to determine the extent of the impacted soil. The borehole; 17BH01; contained concentrations of F2, F3, Benzene, and Ethylbenzene parameters that exceeded the applicable Alberta Tier 2 Guidelines. The results were as follows:

- 17BH01 (0.8-1.0 mbg): F2 and F3 exceedances
- 17BH01 (1.7-2.9 mbg): F2 and F3 exceedances
- 17BH01 DUP (1.7-2.9 mbg): F2, F3, and xylene exceedances

After reviewing North Shore's Phase II ESA, SynergyAspen determined vertical and horizontal delineation of the Wellbore Area was required. In October of 2021, SynergyAspen advanced three (3) boreholes to delineate 17BH01 (BH21-02, BH21-03 and BH21-05), to the north, east, and south of the Wellbore Area. There were no concentrations reported of BTEX or F1-F4 parameters that exceeded the Alberta Tier 1 Guidelines. The soil analytical results are presented in Table 2, and a visual representation is provided in Drawing PAR6207-003 in the Drawings Appendix.

During the investigation conducted in October 2021, SynergyAspen completed additional environmental investigation of the Site and concluded the FAL pathway was no longer applicable at the Site (as referenced in Section 4). The F2, F3, and xylene exceedances identified by North Shore in May of 2017 remained in exceedance of the applicable guidelines; thus, environmental remediation of the Wellbore Area was required.

An excavation of the Wellbore Area was completed in January of 2022, and twenty-two (22) soil samples were collected from the limits of the excavation and analyzed. All samples reported concentrations below the applicable Tier 2 Guidelines for all parameters tested. The soil analytical results are presented in Table 3, and a visual representation is provided in Drawing PAR6207-003 in the Drawings Appendix.

The Wellbore Area remediation work consisted of mechanically excavating 295.56 tonnes of soil and disposing it at the approved Secure Energy Northern Rockies landfill (Facility UWI: A-77-G/94-J-10). The concentrations of regulated parameters in samples collected from the walls and the base of the Wellbore Area were below the applicable guidelines, and the Wellbore Area was backfilled with imported fill before leaving the site.

6.2. Flare Area

North Shore Environmental Consultants (North Shore) completed a Phase II ESA in May of 2017. This Phase II ESA indicated further environmental investigation of the Flare Area, specifically around borehole 17BH19, was required to determine the extent of the impacted soil. The borehole 17BH19; contained concentrations of F2, benzene, ethylbenzene, and xylene parameters that exceeded the applicable Alberta Tier 2 Guidelines. The results were as follows:

- 17BH19 (1.7-2.9 mbg): F2, benzene, ethylbenzene, xylene exceedances

After reviewing North Shore's Phase II ESA, SynergyAspen determined vertical and horizontal delineation of the Flare Area was required. In October of 2021, SynergyAspen advanced three (3) boreholes to delineate 17BH19, to the northeast (BH21-06), northwest (BH21-07), and south (BH21-04) of the Flare Area. There were no concentrations of BTEX or F1-F4 parameters that exceeded the Alberta Tier 1 Guidelines. The soil analytical results are presented in Table 2, and the excavation site plan and Detailed soil analytical results (wellbore area) is provided in Drawing PAR6207-004.

While onsite during operations conducted on October of 2021, SynergyAspen completed additional environmental investigation of the Site and concluded the FAL pathway was no longer applicable at the Site (as referenced in Section 4); thus, the Naphthalene concentrations identified in Northshore's 2017 report do not exceed the applicable Alberta Tier 2 guidelines.

The Flare Area was excavated, and twenty-three (23) soil samples collected from the limits of the excavation and four (4) samples from the stockpile onsite were collected. The results for the stockpile samples reported results below the applicable guidelines and was determined to be suitable material for backfill. The flare area was then backfilled utilizing the stockpiled material in 75-mm lifts, nominally compacted with the excavator bucket and recontoured to match the surrounding grade.

SynergyAspen could not replicate the exceedances located at the flare pit observed by North Shore in the 2017 Phase II ESA, and no samples from either the soil stockpile or the excavation walls and floor contained concentrations of any parameters that exceeded the applicable Alberta Tier 1 and Tier 2 guidelines. It is the opinion of SynergyAspen that the Flare Area does not have any PCOCs that are likely to pose a risk to receptors; thus, no further environmental investigation is required. As such, the stockpiled soil was backfilled to the excavated Flare Area and is no longer considered an area of concern.

6.3. Historical Unknown Spill

During the 2017 Phase I ESA completed by North Shore, it was indicated that in the year 2000, 800 L of drilling waste was spilled on the access road, with the location undetermined.

During the 2017 Phase II ESA completed by North Shore, the historic spill along the access road was not investigated as snow cover prevented identification of the location of the spill. A Site Inspection will be completed in Q2 or Q3 of 2022 or when snow is not on the ground to determine if location of the spill can be identified. If identified, soil samples will be collected for laboratory analysis and remediation conducted if required. The spill reports from North Shore are included in Appendix VII.

As of January 19, 2022, SynergyAspen received the Spill Report from the prior environmental consultant (North Shore Environmental Consultants Inc.). North Shore Phase II ESA Report identified the spill was cleaned up by windrowing impacted snow to the middle of the access road, followed by removal of impacted snow to the remote drilling waste lined sump located at O-35.

7. CONCLUSIONS

Conclusions of the SSI are as follows:

- During the 2017 Phase II ESA completed by North Shore, thirty-seven (37) boreholes were advanced for the purpose of soil sample collection. North Shore observed concentrations of BTEX, PHCs Fraction 1 to 4 (F1-F4), PAHs, Metals, Salinity that exceeded the applicable CCME guidelines in the Wellbore and Flare Areas.

- During the 2021 Desktop Remediation completed by SynergyAspen, analytical results from North Shore's Phase II ESA were reviewed by SynergyAspen to confirm the areas of concern for further investigation. Based on a review of results from the 2017 Stage 2 ESA at the Site, SynergyAspen determined that the PAH, arsenic, chromium and salinity exceedances at the Site were reasonably expected to pose no risk to receptors at the Site. Rationale for the determination was based on the applicable guideline limits with receptor pathways removed; the lack of associated contaminant impacts; low regional soil infiltration rates; naturally occurring metals in the soil profile; and the depths of the samples.

- During the 2021/2022 Supplemental Site Investigation completed by SynergyAspen, seven (7) boreholes were drilled to delineate the impacted soil at the Wellbore and Flare Areas, as well as in the background to provide data for grain size analysis. A test pit was advanced to provide additional PSA data in an attempt to eliminate the DUA pathway, but evidence of a 5 m confining layer was not found. The Wellbore and Flare Areas were excavated, and forty-five (45) soil samples from the two AECs and four (4) stockpile samples from the Flare Area were collected. There were no concentrations of regulated parameters reported in any soil samples in the excavation limits or the Flare Area stockpiled soil that were greater than the applicable Alberta Tier 1 and Tier 2 guidelines. The Flare Area was backfilled with the original soil stockpiled on site, while the 295.56 tonnes of impacted soil from the wellbore area was removed and disposed of at the approved Secure Energy Northern Rockies landfill (Facility UWI: A-77-G/94-J-10). The wellbore area was then backfilled before leaving the site.

- Soil stratigraphy at the background borehole at the Site consisted silty, sandy clay and trace gravel from surface to 4.3 mbg, with some gravel present from 1.2 to 4.3 mbg. Boreholes on the Site were consistent, with silty, sandy clay and trace gravel from surface to the maximum explored depth of 3.0 mbg; trace black soil was found between 1.2 – 1.9 mbg in the flare area and wellbore delineation boreholes, but no exceedances were found. Test pit data collected from the background test pit indicated a sand layer was present from 4.8 mbg to the maximum explored depth of the test pit (6.5 mbg).

- Further restoration work or a Site visit should be conducted to ensure adequate compaction, drainage and re-vegetation is progressing on the Site.

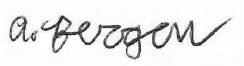
Based on the results of this supplemental investigation, SynergyAspen concludes that the APECs investigated onsite Site have been adequately investigated, however, further environmental assessment work is required to assess the historical spill along the access road. It is SynergyAspen's opinion that a closure application can be submitted to the OROGO on Paramount's behalf for the lease site.

The general limitations of this document are included in Section 10.

8. PROFESSIONAL STATEMENT

This report was written by Andrew Bergen and reviewed by Sabrina McCarthy and Darren Purves. If you have any questions or comments, please do not hesitate to contact our Fort St. John Office at 250-785-1030 to be redirected to the undersigned.

Respectfully Submitted,



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9. REFERENCES

Alberta Energy Regulator (AER). (2014). Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification. March 2014.

Alberta Environment and Parks (AEP). (2019). Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 198 pp.

Alberta Environment and Parks (AEP). (2019). Alberta Tier 2 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 140 pp.

Alberta Environment and Sustainable Resource Development (ESRD). (2014). Subsoil Petroleum Hydrocarbon Guidelines for Remote Forested Sites in the Green Area. 6 pp.

Alberta Environmental and Parks (AEP). (2016). Alberta Environmental Site Assessment Standard. March 1, 2016.

Canada Energy Regulator (CER). (2021). Incident Data. https://www.cer-rec.gc.ca/en/safety-environment/industry-performance/interactive-pipeline/incident-data.html. Accessed January 10, 2022.

Canadian Council of Ministers of the Environment (CCME). (1996). Guidance Manual for Developing Site-Specific Soil Quality Remediation Objectives for Contaminated Sites.

Canadian Council of Ministers of the Environment (CCME). (1999 and updates). Canadian Environmental Quality Guidelines. Canadian Council of Ministers of the Environment, Winnipeg.

Government of Alberta. (2020). Subsoil Salinity Tool Version 3.0 User Manual. November 2020.

Government of British Columbia. (2022). British Columbia Geological Survey MapPlace 2 Resource. https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/british-columbia-geological-survey/mapplace. Accessed April 5, 2022

Government of the Northwest Territories (GNWT). (2003). Guideline for Contaminated Site Remediation. November 2003.

Government of the Northwest Territories (GNWT). (2021). Environment and Natural Resources: Spills. https://www.enr.gov.nt.ca/en/spills. Accessed January 10, 2022.

Government of the Northwest Territories (GNWT). (2021). ATLAS Map Viewer. https://www.maps.geomatics.gov.nt.ca/HTML5Viewer_Prod/index.html?viewer=ATLAS. Accessed January 10, 2022.

Ministry of Environment and Climate Change Strategy (MECCS). (2017). Protocol 2 for Contaminated Sites – Site-Specific Numerical Soil Standards (Version 2.1).

Ministry of Environment and Climate Change Strategy (MECCS). (2017). Technical Guidance on Contaminated Sites – Groundwater Protection Model (Version 2.0).

North Shore Environmental Consultants (2017). Phase I Environmental Site Assessment of F36 60-10-123-15. WID 1841. Fort Liard, Northwest Territories. March, 2017.

North Shore Environmental Consultants (2017). Phase II Environmental Site Assessment of F36 60-10-123-15. WID 1841. Fort Liard, Northwest Territories. May, 2017.

SynergyAspen Environmental Inc. (2021). Desktop Remediation Report of F36 60-10-123-15. WID 1841. Fort Liard, Northwest Territories. July 29, 2021.

10. USER RELIANCE AND GENERAL LIMITATIONS

10.1. User Reliance

SynergyAspen Environmental Inc. (SynergyAspen) prepared this report for the sole use of Paramount Resources Ltd., hereafter referred to as the Client. The Client was privy to the establishment of this project's scope and is aware of its terms and conditions.

Should the Client submit this report to a regulatory authority, the regulatory authority may rely on the results within the context of the document's General Limitations for the purpose of determining whether the Client is meeting (has met) its requirements concerning applicable environmental regulations.

Third party reliance is subject to the scope of work agreed upon by SynergyAspen and the Client and is only suitable within the limitations of the project/document. The activities detailed herein were performed for the Client and this document may not be appropriate for the purposes of a relying party. Application of this document for aims beyond those practically intended by the Client and SynergyAspen is at the exclusive risk of the user. SynergyAspen does not accept legal responsibility for any damages toward any third party as a result of the application, use of, or any conclusion drawn based on this report.

As far as the nature of these investigative activities involves professional opinion, SynergyAspen offers no assurance that the results contained herein support a particular course of action. The investigative activities may have included the application of judgment to scientific principles; hence certain results of this work may be based on subjective interpretation. Professional opinions expressed herein are derived from the specifics currently available within the confines of the existing information, scope of work, budget, and schedule.

10.2. General Limitations

The results and conclusions herein were developed according to the degree of care and skill generally exercised by contemporary environmental professionals within similar conditions and localities. The findings herein are somewhat reliant upon information provided by others. If any of the information is erroneous, amendments to the results, conclusions, and recommendations may be required.

The results, conclusions, and recommendations SynergyAspen presents herein represent SynergyAspen's best professional judgement according to the site conditions and based on available information during preparation of this report. They were determined explicitly for this site and are somewhat reliant upon visual observation of the site, subsurface investigation at specific locations and depths, and select analysis of specific materials (as detailed herein).

While this assessment has attempted to identify all areas of potential environmental concern at the Site, it is possible that other areas of potential environmental concern may have escaped detection due to imprecise government records, undocumented historical environmental accidents, or other undocumented activities that resulted in contamination.

TABLES

TABLE 1: Soil Particle Size Analysis

APEC	Background		
Borehole ID	BH21-01		
Sample ID	BH21-01-02	BH21-01-04	BH21-01-09
Sample Depth (m)	1.20-1.52	2.56-2.80	3.98-4.30
Sample Date	03/Oct/21	03/Oct/21	03/Oct/21
HSVC (ppm)	0	25	110
EC (mS/m)	0.33	0.82	0.66

Parameter	**Unit**			
Sieve Texture[1]	N/A	Loam	Loam	Clay Loam
Particle Size Distribution (Sand; 50 µm - 2 mm)	% by weight	38	46	48
Particle Size Distribution (Silt; 2 µm - 50 µm)	% by weight	32	22	22
Particle Size Distribution (Clay; <2 µm)	% by weight	30	32	30

Footnotes:

APEC = Area of Potential Environmental Concern

[1] Fine-grained soils are defined as 50% or more by mass pass a 75 µm seive; coarse-grained soils have less than 50% by mass pass a 75 µm seive (AEP, 2019).

µm = microns or micrometers

mm = milimetres

m = metres below grade/surface

APEC	17BH01 Delineation (Wellbore Area)										17BH19 Delineation (Flare Area)					
Borehole ID	BH21-02		BH21-05		BH21-03						BH21-04		BH21-06		BH21-07	
Sample ID	**BH21-02-02**	**BH21-02-04**	**BH21-05-02**	**BH21-05-04**	**BH21-03-02**	**BH21-03-03**	**BH21-03-04**	**BH21-03-05**	**BH21-03-06**	**QA/QC RPD (%)**	**BH21-04-02**	**BH21-04-04**	**BH21-06-02**	**BH21-06-04**	**BH21-07-02**	**BH21-07-04**
Sample Depth (m)	0.80-1.00	1.70-1.90	0.80-1.00	1.70-1.90	0.80-1.00	1.20-1.60	1.70-1.90	2.60-3.00	Duplicate		0.64-0.96	1.70-1.90	0.56-0.96	1.70-1.90	0.56-0.96	1.70-1.90
Sample Date	**3-Oct-21**	**3-Oct-21**	**4-Oct-21**	**4-Oct-21**	**3-Oct-21**	**3-Oct-21**	**3-Oct-21**	2.6-3.0			**3-Oct-21**	**3-Oct-21**	**4-Oct-21**	**4-Oct-21**	**4-Oct-21**	**4-Oct-21**
HSVC (ppm)	0	50	25	35	40	50	10	185			0	70	20	20	20	20

TABLE 2: Summary of Analytical Results of Natural Area Surface Natural fine grained soils

Chemical Group	**Parameter**	AB-Tier 1 Guideline (mg/kg)															
Hydrocarbons	Benzene	**0.046**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Ethylbenzene	**0.073**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Toluene	**0.52**	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Xylenes (Total)	**0.99**	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	*	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
	F1 (C6-C10)-BTEX	**210**	<10	<10	<10	<10	<10	<10	<10	<10	<10	*	<10	<10	<10	<10	<10	<10
	F2 (C10-C16)	**150**	<25	<25	<25	<25	<25	<25	<25	<25	<25	*	<25	<25	<25	<25	<25	<25
	F3 (C16-C34)	**1,300**	<50	<50	<50	<50	<50	<50	<50	52	56	7	<50	<50	68	61	<50	<50
	F4 (C34-C50)	**5,600**	<100	<100	<100	<100	<100	<100	<100	<100	<100	*	<100	<100	<100	<100	<100	<100
Moisture	Moisture Content (%)	**N/A**	12.20	12.60	12.00	12.80	11.80	12.00	15.20	11.30	9.86	14	11.90	14.10	13.20	14.30	13.90	16.90

BOLD Concentration greater than AB- Tier 1 standard.

Footnotes:

Alberta Environment and Parks (AEP) January 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

APEC - Area of Potential Environmental Concern

APEC	Wellbore Area					
Excavation ID	EXC22-01					
Sample ID	EXC22-01-01	EXC22-01-02	EXC22-01-03	EXC22-01-04	EXC22-01-05	EXC22-01-06
Sample Depth (m)	0.50 - 0.60	0.50 - 0.60	0.50 - 0.60	0.50 - 0.60	0.50 - 0.60	0.50 - 0.60
Sample Date	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22
HSVC (ppm)	5	0	0	5	5	0
EC (mS/m)	0.23	0.35	0.19	0.16	0.34	0.1

TABLE 3a: Summary of Analytical Results of Natural Area Surface Natural fine grained soils

Chemical Group	Parameter	AB-Tier 1 Guideline[a]	AB-Tier 2 Guideline[b]	Remote Forested Green Area Guideline[c]						
Hydrocarbons	Benzene	**0.046**	**0.046**	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Ethylbenzene	**0.073**	**0.073**	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Toluene	**0.52**	**0.52**	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Xylenes (Total)	**0.99**	**0.99**	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
	F1 (C6-C10)-BTEX	**210**	**210**	**Tier 1**	<10	<10	<10	<10	<10	<10
	F2 (C10-C16)	**150**	**150**	**150**	<25	<25	<25	<25	<25	<25
	F3 (C16-C34)	**1,300**	**1,300**	**1,300**	<50	<50	<50	103	<50	109
	F4 (C34-C50)	**5,600**	**5,600**	**Tier 1**	<100	<100	<100	<100	<100	<100
Moisture	Moisture Content (%)	**N/A**	**N/A**	**N/A**	12.10	14.50	13.80	15.70	11.90	10.90

BOLD Concentration greater than the least-stringent applicable standard.

Footnotes:

a Alberta Environment and Parks (AEP) January 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

b Alberta Environment and Parks (AEP). 2019. Alberta Tier 2 Soil and Groundwater Remediation Guidelines. Protection of Aquatic Life pathway has been eliminated because there is no surface water body within 300m down gradient or 100m up gradient.

c Alberta Environment and Parks (AEP) September 2014. Subsoil Petroleum Hydrocarbon Guidelines for Remote Forested Sites in the Green Area

APEC - Area of Potential Environmental Concern

APEC	Wellbore Area																	
Excavation ID	EXC22-01																	
Sample ID	EXC22-01-07	EXC22-01-08	EXC22-01-09	EXC22-01-10	EXC22-01-19	QA/QC	EXC22-01-11	EXC22-01-12	EXC22-01-13	EXC22-01-14	EXC22-01-15	EXC22-01-16	EXC22-01-17	EXC22-01-18	EXC22-01-20	EXC22-01-22	QA/QC	EXC22-01-21
Sample Depth (m)	1.50 - 1.60	1.50 - 1.60	1.50 - 1.60	1.50 - 1.60	Duplicate	RPD	1.50 - 1.60	1.50 - 1.60	2.50 - 2.60	2.50 - 2.60	2.50 - 2.60	2.50 - 2.60	2.50 - 2.60	2.50 - 2.60	3.10 - 3.20	Duplicate	RPD	3.10 - 3.20
Sample Date	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22		(%)	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22			14-Jan-22
HSVC (ppm)	0	10	5	5			10	5	15	5	0	40	15	5	45			45
EC (mS/m)	0.34	0.65	0.35	0.32			0.41	0.29	0.84	0.28	0.35	0.44	0.32	0.31	0.67			0.54

TABLE 3b: Summary of Analytical Results of Natural Area Sub-Surface Natural fine grained soils

Chemical Group	Parameter	AB-Tier 1 Guideline[a]	AB-Tier 2 Guideline[b]	Remote Forested Green Area Guideline[c]																		
Hydrocarbons	Benzene	**0.046**	**0.046**	-	<0.005	<0.005	<0.005	<0.005	<0.005	*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.005	18%	<0.005
	Ethylbenzene	**0.073**	**0.073**	-	<0.005	<0.005	<0.005	<0.005	<0.005	*	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	0.006	0.006	*	<0.005
	Toluene	**0.52**	**0.52**	-	<0.02	<0.02	<0.02	<0.02	<0.02	*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	*	<0.02
	Xylenes (Total)	**0.99**	**0.99**	-	<0.03	<0.03	<0.03	<0.03	<0.03	*	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	*	<0.03
	F1 (C6-C10)-BTEX	**420**	**420**	**Tier 1**	<10	<10	<10	<10	<10	*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	*	<10
	F2 (C10-C16)	**300**	**300**	**10,000**	<25	<25	<25	<25	<25	*	<25	<25	<25	<25	<25	151	<25	<25	<25	27	*	<25
	F3 (C16-C34)	**2,600**	**2,600**	**14,000**	<50	83	<50	<50	<50	*	<50	69	<50	<50	<50	360	<50	<50	74	110	39%	<50
	F4 (C34-C50)	**12,200**	**12,200**	**Tier 1**	<100	<100	<100	<100	<100	*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	*	<100
Moisture	Moisture Content (%)	**N/A**	**N/A**	**N/A**	14.90	11.60	12.80	14.80	15.60	5%	15.10	9.21	13.10	12.50	13.50	10.80	13.30	12.80	11.90	13.30	11%	15.00

BOLD Concentration greater than the least-stringent applicable standard.

Footnotes:

a Alberta Environment and Parks (AEP) January 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

b Alberta Environment and Parks (AEP). 2019. Alberta Tier 2 Soil and Groundwater Remediation Guidelines. Protection of Aquatic Life pathway has been eliminated because there is no surface water body within 300m down gradient or 100m up gradient.

c Alberta Environment and Parks (AEP) September 2014. Subsoil Petroleum Hydrocarbon Guidelines for Remote Forested Sites in the Green Area

APEC - Area of Potential Environmental Concern

APEC	Flare Area			
Excavation ID	EXC22-02			
Sample ID	EXC22-02-01	EXC22-02-02	EXC22-02-03	EXC22-02-04
Sample Depth (m)	0.50 - 0.60	0.50 - 0.60	0.50 - 0.60	0.50 - 0.60
Sample Date	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22
HSVC (ppm)	10	15	10	15
EC (mS/m)	0.32	0.3	0.28	0.33

TABLE 4a: Summary of Analytical Results of Natural Area Surface Natural fine grained soils

Chemical Group	Parameter	AB-Tier 1 Guideline[a]	AB-Tier 2 Guideline[b]	Remote Forested Green Area Guideline[c]				
Hydrocarbons	Benzene	**0.046**	**0.046**	-	<0.005	<0.005	<0.005	<0.005
	Ethylbenzene	**0.073**	**0.073**	-	<0.005	<0.005	<0.005	<0.005
	Toluene	**0.52**	**0.52**	-	<0.02	<0.02	<0.02	<0.02
	Xylenes (Total)	**0.99**	**0.99**	-	<0.03	<0.03	<0.03	<0.03
	F1 (C6-C10)-BTEX	**210**	**210**	**Tier 1**	<10	<10	<10	<10
	F2 (C10-C16)	**150**	**150**	**150**	<25	<25	<25	<25
	F3 (C16-C34)	**1,300**	**1,300**	**1,300**	<50	<50	<50	<50
	F4 (C34-C50)	**5,600**	**5,600**	**Tier 1**	<100	<100	<100	<100
Moisture	Moisture Content (%)	**N/A**	**N/A**	**N/A**	13.50	15.30	12.00	12.20

BOLD Concentration greater than the least-stringent applicable standard.

Footnotes:

a Alberta Environment and Parks (AEP) January 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

b Alberta Environment and Parks (AEP). 2019. Alberta Tier 2 Soil and Groundwater Remediation Guidelines. Protection of Aquatic Life pathway has been eliminated because there is no surface water body within 300m down gradient or 100m up gradient.

c Alberta Environment and Parks (AEP) September 2014. Subsoil Petroleum Hydrocarbon Guidelines for Remote Forested Sites in the Green Area

APEC - Area of Potential Environmental Concern

TABLE 4b: Summary of Analytical Results of Natural Area Sub-Surface Natural fine grained soils

APEC					Flare Area																						Soil Stockpile		
Excavation ID					EXC22-02																						SP22-02		
Sample ID					**EXC22-02-05**	**EXC22-02-06**	**EXC22-02-07**	**EXC22-02-08**	**EXC22-02-09**	**EXC22-02-10**	**EXC22-02-22**		**EXC22-02-11**	**EXC22-02-12**	**EXC22-02-13**	**EXC22-02-14**	**EXC22-02-15**	**EXC22-02-16**	**EXC22-02-17**	**EXC22-02-18**	**EXC22-02-19**	**EXC22-02-20**	**EXC22-02-23**		**EXC22-02-21**	**SP22-02-01**	**SP22-02-02**	**SP22-02-04**	**SP22-02-05**
Sample Depth (m)					1.50 - 1.60	1.50 - 1.60	1.50 - 1.60	1.50 - 1.60	2.50 - 2.60	2.50 - 2.60	Duplicate	**QA/QC**	2.50 - 2.60	2.50 - 2.60	3.50 - 3.60	3.50 - 3.60	3.50 - 3.60	3.50 - 3.60	4.50 - 4.60	4.50 - 4.60	4.50 - 4.60	4.50 - 4.60	Duplicate	**QA/QC**	4.70	North Side	East Side	West Side	Top
Sample Date					14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22		**RPD**	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22		**RPD**	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22	14-Jan-22
HSVC (ppm)					5	20	0	20	10	5		**(%)**	0	5	15	10	5	5	10	10	0	10		**(%)**	20	5	5	10	15
EC (mS/m)					0.36	0.39	0.72	0.54	0.41	0.47			0.87	0.57	0.42	0.56	0.39	0.53	0.49	0.48	0.63	0.48			0.46	0.57	0.59	0.42	0.86
Chemical Group	**Parameter**	AB-Tier 1 Guideline[a]	AB-Tier 2 Guideline[b]	Remote Forested Green Area Guideline[c]																									
Hydrocarbons	Benzene	**0.046**	**0.046**	-	<0.005	<0.005	<0.005	<0.005	<0.005	0.009	<0.005	*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	*	<0.005	<0.005	<0.005	<0.005	<0.005
	Ethylbenzene	**0.073**	**0.073**	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	*	<0.005	<0.005	<0.005	<0.005	<0.005
	Toluene	**0.52**	**0.52**	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	*	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	*	<0.02	<0.02	<0.02	<0.02	<0.02
	Xylenes (Total)	**0.99**	**0.99**	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	*	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	*	<0.03	<0.03	<0.03	<0.03	<0.03
	F1 (C6-C10)-BTEX	**420**	**420**	**Tier 1**	<10	<10	<10	<10	<10	<10	<10	*	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	*	<10	<10	<10	<10	<10
	F2 (C10-C16)	**300**	**300**	**10,000**	<25	<25	<25	<25	<25	<25	<25	*	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	*	<25	<25	<25	<25	<25
	F3 (C16-C34)	**2,600**	**2,600**	**14,000**	86	<50	<50	<50	<50	<50	<50	*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	*	<50	<50	<50	<50	<50
	F4 (C34-C50)	**12,200**	**12,200**	**Tier 1**	<100	<100	<100	<100	<100	<100	<100	*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	*	<100	<100	<100	<100	<100
Moisture	Moisture Content (%)	**N/A**	**N/A**	**N/A**	12.90	14.80	16.80	18.40	15.10	13.00	13.70	5%	13.40	12.20	15.60	14.80	13.20	12.70	15.20	14.90	12.60	13.10	12.40	5%	16.70	14.90	16.50	14.80	16.60

BOLD Concentration greater than the least-stringent applicable standard.

Footnotes:

a Alberta Environment and Parks (AEP) January 2019. Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

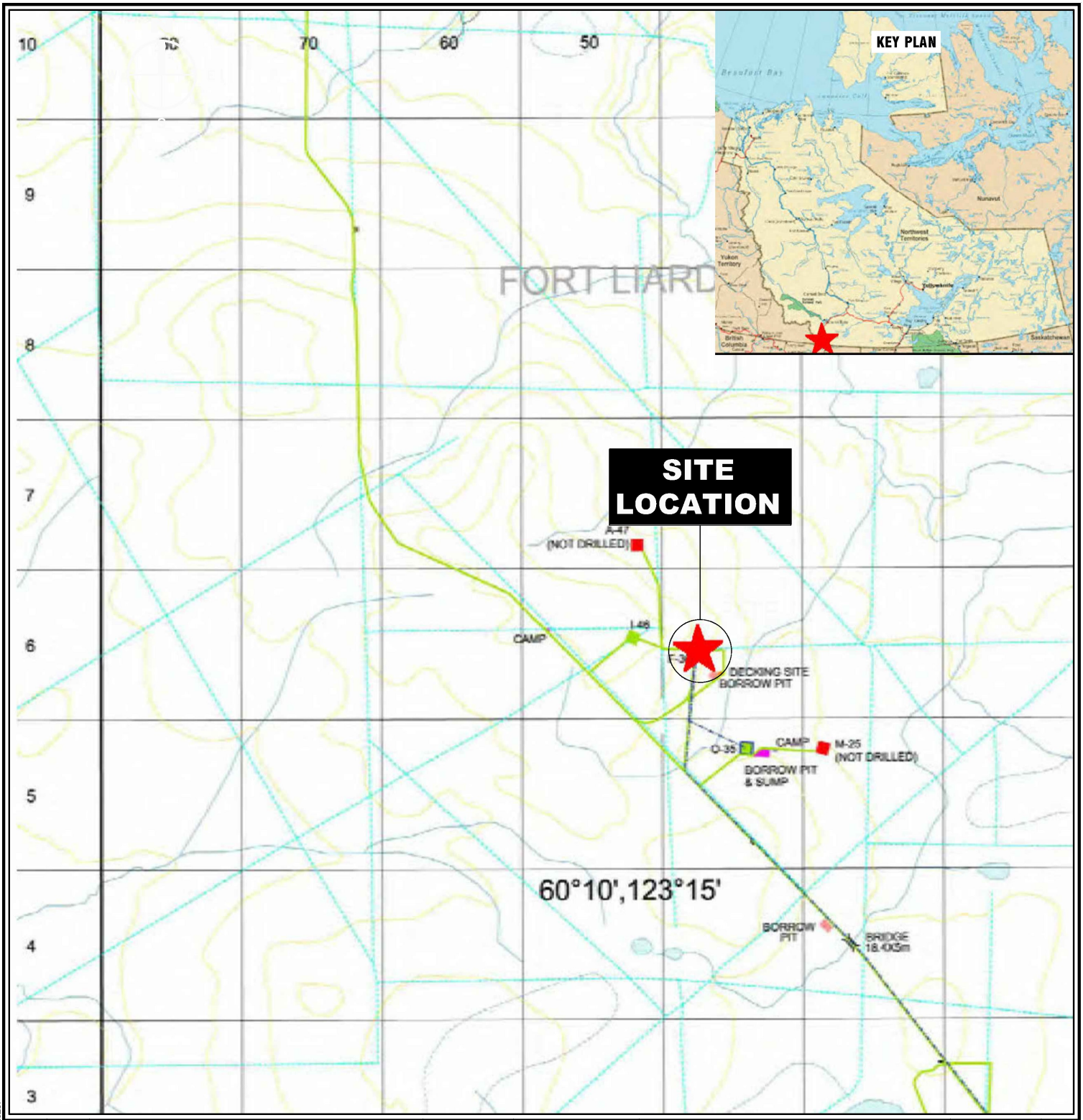
b Alberta Environment and Parks (AEP). 2019. Alberta Tier 2 Soil and Groundwater Remediation Guidelines. Protection of Aquatic Life pathway has been eliminated because there is no surface water body within 300m down gradient or 100m up gradient.

c Alberta Environment and Parks (AEP) September 2014. Subsoil Petroleum Hydrocarbon Guidelines for Remote Forested Sites in the Green Area

APEC - Area of Potential Environmental Concern

DRAWINGS

20210525.1051



CHK	BY	REVISION DESCRIPTION	DATE	REV.
AK	GA	ISSUED TO CLIENT	–	–
–	–	–	–	–

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
–	–	–	–
–	–	–	–

LEGEND

- DRAINAGE LINE
- ROADS
- WETLAND/MUSKEG
- OIL AND GAS WELLS
- PARA ET AL FORT LIARD 300/F-36 60-10-123-15 /00

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. DATA COMPILED BY SYNGIS: SYNERGYASPEN GEOGRAPHIC INFORMATION SYSTEM.
3. NORTH SHORE ENVIRONMENTAL FIGURES
4. ORIGINAL DRAWING PAPER SIZE 8.5x11 INCHES.

SynergyAspen ENVIRONMENTAL

TITLE:

SITE LOCATION PLAN
(60° 05' 27.12" N, 123° 22' 07.54" W)

CLIENT NAME: Paramount Resources Ltd.

SITE LOCATION: PARA ET AL F-36-60-10-123-15 Well ID #1841

DATE: 2021-05-25 | SCALE: 1:20,000 | DWN: GA | CHK'D: AK

PAR6207

DWG No: 001

PATH: C:\USERS\GAQUILO\APPDATA\LOCAL\TEMP\ACPUBLISH_16844\PAR6207

PLOT: 20220405.1339



APEC Label	APECs	Contaminants	PCOCs
A	Wellbore Area	Drilling Mud, Petroleum Hydrocarbons, Condensate, Metals, and Produced Water	BTEX, PHCs Fraction 1 to 4 (F1-F4), PAHs, Metals, Salinity
B	DWDA	Drilling Mud, Petroleum Hydrocarbons, Condensate, Metals, and Produced Water	BTEX, PHCs Fraction 1 to 4 (F1-F4), PAHs, Metals, Salinity
C	Flare Area	Petroleum Hydrocarbons, Condensate, Metals, and Produced Water	BTEX, PHCs Fraction 1 to 4 (F1-F4), PAHs, Metals, Salinity
D	Lagoon Area	Petroleum Hydrocarbons, Condensate, Metals, and Produced Water	BTEX, PHCs Fraction 1 to 4 (F1-F4), PAHs, Metals, Salinity
E	Production Infrastructure and Pipelines	Petroleum Hydrocarbons, Condensate, Metals, and Produced Water	BTEX, PHCs Fraction 1 to 4 (F1-F4), PAHs, Metals, Salinity

CHK	BY	REVISION DESCRIPTION	DATE	REV.
AB	GA	ISSUED TO CLIENT	–	0

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
–	SURVEY PLAN OF WELLSITE	–	–
–	NORTH SHORE ENVIRONMENTAL	–	–
–	–	–	–

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM SYNERGYASPEN FIELDNOTE AND GOGGLE IMAGE. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
3. ORIGINAL DRAWING PAPER SIZE 17x11 INCHES

0 10 20 30 40 50 60

LEGEND

- WELLBORE
- BOREHOLE LOCATION (SYNERGY)
- EXPLORATORY TEST HOLE LOCATION
- APPROXIMATE LEASE BOUNDARY

SynergyAspen ENVIRONMENTAL

TITLE:

AREAS OF POTENTIAL ENVIRONMENTAL CONCERN AND BOREHOLE LOCATIONS PLAN

CLIENT NAME: Paramount Resources Ltd.

SITE LOCATION: PARA ET AL F-36-60-10-123-15
Well ID # 6155

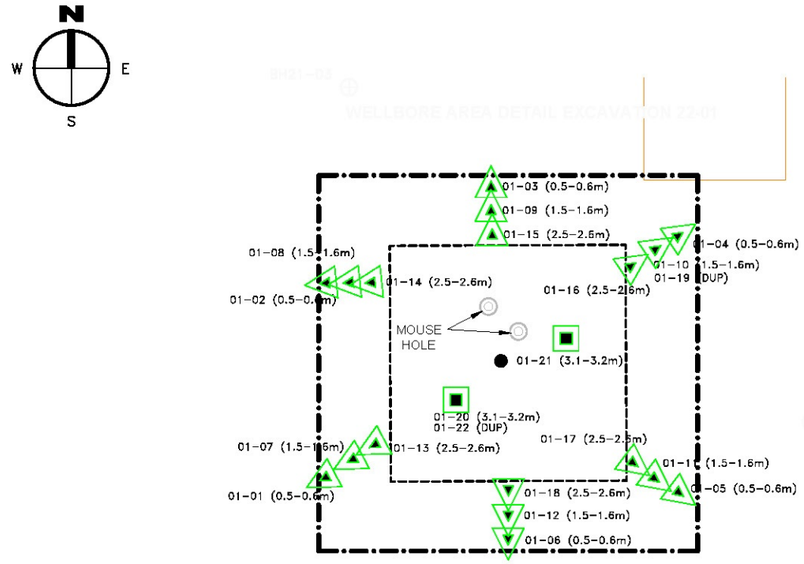
DATE: 2022-04-05
SCALE: 1:1,200
DWN: GA CHK'D: AB

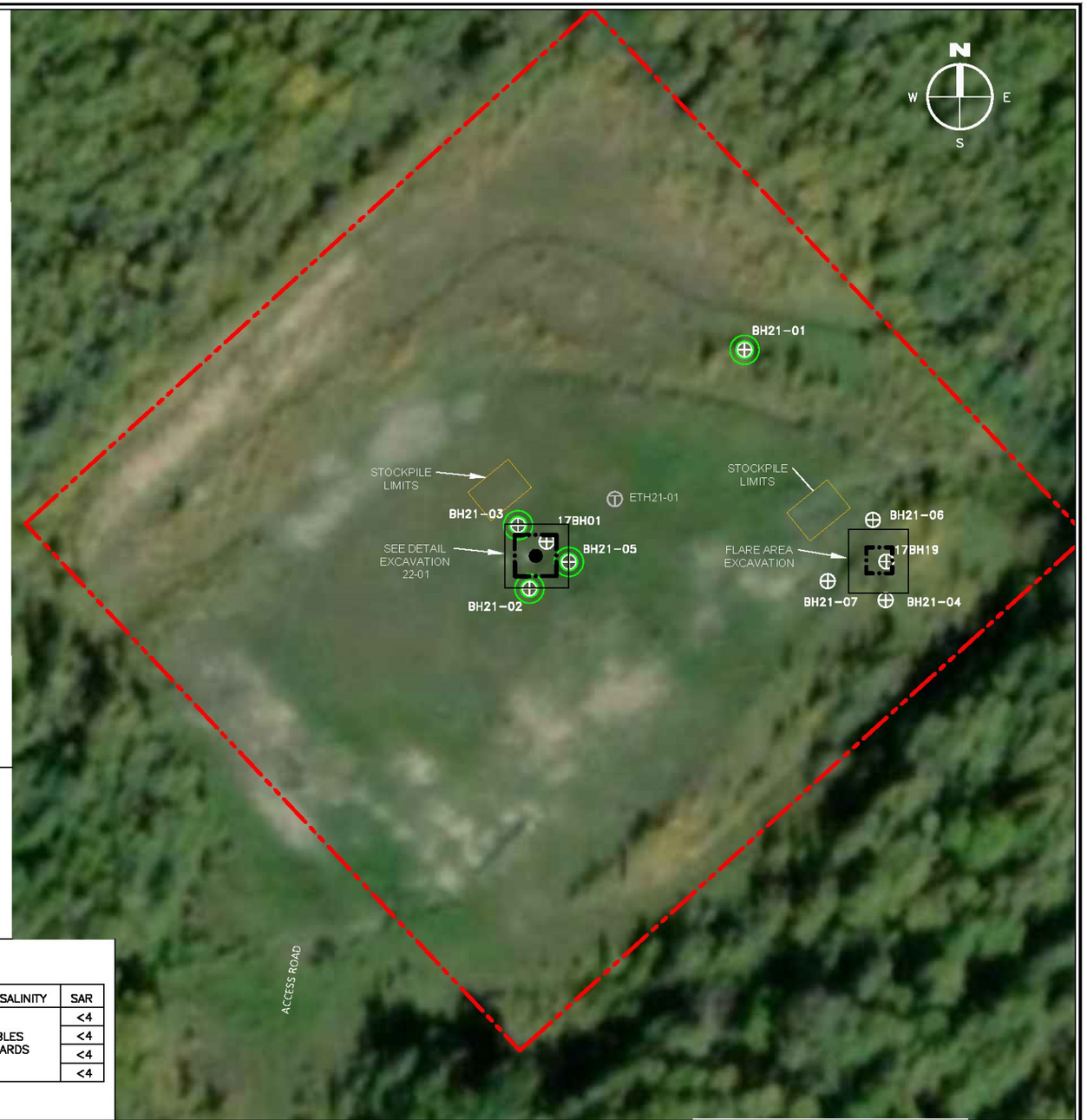
PAR6207

DWG No: 002

FILE: C:\USERS\GAQUILO\APPDATA\LOCAL\TEMP\ACPUBLISH_3404\PAR6207-ST2

PLOT: 20220405.1610





SOIL ANALYTICAL RESULTS LEGEND

[RED] – CONCENTRATIONS GREATER THAN THE APPLICABLE AB–TIER 1 GUIDELINE (<1.5m)

BLUE – CONCENTRATIONS GREATER THAN THE APPLICABLE AB–TIER 2 GUIDELINE (>1.5m)

GREEN – CONCENTRATION LESS THAN OR EQUAL TO THE APPLICABLE STANDARD

SOIL ANALYTICAL STANDARDS

	B	E	T	X	F1 (C6–C10) BTEX	F2 (C10–C16)	F3 (C16–C34)	F4 (C34–C50)	PAHs	METHANOL	METALS	SALINITY	SAR
AB–TIER 1 GUIDELINE–ABOVE 1.5m (mg/kg)	0.046	0.073	0.52	0.99	210	150	1,300	5,600	REFER TO REPORT TABLES FOR APPLICABLE STANDARDS				<4
AB–TIER 1 GUIDELINE–BELOW 1.5m (mg/kg)	0.046	0.073	0.52	0.99	420	300	2,600	12,200					<4
AB–TIER 2 GUIDELINE–ABOVE 1.5m (mg/kg)	0.046	0.073	0.52	0.99	210	150	1,300	5,600					<4
AB–TIER 2 GUIDELINE–BELOW 1.5m (mg/kg)	0.046	0.073	0.52	0.99	420	300	2,600	12,200					<4

CHK	BY	REVISION DESCRIPTION	DATE	REV.
AB	GA	ISSUED TO CLIENT	–	0

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
–	SYNERGYASPEN FIELDNOTES	2022-01-14	–

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM MEASUREMENTS TAKEN IN THE FIELD. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
3. ORIGINAL DRAWING PAPER SIZE 17x11 INCHES
4. PLEASE REFER TO ANALYTICAL TABLES FOR REFERENCE TO APPLICABLE SITE SPECIFIC FACTORS.

LEGEND

- WELLBORE
- BOREHOLE LOCATION
- EXPLORATORY TESTHOLE LOCATION
- FLOOR SAMPLE
- WALL SAMPLE
- STOCKPILE SAMPLE

LEGEND

- APPROXIMATE LEASE BOUNDARY
- LIMITS OF EXCAVATION (TOE)
- LIMITS OF EXCAVATION (TOP)
- STOCKPILE LIMITS

SCALE 1:1,000
0 5 10 50
METRES

SynergyAspen ENVIRONMENTAL

TITLE:

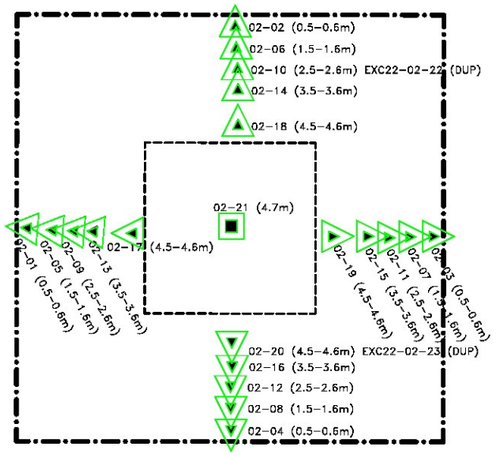
EXCAVATION SITE PLAN AND DETAILED SOIL ANALYTICAL RESULTS (WELLBORE AREA)

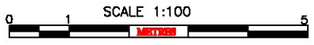
CLIENT NAME: Paramount Resources Ltd.			
SITE LOCATION:	DATE: 2022-04-05	PAR6207	
PARA ET AL F-36-60-10-123-15 Well ID # 6155	SCALE: AS NOTED	DWG No:	003
	DWN: GA CHK'D: AB		

FILE: C:\USERS\GAQUILO\APPDATA\LOCAL\TEMP\ACPUBLISH_3404\PAR6207-EXC

PLOT: 20220405.1653







SOIL ANALYTICAL RESULTS LEGEND

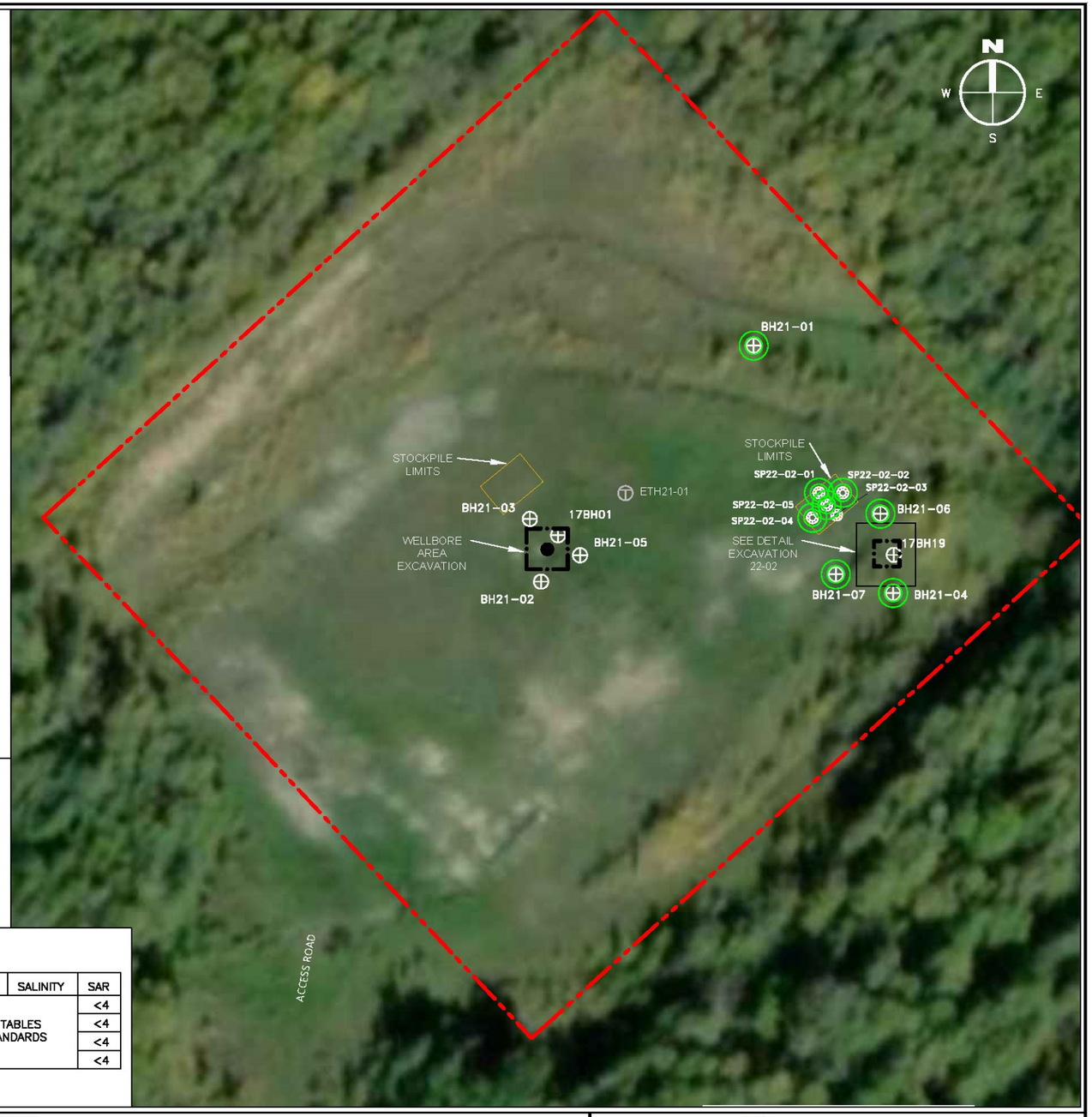
[RED] – CONCENTRATIONS GREATER THAN THE APPLICABLE AB–TIER 1 GUIDELINE (<1.5m)

BLUE – CONCENTRATIONS GREATER THAN THE APPLICABLE AB–TIER 2 GUIDELINE (>1.5m)

GREEN – CONCENTRATION LESS THAN OR EQUAL TO THE APPLICABLE STANDARD

SOIL ANALYTICAL STANDARDS

	B	E	T	X	F1 (C6–C10) BTEX	F2 (C10–C16)	F3 (C16–C34)	F4 (C34–C50)	PAHs	METHANOL	METALS	SALINITY	SAR
AB–TIER 1 GUIDELINE–ABOVE 1.5m (mg/kg)	0.046	0.073	0.52	0.99	210	150	1,300	5,600	REFER TO REPORT TABLES FOR APPLICABLE STANDARDS				<4
AB–TIER 1 GUIDELINE–BELOW 1.5m (mg/kg)	0.046	0.073	0.52	0.99	420	300	2,600	12,200					<4
AB–TIER 2 GUIDELINE–ABOVE 1.5m (mg/kg)	0.046	0.073	0.52	0.99	210	150	1,300	5,600					<4
AB–TIER 2 GUIDELINE–BELOW 1.5m (mg/kg)	0.046	0.073	0.52	0.99	420	300	2,600	12,200					<4



CHK	BY	REVISION DESCRIPTION	DATE	REV.
AB	GA	ISSUED TO CLIENT	–	0

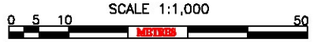
DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
–	SYNERGYASPEN FIELDNOTES	2022-01-14	–

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM MEASUREMENTS TAKEN IN THE FIELD. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
3. ORIGINAL DRAWING PAPER SIZE 17x11 INCHES
4. PLEASE REFER TO ANALYTICAL TABLES FOR REFERENCE TO APPLICABLE SITE SPECIFIC FACTORS.

LEGEND

- WELLBORE
- BOREHOLE LOCATION
- EXPLORATORY TESTHOLE LOCATION
- FLOOR SAMPLE
- WALL SAMPLE
- STOCKPILE SAMPLE
- APPROXIMATE LEASE BOUNDARY
- LIMITS OF EXCAVATION (TOE)
- LIMITS OF EXCAVATION (TOP)
- STOCKPILE LIMITS



SynergyAspen ENVIRONMENTAL

TITLE:

EXCAVATION SITE PLAN AND DETAILED SOIL ANALYTICAL RESULTS (FLARE AREA)

CLIENT NAME: Paramount Resources Ltd.			
SITE LOCATION:	DATE: 2022-04-05		PAR6207
PARA ET AL F-36-60-10-123-15 Well ID # 6155	SCALE: AS NOTED	DWG No:	004
	DWN: GA CHK'D: AB		

FILE: C:\USERS\GAQUILO\APPDATA\LOCAL\TEMP\ACPUBLISH_3404\PAR6207-EXC

APPENDIX I

SITE PHOTOGRAPHS

SynergyAspen ENVIRONMENTAL

Port Moody Office
2328 Clarke Street
Port Moody, BC
V3H 1Y8
PH: 604-931-1026
FX: 604-931-1046

Fort St. John Office
9904 106 Street
Fort St. John, BC
V1J 1V8
PH: 250-785-1030
FX: 250-785-1034



PHOTOGRAPH 1: Access Seismic Line, facing north (September 24, 2021).



PHOTOGRAPH 2: Aerial of Site, facing north (September 24, 2021).



PHOTOGRAPH 3: Elevation difference of 27.2 m (according to Survey), facing northwest (September 24, 2021).



PHOTOGRAPH 4: Site view, facing southeast (September 24, 2021).



PHOTOGRAPH 5: Drilling BH21-04 in flare area delineation, facing northwest (October 4, 2021).



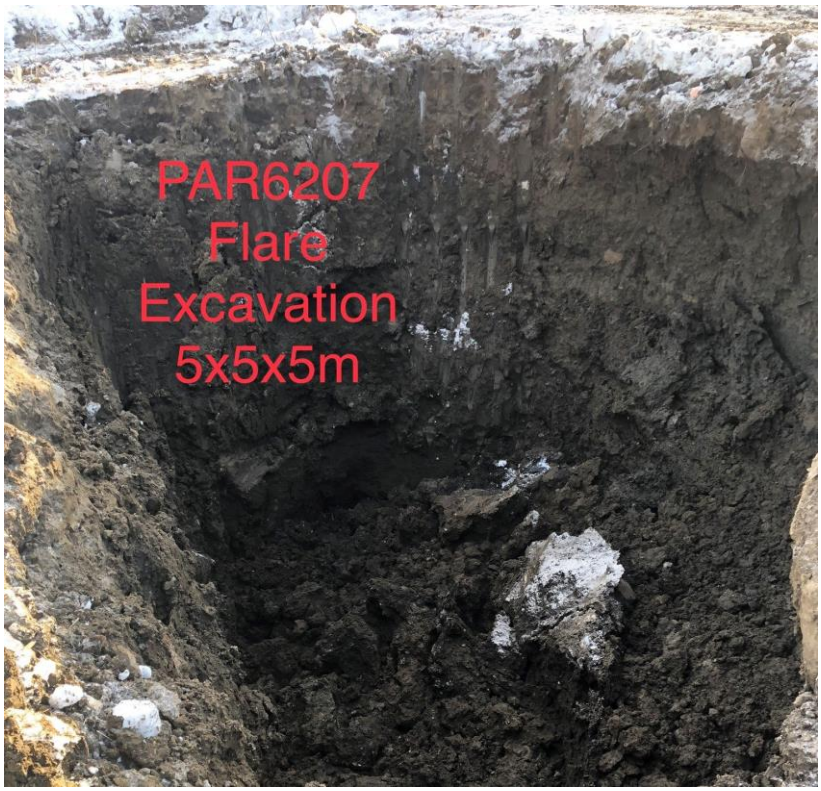
PHOTOGRAPH 6: Drilling BH21-05 in wellbore area delineation, facing west (October 4, 2021).



PHOTOGRAPH 6: Wellbore area post-excavation, pre-abandonment, facing east (January 13, 2022).



PHOTOGRAPH 7: Wellbore area post-excavation, post-abandonment (January 13, 2022).



PHOTOGRAPH 8: Flare excavation for test pit sampling (January 24, 2022)



PHOTOGRAPH 9: Excavated soil for stockpile sampling (January 24, 2022)

APPENDIX II

WATER WELL SEARCH

ATLAS
Government of Northwest Territories

Paramount F-36
Waterbody Search results



May 25, 2021

Legend

- Block Land Transfer Boundaries
- Development Areas
- Surveyed Parcels
- Line Approximately 31m from O.H.W.M.
- Municipal Boundaries
- Condominium Units
- Building Footprints

Scale 1: 10,000

250 metres

UTM Zone: 10

COPYRIGHT Government of the Northwest Territories, Department of Lands.

APPENDIX III

QUALITY ASSURANCE / QUALITY CONTROL (QA/QC) PROGRAM

SynergyAspen ENVIRONMENTAL

Port Moody Office
2328 Clarke Street
Port Moody, BC
V3H 1Y8
PH: 604-931-1026
FX: 604-931-1046

Fort St. John Office
9904 106 Street
Fort St. John, BC
V1J 1V8
PH: 250-785-1030
FX: 250-785-1034

QUALITY ASSURANCE/QUALITY CONTROL

SynergyAspen follows strict QA/QC protocols for all sample collection, handling and analysis. The QA/QC program will generally include the following:

- management of field personnel by senior personnel;
- execution of SynergyAspen field protocols by trained field personnel;
- written field instructions provided to field personnel;
- careful and complete documentation of all field activities by field personnel;
- decontamination of sampling equipment (e.g. augers, split spoon, etc.) between samples:
  ⇒ samples are collected to avoid cross-contamination and other field sampling errors. Samples are placed in contaminant-free containers specifically for such use;
- chain-of-custody documentation for sample submission:
  ⇒ use of a coding system for sample submission to the laboratory so that information regarding site locales or anticipated analytical results is unavailable to the analyst(s);
- use of a Canadian Association for Environmental Analytical Laboratories accredited laboratory;
- adherence to laboratory sampling and analysis protocols (e.g., hold times, detection limits, approved methodology);
- procedures to confirm accurate transcription of laboratory data into tables;
- review of laboratory QC performance to ensure results are within acceptable limits as per the BC Environmental Laboratory Manual (2013):
  ⇒ Results of the laboratory's internal checks will be included in the analytical report;
- submission of field QC samples and implementation of corrective action plans, if deemed appropriate, when acceptable limits are exceeded:
  ⇒ To assess the QA/QC for the blind duplicate sets, SynergyAspen calculates the practical quantitation limits (PQL: defined as five times the method detection limit) and, if appropriate, the relative percent difference (RPD: defined as the absolute value of the difference between a sample set divided by the average of the two results). If sample concentrations are less than the PQL, RPDs are not considered meaningful and are not calculated. RPDs of less than 100% for hydrocarbons in soil and less than 70% for inorganics in soil, less than 30% for hydrocarbons in groundwater, and less than 20% for inorganics in groundwater are considered acceptable according to SynergyAspen's preferred operating procedures.

  ⇒ The above RPDs take into consideration the endorsements of the BC Field Sampling Manual (2013) where it states– 'It should be expected that the RPD is somewhat greater than that for laboratory duplicates. If one of a set of duplicate values at or greater than five times the MDL, then RPD values >20% indicate a possible problem, and > 50% indicate a definite problem, most likely either contamination or lack of sample representativeness.' The acceptable RPDs referenced above for groundwater are equivalent to the RPDs prescribed in the BC Environmental Laboratory Manual (2013) for laboratory duplicates. The above referenced SynergyAspen RPDs in soil are higher than the endorsed RPDs for field duplicates taking into consideration the 'lack of sample representativeness', i.e. normal heterogeneity.

  ⇒ Should there be an exceedance in the RPD, the higher of the two values is selected and compared to the applicable standard.

Calculated RPD values for the blind field duplicate samples are presented in the analytical data tables, included in the Tables Appendix of the report.

APPENDIX IV

BOREHOLE, TEST PIT, AND EXCAVATION SOIL LOGS

Project No.: PAR6207 **Logged By:** JC

Location: F-36, FORT LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: BACKGROUND

Borehole No.: BH21-01

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev.
0	0		Ground Surface	
0 – 14	0 – 4		**CLAY,** silty, some sand, trace gravel, stiff, medium plasticity, dark brown, damp. between 0.56 - 2.84 m, hard. between 1.2 - 4.3 m, some gravel. between 2.1 - 4.3 m, dark grey. between 2.84 - 4.3 m, stiff. between 3.3 - 4.3 m, trace sand.	
14	4		End of Borehole	

SAMPLE

Number	Type	Recovery	HV Concentration (ppm)	%LEL	
1-1			0		EC = 0.30 mS/m
1-2			0		EC = 0.33 mS/m
1-3			175		EC = 0.65 mS/m
1-4			25		EC = 0.82 mS/m
1-5			280		EC = 0.28 mS/m
1-6			170		EC = 0.57 mS/m
1-7			110		EC = 0.66 mS/m

HV Concentration ppm: 125, 250, 375

%LEL: 20, 40, 60, 80

Borehole Completion Details

No MW Installed

CUTTINGS

Drill Method: SOLID STEM AUGER

Sample Type: GRAB

Hole Size: 3 1/4"

Drill Date: OCT. 03, 2021

Surface Elev. (m): 0

Drilled By: CLEAN HARBORS

Checked By: PS

Sheet: 1 of 1

Project No.: PAR6207 **Logged By:** JC

Location: F-36, FORT LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: 17BH01 DELINEATION

Borehole No.: BH21-02

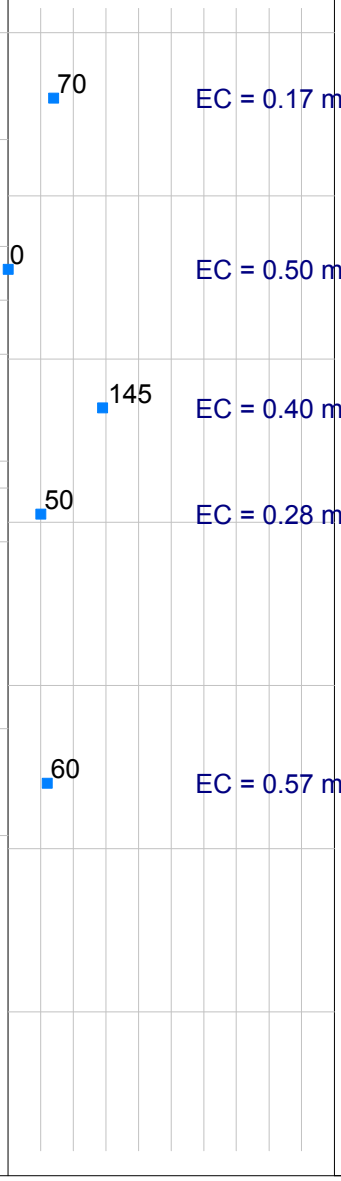
SynergyAspen ENVIRONMENTAL

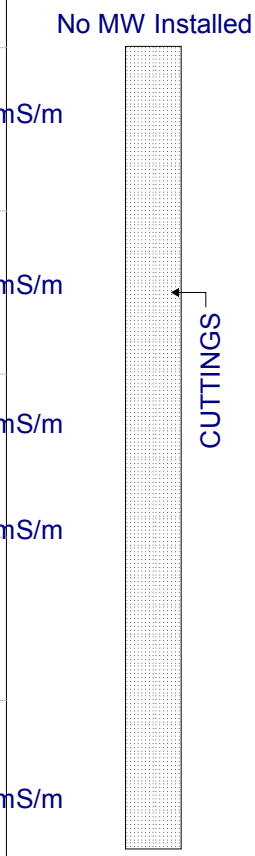
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev.
0	0		Ground Surface	
0 – 7.5	0 – 2.3		**CLAY,** silty, trace sand, trace gravel, stiff, medium plasticity, brown, damp.	
7.5 – 8.5	2.3 – 2.6		**SILT AND SAND,** trace clay, trace gravel, soft, non-plastic, brown, moist. between 1.28 - 1.44 m, trace black staining.	
8.5 – 13	2.6 – 4		**CLAY,** silty, sandy, trace gravel, stiff to soft, low to non-plastic, brown, moist.	
13	4		End of Borehole	

SAMPLE

Number	Type	Recovery
2-1		
2-2		
2-3		
2-4		
2-5		





Drill Method: SOLID STEM AUGER
Sample Type: GRAB
Hole Size: 3 1/4"
Drill Date: OCT. 03, 2021

Surface Elev. (m): 0
Drilled By: CLEAN HARBORS
Checked By: PS
Sheet: 1 of 1

Project No.: PAR6207 **Logged By:** JC

Location: F-36, FORT LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: 17BH01 DELINEATION

Borehole No.: BH21-03

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev.
0	0		Ground Surface	
0 – 10	0 – 3		**CLAY,** silty, sandy, trace gravel, stiff, medium plasticity, brown, damp. between 1.44 - 1.6 m, blebs, trace black staining. between 2.2 - 3.0 m, some sand, dark grey.	
10	3		End of Borehole	

SAMPLE

Number	Type	Recovery
3-1		
3-2		
3-3		
3-4		
3-5		
3-6	(DUP)	

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

90	EC = 0.41 mS/m
40	EC = 0.27 mS/m
50	EC = 0.51 mS/m
10	EC = 0.54 mS/m
185	EC = 0.59 mS/m

Borehole Completion Details

No MW Installed

CUTTINGS

Drill Method: SOLID STEM AUGER

Sample Type: GRAB

Hole Size: 3 1/4"

Drill Date: OCT. 03, 2021

Surface Elev. (m): 0

Drilled By: CLEAN HARBORS

Checked By: PS

Sheet: 1 of 1

Project No.: PAR6207 **Logged By:** JC

Location: F-36, FORT LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: 17BH19 DELINEATION

Borehole No.: BH21-04

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev.
0	0		Ground Surface	
0 – 10	0 – 3		**CLAY,** silty, sandy, trace gravel, stiff, medium plasticity, brown, damp. between 1.2 - 3.0 m, greyish-brown. between 1.2 - 2.2 m, soft. between 1.7 - 1.9 m, trace black staining. between 2.2 - 3.0 m, some sand, soft to stiff.	
10	3		End of Borehole	

SAMPLE

Number	Type	Recovery
4-1		
4-2		
4-3		
4-4		
4-5		

HV Concentration ppm: 125 250 375

%LEL: 20 40 60 80

Number	HV Concentration (ppm)	%LEL	EC
4-1	20		EC = 0.21 mS/m
4-2	0		EC = 0.36 mS/m
4-3	30		EC = 0.60 mS/m
4-4	70		EC = 0.64 mS/m
4-5	30		EC = 0.61 mS/m

Borehole Completion Details

No MW Installed

CUTTINGS

Drill Method: SOLID STEM AUGER

Sample Type: GRAB

Hole Size: 3 1/4"

Drill Date: OCT. 03, 2021

Surface Elev. (m): 0

Drilled By: CLEAN HARBORS

Checked By: PS

Sheet: 1 of 1

Project No.: PAR6207 **Logged By:** JC

Location: F-36, FORT LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: 17BH01 DELINEATION

Borehole No.: BH21-05

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev.
0	0		Ground Surface	
0 – 10	0 – 3		**CLAY,** silty, sandy, trace gravel, stiff to soft, medium plasticity, brown, damp to moist. at 0.9 m, silt pockets. between 2.2 - 3.0 m, stiff.	
10	3		End of Borehole	

SAMPLE

Number	Type	Recovery
5-1		
5-6	(DUP)	
5-2		
5-3		
5-4		
5-5		

HV Concentration

ppm: 125 250 375

%LEL: 20 40 60 80

80	EC = 0.37 mS/m
25	EC = 0.22 mS/m
45	EC = 0.41 mS/m
35	EC = 0.41 mS/m
0	EC = 0.72 mS/m

Borehole Completion Details

No MW Installed

CUTTINGS

Drill Method: SOLID STEM AUGER

Sample Type: GRAB

Hole Size: 3 1/4"

Drill Date: OCT. 04, 2021

Surface Elev. (m): 0

Drilled By: CLEAN HARBORS

Checked By: PS

Sheet: 1 of 1

Project No.: PAR6207 **Logged By:** JC

Location: F-36, FORT LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: 17BH19 DELINEATION

Borehole No.: BH21-06

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev.
0	0		Ground Surface	
0 – 10	0 – 3		**CLAY,** silty, some sand, trace gravel, stiff, medium plasticity, dark brown, damp. between 1.2 - 2.24 m, sandy. between 1.2 - 3.0 m, low plasticity, dark greyish-brown. between 2.0 - 2.24 m, soft. between 2.24 - 3.0 m, some sand, stiff.	
10	3		End of Borehole	

SAMPLE

Number	Type	Recovery	HV Concentration ppm (125, 250, 375)	%LEL (20, 40, 60, 80)
6-1			0	EC = 0.29 mS/m
6-2			20	EC = 0.47 mS/m
6-3			30	EC = 0.77 mS/m
6-4			20	EC = 0.92 mS/m
6-5			20	EC = 0.81 mS/m

Borehole Completion Details

No MW Installed

CUTTINGS

Drill Method: SOLID STEM AUGER
Sample Type: GRAB
Hole Size: 3 1/4"
Drill Date: OCT. 04, 2021

Surface Elev. (m): 0
Drilled By: CLEAN HARBORS
Checked By: PS
Sheet: 1 of 1

Project No.: PAR6207 **Logged By:** JC

Location: F-36, FORT LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: 17BH19 DELINEATION

Borehole No.: BH21-07

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev.
0	0		Ground Surface	
0 – 10	0 – 3		**CLAY,** silty, sandy, trace gravel, stiff, low plasticity, brown, damp. between 1.68 - 1.94 m, very soft. between 1.68 - 2.2 m, light brown. between 2.2 - 3.0 m, brown.	
10	3		End of Borehole	

SAMPLE

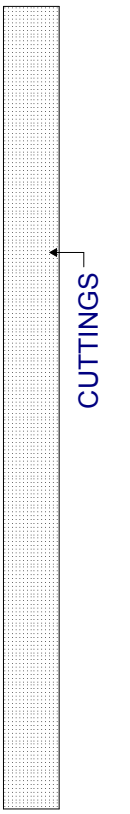
Number	Type	Recovery
7-1		
7-2		
7-3		
7-4		
7-5		

HV Concentration ppm: 125 250 375

%LEL: 20 40 60 80

Number	HV (ppm)	Result
7-1	25	EC = 0.23 mS/m
7-2	20	EC = 0.55 mS/m
7-3	15	EC = 0.57 mS/m
7-4	20	EC = 0.41 mS/m
7-5	20	EC = 0.54 mS/m

Borehole Completion Details



Drill Method: SOLID STEM AUGER

Sample Type: GRAB

Hole Size: 3 1/4"

Drill Date: OCT. 04, 2021

Surface Elev. (m): 0

Drilled By: CLEAN HARBORS

Checked By: PS

Sheet: 1 of 1

Project No.: PAR6207 **Logged By:** JC

Location: F-36, FORT LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: 17BH01 DELINEATION

Borehole No.: ETH21-01

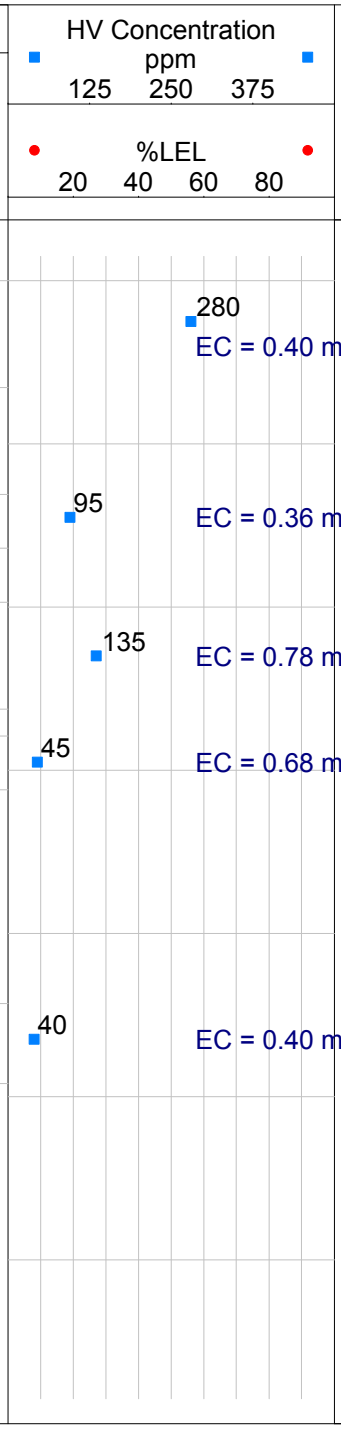
SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

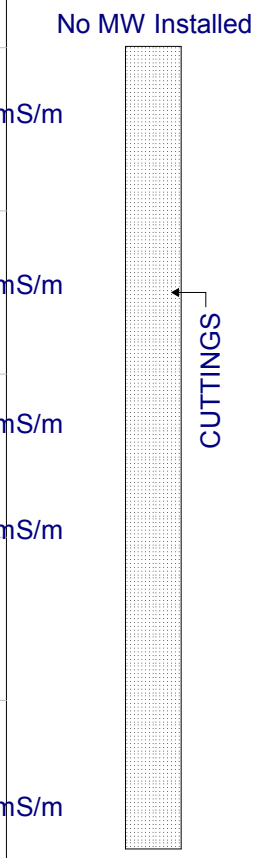
Depth (ft)	Depth (m)	Symbol	Description	Elev.
0	0		Ground Surface	
0 – 10	0 – 3		**CLAY,** silty, sandy, trace gravel, stiff, low to medium plasticity, brown, damp. between 0.56 - 1.52 m, clay and sand, soft to stiff, low plasticity. between 1.52 - 3.0 m, sandy, stiff, low to medium plasticity. between 1.44 - 3.0 m, trace blebs.	
10	3		End of Borehole	

SAMPLE

Number	Type	Recovery
1-1		
1-2		
1-3		
1-4		
1-5		



Borehole Completion Details



Drill Method: SOLID STEM AUGER
Sample Type: GRAB
Hole Size: 3 1/4"
Drill Date: OCT. 03, 2021

Surface Elev. (m): 0
Drilled By: CLEAN HARBORS
Checked By: PS
Sheet: 1 of 1

Test Pit: TP22-01

Project No.: PAR6207 **Logged By:** JC

Location: F-36, FORT LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: PARTICAL SIZE ANALYSIS

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE				SAMPLE			HV Concentration ppm 125 250 375 / %LEL 20 40 60 80	Borehole Completion Details
Depth (ft / m)	Symbol	Description	Elev	Number	Type	Recovery		
0 / 0		Ground Surface						No MW Installed
0–1.4		**SILT,** clay, some organics, soft, low plasticity, dark brown, damp.						
1.4–6.5		**SILT AND CLAY,** brown. between 0.3 - 1.4 m, light brown cobble.		1-1			0 EC = 0.41 mS/m	
6.5–21.3		**CLAY,** trace silt, firm, medium plasticity, brownish-grey, fine grained gravel. between 2.5 - 6.0 m, firm, greyish-brown, bolders. between 6.0 - 6.5 m, stiff, grey. at 6.5 m, shale, excavator refusal.		1-2			0 EC = 0.28 mS/m	
				1-3			0 EC = 0.44 mS/m	CUTTINGS
				1-4			0 EC = 0.21 mS/m	
				1-5			0 EC = 0.20 mS/m	
				1-6			0 EC = 0.06mS/m	
21.3		End of Borehole						

Drill Method: EXCAVATOR
Sample Type: GRAB
Hole Size:
Drill Date: JAN. 15, 2022

Surface Elev. (m): 0
Drilled By: BEAVER
Checked By: MP
Sheet: 1 of 1

Project No.: PAR6207 **Logged By:** JC

Location: F-36, FORT LIARD

Client: PARAMOUNT RESOURCES LTD.

APEC: PARTICLE SIZE ANALYSIS

Borehole No.: BH21-01

SynergyAspen ENVIRONMENTAL

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Elev
0	0		Ground Surface	
0 – 3	0 – 1		**SILT,** clay, some organics, soft, low plasticity, dark brown, damp.	
3 – 5	1 – 1		**SILT AND CLAY,** brown.	
5 – 7	1 – 2		between 0.3 - 1.4 m, light brown cobble.	
7 – 13	2 – 4		**CLAY,** trace silt, firm, medium plasticity, brownish-grey, fine grained gravel. between 2.5 - 6.0 m, firm,greyish-brown, boulders. between 6.0 - 6.5 m, stiff, grey.	
13 – 21	4 – 6		at 6.5 m, shale, excavator refusal.	
21	7		End of Borehole	

SAMPLE

Number	Type	Recovery	HV Concentration (ppm)	%LEL	Borehole Completion Details
1-1			0	EC = 0.41 mS/m	No MW Installed
1-2			0	EC = 0.28 mS/m	
1-3			0	EC = 0.44 mS/m	CUTTINGS
1-4			0	EC = 0.21 mS/m	
1-5			0	EC = 0.20 mS/m	
1-6			0	EC = 0.06mS/m	

HV Concentration ppm: 125 250 375

%LEL: 20 40 60 80

Drill Method: EXCAVATOR

Sample Type: GRAB

Hole Size:

Drill Date: JAN. 15, 2022

Surface Elev. (m): 0

Drilled By: BEAVER

Checked By: MP

Sheet: 1 of 1

SynergyAspen ENVIRONMENTAL

TABLE 5: Soil Log

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Sample Type	Description	North (m)[b]	East (m)[b]	Sample Depth (m)	EC (mS)	HSVC (ppm)
EXC22-01	EXC22-01-01	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			0.5-0.6	0.32	5
EXC22-01	EXC22-01-02	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			0.5-0.6	0.35	0
EXC22-01	EXC22-01-03	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			0.5-0.6	0.19	0
EXC22-01	EXC22-01-04	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			0.5-0.6	0.16	5
EXC22-01	EXC22-01-05	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			0.5-0.6	0.34	5
EXC22-01	EXC22-01-06	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			0.5-0.6	0.10	0
EXC22-01	EXC22-01-07	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			1.5-1.6	0.34	5
EXC22-01	EXC22-01-08	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			1.5-1.6	0.65	10
EXC22-01	EXC22-01-09	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			1.5-1.6	0.35	5
EXC22-01	EXC22-01-10	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			1.5-1.6	0.32	5
EXC22-01	EXC22-01-19 (DUP of EXC22-01-10)								
EXC22-01	EXC22-01-11	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			1.5-1.6	0.41	10
EXC22-01	EXC22-01-12	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			1.5-1.6	0.29	5
EXC22-01	EXC22-01-13	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			2.5-2.6	0.84	15
EXC22-01	EXC22-01-14	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			2.5-2.6	0.28	5
EXC22-01	EXC22-01-15	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			2.5-2.6	5	0
EXC22-01	EXC22-01-16	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			2.5-2.6	0.44	40
EXC22-01	EXC22-01-17	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			2.5-2.6	0.32	15
EXC22-01	EXC22-01-18	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			2.5-2.6	0.31	5
EXC22-01	EXC22-01-20	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, grey, damp, fine grained gravel.			3.1-3.2	0.54	45
EXC22-01	EXC22-01-22 (DUP of EXC22-01-20)								
EXC22-01	EXC22-01-21	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, grey, damp, fine grained gravel.			3.1-3.2	0.67	45
EXC22-02	EXC22-02-01	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			0.5-0.6	0.32	10
EXC22-02	EXC22-02-02	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			0.5-0.6	0.3	15
EXC22-02	EXC22-02-03	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			0.5-0.6	0.28	10
EXC22-02	EXC22-02-04	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			0.5-0.6	0.33	15
EXC22-02	EXC22-02-05	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			1.5-1.6	0.36	5
EXC22-02	EXC22-02-06	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			1.5-1.6	0.39	20
EXC22-02	EXC22-02-07	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			1.5-1.6	0.72	0
EXC22-02	EXC22-02-08	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			1.5-1.6	0.54	20
EXC22-02	EXC22-02-09	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			2.5-2.6	0.44	10
EXC22-02	EXC22-02-10	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			2.5-2.6	0.47	5
EXC22-02	EXC22-02-11	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			2.5-2.6	0.87	0
EXC22-02	EXC22-02-12	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			2.5-2.6	0.57	5
EXC22-02	EXC22-02-13	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			3.5-3.6	0.42	15
EXC22-02	EXC22-02-14	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			3.5-3.6	0.56	10
EXC22-02	EXC22-02-15	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			3.5-3.6	0.59	5
EXC22-02	EXC22-02-16	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			3.5-3.6	0.53	5
EXC22-02	EXC22-02-17	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			4.5-4.6	0.49	10
EXC22-02	EXC22-02-18	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			4.5-4.6	0.48	10
EXC22-02	EXC22-02-19	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			4.5-4.6	0.63	0
EXC22-02	EXC22-02-20	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			4.5-4.6	0.48	10
EXC22-02	EXC22-02-21	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel, small roots.			4.7	0.46	20
SP22-02	SP22-02-01	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			Stock Pile	0.57	5
SP22-02	SP22-02-02	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			Stock Pile	0.59	5
SP22-02	SP22-02-03	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			Stock Pile	0.46	15
SP22-02	SP22-02-04	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			Stock Pile	0.42	10
SP22-02	SP22-02-05	1/14/2022	Grab	**CLAY,** trace silt, firm, medium plasticity, brown, damp, fine grained gravel.			Stock Pile	0.86	15
LF22-01	Wellbore Area	1/11/2022		**CLAY,** some silt, stiff, medium plasticity, brownish-grey, damp.			1.5	0.39	0
LF22-02	Flare Area	1/11/2022		**CLAY,** some silt, stiff, high plasticity, brownish-grey, moist.			3.5	0.83	40

APPENDIX V

EXCAVATION LOAD SUMMARY

Load confirmation copy

Tax registration number: 857304323

SECURE ENERGY

NORLF-000007

INVOICE TO:

Paramount Resources Ltd.

2800, 421 - 7th Ave SW
Calgary, AB T2P 4K9
CAN

Attention: Ian Keir

Loads from: 1/24/2022
To: 1/31/2022

Load confirmation date: Feb 02, 2022
Facility: Northern Rockies LF
Facility UWI: A-77-G/94-J-10

Unique Well Identifier (UWI): **F-36-60-10-123-15**
Owner/Producer of UWI: Paramount Resources Ltd.
SCA Number: SESC178775

Buyer code
Cost Center
Major Code
Minor Code

Service Provided	Volume	Currency	Rate	Amount
Landfill Disposal - Remediation - Contaminated Debris and Soil (crude oil/condensate	**295.56 Tonnes**	**CAD**	**$61.00**	**$18,029.16**
Government Waste Fee - Contaminated Debris and Soil (crude oil/condensate	**295.56 Tonnes**	**CAD**	**$0.90**	**$266.00**
			Load confirmation amount	**$18,295.16**

****PLEASE DO NOT PAY****
THIS IS A LOAD CONFIRMATION FOR APPROVAL. PROCESSING CHARGES ARE FINAL, CREDIT PRICES ARE ESTIMATES.

Signatory: Marsha Pereira

If you have any questions regarding this load confirmation, please contact Jackie Lafleur - NORLF
Phone : 250-774-3028 Fax :
Email : adminlaglacetrd@secure-energy.com

Secure Energy thanks you for your business!

Paramount Resources Ltd
Site/Dept: PR-210
AFE/CC: 215200688
WO/PO:
Location/UWI: F-36-6010-12315
Account: Major: 9235 Minor: 10
Project Engineer: Tyler Wilson
Paramount Rep: Rocky Arndt (Printed Name)
Signature: Date: Feb 7/22
Submit Invoices electronically to OpenInvoice.com

LOAD CONFIRMATION SUMMARY

SECURE ENERGY

UWI: F-36-60-10-123-15

Owner: Paramount Resources Ltd.

Load confirmation #: NORLF-000007

Date	Trucking Company		Manifest #		Bill of Lading		Meter / Scale Receipt	
	Service Description	**Gross Wt**	**Tare Wt**	**Net Wt.**	**Units**	**% of Load**	**Rate**	**Amount**
Jan 24, 2022	*Radar Road Transport Ltd.*		*N*		*13367825*		*NORLF000047-LF*	
	Landfill Disposal - Remediation - Contaminated Debris and Soil (crude oil/condensate	**31.63**	**18.00**	**13.63**	**Tonnes**		**$61.00**	**$831.43**
	Government Waste Fee - Contaminated Debris and Soil (crude oil/condensate	31.63	18.00	13.63	Tonnes		$0.90	$12.27
Jan 27, 2022	*Radar Road Transport Ltd.*		*N*		*012722-001*		*NORLF000065-LF*	
	Landfill Disposal - Remediation - Contaminated Debris and Soil (crude oil/condensate	**46.89**	**18.00**	**28.89**	**Tonnes**		**$61.00**	**$1,762.29**
	Government Waste Fee - Contaminated Debris and Soil (crude oil/condensate	46.89	18.00	28.89	Tonnes		$0.90	$26.00
Jan 27, 2022	*Radar Road Transport Ltd.*		*N*		*012722-002*		*NORLF000066-LF*	
	Landfill Disposal - Remediation - Contaminated Debris and Soil (crude oil/condensate	**42.48**	**17.80**	**24.68**	**Tonnes**		**$61.00**	**$1,505.48**
	Government Waste Fee - Contaminated Debris and Soil (crude oil/condensate	42.48	17.80	24.68	Tonnes		$0.90	$22.21
Jan 28, 2022	*Radar Road Transport Ltd.*		*N*		*13367837*		*NORLF000079-LF*	
	Landfill Disposal - Remediation - Contaminated Debris and Soil (crude oil/condensate	**42.07**	**19.29**	**22.78**	**Tonnes**		**$61.00**	**$1,389.58**
	Government Waste Fee - Contaminated Debris and Soil (crude oil/condensate	42.07	19.29	22.78	Tonnes		$0.90	$20.50

LOAD CONFIRMATION SUMMARY

SECURE ENERGY

UWI: F-36-60-10-123-15

Owner: Paramount Resources Ltd.

Load confirmation #: NORLF-000007

Jan 29, 2022	*Radar Road Transport Ltd.*		*N*		*13367838*	*NORLF000080-LF*		
	Landfill Disposal - Remediation - Contaminated Debris and Soil (crude oil/condensate	**43.41**	**18.00**	**25.41**	**Tonnes**	**$61.00**	**$1,550.01**
	Government Waste Fee - Contaminated Debris and Soil (crude oil/condensate	43.41	18.00	25.41	Tonnes	$0.90	$22.87
Jan 29, 2022	*Radar Road Transport Ltd.*		*N*		*1336739*	*NORLF000081-LF*		
	Landfill Disposal - Remediation - Contaminated Debris and Soil (crude oil/condensate	**49.16**	**20.70**	**28.46**	**Tonnes**	**$61.00**	**$1,736.06**
	Government Waste Fee - Contaminated Debris and Soil (crude oil/condensate	49.16	20.70	28.46	Tonnes	$0.90	$25.61
Jan 29, 2022	*Radar Road Transport Ltd.*		*N*		*012922-01*	*NORLF000083-LF*		
	Landfill Disposal - Remediation - Contaminated Debris and Soil (crude oil/condensate	**37.50**	**17.80**	**19.70**	**Tonnes**	**$61.00**	**$1,201.70**
	Government Waste Fee - Contaminated Debris and Soil (crude oil/condensate	37.50	17.80	19.70	Tonnes	$0.90	$17.73
Jan 29, 2022	*Radar Road Transport Ltd.*		*N*		*13367841*	*NORLF000086-LF*		
	Landfill Disposal - Remediation - Contaminated Debris and Soil (crude oil/condensate	**45.80**	**20.02**	**25.78**	**Tonnes**	**$61.00**	**$1,572.58**
	Government Waste Fee - Contaminated Debris and Soil (crude oil/condensate	45.80	20.02	25.78	Tonnes	$0.90	$23.20
Jan 29, 2022	*Radar Road Transport Ltd.*		*N*		*13367840*	*NORLF000087-LF*		
	Landfill Disposal - Remediation - Contaminated Debris and Soil (crude oil/condensate	**46.80**	**19.20**	**27.60**	**Tonnes**	**$61.00**	**$1,683.60**
	Government Waste Fee - Contaminated Debris and Soil (crude oil/condensate	46.80	19.20	27.60	Tonnes	$0.90	$24.84

LOAD CONFIRMATION SUMMARY

SECURE ENERGY

UWI: F-36-60-10-123-15

Owner: Paramount Resources Ltd.

Load confirmation #: NORLF-000007

Jan 31, 2022	*Radar Road Transport Ltd.*		*N*		*0131202201*	*NORLF000101-LF*		
	Landfill Disposal - Remediation - Contaminated Debris and Soil (crude oil/condensate	**45.42**	**20.70**	**24.72**	**Tonnes**	**$61.00**	**$1,507.92**
	Government Waste Fee - Contaminated Debris and Soil (crude oil/condensate	45.42	20.70	24.72	Tonnes	$0.90	$22.25
Jan 31, 2022	*Radar Road Transport Ltd.*		*N*		*0131202202*	*NORLF000102-LF*		
	Landfill Disposal - Remediation - Contaminated Debris and Soil (crude oil/condensate	**45.62**	**18.00**	**27.62**	**Tonnes**	**$61.00**	**$1,684.82**
	Government Waste Fee - Contaminated Debris and Soil (crude oil/condensate	45.62	18.00	27.62	Tonnes	$0.90	$24.86
Jan 31, 2022	*Radar Road Transport Ltd.*		*N*		*0131202203*	*NORLF000103-LF*		
	Landfill Disposal - Remediation - Contaminated Debris and Soil (crude oil/condensate	**47.31**	**21.02**	**26.29**	**Tonnes**	**$61.00**	**$1,603.69**
	Government Waste Fee - Contaminated Debris and Soil (crude oil/condensate	47.31	21.02	26.29	Tonnes	$0.90	$23.66

Total **$18,295.16**

APPENDIX VI

LABORATORY ANALYTICAL REPORTS

Element
#1 8822-100 Street
Fort St. John, British Columbia
V1J 3W9, Canada

T: +1 (250) 785-2731
F: +1 (250) 785-7092
E: info.FortStJohn@element.com
W: www.element.com

Report Transmission Cover Page

Bill To: Paramount Resources Ltd.
Fort St John, BC, Canada
Attn: Patricia Stebbing
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525192**
Control Number:
Date Received: Oct 5, 2021
Date Reported: Oct 25, 2021
Report Number: 2669398

Contact	Company	Address
Element Invoicing	**Paramount Resources Ltd.**	7217 Roper Road Edmonton, AB T6B 3J4 Phone: (780) 438-5522 Fax: Email: invoicing.edmonton@element.com

Delivery	Format	Deliverables
Post	PDF	COC / Invoice

Contact	Company	Address
Patricia Stebbing	**SynergyAspen Environmental**	Fort St John, BC null Phone: (250) 785-1030 Fax: Email: pstebbing@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR
Email - Zip Multiple Formats By Report	Generic ESDAT Chemistry File	Test Report
Email - Zip Multiple Formats By Report	Generic ESDAT Sample File	Test Report

Contact	Company	Address
Project Coordinator	**SynergyAspen Environmental**	2328 Clarke St. Port Moody, BC V3H 1Y8 Phone: (604) 931-1026 Fax: (604) 931-1046 Email: projectcoordinator@synergyaspen.ca

Delivery	Format	Deliverables
Email - Multiple Reports By Lot	PDF	COC / Invoice
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COC / COA
Email - Single Report	PDF	COC / Test Report
Email - Single Report	PDF	COR

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Element
#1 8822-100 Street
Fort St. John, British Columbia
V1J 3W9, Canada

T: +1 (250) 785-2731
F: +1 (250) 785-7092
E: info.FortStJohn@element.com
W: www.element.com

Analytical Report

Bill To: Paramount Resources Ltd.
Fort St John, BC, Canada
Attn: Patricia Stebbing
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525192**
Control Number:
Date Received: Oct 5, 2021
Date Reported: Oct 25, 2021
Report Number: 2669398

Reference Number	1525192-3	1525192-5	1525192-7
Sample Date	Oct 03, 2021	Oct 03, 2021	Oct 03, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	BH21-01-03 / 1.2-1.52	BH21-01-05 / 2.56-2.8	BH21-01-07 / 3.98-4.3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay Loam	Sandy Clay Loam	Sandy Clay Loam	
Sand	50 µm - 2 mm	% by weight	38	46	48	0.1
Silt	2 µm - 50 µm	% by weight	32	22	22	0.1
Clay	<2 µm	% by weight	30	32	30	0.1

Element
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Analytical Report

Bill To: Paramount Resources Ltd.
Fort St John, BC, Canada
Attn: Patricia Stebbing
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525192**
Control Number:
Date Received: Oct 5, 2021
Date Reported: Oct 25, 2021
Report Number: 2669398

Reference Number	1525192-9	1525192-11	1525192-14
Sample Date	Oct 03, 2021	Oct 03, 2021	Oct 03, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	BH21-02-02 / 0.8-1	BH21-02-04 / 1.7-1.9	BH21-03-02 / 0.8-1
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	No	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		19-Oct-21	19-Oct-21	19-Oct-21	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	12.20	12.60	11.80	

Element
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Fort St. John, British Columbia
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Analytical Report

Bill To: Paramount Resources Ltd.
Fort St John, BC, Canada
Attn: Patricia Stebbing
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525192**
Control Number:
Date Received: Oct 5, 2021
Date Reported: Oct 25, 2021
Report Number: 2669398

Reference Number	1525192-15	1525192-16	1525192-17
Sample Date	Oct 03, 2021	Oct 03, 2021	Oct 03, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	BH21-03-03 / 1.2-1.6	BH21-03-04 / 1.7-1.9	BH21-03-05 / 2.6-3
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		19-Oct-21	19-Oct-21	19-Oct-21	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	52	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	12.00	15.20	11.30	

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Analytical Report

Bill To: Paramount Resources Ltd.
Fort St John, BC, Canada
Attn: Patricia Stebbing
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525192**
Control Number:
Date Received: Oct 5, 2021
Date Reported: Oct 25, 2021
Report Number: 2669398

Reference Number	1525192-18	1525192-20	1525192-22
Sample Date	Oct 03, 2021	Oct 03, 2021	Oct 03, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	BH21-03-06 / 2.6-3	BH21-04-02 / 0.64-0.96	BH21-04-04 / 1.7-1.9
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	No	No	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		19-Oct-21	19-Oct-21	19-Oct-21	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	56	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	9.86	11.90	14.10	

Approved by:

Anthony Neumann, MSc
General Manager

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Quality Control

Bill To: Paramount Resources Ltd.
Fort St John, BC, Canada
Attn: Patricia Stebbing
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525192**
Control Number:
Date Received: Oct 5, 2021
Date Reported: Oct 25, 2021
Report Number: 2669398

Extractable Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	0	-10	10	yes
F3c C16-C34	µg/mL	0	-30	30	yes
F4c C34-C50	µg/mL	0	-20	20	yes
F4HTGCc C34-C50+	µg/mL	0	-20	20	yes
Date Acquired: October 15, 2021					

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	109.88	80	120	yes
F3c C16-C34	µg/mL	110.65	80	120	yes
F4c C34-C50	µg/mL	108.36	80	120	yes
F4HTGCc C34-C50+	µg/mL	111.44	80	120	yes
Date Acquired: October 15, 2021					

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F2c C10-C16	mg/kg	<25	<25	50	10	yes
F3c C16-C34	mg/kg	<50	<50	50	10	yes
F4c C34-C50	mg/kg	<100	<100	50	10	yes
F4HTGCc C34-C50+	mg/kg	<100	<100	50	10	yes
Date Acquired: October 15, 2021						

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.005	0.005	yes
Toluene	ng	0	-0.06	0.06	yes
Ethylbenzene	ng	0	-0.030	0.030	yes
Total Xylenes (m,p,o)	ng	0	-0.09	0.09	yes
Styrene	ng	0	-0.030	0.030	yes
Date Acquired: October 15, 2021					

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	90.76	80	120	yes
Toluene	ng	94.06	80	120	yes
Ethylbenzene	ng	93.25	80	120	yes
m,p-Xylene	ng	91.56	80	120	yes
Total Xylenes (m,p,o)	ng	91.53	80	120	yes
Styrene	ng	97.33	80	120	yes
Date Acquired: October 15, 2021					

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Benzene	mg/kg	<0.005	<0.005	50	0.010	yes
Toluene	mg/kg	<0.02	<0.02	50	0.04	yes
Ethylbenzene	mg/kg	<0.005	<0.005	50	0.020	yes
m,p-Xylene	mg/kg	<0.02	<0.02	50	0.04	yes
o-Xylene	mg/kg	<0.02	<0.02	50	0.04	yes
Total Xylenes (m,p,o)	mg/kg	<0.03	<0.03	50	0.06	yes
Styrene	mg/kg	<0.01	<0.01	50	0.020	yes
Date Acquired: October 15, 2021						

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Quality Control

Bill To: Paramount Resources Ltd.
Fort St John, BC, Canada
Attn: Patricia Stebbing
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525192**
Control Number:
Date Received: Oct 5, 2021
Date Reported: Oct 25, 2021
Report Number: 2669398

Physical and Aggregate Properties

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Sand	% by weight	28	20	32	yes
Clay	% by weight	30	27	36	yes
<50 um	% by weight	72.4	67.500	82.500	yes

Date Acquired: October 21, 2021

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	ng	0	-10	10	yes

Date Acquired: October 15, 2021

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F1 C6-C10	mg/kg	<10	<10	50	0	yes
F1 -BTEX	mg/kg	<10	<10	50	0	yes

Date Acquired: October 15, 2021

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Methodology and Notes

Bill To:	Paramount Resources Ltd. Fort St John, BC, Canada	Project ID:	PAR6207	Lot ID:	**1525192**
Attn:	Patricia Stebbing	Project Name:	Stage 2 PSI	Control Number:	
Sampled By:	Jack Common	Project Location:	F-36	Date Received:	Oct 5, 2021
Company:	SynergyAspen	LSD:	F-36	Date Reported:	Oct 25, 2021
		P.O.:		Report Number:	2669398
		Proj. Acct. code:			

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Oct 15, 2021	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Oct 15, 2021	Element Calgary
Particle Size Analysis - GS	Carter	*	Hydrometer Method, 55.3	Oct 21, 2021	Element Edmonton - Roper Road
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Oct 15, 2021	Element Calgary

** Reference Method Modified*

References

Carter	Soil Sampling and Methods of Analysis.
CCME	Canadian Council of Ministers of the Environment
US EPA	US Environmental Protection Agency Test Methods

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Report Transmission Cover Page

Bill To: SynergyAspen Environmental
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Attn: Project Coordinator
Sampled By: Jack Common/Sam Carp
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525505**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Oct 19, 2021
Report Number: 2670021

Contact	Company	Address
Patricia Stebbing	**SynergyAspen Environmental**	Fort St John, BC null Phone: (250) 785-1030 Fax: Email: pstebbing@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR
Email - Zip Multiple Formats By Report	Generic ESDAT Chemistry File	Test Report
Email - Zip Multiple Formats By Report	Generic ESDAT Sample File	Test Report

Contact	Company	Address
Project Coordinator	**SynergyAspen Environmental**	2328 Clarke St. Port Moody, BC V3H 1Y8 Phone: (604) 931-1026 Fax: (604) 931-1046 Email: projectcoordinator@synergyaspen.ca

Delivery	Format	Deliverables
Email - Multiple Reports By Lot	PDF	COC / Invoice
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COC / COA
Email - Single Report	PDF	COC / Test Report
Email - Single Report	PDF	COR

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Analytical Report

Bill To: SynergyAspen Environmental
2328 Clarke St.
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Attn: Project Coordinator
Sampled By: Jack Common/Sam Carp
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525505**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Oct 19, 2021
Report Number: 2670021

Reference Number	1525505-2	1525505-4	1525505-8
Sample Date	Oct 04, 2021	Oct 04, 2021	Oct 04, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	BH21-05-02 / 0.8-1 / 6.8 °C	BH21-05-04 / 1.7-1.9 / 6.8 °C	BH21-06-02 / 0.56-0.96 / 6.8 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		15-Oct-21	15-Oct-21	15-Oct-21	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	68	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	12.00	12.80	13.20	

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Analytical Report

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Attn: Project Coordinator
Sampled By: Jack Common/Sam Carp
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525505**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Oct 19, 2021
Report Number: 2670021

Reference Number	1525505-10	1525505-13	1525505-15
Sample Date	Oct 04, 2021	Oct 04, 2021	Oct 04, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	BH21-06-04 / 1.7-1.9 / 6.8 °C	BH21-07-02 / 0.56-0.96 / 6.8 °C	BH21-07-04 / 1.7-1.9 / 6.8 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		15-Oct-21	15-Oct-21	15-Oct-21	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	61	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	14.30	13.90	16.90	

Approved by:

Max Hewitt
Operations Manager

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Quality Control

Bill To: SynergyAspen Environmental
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Attn: Project Coordinator
Sampled By: Jack Common/Sam Carp
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525505**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Oct 19, 2021
Report Number: 2670021

Extractable Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	0	-10	10	yes
F3c C16-C34	µg/mL	0	-30	30	yes
F4c C34-C50	µg/mL	0	-20	20	yes
F4HTGCc C34-C50+	µg/mL	0	-20	20	yes
Date Acquired:	October 13, 2021				

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	100.47	80	120	yes
F3c C16-C34	µg/mL	103.32	80	120	yes
F4c C34-C50	µg/mL	102.64	80	120	yes
F4HTGCc C34-C50+	µg/mL	98.64	80	120	yes
Date Acquired:	October 13, 2021				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F2c C10-C16	mg/kg	<25	<25	50	10	yes
F3c C16-C34	mg/kg	<50	<50	50	10	yes
F4c C34-C50	mg/kg	<100	<100	50	10	yes
F4HTGCc C34-C50+	mg/kg	<100	<100	50	10	yes
Date Acquired:	October 13, 2021					

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	mg/kg	113	70	130	yes
F3c C16-C34	mg/kg	117	70	130	yes
F4c C34-C50	mg/kg	108	70	130	yes
F4HTGCc C34-C50+	mg/kg	107	70	130	yes
Date Acquired:	October 13, 2021				

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.005	0.005	yes
Toluene	ng	0	-0.06	0.06	yes
Ethylbenzene	ng	0	-0.030	0.030	yes
Total Xylenes (m,p,o)	ng	0	-0.09	0.09	yes
Styrene	ng	0	-0.030	0.030	yes
Date Acquired:	October 13, 2021				

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	91.59	80	120	yes
Toluene	ng	88.59	80	120	yes
Ethylbenzene	ng	93.53	80	120	yes
m,p-Xylene	ng	89.00	80	120	yes
Total Xylenes (m,p,o)	ng	89.15	80	120	yes
Styrene	ng	94.32	80	120	yes
Date Acquired:	October 13, 2021				

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	mg/kg	84	70	130	yes
Toluene	mg/kg	91	70	130	yes

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Sampled By: Jack Common/Sam Carp
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525505**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Oct 19, 2021
Report Number: 2670021

Mono-Aromatic Hydrocarbons - Soil - Continued

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Ethylbenzene	mg/kg	105	70	130	yes
m,p-Xylene	mg/kg	94	70	130	yes
o-Xylene	mg/kg	97	70	130	yes
Styrene	mg/kg	115	70	130	yes

Date Acquired: October 13, 2021

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	ng	0	-10	10	yes

Date Acquired: October 13, 2021

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	mg/kg	116	70	130	yes

Date Acquired: October 13, 2021

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Methodology and Notes

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Attn: Project Coordinator
Sampled By: Jack Common/Sam Carp
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525505**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Oct 19, 2021
Report Number: 2670021

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Oct 13, 2021	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Oct 13, 2021	Element Calgary
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Oct 13, 2021	Element Calgary

** Reference Method Modified*

References

CCME	Canadian Council of Ministers of the Environment
US EPA	US Environmental Protection Agency Test Methods

Please direct any inquiries regarding this report to our Client Services group.
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Report Transmission Cover Page

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Nov 12, 2021
Report Number: 2682177

Contact	Company	Address
Element Invoicing	**Paramount Resources Ltd**	7217 Roper Road Edmonton, AB T6B 3J4 Phone: (780) 438-5522 Fax: Email: invoicing.edmonton@element.com

Delivery	Format	Deliverables
Post	PDF	COC / Invoice

Contact	Company	Address
Patricia Stebbing	**SynergyAspen Environmental**	Fort St John, BC null Phone: (250) 785-1030 Fax: Email: pstebbing@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR
Email - Zip Multiple Formats By Report	Generic ESDAT Chemistry File	Test Report
Email - Zip Multiple Formats By Report	Generic ESDAT Sample File	Test Report

Contact	Company	Address
Project Coordinator	**SynergyAspen Environmental**	2328 Clarke St. Port Moody, BC V3H 1Y8 Phone: (604) 931-1026 Fax: (604) 931-1046 Email: projectcoordinator@synergyaspen.ca

Delivery	Format	Deliverables
Email - Multiple Reports By Lot	PDF	COC / Invoice
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COC / COA
Email - Single Report	PDF	COC / Test Report
Email - Single Report	PDF	COR

Notes To Clients:

- Nov 10, 2021 - Sample 19 was received in a plastic bag which does not meet the sample requirements for F2-F4 hydrocarbon as specified by the reference method.

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V3H 1Y8
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Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Nov 12, 2021
Report Number: 2682177

Reference Number	1525504-1	1525504-3	1525504-5
Sample Date	Oct 04, 2021	Oct 04, 2021	Oct 04, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	BH21-01-01 / 0-0.32 / 6.8 °C	BH21-01-03 / 1.2-1.52 / 6.8 °C	BH21-01-05 / 2.48-2.8 / 6.8 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	<0.05	<0.05	0.05	0.05
Antimony	Strong Acid Extractable	mg/kg	0.4	0.7	0.5	0.2
Arsenic	Strong Acid Extractable	mg/kg	7.4	9.4	11.2	0.2
Barium	Strong Acid Extractable	mg/kg	182	335	195	1
Beryllium	Strong Acid Extractable	mg/kg	0.4	0.6	0.5	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.36	0.58	0.69	0.01
Chromium	Strong Acid Extractable	mg/kg	19.5	18.8	14.3	0.5
Cobalt	Strong Acid Extractable	mg/kg	8.0	8.5	9.5	0.1
Copper	Strong Acid Extractable	mg/kg	11.4	21.7	24.1	1
Lead	Strong Acid Extractable	mg/kg	8.7	10.1	11.1	0.1
Mercury	Strong Acid Extractable	mg/kg	<0.05	0.05	0.05	0.05
Molybdenum	Strong Acid Extractable	mg/kg	1.1	1.7	2.8	1
Nickel	Strong Acid Extractable	mg/kg	20.4	28.0	27.1	0.5
Selenium	Strong Acid Extractable	mg/kg	0.5	0.5	0.6	0.3
Silver	Strong Acid Extractable	mg/kg	<0.10	0.2	0.2	0.1
Thallium	Strong Acid Extractable	mg/kg	0.09	0.16	0.23	0.05
Tin	Strong Acid Extractable	mg/kg	<1.0	<1.0	<1.0	1
Uranium	Strong Acid Extractable	mg/kg	0.6	0.9	1.5	0.5
Vanadium	Strong Acid Extractable	mg/kg	29.6	33.5	23.8	0.1
Zinc	Strong Acid Extractable	mg/kg	75	88	105	1
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.41	0.50	0.35	0.01
SAR	Saturated Paste		<0.1	0.2	0.4	
% Saturation		%	70	103	80	
Calcium	Saturated Paste	mg/kg	59.2	74.6	30.3	
Magnesium	Saturated Paste	mg/kg	8.4	26.4	13.1	
Sodium	Saturated Paste	mg/kg	2	10	9	
Potassium	Saturated Paste	mg/kg	1	1	2	
Chloride	Saturated Paste	mg/L	5	4	5	2
Chloride	Saturated Paste	mg/kg	3	4	4	
Sulfate (SO4)	Saturated Paste	mg/kg	18	91.5	21	
TGR	Saturated Paste	T/ac	<0.1	<0.1	<0.1	
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.4	7.8	7.8	

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V3H 1Y8
Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Nov 12, 2021
Report Number: 2682177

Reference Number	1525504-1	1525504-3	1525504-6
Sample Date	Oct 04, 2021	Oct 04, 2021	Oct 04, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	BH21-01-01 / 0-0.32 / 6.8 °C	BH21-01-03 / 1.2-1.52 / 6.8 °C	BH21-01-06 / 3.08-3.62 / 6.8 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Silt Loam	Clay Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	23	20	33	0.1
Silt	2 µm - 50 µm	% by weight	61	47	33	0.1
Clay	<2 µm	% by weight	16	32	34	0.1

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Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Nov 12, 2021
Report Number: 2682177

Reference Number	1525504-8
Sample Date	Oct 04, 2021
Sample Time	NA
Sample Location	
Sample Description	BH21-01-08 / 4.85 / 6.8 °C
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Clay Loam			
Sand	50 µm - 2 mm	% by weight	30			0.1
Silt	2 µm - 50 µm	% by weight	30			0.1
Clay	<2 µm	% by weight	40			0.1

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Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Nov 12, 2021
Report Number: 2682177

Reference Number	1525504-9	1525504-12	1525504-14
Sample Date	Oct 04, 2021	Oct 04, 2021	Oct 04, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	BH21-02-01 / 0-0.32 / 6.8 °C	BH21-02-04 / 1.96-2.28 / 6.8 °C	BH21-02-06 / 0-0.32 / 6.8 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m		0.37		0.01
SAR	Saturated Paste			0.3		
% Saturation		%	83	57	80	
Calcium	Saturated Paste	mg/kg		26.9		
Magnesium	Saturated Paste	mg/kg		6.6		
Sodium	Saturated Paste	mg/kg		5		
Potassium	Saturated Paste	mg/kg		3		
Chloride	Saturated Paste	mg/L		4		2
Chloride	Saturated Paste	mg/kg		2		
Sulfate (SO4)	Saturated Paste	mg/kg		43.1		
TGR	Saturated Paste	T/ac		<0.1		

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Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Nov 12, 2021
Report Number: 2682177

Reference Number	1525504-9	1525504-14	1525504-19
Sample Date	Oct 04, 2021	Oct 04, 2021	Oct 04, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	BH21-02-01 / 0-0.32 / 6.8 °C	BH21-02-06 / 0-0.32 / 6.8 °C	BH21-03-05 / 2.68-3 / 6.8 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Metals Strong Acid Digestion						
Boron	Saturated Paste	mg/L	<0.05	<0.05	0.08	0.05
Antimony	Strong Acid Extractable	mg/kg	0.5	0.5	0.4	0.2
Arsenic	Strong Acid Extractable	mg/kg	9.4	8.9	9.2	0.2
Barium	Strong Acid Extractable	mg/kg	218	218	175	1
Beryllium	Strong Acid Extractable	mg/kg	0.6	0.6	0.5	0.1
Cadmium	Strong Acid Extractable	mg/kg	0.37	0.37	0.31	0.01
Chromium	Strong Acid Extractable	mg/kg	23.1	18.7	16.0	0.5
Cobalt	Strong Acid Extractable	mg/kg	9.4	9.7	7.1	0.1
Copper	Strong Acid Extractable	mg/kg	22.5	22.4	20.8	1
Lead	Strong Acid Extractable	mg/kg	10.8	10.2	10.1	0.1
Mercury	Strong Acid Extractable	mg/kg	0.06	0.05	0.05	0.05
Molybdenum	Strong Acid Extractable	mg/kg	2.0	1.9	1.8	1
Nickel	Strong Acid Extractable	mg/kg	32.1	30.8	23.3	0.5
Selenium	Strong Acid Extractable	mg/kg	0.4	0.4	1.1	0.3
Silver	Strong Acid Extractable	mg/kg	0.1	0.1	0.1	0.1
Thallium	Strong Acid Extractable	mg/kg	0.20	0.20	0.22	0.05
Tin	Strong Acid Extractable	mg/kg	<1.0	<1.0	<1.0	1
Uranium	Strong Acid Extractable	mg/kg	1.1	1.1	1.5	0.5
Vanadium	Strong Acid Extractable	mg/kg	25.9	26.7	23.1	0.1
Zinc	Strong Acid Extractable	mg/kg	87	83	83	1

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Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Nov 12, 2021
Report Number: 2682177

Reference Number	1525504-10	1525504-12	1525504-15
Sample Date	Oct 04, 2021	Oct 04, 2021	Oct 04, 2021
Sample Time	NA	NA	NA
Sample Location			
Sample Description	BH21-02-02 / 0.64-0.96 / 6.8 °C	BH21-02-04 / 1.96-2.28 / 6.8 °C	BH21-03-01 / 0-0.32 / 6.8 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	0.011	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	0.05	0.03
Methanol Field Preservation			Yes	Yes	No	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		19-Oct-21	19-Oct-21	28-Oct-21	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	11.90	12.60	10.80	

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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Nov 12, 2021
Report Number: 2682177

Reference Number	1525504-12	1525504-16
Sample Date	Oct 04, 2021	Oct 04, 2021
Sample Time	NA	NA
Sample Location		
Sample Description	BH21-02-04 / 1.96-2.28 / 6.8 °C	BH21-03-02 / 0.64-0.96 / 6.8 °C
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Soil Acidity						
pH	1:2 Soil:CaCl2 sol.	pH	7.7	7.8		

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Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
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Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Nov 12, 2021
Report Number: 2682177

Reference Number	1525504-15
Sample Date	Oct 04, 2021
Sample Time	NA
Sample Location	
Sample Description	BH21-03-01 / 0-0.32 / 6.8 °C
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Soil						
Naphthalene	Dry Weight	mg/kg	<0.01			0.010
Acenaphthylene	Dry Weight	mg/kg	<0.05			0.05
Acenaphthene	Dry Weight	mg/kg	<0.05			0.05
Fluorene	Dry Weight	mg/kg	<0.05			0.05
Phenanthrene	Dry Weight	mg/kg	<0.01			0.01
Anthracene	Dry Weight	mg/kg	<0.003			0.003
Fluoranthene	Dry Weight	mg/kg	<0.01			0.010
Pyrene	Dry Weight	mg/kg	0.015			0.010
Benzo(a)anthracene	Dry Weight	mg/kg	<0.01			0.01
Chrysene	Dry Weight	mg/kg	<0.05			0.05
Benzo(b+j)fluoranthene	Dry Weight	mg/kg	<0.05			0.05
Benzo(k)fluoranthene	Dry Weight	mg/kg	<0.05			0.05
Benzo(a)pyrene	Dry Weight	mg/kg	<0.05			0.05
Indeno(1,2,3-c,d)pyrene	Dry Weight	mg/kg	<0.05			0.05
Dibenzo(a,h)anthracene	Dry Weight	mg/kg	<0.05			0.05
Benzo(g,h,i)perylene	Dry Weight	mg/kg	<0.05			0.05
CB(a)P	B(a)P Total Potency Equivalents	mg/kg	0.006			0.001
IACR_Coarse	Index of Additive Cancer Risk		<0.001			0.001
IACR_Fine	Index of Additive Cancer Risk		<0.001			0.001
PAH - Soil - Surrogate Recovery						
Nitrobenzene-d5	PAH - Surrogate	%	97			50-140
2-Fluorobiphenyl	PAH - Surrogate	%	102			50-140
p-Terphenyl-d14	PAH - Surrogate	%	97			50-140

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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Nov 12, 2021
Report Number: 2682177

Reference Number	1525504-16	1525504-19
Sample Date	Oct 04, 2021	Oct 04, 2021
Sample Time	NA	NA
Sample Location		
Sample Description	BH21-03-02 / 0.64-0.96 / 6.8 °C	BH21-03-05 / 2.68-3 / 6.8 °C
Matrix	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Salinity						
Electrical Conductivity	Saturated Paste	dS/m	0.36			0.01
SAR	Saturated Paste		0.3			
% Saturation		%	57	60		
Calcium	Saturated Paste	mg/kg	27.4			
Magnesium	Saturated Paste	mg/kg	6.9			
Sodium	Saturated Paste	mg/kg	5			
Potassium	Saturated Paste	mg/kg	2			
Chloride	Saturated Paste	mg/L	4			2
Chloride	Saturated Paste	mg/kg	2			
Sulfate (SO4)	Saturated Paste	mg/kg	39.9			
TGR	Saturated Paste	T/ac	<0.1			

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Project Location: F-36
LSD: F-36
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Lot ID: **1525504**
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Reference Number	1525504-19
Sample Date	Oct 04, 2021
Sample Time	NA
Sample Location	
Sample Description	BH21-03-05 / 2.68-3 / 6.8 °C
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005			0.005
Toluene	Dry Weight	mg/kg	<0.02			0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005			0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03			0.03
Methanol Field Preservation			Yes			
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10			10
F1 -BTEX	Dry Weight	mg/kg	<10			10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		10-Nov-21			
F2c C10-C16	Dry Weight	mg/kg	<25			25
F3c C16-C34	Dry Weight	mg/kg	<50			50
F4c C34-C50	Dry Weight	mg/kg	<100			100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100			100
% C50+		%	<5			
Silica Gel Cleanup						
Silica Gel Cleanup			Done			
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	17.40			

Approved by:

Benjamin Morris, B.Sc
Operations Manager

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Quality Control

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Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:

Lot ID: **1525504**
Control Number:
Date Received: Oct 6, 2021
Date Reported: Nov 12, 2021
Report Number: 2682177

Extractable Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	0	-10	10	yes
F3c C16-C34	µg/mL	0	-30	30	yes
F4c C34-C50	µg/mL	0	-20	20	yes
F4HTGCc C34-C50+	µg/mL	0	-20	20	yes
Date Acquired:	October 15, 2021				

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	103.74	80	120	yes
F3c C16-C34	µg/mL	105.55	80	120	yes
F4c C34-C50	µg/mL	94.93	80	120	yes
F4HTGCc C34-C50+	µg/mL	91.10	80	120	yes
Date Acquired:	October 15, 2021				

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	mg/kg	90	70	130	yes
F3c C16-C34	mg/kg	101	70	130	yes
F4c C34-C50	mg/kg	110	70	130	yes
F4HTGCc C34-C50+	mg/kg	113	70	130	yes
Date Acquired:	October 27, 2021				

Metals Strong Acid Digestion

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Boron	mg/L	0.00242347	-0.05	0.07	yes
Antimony	µg/L	0.00532749	-0.1	0.2	yes
Arsenic	µg/L	0.00623878	-0.2	0.2	yes
Barium	µg/L	0.12652	-1	1	yes
Beryllium	µg/L	-1.12965e-005	-0.1	0.1	yes
Cadmium	µg/L	0.00110679	-0.01	0.01	yes
Chromium	µg/L	0.245151	-0.5	0.5	yes
Cobalt	µg/L	0.00261757	-0.1	0.1	yes
Copper	µg/L	0.0377192	-0.6	1.2	yes
Lead	µg/L	0.0179085	-5.0	5.0	yes
Mercury	µg/L	0.00195854	-0.04	0.04	yes
Molybdenum	µg/L	-0.00616385	-1.0	1.0	yes
Nickel	µg/L	0.112032	-0.4	0.7	yes
Selenium	µg/L	0.00203015	-0.30	0.30	yes
Silver	µg/L	0.00069243	-0.09	0.14	yes
Thallium	µg/L	0.0189308	-0.04	0.04	yes
Tin	µg/L	0.000749515	-0.4	0.4	yes
Uranium	µg/L	0.00232769	-0.5	0.5	yes
Vanadium	µg/L	-0.0339885	-0.1	0.1	yes
Zinc	µg/L	0.233071	-1	1	yes
Date Acquired:	October 27, 2021				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Antimony	mg/kg	0.4	0.4	20	0.4	yes

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Quality Control

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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

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Metals Strong Acid Digestion - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Arsenic	mg/kg	7.4	7.4	20	0.4	yes
Barium	mg/kg	182	186	20	2	yes
Beryllium	mg/kg	0.4	0.4	20	0.2	yes
Cadmium	mg/kg	0.36	0.36	20	0.02	yes
Chromium	mg/kg	19.5	19.1	20	1.1	yes
Cobalt	mg/kg	8.0	7.7	20	0.2	yes
Copper	mg/kg	11.4	11.2	20	2.2	yes
Lead	mg/kg	8.7	9.8	20	0.2	yes
Mercury	mg/kg	<0.05	<0.05	20	0.05	yes
Molybdenum	mg/kg	1.1	1.0	20	2.2	yes
Nickel	mg/kg	20.4	19.2	20	1.1	yes
Selenium	mg/kg	0.5	0.5	20	0.66	yes
Silver	mg/kg	<0.10	<0.10	20	0.22	yes
Thallium	mg/kg	0.09	0.09	20	0.11	yes
Tin	mg/kg	<1.0	<1.0	20	2.2	yes
Uranium	mg/kg	0.6	0.6	20	1.1	yes
Vanadium	mg/kg	29.6	29.0	20	0.2	yes
Zinc	mg/kg	75	74	20	2	yes
Date Acquired:	October 27, 2021					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Antimony	mg/kg	38.1	37.6	42.4	yes
Arsenic	mg/kg	37.6	36.3	43.9	yes
Barium	mg/kg	195	188	212	yes
Beryllium	mg/kg	18.6	17.4	22.2	yes
Cadmium	mg/kg	2.01	1.88	2.28	yes
Chromium	mg/kg	97.9	93.2	107.0	yes
Cobalt	mg/kg	19.5	18.2	21.2	yes
Copper	mg/kg	195	186.6	216.6	yes
Lead	mg/kg	18.4	18.3	21.3	yes
Mercury	mg/kg	3.02	2.64	3.36	yes
Molybdenum	mg/kg	190	185.1	222.3	yes
Nickel	mg/kg	97.0	92.4	106.2	yes
Selenium	mg/kg	39.9	35.20	44.20	yes
Silver	mg/kg	19.4	18.20	22.40	yes
Thallium	mg/kg	9.76	9.02	10.82	yes
Tin	mg/kg	196	191.2	215.2	yes
Uranium	mg/kg	96.5	86.0	116.0	yes
Vanadium	mg/kg	19.4	18.0	21.6	yes
Zinc	mg/kg	195	186	210	yes
Date Acquired:	October 27, 2021				
Antimony	mg/kg	3.5	3.1	4.6	yes
Arsenic	mg/kg	4.0	3.1	4.7	yes
Barium	mg/kg	98	81	121	yes
Beryllium	mg/kg	0.3	0.2	0.4	yes

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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6207
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LSD: F-36
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Metals Strong Acid Digestion - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Cadmium	mg/kg	0.95	0.71	1.13	yes
Chromium	mg/kg	76.3	64.7	97.1	yes
Cobalt	mg/kg	6.5	5.4	7.8	yes
Copper	mg/kg	124	101.9	152.9	yes
Lead	mg/kg	257	200.6	318.8	yes
Mercury	mg/kg	0.07	0.05	0.08	yes
Molybdenum	mg/kg	<1.0	0.9	1.2	yes
Nickel	mg/kg	25.2	21.3	32.1	yes
Selenium	mg/kg	<0.3	0.26	0.32	yes
Silver	mg/kg	3.9	2.30	5.30	yes
Thallium	mg/kg	0.08	0.06	0.09	yes
Tin	mg/kg	10.1	7.9	12.1	yes
Uranium	mg/kg	<0.5	0.4	0.6	yes
Vanadium	mg/kg	28.6	23.8	33.8	yes
Zinc	mg/kg	332	261	391	yes

Date Acquired: October 27, 2021

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.005	0.005	yes
Toluene	ng	0	-0.06	0.06	yes
Ethylbenzene	ng	0	-0.030	0.030	yes
Total Xylenes (m,p,o)	ng	0	-0.09	0.09	yes
Styrene	ng	0	-0.030	0.030	yes

Date Acquired: October 15, 2021

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	96.86	80	120	yes
Toluene	ng	92.09	80	120	yes
Ethylbenzene	ng	86.76	80	120	yes
m,p-Xylene	ng	92.93	80	120	yes
Total Xylenes (m,p,o)	ng	91.65	80	120	yes
Styrene	ng	91.73	80	120	yes

Date Acquired: October 15, 2021

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	mg/kg	109	70	130	yes
Toluene	mg/kg	108	70	130	yes
Ethylbenzene	mg/kg	102	70	130	yes
m,p-Xylene	mg/kg	93	70	130	yes
o-Xylene	mg/kg	95	70	130	yes
Styrene	mg/kg	109	70	130	yes

Date Acquired: October 27, 2021

PAH - Soil - Surrogate Recovery

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC

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Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6207
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PAH - Soil - Surrogate Recovery

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Nitrobenzene-d5	%	95.3343	50	140	yes
2-Fluorobiphenyl	%	100.995	50	140	yes
p-Terphenyl-d14	%	89.0498	50	140	yes

Date Acquired: October 29, 2021

Physical and Aggregate Properties

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Sand	% by weight	24	20	32	yes
Clay	% by weight	32	27	36	yes
<50 um	% by weight	76.4	67.500	82.500	yes

Date Acquired: November 01, 2021

Polycyclic Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Naphthalene	ng/mL	0	-0.010	0.010	yes
Acenaphthylene	ng/mL	0	-0.05	0.05	yes
Acenaphthene	ng/mL	0	-0.05	0.05	yes
Fluorene	ng/mL	0	-0.05	0.05	yes
Phenanthrene	ng/mL	0	-0.01	0.01	yes
Anthracene	ng/mL	0	-0.003	0.003	yes
Fluoranthene	ng/mL	0	-0.010	0.010	yes
Pyrene	ng/mL	0	-0.010	0.010	yes
Benzo(a)anthracene	ng/mL	0	-0.01	0.01	yes
Chrysene	ng/mL	0	-0.05	0.05	yes
Benzo(b)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(b+j)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(k)fluoranthene	ng/mL	0	-0.05	0.05	yes
Benzo(a)pyrene	ng/mL	0	-0.05	0.05	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	0	-0.05	0.05	yes
Dibenzo(a,h)anthracene	ng/mL	0	-0.05	0.05	yes
Benzo(g,h,i)perylene	ng/mL	0	-0.05	0.05	yes

Date Acquired: October 29, 2021

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Naphthalene	ng/mL	99.80	80	120	yes
Acenaphthylene	ng/mL	89.20	80	120	yes
Acenaphthene	ng/mL	103.00	80	120	yes
Fluorene	ng/mL	105.20	80	120	yes
Phenanthrene	ng/mL	102.40	80	120	yes
Anthracene	ng/mL	107.80	80	120	yes
Fluoranthene	ng/mL	108.80	80	120	yes
Pyrene	ng/mL	107.40	80	120	yes
Benzo(a)anthracene	ng/mL	99.80	80	120	yes
Chrysene	ng/mL	104.40	80	120	yes
Benzo(b)fluoranthene	ng/mL	98.40	80	120	yes

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Quality Control

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Sampled By: Jack Common
Company: SynergyAspen

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Project Name: Stage 2 PSI
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Polycyclic Aromatic Hydrocarbons - Soil - Continued

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzo(k)fluoranthene	ng/mL	94.00	80	120	yes
Benzo(a)pyrene	ng/mL	99.20	80	120	yes
Indeno(1,2,3-c,d)pyrene	ng/mL	103.00	80	120	yes
Dibenzo(a,h)anthracene	ng/mL	101.80	80	120	yes
Benzo(g,h,i)perylene	ng/mL	103.80	80	120	yes

Date Acquired: October 29, 2021

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Naphthalene	mg/kg	<0.01	<0.01	50	0.020	yes
Acenaphthylene	mg/kg	<0.05	<0.05	50	0.10	yes
Acenaphthene	mg/kg	<0.05	<0.05	50	0.10	yes
Fluorene	mg/kg	<0.05	<0.05	50	0.10	yes
Phenanthrene	mg/kg	0.02	0.02	50	0.02	yes
Anthracene	mg/kg	<0.003	<0.003	50	0.006	yes
Fluoranthene	mg/kg	0.011	0.011	50	0.020	yes
Pyrene	mg/kg	0.080	0.099	50	0.020	yes
Benzo(a)anthracene	mg/kg	<0.01	<0.01	50	0.02	yes
Chrysene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(b)fluoranthene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(k)fluoranthene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(a)pyrene	mg/kg	<0.05	<0.05	50	0.10	yes
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.05	<0.05	50	0.10	yes
Dibenzo(a,h)anthracene	mg/kg	<0.05	<0.05	50	0.10	yes
Benzo(g,h,i)perylene	mg/kg	<0.05	<0.05	50	0.10	yes

Date Acquired: October 29, 2021

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Naphthalene	mg/kg	116	50	140	yes
Acenaphthylene	mg/kg	100	50	140	yes
Acenaphthene	mg/kg	118	50	140	yes
Fluorene	mg/kg	116	50	140	yes
Phenanthrene	mg/kg	118	50	140	yes
Anthracene	mg/kg	118	50	140	yes
Fluoranthene	mg/kg	121	50	140	yes
Pyrene	mg/kg	120	50	140	yes
Benzo(a)anthracene	mg/kg	113	50	140	yes
Chrysene	mg/kg	121	50	140	yes
Benzo(b)fluoranthene	mg/kg	101	50	140	yes
Benzo(k)fluoranthene	mg/kg	119	50	140	yes
Benzo(a)pyrene	mg/kg	102	50	140	yes
Indeno(1,2,3-c,d)pyrene	mg/kg	117	50	140	yes
Dibenzo(a,h)anthracene	mg/kg	97	50	140	yes
Benzo(g,h,i)perylene	mg/kg	108	50	140	yes

Date Acquired: October 29, 2021

Salinity

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Attn: Project Coordinator
Sampled By: Jack Common
Company: SynergyAspen

Project ID: PAR6207
Project Name: Stage 2 PSI
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Salinity

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Calcium	mg/L	0.079805	-0.4	0.5	yes
Magnesium	mg/L	-0.0151732	-0.1	0.1	yes
Sodium	mg/L	-0.0165171	-0	2	yes
Potassium	mg/L	-0.00357528	-0.5	0.7	yes
Chloride	mg/L	2.3634	0	5	yes
Sulfate-S	mg/L	0.0974775	-0	1	yes
Date Acquired:	October 26, 2021				

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Electrical Conductivity	dS/m	1.65	1.31	1.79	yes
% Saturation	%	59	55	67	yes
Calcium	mg/L	321	231.4	347.2	yes
Magnesium	mg/L	57.4	40.3	60.7	yes
Sodium	mg/L	24	20	26	yes
Potassium	mg/L	11.0	9.6	13.2	yes
Chloride	mg/L	30	24	33	yes
Sulfate-S	mg/L	224	175	242	yes
Date Acquired:	October 26, 2021				
Electrical Conductivity	dS/m	32.0	26.80	35.20	yes
Calcium	mg/L	246	226.9	261.1	yes
Magnesium	mg/L	101	91.0	104.8	yes
Sodium	mg/L	255	229	264	yes
Potassium	mg/L	252	230.7	265.5	yes
Chloride	mg/L	2150	1852	2229	yes
Sulfate-S	mg/L	149	137	158	yes
Date Acquired:	October 26, 2021				

Soil Acidity

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
pH	pH	6.5	6.3	6.9	yes
Date Acquired:	October 28, 2021				

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	ng	0	-10	10	yes
Date Acquired:	October 15, 2021				

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	mg/kg	92	70	130	yes
Date Acquired:	October 27, 2021				

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Methodology and Notes

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Sampled By: Jack Common
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Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Oct 15, 2021	Element Calgary
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Oct 27, 2021	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Oct 15, 2021	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Oct 27, 2021	Element Calgary
Metals ICP (Hot Block) in soil	EPA	*	Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements, October 1999, 200.2	Oct 27, 2021	Element Edmonton - Roper Road
Metals ICP (Hot Block) in soil	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Oct 27, 2021	Element Edmonton - Roper Road
PAH - Soil	AEP		Index of Additive Cancer Risk (IACR), IACR	Oct 29, 2021	Element Calgary
PAH - Soil	US EPA	*	Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, 8270	Oct 29, 2021	Element Calgary
Particle Size Analysis - GS	Carter	*	Hydrometer Method, 55.3	Nov 1, 2021	Element Edmonton - Roper Road
pH by CaCl2 (1:2 ratio) in soil	McKeague	*	pH in 0.01M Calcium Chloride, 3.11	Oct 28, 2021	Element Edmonton - Roper Road
Saturated Paste in General Soil	APHA	*	Automated Ferricyanide Method, 4500-Cl-E	Oct 26, 2021	Element Edmonton - Roper Road
Saturated Paste in General Soil	Carter	*	Electrical Conductivity and Soluble Ions, Chapter 15	Oct 26, 2021	Element Edmonton - Roper Road
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Oct 15, 2021	Element Calgary
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Oct 27, 2021	Element Calgary

** Reference Method Modified*

References

AEP	Alberta Tier 1 Soil and Groundwater Remediation Guidelines
APHA	Standard Methods for the Examination of Water and Wastewater
Carter	Soil Sampling and Methods of Analysis.
CCME	Canadian Council of Ministers of the Environment
EPA	Environmental Protection Agency Test Methods - US

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Methodology and Notes

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Company:	SynergyAspen

Project ID:	PAR6207
Project Name:	Stage 2 PSI
Project Location:	F-36
LSD:	F-36
P.O.:	
Proj. Acct. code:	

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McKeague	Manual on Soil Sampling and Methods of Analysis
US EPA	US Environmental Protection Agency Test Methods

Comments:

- Nov 10, 2021 - Sample 19 was received in a plastic bag which does not meet the sample requirements for F2-F4 hydrocarbon as specified by the reference method.

Please direct any inquiries regarding this report to our Client Services group.
Results relate only to samples as submitted.
The test report shall not be reproduced except in full, without the written approval of the laboratory.

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Report Transmission Cover Page

Bill To: Paramount Resources Ltd
9904 106 Street
Fort St. John, BC, Canada
Attn: Marsha Pereira
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1546650**
Control Number: G1L0110A01
Date Received: Jan 13, 2022
Date Reported: Jan 15, 2022
Report Number: 2710093

Contact	Company	Address
Element Invoicing	**Paramount Resources Ltd**	7217 Roper Road Edmonton, AB T6B 3J4 Phone: (780) 438-5522 Fax: Email: invoicing.edmonton@element.com

Delivery	Format	Deliverables
Post	PDF	COC / Invoice

Contact	Company	Address
Lori Johnson	**SynergyAspen Environmental**	9904 106 Street Fort St John, BC V1J 1V8 Phone: (250) 785-1030 Fax: (250) 785-1034 Email: ljohnson@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR

Contact	Company	Address
Marsha Pereira	**SynergyAspen Environmental**	9904 106 Street Fort St. John, BC null Phone: (250) 785-1030 Fax: Email: mpereira@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / COA
Email - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Zip Multiple Formats By Report	Generic ESDAT Chemistry File	Test Report
Email - Zip Multiple Formats By Report	Generic ESDAT Sample File	Test Report

Contact	Company	Address
Project Coordinator	**SynergyAspen Environmental**	2328 Clarke St. Port Moody, BC V3H 1Y8 Phone: (604) 931-1026 Fax: (604) 931-1046 Email: projectcoordinator@synergyaspen.ca

Delivery	Format	Deliverables
Email - Multiple Reports By Lot	PDF	COC / Invoice
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COC / COA
Email - Single Report	PDF	COC / Test Report
Email - Single Report	PDF	COR

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Analytical Report

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Lot ID: **1546650**
Control Number: G1L0110A01
Date Received: Jan 13, 2022
Date Reported: Jan 15, 2022
Report Number: 2710093

Reference Number	1546650-1
Sample Date	January 10, 2022
Sample Time	NA
Sample Location	
Sample Description	LF22-01-01
Sample Matrix	Waste - industrial

Analyte		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Aggregate Organic Constituents						
Oil	As Received	% by weight	<0.5	0.5	3	Below Limit
Oil and Grease	Dried Basis	% by weight	<0.6	0.5	3	Below Limit
Leachate Inorganic- SWEP						
Arsenic	SWEP Leachate	mg/L	<0.2	0.2	2.5	Below Limit
Barium	SWEP Leachate	mg/L	0.041	0.005	100.0	Below Limit
Boron	SWEP Leachate	mg/L	<0.1	0.1	500.0	Below Limit
Cadmium	SWEP Leachate	mg/L	<0.005	0.005	0.5	Below Limit
Chromium	SWEP Leachate	mg/L	<0.01	0.01	5.0	Below Limit
Copper	SWEP Leachate	mg/L	<0.05	0.05	100	Below Limit
Lead	SWEP Leachate	mg/L	<0.05	0.05	5.0	Below Limit
Mercury	SWEP Leachate	mg/L	<0.001	0.001	0.1	Below Limit
Selenium	SWEP Leachate	mg/L	<0.2	0.2	1.0	Below Limit
Silver	SWEP Leachate	mg/L	<0.02	0.02	5.0	Below Limit
Uranium	SWEP Leachate	mg/L	<0.6	0.6	10.0	Below Limit
Zinc	SWEP Leachate	mg/L	0.033	0.005	500.0	Below Limit
Cyanide	SWEP Leachate	mg/L	0.02	0.01	20.0	Below Limit
Fluoride	SWEP Leachate	mg/L	0.15	0.04	150.0	Below Limit
Nitrate and Nitrite	SWEP Leachate	mg/L	<3	0.4	1000.0	Below Limit
Nitrate	SWEP Leachate	mg/L	<2	0.4	4500.0	Below Limit
Nitrite	SWEP Leachate	mg/L	<1	0.4	320.0	Below Limit
Non-Halogenated Aromatics - Soil						
Benzene	Dry Weight	mg/kg	<0.02	0.02		
Toluene	Dry Weight	mg/kg	<0.02	0.02		
Ethylbenzene	Dry Weight	mg/kg	<0.02	0.02		
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.02	0.02		
Total BTEX	Dry Weight	mg/kg	<0.08	0.04	1000	Below Limit
Methanol Field Preservation			Yes			
Waste Characterization						
pH	1:2 Soil:Water	pH	8.1		2-12.5	
Paint Filter	Interpretation		Solid Waste			
Flash			No			
Flash Point		°C	>75		>60.5	Within Limits
Field Preservation						
Methanol Field Preservation			Yes			
Mono-Aromatic Hydrocarbons - Leachate						
Benzene	TCLP Leachate	mg/L	<0.01	0.01	0.5	Below Limit
Toluene	TCLP Leachate	mg/L	<0.01	0.01	2.4	Below Limit

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Project Location: F-36
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Lot ID: **1546650**
Control Number: G1L0110A01
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Reference Number	1546650-1
Sample Date	January 10, 2022
Sample Time	NA
Sample Location	
Sample Description	LF22-01-01
Sample Matrix	Waste - industrial

Analyte		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Mono-Aromatic Hydrocarbons - Leachate - Continued						
Ethylbenzene	TCLP Leachate	mg/L	<0.01	0.01	0.24	Below Limit
Total Xylenes (m,p,o)	TCLP Leachate	mg/L	<0.01	0.01	30	Below Limit
Soil % Moisture						
Moisture	Soil % Moisture	%	11.3	0.5		

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Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1546650**
Control Number: G1L0110A01
Date Received: Jan 13, 2022
Date Reported: Jan 15, 2022
Report Number: 2710093

Reference Number	1546650-2
Sample Date	January 10, 2022
Sample Time	NA
Sample Location	
Sample Description	LF22-02-01
Sample Matrix	Waste - industrial

Analyte		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Aggregate Organic Constituents						
Oil	As Received	% by weight	<0.5	0.5	3	Below Limit
Oil and Grease	Dried Basis	% by weight	<0.6	0.5	3	Below Limit
Leachate Inorganic- SWEP						
Arsenic	SWEP Leachate	mg/L	<0.2	0.2	2.5	Below Limit
Barium	SWEP Leachate	mg/L	0.049	0.005	100.0	Below Limit
Boron	SWEP Leachate	mg/L	<0.1	0.1	500.0	Below Limit
Cadmium	SWEP Leachate	mg/L	<0.005	0.005	0.5	Below Limit
Chromium	SWEP Leachate	mg/L	<0.01	0.01	5.0	Below Limit
Copper	SWEP Leachate	mg/L	<0.05	0.05	100	Below Limit
Lead	SWEP Leachate	mg/L	<0.05	0.05	5.0	Below Limit
Mercury	SWEP Leachate	mg/L	<0.001	0.001	0.1	Below Limit
Selenium	SWEP Leachate	mg/L	<0.2	0.2	1.0	Below Limit
Silver	SWEP Leachate	mg/L	<0.02	0.02	5.0	Below Limit
Uranium	SWEP Leachate	mg/L	<0.6	0.6	10.0	Below Limit
Zinc	SWEP Leachate	mg/L	0.023	0.005	500.0	Below Limit
Cyanide	SWEP Leachate	mg/L	0.02	0.01	20.0	Below Limit
Fluoride	SWEP Leachate	mg/L	0.31	0.04	150.0	Below Limit
Nitrate and Nitrite	SWEP Leachate	mg/L	<3	0.4	1000.0	Below Limit
Nitrate	SWEP Leachate	mg/L	<2	0.4	4500.0	Below Limit
Nitrite	SWEP Leachate	mg/L	<1	0.4	320.0	Below Limit
Non-Halogenated Aromatics - Soil						
Benzene	Dry Weight	mg/kg	<0.02	0.02		
Toluene	Dry Weight	mg/kg	<0.02	0.02		
Ethylbenzene	Dry Weight	mg/kg	<0.02	0.02		
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.02	0.02		
Total BTEX	Dry Weight	mg/kg	<0.08	0.04	1000	Below Limit
Methanol Field Preservation			Yes			
Waste Characterization						
pH	1:2 Soil:Water	pH	8.3		2-12.5	
Paint Filter	Interpretation		Solid Waste			
Flash			No			
Flash Point		°C	>75		>60.5	Within Limits
Field Preservation						
Methanol Field Preservation			Yes			
Mono-Aromatic Hydrocarbons - Leachate						
Benzene	TCLP Leachate	mg/L	<0.01	0.01	0.5	Below Limit
Toluene	TCLP Leachate	mg/L	<0.01	0.01	2.4	Below Limit

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Lot ID: **1546650**
Control Number: G1L0110A01
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Reference Number	1546650-2
Sample Date	January 10, 2022
Sample Time	NA
Sample Location	
Sample Description	LF22-02-01
Sample Matrix	Waste - industrial

Analyte		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Mono-Aromatic Hydrocarbons - Leachate - Continued						
Ethylbenzene	TCLP Leachate	mg/L	<0.01	0.01	0.24	Below Limit
Total Xylenes (m,p,o)	TCLP Leachate	mg/L	<0.01	0.01	30	Below Limit
Soil % Moisture						
Moisture	Soil % Moisture	%	13.9	0.5		

Approved by:

Anthony Neumann, MSc
General Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

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Aggregate Organic Constituents

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Oil	% by weight	<0.5	<0.5	20	0.5	yes
Date Acquired:	January 14, 2022					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Oil	% by weight	0.9	0.5	1.1	yes
Date Acquired:	January 14, 2022				

Leachate Inorganic- SWEP

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Arsenic	mg/L	-0.000284226	-0.0	0.0	yes
Barium	mg/L	0	-0.003	0.003	yes
Boron	mg/L	0.00622379	-0.1	0.1	yes
Cadmium	mg/L	5.56719e-005	-0.000	0.000	yes
Chromium	mg/L	-0.000559292	-0.00	0.00	yes
Copper	mg/L	-4.02058e-005	-0.05	0.05	yes
Lead	mg/L	0	-0.00	0.00	yes
Mercury	µg/L	-0.00935415	-0.900	0.900	yes
Selenium	mg/L	-3.70961e-005	-0.01	0.01	yes
Silver	mg/L	-2.98236e-005	-0.01	0.01	yes
Uranium	mg/L	4.86191e-006	-0.0	0.0	yes
Zinc	mg/L	-0.000615958	-0.005	0.005	yes
Cyanide	mg/L	0	-0.010	0.010	yes
Fluoride	mg/L	0.037	-0.04	0.04	yes
Nitrate and Nitrite - N	mg/L	0	-1.2	1.2	yes
Nitrite - N	mg/L	0	-1.2	1.2	yes
Date Acquired:	January 14, 2022				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Arsenic	mg/L	<0.2	<0.2	20	0.0	yes
Barium	mg/L	0.087	0.083	20	0.003	yes
Boron	mg/L	<0.1	<0.1	20	0.1	yes
Cadmium	mg/L	<0.005	<0.005	20	0.000	yes
Chromium	mg/L	<0.01	<0.01	20	0.00	yes
Copper	mg/L	<0.05	<0.05	20	0.00	yes
Lead	mg/L	<0.05	<0.05	20	0.00	yes
Mercury	mg/L	<0.001	<0.001	20	0.000	yes
Selenium	mg/L	<0.2	<0.2	20	0.01	yes
Silver	mg/L	<0.02	<0.02	20	0.01	yes
Uranium	mg/L	<0.6	<0.6	20	0.0	yes
Zinc	mg/L	0.017	0.017	20	0.002	yes
Cyanide	mg/L	0.04	0.04	20	0.012	yes
Fluoride	mg/L	0.28	0.25	20	0.02	yes
Nitrate and Nitrite - N	mg/L	<0.4	<0.4	20	0.8	yes
Nitrite - N	mg/L	<0.4	<0.4	20	0.8	yes
Date Acquired:	January 14, 2022					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC

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Leachate Inorganic- SWEP - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Arsenic	mg/L	0.9	0.8	1.1	yes
Barium	mg/L	4.70	4.250	5.750	yes
Boron	mg/L	0.9	0.8	1.1	yes
Cadmium	mg/L	0.944	0.850	1.150	yes
Chromium	mg/L	0.92	0.85	1.15	yes
Copper	mg/L	0.91	0.85	1.15	yes
Lead	mg/L	0.92	0.85	1.15	yes
Mercury	mg/L	0.002	0.002	0.002	yes
Selenium	mg/L	1.0	0.85	1.15	yes
Silver	mg/L	0.95	0.85	1.15	yes
Uranium	mg/L	0.9	0.8	1.1	yes
Zinc	mg/L	0.910	0.850	1.150	yes
Cyanide	mg/L	0.14	0.128	0.173	yes
Fluoride	mg/L	0.99	0.85	1.15	yes
Nitrate and Nitrite - N	mg/L	10.4	8.5	11.5	yes
Nitrite - N	mg/L	0.9	0.8	1.1	yes

Date Acquired: January 14, 2022

Mono-Aromatic Hydrocarbons - Leachate

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.01	0.01	yes
Toluene	ng	0	-0.01	0.01	yes
Ethylbenzene	ng	0	-0.01	0.01	yes
Total Xylenes (m,p,o)	ng	0	-0.01	0.01	yes

Date Acquired: January 13, 2022

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	95.72	80	120	yes
Toluene	ng	101.58	80	120	yes
Ethylbenzene	ng	92.72	80	120	yes
Total Xylenes (m,p,o)	ng	94.77	80	120	yes

Date Acquired: January 13, 2022

Benzene	ng	85.05	80	120	yes
Toluene	ng	82.06	80	120	yes
Ethylbenzene	ng	84.10	80	120	yes
Total Xylenes (m,p,o)	ng	86.66	80	120	yes

Date Acquired: January 13, 2022

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	mg/L	95	80	120	yes
Toluene	mg/L	94	80	120	yes
Ethylbenzene	mg/L	103	80	120	yes
o-Xylene	mg/L	91	80	120	yes
Total Xylenes (m,p,o)	mg/L	104	80	120	yes

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Non-Halogenated Aromatics - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.02	0.02	yes
Toluene	ng	0	-0.02	0.02	yes
Ethylbenzene	ng	0	-0.02	0.02	yes
Total Xylenes (m,p,o)	ng	0	-0.02	0.02	yes
Date Acquired:	January 13, 2022				
Benzene	ng	0	-0.02	0.02	yes
Toluene	ng	0	-0.02	0.02	yes
Ethylbenzene	ng	0	-0.02	0.02	yes
Total Xylenes (m,p,o)	ng	0	-0.02	0.02	yes
Date Acquired:	January 13, 2022				

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	94.20	80	120	yes
Toluene	ng	102.40	80	120	yes
Ethylbenzene	ng	95.20	80	120	yes
Total Xylenes (m,p,o)	ng	96.00	80	120	yes
Date Acquired:	January 13, 2022				
Benzene	ng	87.00	80	120	yes
Toluene	ng	85.20	80	120	yes
Ethylbenzene	ng	86.80	80	120	yes
Total Xylenes (m,p,o)	ng	86.67	80	120	yes
Date Acquired:	January 13, 2022				

Waste Characterization

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
pH	pH	11.0	10.9	0	0.2	yes
Date Acquired:	January 14, 2022					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
pH	pH	7.0	6.7	7.3	yes
Date Acquired:	January 14, 2022				
pH	pH	9.1	8.2	10.1	yes
Date Acquired:	January 14, 2022				
pH	pH	6.9	6.2	7.5	yes
Date Acquired:	January 14, 2022				
Flash Point	°C	69	68	74	yes
Date Acquired:	January 14, 2022				

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Methodology and Notes

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		Project Name:	Remediation	Control Number:	G1L0110A01
		Project Location:	F-36	Date Received:	Jan 13, 2022
Attn:	Marsha Pereira	LSD:	F-36	Date Reported:	Jan 15, 2022
Sampled By:	Collin Batchelor	P.O.:		Report Number:	2710093
Company:	SynergyAspen Environmental	Proj. Acct. code:			
		OI Customer	PR210-Drilling and		

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
BTEX - Leachate (Non-modified)	US EPA		Toxicity Characteristic Leaching Procedure, SW-846, EPA 1311 (Non-modified)	Jan 13, 2022	Element Fort St. John
BTEX-Soil - LF	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Jan 13, 2022	Element Fort St. John
Flash Point (Closed cup) (FSJ)	ASTM	*	Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester, D 93-20	Jan 14, 2022	Element Fort St. John
Leachate Inorganic (Modified SWEP)	APHA	*	Ion Selective Electrode, 4500-F- C	Jan 14, 2022	Element Fort St. John
Leachate Inorganic (Modified SWEP)	Environmental Management Act	*	Modified Leachate Extraction Procedure, BC Reg 63/88	Jan 14, 2022	Element Fort St. John
Leachate Inorganic (Modified SWEP)	HACH	*	Cyanide: Pyridine-Pyrazalone Method, Method 8027	Jan 14, 2022	Element Fort St. John
Leachate Inorganic (Modified SWEP)	US EPA	*	US-EPA 353.2, 353.2	Jan 14, 2022	Element Fort St. John
Moisture - Soil (FSJ)	Carter	*	Sample Moisture Content, 4.4	Jan 14, 2022	Element Fort St. John
Oil and Grease - Special Waste (SWOG)	B.C.M.O.E	*	Determination of Waste Oil Content in Solids and Liquids for Hazardous Waste Regulations - PBM, SWOG	Jan 14, 2022	Element Fort St. John
Paint Filter Liquids Test	US EPA	*	Paint Filter Liquids Test, 9095B	Jan 14, 2022	Element Fort St. John
pH and Conductivity in general soil 1:2 (FSJ)	McKeague	*	1:2 Soil:Water Ratio, 4.12	Jan 14, 2022	Element Fort St. John

** Reference Method Modified*

References

APHA	Standard Methods for the Examination of Water and Wastewater
ASTM	Annual Book of ASTM Standards
B.C.M.O.E	B.C. Ministry of Environment
Carter	Soil Sampling and Methods of Analysis.
Environmental	BC Environmental Management Act, Hazardous Waste Regulation
HACH	HACH Analytical Procedures for DR/200 and DR/300 Instruments
McKeague	Manual on Soil Sampling and Methods of Analysis
US EPA	US Environmental Protection Agency Test Methods

Guidelines

Guideline Description	CCS Secure Landfill (BC)
Guideline Source	British Columbia Hazardous Waste Regulation, BC MOE Reg 63/88
Guideline Comments	Limits for analytes that may be required for Landfill Waste Acceptance may not be presented in this report. Consult the BC Hazardous Waste Regulation and the BC Hazardous Waste Legislation Guide for information.

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Methodology and Notes

Bill To:	Paramount Resources Ltd 9904 106 Street Fort St. John, BC, Canada
Attn:	Marsha Pereira
Sampled By:	Collin Batchelor
Company:	SynergyAspen Environmental

Project ID:	PAR6207
Project Name:	Remediation
Project Location:	F-36
LSD:	F-36
P.O.:	
Proj. Acct. code:	
OI Customer	PR210-Drilling and

Lot ID:	**1546650**
Control Number:	G1L0110A01
Date Received:	Jan 13, 2022
Date Reported:	Jan 15, 2022
Report Number:	2710093

The comparison of test results to guideline limits is provided for information purposes only. This is not to be taken as a statement of conformance / nonconformance to any guideline, regulation or limit. The data user is responsible for all conclusions drawn with respect to the data and is advised to consult official regulatory references when evaluating compliance.

Please direct any inquiries regarding this report to our Client Services group.
Results relate only to samples as submitted.
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Report Transmission Cover Page

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547429**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 24, 2022
Report Number: 2711310

Contact	Company	Address
Element Invoicing	**Paramount Resources Ltd**	7217 Roper Road Edmonton, AB T6B 3J4 Phone: (780) 438-5522 Fax: Email: invoicing.edmonton@element.com

Delivery	Format	Deliverables
Post	PDF	COC / Invoice

Contact	Company	Address
Lori Johnson	**SynergyAspen Environmental**	9904 106 Street Fort St John, BC V1J 1V8 Phone: (250) 785-1030 Fax: (250) 785-1034 Email: ljohnson@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR

Contact	Company	Address
Marsha Pereira	**SynergyAspen Environmental**	9904 106 Street Fort St. John, BC null Phone: (250) 785-1030 Fax: Email: mpereira@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / COA
Email - Merge Reports	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR
Email - Zip Multiple Formats By Report	Generic ESDAT Chemistry File	Test Report
Email - Zip Multiple Formats By Report	Generic ESDAT Sample File	Test Report

Contact	Company	Address
Project Coordinator	**SynergyAspen Environmental**	2328 Clarke St. Port Moody, BC V3H 1Y8 Phone: (604) 931-1026 Fax: (604) 931-1046 Email: projectcoordinator@synergyaspen.ca

Delivery	Format	Deliverables
Email - Multiple Reports By Lot	PDF	COC / Invoice
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COC / COA
Email - Single Report	PDF	COC / Test Report
Email - Single Report	PDF	COR

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Report Transmission Cover Page

Bill To:	Paramount Resources Ltd 2328 Clarke St. Port Moody, BC, Canada V3H 1Y8	Project ID:	PAR6207	Lot ID:	**1547429**
		Project Name:	Remediation	Control Number:	
		Project Location:	F-36	Date Received:	Jan 18, 2022
		LSD:	F-36	Date Reported:	Jan 24, 2022
Attn:	Project Coordinator	P.O.:		Report Number:	2711310
Sampled By:	Collin Batchelor	Proj. Acct. code:			
Company:	SynergyAspen Environmental	OI Customer	PR210-Drilling and		

Contact	Company	Address
Tanya Allen	**SynergyAspen Environmental**	2328 Clarke St. Port Moody, BC V3H 1Y8 Phone: (604) 931-1026 Fax: (604) 931-1046 Email: tallen@synergyaspen.ca

Delivery	Format	Deliverables
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Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report

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Analytical Report

Bill To:	Paramount Resources Ltd 2328 Clarke St. Port Moody, BC, Canada V3H 1Y8	Project ID:	PAR6207	Lot ID:	**1547429**
		Project Name:	Remediation	Control Number:	
		Project Location:	F-36	Date Received:	Jan 18, 2022
		LSD:	F-36	Date Reported:	Jan 24, 2022
Attn:	Project Coordinator	P.O.:		Report Number:	2711310
Sampled By:	Collin Batchelor	Proj. Acct. code:			
Company:	SynergyAspen Environmental	OI Customer	PR210-Drilling and		

Reference Number	1547429-1	1547429-2	1547429-3
Sample Date	Jan 14, 2022	Jan 14, 2022	Jan 14, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6207 / EXC22-01-01 / 0.5 - 0.6 / -3.2 °C	PAR6207 / EXC22-01-02 / 0.5 - 0.6 / -3.2 °C	PAR6207 / EXC22-01-03 / 0.5 - 0.6 / -3.2 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22	20-Jan-22	20-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	12.10	14.50	13.80	

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547429**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 24, 2022
Report Number: 2711310

Reference Number	1547429-4	1547429-5	1547429-6
Sample Date	Jan 14, 2022	Jan 14, 2022	Jan 14, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6207 / EXC22-01-04 / 0.5 - 0.6 / -3.2 °C	PAR6207 / EXC22-01-05 / 0.5 - 0.6 / -3.2 °C	PAR6207 / EXC22-01-06 / 0.5 - 0.6 / -3.2 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22	20-Jan-22	20-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	103	<50	109	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	15.70	11.90	10.90	

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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547429**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 24, 2022
Report Number: 2711310

Reference Number	1547429-7	1547429-8	1547429-9
Sample Date	Jan 14, 2022	Jan 14, 2022	Jan 14, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6207 / EXC22-01-07 / 1.5 - 1.6 / -3.2 °C	PAR6207 / EXC22-01-08 / 1.5 - 1.6 / -3.2 °C	PAR6207 / EXC22-01-09 / 1.5 - 1.6 / -3.2 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22	20-Jan-22	20-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	83	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	14.90	11.60	12.80	

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Analytical Report

Bill To: Paramount Resources Ltd
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Port Moody, BC, Canada
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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547429**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 24, 2022
Report Number: 2711310

Reference Number	1547429-10	1547429-11	1547429-12
Sample Date	Jan 14, 2022	Jan 14, 2022	Jan 14, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6207 / EXC22-01-10 / 1.5 - 1.6 / -3.2 °C	PAR6207 / EXC22-01-11 / 1.5 - 1.6 / -3.2 °C	PAR6207 / EXC22-01-12 / 1.5 - 1.6 / -3.2 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22	20-Jan-22	20-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	69	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	14.80	15.10	9.21	

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Analytical Report

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Port Moody, BC, Canada
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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547429**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 24, 2022
Report Number: 2711310

Reference Number	1547429-13	1547429-14	1547429-15
Sample Date	Jan 14, 2022	Jan 14, 2022	Jan 14, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6207 / EXC22-01-13 / 2.5 - 2.6 / -3.2 °C	PAR6207 / EXC22-01-14 / 2.5 - 2.6 / -3.2 °C	PAR6207 / EXC22-01-15 / 2.5 - 2.6 / -3.2 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22	20-Jan-22	20-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	13.10	12.50	13.50	

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Analytical Report

Bill To: Paramount Resources Ltd
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Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547429**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 24, 2022
Report Number: 2711310

Reference Number	1547429-16	1547429-17	1547429-18
Sample Date	Jan 14, 2022	Jan 14, 2022	Jan 14, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6207 / EXC22-01-16 / 2.5 - 2.6 / -3.2 °C	PAR6207 / EXC22-01-17 / 2.5 - 2.6 / -3.2 °C	PAR6207 / EXC22-01-18 / 2.5 - 2.6 / -3.2 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22	20-Jan-22	20-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	151	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	360	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	10.80	13.30	12.80	

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547429**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 24, 2022
Report Number: 2711310

	Reference Number	1547429-19	1547429-20	1547429-21	
	Sample Date	Jan 14, 2022	Jan 15, 2022	Jan 15, 2022	
	Sample Time	NA	NA	NA	
	Sample Location				
	Sample Description	PAR6207 / EXC22-01-19 / 1.5-1.6 / -3.2 °C	PAR6207 / EXC22-01-20 / 3.1 - 3.2 / -3.2 °C	PAR6207 / EXC22-01-21 / 3.1 - 3.2 / -3.2 °C	
	Matrix	Soil	Soil	Soil	
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	0.006	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	0.006	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22	20-Jan-22	20-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	74	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	15.60	11.90	15.00	

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Analytical Report

Bill To:	Paramount Resources Ltd 2328 Clarke St. Port Moody, BC, Canada V3H 1Y8	Project ID:	PAR6207	Lot ID:	**1547429**
		Project Name:	Remediation	Control Number:	
		Project Location:	F-36	Date Received:	Jan 18, 2022
		LSD:	F-36	Date Reported:	Jan 24, 2022
Attn:	Project Coordinator	P.O.:		Report Number:	2711310
Sampled By:	Collin Batchelor	Proj. Acct. code:			
Company:	SynergyAspen Environmental	OI Customer	PR210-Drilling and		

Reference Number	1547429-22
Sample Date	Jan 15, 2022
Sample Time	NA
Sample Location	
Sample Description	PAR6207 / EXC22-01-22 / 3.1-3.2 / -3.2 °C
Matrix	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	0.005			0.005
Toluene	Dry Weight	mg/kg	<0.02			0.02
Ethylbenzene	Dry Weight	mg/kg	0.006			0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03			0.03
Methanol Field Preservation			Yes			
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10			10
F1 -BTEX	Dry Weight	mg/kg	<10			10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22			
F2c C10-C16	Dry Weight	mg/kg	27			25
F3c C16-C34	Dry Weight	mg/kg	110			50
F4c C34-C50	Dry Weight	mg/kg	<100			100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100			100
% C50+		%	<5			
Silica Gel Cleanup						
Silica Gel Cleanup			Done			
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	13.30			

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547429**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 24, 2022
Report Number: 2711310

Reference Number	1547429-23	1547429-24	1547429-25
Sample Date	Jan 15, 2022	Jan 15, 2022	Jan 15, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6207 / PSA22-01-01 / 0.8 - 0.9 / -3.2 °C	PAR6207 / PSA22-01-02 / 1.8 - 1.9 / -3.2 °C	PAR6207 / PSA22-01-03 / 2.8 - 2.9 / -3.2 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Silt Loam	Loam	Clay Loam	
Sand	50 µm - 2 mm	% by weight	35	42	34	0.1
Silt	2 µm - 50 µm	% by weight	50	40	33	0.1
Clay	<2 µm	% by weight	15	18	33	0.1

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547429**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 24, 2022
Report Number: 2711310

Reference Number	1547429-26	1547429-27	1547429-28
Sample Date	Jan 15, 2022	Jan 15, 2022	Jan 15, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6207 / PSA22-01-04 / 3.8 - 3.9 / -3.2 °C	PAR6207 / PSA22-01-05 / 4.8 - 4.9 / -3.2 °C	PAR6207 / PSA22-01-06 / 5.8 - 5.9 / -3.2 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Texture			Loam	Sandy Loam	Loamy Sand	
Sand	50 µm - 2 mm	% by weight	41	66	81	0.1
Silt	2 µm - 50 µm	% by weight	37	22	11	0.1
Clay	<2 µm	% by weight	22	12	8	0.1

Approved by:

Anthony Neumann, MSc
General Manager

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Quality Control

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547429**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 24, 2022
Report Number: 2711310

Extractable Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	0	-10	10	yes
F3c C16-C34	µg/mL	0	-30	30	yes
F4c C34-C50	µg/mL	0	-20	20	yes
F4HTGCc C34-C50+	µg/mL	0	-20	20	yes
Date Acquired:	January 20, 2022				

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	102.51	80	120	yes
F3c C16-C34	µg/mL	102.72	80	120	yes
F4c C34-C50	µg/mL	103.77	80	120	yes
F4HTGCc C34-C50+	µg/mL	105.67	80	120	yes
Date Acquired:	January 20, 2022				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F2c C10-C16	mg/kg	<25	<25	50	10	yes
F3c C16-C34	mg/kg	<50	<50	50	10	yes
F4c C34-C50	mg/kg	<100	<100	50	10	yes
F4HTGCc C34-C50+	mg/kg	<100	<100	50	10	yes
Date Acquired:	January 20, 2022					

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	mg/kg	97	70	130	yes
F3c C16-C34	mg/kg	106	70	130	yes
F4c C34-C50	mg/kg	108	70	130	yes
F4HTGCc C34-C50+	mg/kg	110	70	130	yes
Date Acquired:	January 20, 2022				

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.005	0.005	yes
Toluene	ng	0	-0.06	0.06	yes
Ethylbenzene	ng	0	-0.030	0.030	yes
Total Xylenes (m,p,o)	ng	0	-0.09	0.09	yes
Styrene	ng	0	-0.030	0.030	yes
Date Acquired:	January 20, 2022				

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	99.21	80	120	yes
Toluene	ng	100.37	80	120	yes
Ethylbenzene	ng	103.34	80	120	yes
m,p-Xylene	ng	107.70	80	120	yes
Total Xylenes (m,p,o)	ng	108.10	80	120	yes
Styrene	ng	93.99	80	120	yes
Date Acquired:	January 20, 2022				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Benzene	mg/kg	<0.005	<0.005	50	0.010	yes
Toluene	mg/kg	<0.02	<0.02	50	0.04	yes

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Quality Control

Bill To: Paramount Resources Ltd
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Port Moody, BC, Canada
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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547429**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 24, 2022
Report Number: 2711310

Mono-Aromatic Hydrocarbons - Soil - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Ethylbenzene	mg/kg	<0.005	<0.005	50	0.020	yes
m,p-Xylene	mg/kg	<0.02	<0.02	50	0.04	yes
o-Xylene	mg/kg	<0.02	<0.02	50	0.04	yes
Total Xylenes (m,p,o)	mg/kg	<0.03	<0.03	50	0.06	yes
Styrene	mg/kg	<0.01	<0.01	50	0.020	yes
Date Acquired:	January 20, 2022					

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	mg/kg	93	70	130	yes
Toluene	mg/kg	94	70	130	yes
Ethylbenzene	mg/kg	103	70	130	yes
m,p-Xylene	mg/kg	114	70	130	yes
o-Xylene	mg/kg	118	70	130	yes
Styrene	mg/kg	87	70	130	yes
Date Acquired:	January 20, 2022				

Physical and Aggregate Properties

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Sand	% by weight	35	34	10	0	yes
Silt	% by weight	50	50	10	0	yes
Clay	% by weight	15	16	10	0	yes
Date Acquired:	January 20, 2022					

Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Sand	% by weight	26	15	35	yes
Silt	% by weight	44	32	54	yes
Clay	% by weight	30	24	40	yes
Date Acquired:	January 20, 2022				

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	ng	0	-10	10	yes
Date Acquired:	January 20, 2022				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F1 C6-C10	mg/kg	<10	<10	50	0	yes
F1 -BTEX	mg/kg	<10	<10	50	0	yes
Date Acquired:	January 20, 2022					

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	mg/kg	88	70	130	yes
Date Acquired:	January 20, 2022				

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Methodology and Notes

Bill To:	Paramount Resources Ltd 2328 Clarke St. Port Moody, BC, Canada V3H 1Y8	Project ID:	PAR6207	Lot ID:	**1547429**
		Project Name:	Remediation	Control Number:	
		Project Location:	F-36	Date Received:	Jan 18, 2022
		LSD:	F-36	Date Reported:	Jan 24, 2022
Attn:	Project Coordinator	P.O.:		Report Number:	2711310
Sampled By:	Collin Batchelor	Proj. Acct. code:			
Company:	SynergyAspen Environmental	OI Customer	PR210-Drilling and		

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 20, 2022	Element Calgary
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 20, 2022	Element Calgary
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 21, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Jan 20, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Jan 20, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Jan 21, 2022	Element Calgary
Particle Size Analysis - GS	Carter	*	Hydrometer Method, 55.3	Jan 20, 2022	Element Edmonton - Roper Road
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 20, 2022	Element Calgary

** Reference Method Modified*

References

Carter	Soil Sampling and Methods of Analysis.
CCME	Canadian Council of Ministers of the Environment
US EPA	US Environmental Protection Agency Test Methods

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Report Transmission Cover Page

Bill To: Paramount Resources Ltd
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Port Moody, BC, Canada
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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547442**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 23, 2022
Report Number: 2711318

Contact	Company	Address
Element Invoicing	**Paramount Resources Ltd**	7217 Roper Road Edmonton, AB T6B 3J4 Phone: (780) 438-5522 Fax: Email: invoicing.edmonton@element.com

Delivery	Format	Deliverables
Post	PDF	COC / Invoice

Contact	Company	Address
Lori Johnson	**SynergyAspen Environmental**	9904 106 Street Fort St John, BC V1J 1V8 Phone: (250) 785-1030 Fax: (250) 785-1034 Email: ljohnson@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COR

Contact	Company	Address
Marsha Pereira	**Secure Energy**	120, 8832 Blackfoot Trail SE Calgary, AB T2J 3J1 Phone: (647) 888-7092 Fax: (403) 294-0023 Email:

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / COA
Email - Merge Reports	PDF	COC / Test Report
Email - Single Report	PDF	COC / Invoice
Email - Single Report	Secure ESDAT Chemistry File	Test Report
Email - Single Report	Secure ESDAT Sample File	Test Report

Contact	Company	Address
Project Coordinator	**SynergyAspen Environmental**	2328 Clarke St. Port Moody, BC V3H 1Y8 Phone: (604) 931-1026 Fax: (604) 931-1046 Email: projectcoordinator@synergyaspen.ca

Delivery	Format	Deliverables
Email - Multiple Reports By Lot	PDF	COC / Invoice
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report
Email - Single Report	PDF	COC / COA
Email - Single Report	PDF	COC / Test Report

Contact	Company	Address
Tanya Allen	**SynergyAspen Environmental**	2328 Clarke St. Port Moody, BC V3H 1Y8 Phone: (604) 931-1026 Fax: (604) 931-1046 Email: tallen@synergyaspen.ca

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / COA
Email - Multiple Reports By Lot	PDF	COC / Test Report
Email - Multiple Reports By Lot	SynergyAspen Custom Excel	Test Report

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Report Transmission Cover Page

Bill To:	Paramount Resources Ltd 2328 Clarke St. Port Moody, BC, Canada V3H 1Y8	Project ID:	PAR6207	Lot ID:	**1547442**
		Project Name:	Remediation	Control Number:	
		Project Location:	F-36	Date Received:	Jan 18, 2022
		LSD:	F-36	Date Reported:	Jan 23, 2022
		P.O.:		Report Number:	2711318
Attn:	Project Coordinator	Proj. Acct. code:			
Sampled By:	Collin Batchelor				
Company:	SynergyAspen Environmental	OI Customer	PR210-Drilling and		

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547442**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 23, 2022
Report Number: 2711318

Reference Number	1547442-1	1547442-2	1547442-3
Sample Date	Jan 14, 2022	Jan 14, 2022	Jan 14, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6207 / EXC22-02-01 / 0.5 - 0.6 / -3.2 °C	PAR6207 / EXC22-02-02 / 0.5 - 0.6 / -3.2 °C	PAR6207 / EXC22-02-03 / 0.5 - 0.6 / -3.2 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22	20-Jan-22	20-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	13.50	15.30	12.00	

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547442**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 23, 2022
Report Number: 2711318

Reference Number	1547442-4	1547442-5	1547442-6
Sample Date	Jan 14, 2022	Jan 14, 2022	Jan 14, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6207 / EXC22-02-04 / 0.5 - 0.6 / -3.2 °C	PAR6207 / EXC22-02-05 / 1.5 - 1.6 / -3.2 °C	PAR6207 / EXC22-02-06 / 1.5 - 1.6 / -3.2 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22	20-Jan-22	20-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	86	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	12.20	12.90	14.80	

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547442**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 23, 2022
Report Number: 2711318

Reference Number	1547442-7	1547442-8	1547442-9
Sample Date	Jan 14, 2022	Jan 14, 2022	Jan 14, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6207 / EXC22-02-07 / 1.5 - 1.6 / -3.2 °C	PAR6207 / EXC22-02-08 / 1.5 - 1.6 / -3.2 °C	PAR6207 / EXC22-02-09 / 2.5 - 2.6 / -3.2 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22	20-Jan-22	20-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	16.80	18.40	15.10	

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547442**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 23, 2022
Report Number: 2711318

Reference Number	1547442-10	1547442-11	1547442-12
Sample Date	Jan 14, 2022	Jan 14, 2022	Jan 14, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6207 / EXC22-02-10 / 2.5 - 2.6 / -3.2 °C	PAR6207 / EXC22-02-11 / 2.5 - 2.6 / -3.2 °C	PAR6207 / EXC22-02-12 / 2.5 - 2.6 / -3.2 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	0.009	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22	20-Jan-22	20-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	13.00	13.40	12.20	

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547442**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 23, 2022
Report Number: 2711318

Reference Number	1547442-13	1547442-14	1547442-15
Sample Date	Jan 14, 2022	Jan 14, 2022	Jan 14, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6207 / EXC22-02-13 / 3.5 - 3.6 / -3.2 °C	PAR6207 / EXC22-02-14 / 3.5 - 3.6 / -3.2 °C	PAR6207 / EXC22-02-15 / 3.5 - 3.6 / -3.2 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22	20-Jan-22	20-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	15.60	14.80	13.20	

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547442**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 23, 2022
Report Number: 2711318

Reference Number	1547442-16	1547442-17	1547442-18
Sample Date	Jan 14, 2022	Jan 14, 2022	Jan 14, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6207 / EXC22-02-16 / 3.5 - 3.6 / -3.2 °C	PAR6207 / EXC22-02-17 / 4.5 - 4.6 / -3.2 °C	PAR6207 / EXC22-02-18 / 4.5 - 4.6 / -3.2 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22	20-Jan-22	20-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	12.70	15.20	14.90	

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547442**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 23, 2022
Report Number: 2711318

Reference Number		1547442-19	1547442-20	1547442-21
Sample Date		Jan 14, 2022	Jan 14, 2022	Jan 14, 2022
Sample Time		NA	NA	NA
Sample Location				
Sample Description		PAR6207 / EXC22-02-19 / 4.5 - 4.6 / -3.2 °C	PAR6207 / EXC22-02-20 / 4.5 - 4.6 / -3.2 °C	PAR6207 / EXC22-02-21 / 4.7 - 4.7 / -3.2 °C
Matrix		Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22	20-Jan-22	20-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	12.60	13.10	16.70	

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547442**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 23, 2022
Report Number: 2711318

Reference Number	1547442-22	1547442-23	1547442-24
Sample Date	Jan 14, 2022	Jan 14, 2022	Jan 14, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6207 / EXC22-02-22 / 2.5 / -3.2 °C	PAR6207 / EXC22-02-23 / 4.5 / -3.2 °C	PAR6207 / SP22-02-01 / -3.2 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22	20-Jan-22	20-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	13.70	12.40	14.90	

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Analytical Report

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547442**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 23, 2022
Report Number: 2711318

Reference Number	1547442-25	1547442-27	1547442-28
Sample Date	Jan 14, 2022	Jan 14, 2022	Jan 14, 2022
Sample Time	NA	NA	NA
Sample Location			
Sample Description	PAR6207 / SP22-02-02 / -3.2 °C	PAR6207 / SP22-02-04 / -3.2 °C	PAR6207 / SP22-02-05 / -3.2 °C
Matrix	Soil	Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Toluene	Dry Weight	mg/kg	<0.02	<0.02	<0.02	0.02
Ethylbenzene	Dry Weight	mg/kg	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	mg/kg	<0.03	<0.03	<0.03	0.03
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
F1 C6-C10	Dry Weight	mg/kg	<10	<10	<10	10
F1 -BTEX	Dry Weight	mg/kg	<10	<10	<10	10
Extractable Petroleum Hydrocarbons - Soil						
Extraction Date	Total Extractables		20-Jan-22	20-Jan-22	20-Jan-22	
F2c C10-C16	Dry Weight	mg/kg	<25	<25	<25	25
F3c C16-C34	Dry Weight	mg/kg	<50	<50	<50	50
F4c C34-C50	Dry Weight	mg/kg	<100	<100	<100	100
F4HTGCc C34-C50+	Dry Weight	mg/kg	<100	<100	<100	100
% C50+		%	<5	<5	<5	
Silica Gel Cleanup						
Silica Gel Cleanup			Done	Done	Done	
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	16.50	14.80	16.60	

Approved by:

Mike Yohemas, BSc
General Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
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Quality Control

Bill To: Paramount Resources Ltd
2328 Clarke St.
Port Moody, BC, Canada
V3H 1Y8
Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547442**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 23, 2022
Report Number: 2711318

Extractable Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	0	-10	10	yes
F3c C16-C34	µg/mL	0	-30	30	yes
F4c C34-C50	µg/mL	0	-20	20	yes
F4HTGCc C34-C50+	µg/mL	0	-20	20	yes
Date Acquired:	January 20, 2022				

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	µg/mL	101.53	80	120	yes
F3c C16-C34	µg/mL	103.28	80	120	yes
F4c C34-C50	µg/mL	100.81	80	120	yes
F4HTGCc C34-C50+	µg/mL	96.45	80	120	yes
Date Acquired:	January 20, 2022				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F2c C10-C16	mg/kg	<25	<25	50	10	yes
F3c C16-C34	mg/kg	<50	<50	50	10	yes
F4c C34-C50	mg/kg	<100	<100	50	10	yes
F4HTGCc C34-C50+	mg/kg	<100	<100	50	10	yes
Date Acquired:	January 20, 2022					

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F2c C10-C16	mg/kg	95	70	130	yes
F3c C16-C34	mg/kg	101	70	130	yes
F4c C34-C50	mg/kg	113	70	130	yes
F4HTGCc C34-C50+	mg/kg	104	70	130	yes
Date Acquired:	January 20, 2022				

Mono-Aromatic Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Benzene	ng	0	-0.005	0.005	yes
Toluene	ng	0	-0.06	0.06	yes
Ethylbenzene	ng	0	-0.030	0.030	yes
Total Xylenes (m,p,o)	ng	0	-0.09	0.09	yes
Styrene	ng	0	-0.030	0.030	yes
Date Acquired:	January 20, 2022				

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	ng	89.97	80	120	yes
Toluene	ng	97.85	80	120	yes
Ethylbenzene	ng	94.70	80	120	yes
m,p-Xylene	ng	92.92	80	120	yes
Total Xylenes (m,p,o)	ng	92.97	80	120	yes
Styrene	ng	97.53	80	120	yes
Date Acquired:	January 20, 2022				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Benzene	mg/kg	<0.005	<0.005	50	0.010	yes
Toluene	mg/kg	<0.02	<0.02	50	0.04	yes

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Quality Control

Bill To: Paramount Resources Ltd
2328 Clarke St.
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Attn: Project Coordinator
Sampled By: Collin Batchelor
Company: SynergyAspen Environmental

Project ID: PAR6207
Project Name: Remediation
Project Location: F-36
LSD: F-36
P.O.:
Proj. Acct. code:
OI Customer PR210-Drilling and

Lot ID: **1547442**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 23, 2022
Report Number: 2711318

Mono-Aromatic Hydrocarbons - Soil - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Ethylbenzene	mg/kg	<0.005	<0.005	50	0.020	yes
m,p-Xylene	mg/kg	<0.02	<0.02	50	0.04	yes
o-Xylene	mg/kg	<0.02	<0.02	50	0.04	yes
Total Xylenes (m,p,o)	mg/kg	<0.03	<0.03	50	0.06	yes
Styrene	mg/kg	<0.01	<0.01	50	0.020	yes
Date Acquired:	January 20, 2022					

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
Benzene	mg/kg	77	70	130	yes
Toluene	mg/kg	82	70	130	yes
Ethylbenzene	mg/kg	95	70	130	yes
m,p-Xylene	mg/kg	95	70	130	yes
o-Xylene	mg/kg	99	70	130	yes
Styrene	mg/kg	97	70	130	yes
Date Acquired:	January 20, 2022				

Volatile Petroleum Hydrocarbons - Soil

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	ng	0	-10	10	yes
Date Acquired:	January 20, 2022				

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
F1 C6-C10	mg/kg	<10	<10	50	0	yes
F1 -BTEX	mg/kg	<10	<10	50	0	yes
Date Acquired:	January 20, 2022					

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit	Passed QC
F1 C6-C10	mg/kg	105	70	130	yes
Date Acquired:	January 20, 2022				

Element
#1 8822-100 Street
Fort St. John, British Columbia
V1J 3W9, Canada

T: +1 (250) 785-2731
F: +1 (250) 785-7092
E: info.FortStJohn@element.com
W: www.element.com

Methodology and Notes

Bill To:	Paramount Resources Ltd 2328 Clarke St. Port Moody, BC, Canada V3H 1Y8	Project ID:	PAR6207
		Project Name:	Remediation
		Project Location:	F-36
		LSD:	F-36
Attn:	Project Coordinator	P.O.:	
Sampled By:	Collin Batchelor	Proj. Acct. code:	
Company:	SynergyAspen Environmental	OI Customer	PR210-Drilling and

Lot ID: **1547442**
Control Number:
Date Received: Jan 18, 2022
Date Reported: Jan 23, 2022
Report Number: 2711318

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 20, 2022	Element Calgary
BTEX-CCME - Soil	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 20, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Jan 20, 2022	Element Calgary
BTEX-CCME - Soil	US EPA	*	Volatile Organic Compounds in Various Sample Matrices Using Equilibrium Headspace Analysis/Gas Chromatography Mass Spectrometry, 5021/8260	Jan 20, 2022	Element Calgary
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 20, 2022	Element Calgary
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 20, 2022	Element Calgary
TEH-CCME-Soil (Shake)	CCME	*	Reference Method for Canada-Wide Standard for PHC in Soil, CWS PHCS TIER 1	Jan 21, 2022	Element Calgary

** Reference Method Modified*

References

CCME	Canadian Council of Ministers of the Environment
US EPA	US Environmental Protection Agency Test Methods

Please direct any inquiries regarding this report to our Client Services group.
Results relate only to samples as submitted.
The test report shall not be reproduced except in full, without the written approval of the laboratory.

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Project Information

Project ID:	PAR6207
Project Name:	Stage 2 PSI
Project Location:	F-36
Legal Location:	F-36
PO/AFE#:	
Proj. Acct. Code:	
Quote #:	

Invoice To

Company:	Paramount Resources c/o SynergyAspen
Address:	9904 106 St
	Fort St John V1J 1V8
Attention:	Patricia Stebbing
Phone:	250-785-1030
Cell:	250-262-6173
Fax:	
E-mail:	pstebbing@synergyaspen.ca
Agreement ID:	
Copy of Report:	YES / NO

Report To

Company:	SynergyAspen Enironmental
Address:	9904 106 St
	Fort St John V1J 1V8
Attention:	Patricia Stebbing
Phone:	250-785-1030
Cell:	250-262-6173
Fax:	
E-mail 1:	pstebbing@synergyaspen.ca
E-mail 2:	
Copy of Invoice:	YES / NO

Additional Reports to

1) Name: Project Coordinator
E-mail: jectcoordinator@synergyaspe
2) Name:
E-mail:

Sample Custody

Sampled by: Jack Common
Company: SynergyAspen

I authorize Element to proceed with the work indicated on this form:

Signature:
Date/Time:

RUSH Priority

- ☐ Same Day (200%)
- ☐ Next Day/Two Day (100%)
- ☐ Three or Four Days (50%)
- ☑ 5 to 7 Days (Regular TAT)

Date Required

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples. If not all samples require RUSH, please indicate in the special instructions.

Report Results

- ☑ Email
- ☐ Online
- ☐ Fax
- ☑ QA/QC
- ☑ PDF
- ☑ Excel

Requirements

- ☐ HCDWORG
- ☐ SPIGEC
- ☑ AB Tier 1
- ☐ BCCSR

Other (list below)

Special Instructions/Comments (please include contact information including phone number if different from above).

Agreement 2911. Please note AB tier 1 guidelines (NOT BCCSR)

	Site I.D.	Sample Description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	PS1, 05 (GSA)	ABT1SAL-S (Salinity)	TT43 (Metals)	CCMEC (BTEX, F1-F4)	PAH2 (PAHs)	ABT1MEOHS (Methanol)	GLY2 (Glycol)					HOLD
			in m							Enter tests above (✓ relevant samples below)											
1		BH21-01-01	0	0.32	10/3/2021	water	grab	1													x
2		BH21-01-02	0.64	0.96	10/3/2021	water	grab	1													x
3		BH21-01-03	1.2	1.52	10/3/2021	soil	grab	1		X											
4		BH21-01-04	1.76	2.08	10/3/2021	soil	grab	1													x
5		BH21-01-05	2.56	2.8	10/3/2021	soil	grab	1		X											
6		BH21-01-06	3.3	3.62	10/3/2021	soil	grab	1													x
7		BH21-01-07	3.98	4.3	10/3/2021	soil	grab	1		X											
8		BH21-02-01	0	0.4	10/3/2021	soil	grab	3	x												x
9		BH21-02-02	0.8	1	10/3/2021	soil	grab	3	x				X								
10		BH21-02-03	1.2	1.6	10/3/2021	soil	grab	3	x												x
11		BH21-02-04	1.7	1.9	10/3/2021	soil	grab	3	x				X								
12		BH21-02-05	2.6	3	10/3/2021	soil	grab	3	x												x
13		BH21-03-01	0	0.4	10/3/2021	soil	grab	3	x												x
14		BH21-03-02	0.8	1	10/3/2021	soil	grab	3	x				X								
15		BH21-03-03	1.2	1.6	10/3/2021	soil	grab	3	x				X								

Please indicate any potentially hazardous samples

Submission of this form acknowledges acceptance of Element's Standard of terms and conditions (https://www.element.com/terms/terms-and-conditions)

Lot: 1525192 COC

Temp. received: °C

Date/Time stamp:

Delivery Method:

Waybill:

Received by:

Special Instructions/Comments (please include contact information including ph. # if different from above).

	Site I.D.	Sample description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	PS1, 05 (GSA)	ABT1SAL-S (Salinity)	TT43 (Metals)	CCMEC (BTEX, F1-F4)	PAH2 (PAHs)	ABT1MEOHS (Methanol)	GLY2 (Glycol)					Hold
			in m							Enter tests above (✓ relevant samples below)											
		BH21-03-04	1.7	1.9	10/3/2021	soil	grab	3	x				X								
		BH21-03-05	2.6	3	10/3/2021	soil	grab	3	x				X								
		BH21-03-06			10/3/2021	soil	grab	3	x				X								
		BH21-04-01	0	0.32	10/3/2021	soil	grab	3	x												x
		BH21-04-02	0.64	0.96	10/3/2021	soil	grab	3	x				X								
		BH21-04-03	1.2	1.52	10/3/2021	soil	grab	3	x												x
		BH21-04-04	1.7	1.9	10/3/2021	soil	grab	3	x				X								
		BH21-04-05	2.65	3	10/3/2021	soil	grab	3	x												x

Please indicate any potentially hazardous samples

Control # F5K1003A02

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Project Information

Project ID:	PAR6206
Project Name:	Stage 2 PSI
Project Location:	I-02
Legal Location:	I-02
PO/AFE#:	
Proj. Acct. Code:	
Quote #:	

Invoice To

Company:	Paramount Resources c/o SynergyAspen
Address:	9904 106 St
	Fort St John V1J 1V8
Attention:	Patricia Stebbing
Phone:	250-785-1030
Cell:	250-262-6173
Fax:	
E-mail:	pstebbing@synergyaspen.ca
Agreement ID:	
Copy of Report:	YES / NO

Report To

Company:	SynergyAspen Enironmental
Address:	9904 106 St
	Fort St John V1J 1V8
Attention:	Patricia Stebbing
Phone:	250-785-1030
Cell:	250-262-6173
Fax:	
E-mail 1:	pstebbing@synergyaspen.ca
E-mail 2:	
Copy of Invoice:	YES / NO

Additional Reports to

1) Name: Project Coordinator
E-mail: jectcoordinator@synergyaspe
2) Name:
E-mail:

Sample Custody

Sampled by: Jack Common
Company: SynergyAspen

I authorize Element to proceed with the work indicated on this form:

Signature:
Date/Time:

RUSH Priority

- ☐ Same Day (200%)
- ☐ Next Day/Two Day (100%)
- ☐ Three or Four Days (50%)
- ☑ 5 to 7 Days (Regular TAT)

Date Required _____

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples. If not all samples require RUSH, please indicate in the special instructions.

Report Results

- ☑ Email
- ☐ Online
- ☐ Fax
- ☑ QA/QC
- ☑ PDF
- ☑ Excel

Requirements

- ☐ HCDWORG
- ☐ SPIGEC
- ☐ AB Tier 1
- ☑ BCCSR

Other (list below)

Special Instructions/Comments (please include contact information including phone number if different from above).

Agreement number 2911

	Site I.D.	Sample Description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	PS1, 05 (GSA)	ABT1SAL-S (Salinity)	TT43 (Metals)	CCMEC (BTEX, F1-F4)	PAH2 (PAHs)	ABT1MEOHS (Methanol)	GLY2 (Glycol)					HOLD
			in m							Enter tests above (✓ relevant samples below)											
1		BH21-01-01	0	0.32	2021-10-04	soil	grab	1	x	x	x	x									x
2		BH21-01-02	0.64	0.96	2021-10-04	soil	grab	1	x													x
3		BH21-01-03	1.2	1.52	2021-10-04	soil	grab	1	x	x	x	x										x
4		BH21-01-04	2	2.32	2021-10-04	soil	grab	1	x													x
5		BH21-01-05	2.48	2.8	2021-10-04	soil	grab	1	x		x	x										x
6		BH21-01-06	3.08	3.62	2021-10-04	soil	grab	1	x	x												x
7		BH21-01-07	3.88	4.3	2021-10-04	soil	grab	1	x													x
8		BH21-01-08	4.85	0.4	2021-10-04	soil	grab	1	x	x												x
9		BH21-02-01	0	0.32	2021-10-04	soil	grab	3	x			x										x
10		BH21-02-02	0.64	0.96	2021-10-04	soil	grab	3	x				x									x
11		BH21-02-03	1.2	1.52	2021-10-04	soil	grab	3	x													x
12		BH21-02-04	1.96	2.28	2021-10-04	soil	grab	3	x		x		x									x
13		BH21-02-05	2.68	3	2021-10-04	soil	grab	3	x													x
14		BH21-02-06	0	0.32	2021-10-04	soil	grab	3	x			x										x
15		BH21-03-01	0	0.32	2021-10-04	soil	grab	3	x				x	x								x

Please indicate any potentially hazardous samples

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Page 1 of 2 Control # F5K1004B01

ED 120-005

affix barcode here

Lot: 1525504 COC

Temp. received: °C

Date/Time stamp:

Delivery Method:

Waybill:

Received by:

Special Instructions/Comments (please include contact information including ph. # if different from above).

	Site I.D.	Sample description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	PS1, 05 (GSA)	ABT1SAL-S (Salinity)	TT43 (Metals)	CCMEC (BTEX, F1-F4)	PAH2 (PAHs)	ABT1MEOHS (Methanol)	GLY2 (Glycol)					HOLD
			in m							Enter tests above (✓ relevant samples below)											
		BH21-03-02	0.64	0.96	2021-10-04	soil	grab	3	x		x										x
		BH21-03-03	1.2	1.52	2021-10-04	soil	grab	3	x												x
		BH21-03-04	1.96	2.28	2021-10-04	soil	grab	3	x												x
		BH21-03-05	2.68	3	2021-10-04	soil	grab	3	x			x	x								x

Please indicate any potentially hazardous samples

Control # F5K1004B02

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Project Information

Project ID:	PAR6207
Project Name:	Stage 2 PSI
Project Location:	F-36
Legal Location:	F-36
PO/AFE#:	
Proj. Acct. Code:	
Quote #:	

Invoice To

Company:	Paramount Resources c/o SynergyAspen
Address:	9904 106 St
	Fort St John. BC, V1J 1V8
Attention:	Patricia Stebbing
Phone:	250-262-6173
Cell:	
Fax:	
E-mail:	pstebbing@synergyaspen.ca
Agreement ID:	
Copy of Report:	YES / NO

Report To

Company:	SynergyAspen Environmental
Address:	9904 106 St
	Fort St John, BC, V1J 1V8
Attention:	Patricia Stebbing
Phone:	250-262-6173
Cell:	
Fax:	
E-mail 1:	pstebbing@synergyaspen.ca
E-mail 2:	projectcoordinator@synergyaspen.c
Copy of Invoice:	YES

Additional Reports to

1) Name:
E-mail:
2) Name:
E-mail:

Sample Custody

Sampled by: ack Common / Sam Carpent
Company: SynergyAspen Environmental

I authorize Element to proceed with the work indicated on this form:

Signature:
Date/Time:

RUSH Priority

- ☐ Same Day (200%)
- ☐ Next Day/Two Day (100%)
- ☐ Three or Four Days (50%)
- ☑ 5 to 7 Days (Regular TAT)

Date Required _____

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Report Results

- ☑ Email
- ☐ Online
- ☐ Fax
- ☑ QA/QC
- ☑ PDF
- ☑ Excel

Requirements

- ☐ HCDWORG
- ☐ SPIGEC
- ☑ AB Tier 1
- ☐ BCCSR

Other (list below)

Special Instructions/Comments (please include contact information including phone number if different from above).

Agreement 2911. Please note AB tier 1 guidelines (NOT BCCSR) and updated "invoice to" section

	Site I.D.	Sample Description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	PS1, 05 (GSA)	ABT1SAL-S (Salinity)	TT43 (Metals)	CCMEC (BTEX, F1-F4)	PAH2 (PAHs)	ABT1MEOHS (Methanol)	GLY2 (Glycol)						HOLD
			in m							Enter tests above (✓ relevant samples below)												
1	PAR6207	BH21-05-01	0	0.32	4-Oct-21	Soil	Grab	3	x													x
2	PAR6207	BH21-05-02	0.8	1	4-Oct-21	Soil	Grab	3	x				X									
3	PAR6207	BH21-05-03	1.2	1.52	4-Oct-21	Soil	Grab	3	x													x
4	PAR6207	BH21-05-04	1.7	1.9	4-Oct-21	Soil	Grab	3	x				X									
5	PAR6207	BH21-05-05	2.68	3	4-Oct-21	Soil	Grab	3	x													x
6	PAR6207	BH21-05-06	0	0.32	4-Oct-21	Soil	Grab	3	x													x
7	PAR6207	BH21-06-01	0	0.4	4-Oct-21	Soil	Grab	3	x													x
8	PAR6207	BH21-06-02	0.56	0.96	4-Oct-21	Soil	Grab	3	x				X									
9	PAR6207	BH21-06-03	1.2	1.6	4-Oct-21	Soil	Grab	3	x													x
10	PAR6207	BH21-06-04	1.7	1.9	4-Oct-21	Soil	Grab	3	x				X									
11	PAR6207	BH21-06-05	2.68	3	4-Oct-21	Soil	Grab	3	x													x
12	PAR6207	BH21-07-01	0	0.4	4-Oct-21	Soil	Grab	3	x													x
13	PAR6207	BH21-07-02	0.56	0.96	4-Oct-21	Soil	Grab	3	x				X									
14	PAR6207	BH21-07-03	1.2	1.52	4-Oct-21	Soil	Grab	3	x													x
15	PAR6207	BH21-07-04	1.7	1.9	4-Oct-21	Soil	Grab	3	x				X									

Please indicate any potentially hazardous samples

Submission of this form acknowledges acceptance of Element's Standard of terms and conditions (https://www.element.com/terms/terms-and-conditions)

Page __1____ of __ 2

F5K1004A01

Lot: 1525505 COC

Temp. received: °C

Date/Time stamp:

Delivery Method:

Waybill:

Received by:

Special Instructions/Comments (please include contact information including ph. # if different from above).

	Site I.D.	Sample description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers	MeOH Field Preserved?	PS1, 05 (GSA)	ABT1SAL-S (Salinity)	TT43 (Metals)	CCMEC (BTEX, F1-F4)	PAH2 (PAHs)	ABT1MEOHS (Methanol)	GLY2 (Glycol)					Hold
			in m					#	✓	Enter tests above (✓ relevant samples below)											
	PAR6207	BH21-07-05	1.7	1.9	4-Oct-21	Soil	Grab	3	x												x
	PAR6207	BH21-07-06			4-Oct-21	Soil	Grab	1	x				X								

Please indicate any potentially hazardous samples

Control # F5K1004A02

element

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Project Information

Project ID:	PAR6207
Project Name:	Remediation
Project Location:	F-36
Legal Location:	F-36
PO/AFE#:	
Proj. Acct. Code:	
Quote #:	

Invoice To

Company:	Paramount c/o SynergyAspen
Address:	9904 106 St
	Fort St John. BC, V1J 1V8
Attention:	Marsha Pereira
Phone:	236-818-3614
Cell:	
Fax:	
E-mail:	mpereira@synergyaspen.ca
Agreement ID:	2911
Copy of Report:	YES

Report To

Company:	SynergyAspen Environmental
Address:	9904 106 St
	Fort St John, BC, V1J 1V8
Attention:	Marsha Pereira
Phone:	236-818-3614
Cell:	
Fax:	
E-mail 1:	mpereira@synergyaspen.ca
E-mail 2:	projectcoordinator@synergyaspen.ca
Copy of Invoice:	YES

Additional Reports to

1) Name: Lori Johnson
E-mail: ljohnson@synergyaspen.ca
2) Name:
E-mail:

Sample Custody

Sampled by: Collin Batchelor
Company: SynergyAspen Environmental
I authorize Element to proceed with the work indicated on this form:
Signature:
Date/Time:

RUSH Priority

- ☐ Same Day (200%)
- ☐ Next Day/Two Day (100%)
- ☐ Three or Four Days (50%)
- ☑ 5 to 7 Days (Regular TAT)

Date Required _____

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples. If not all samples require RUSH, please indicate in the special instructions.

Report Results

- ☑ Email
- ☑ QA/QC
- ☐ Online
- ☑ PDF
- ☐ Fax
- ☑ Excel

Requirements

- ☐ HCDWORG
- ☐ SPIGEC
- ☑ AB Tier 1
- ☐ BCCSR

Other (list below)

Special Instructions/Comments (please include contact information including phone number if different from above).

	Site I.D.	Sample Description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	PS1,05 - GSA	S32KBC,05 - Salinity	S30BC - Muskeg Salinity	G2,05 - Metals	BCCCS-SILV	CTEH2 - BTEX/VPH/EPH	CTEH10 - BV/E/L/H/PAH	CVPH2 - BTEX/VPH	CTEH5,CTEH5SGA-EPHS	CTEH9SG - L/H SG	GLY2 - Glycol	Hold
			in m							Enter tests above (✓ relevant samples below)											
1	PAR6207	LF22-01-01			10-Jan-22	Soil	Grab	9	x					X							
2	PAR6207	LF22-02-01			10-Jan-22	Soil	Grab	9	x					X							
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					

Please indicate any potentially hazardous samples

Submission of this form acknowledges acceptance of Element's Standard of terms and conditions (https://www.element.com/terms/terms-and-conditions)

Page 1 of 1 G1L0110A01

Lot: 1546650 COC

Temp. received: 9.8 °C
Date/Time stamp: [illegible]
Delivery Method: FN
Waybill:
Received by: K HAIRE

element
www.Element.com

Project Information

Project ID:	PAR6207
Project Name:	Remediation
Project Location:	F-36
Legal Location:	F-36
PO/AFE#:	
Proj. Acct. Code:	
Quote #:	

Invoice To

Company:	Paramount c/o SynergyAspen
Address:	9904 106 St
	Fort St John. BC, V1J 1V8
Attention:	Marsha Pereira
Phone:	236-818-3614
Cell:	
Fax:	
E-mail:	mpereira@synergyaspen.ca
Agreement ID:	2911
Copy of Report:	YES

Report To

Company:	SynergyAspen Environmental
Address:	9904 106 St
	Fort St John, BC, V1J 1V8
Attention:	Marsha Pereira
Phone:	236-818-3614
Cell:	
Fax:	
E-mail 1:	mpereira@synergyaspen.ca
E-mail 2:	projectcoordinator@synergyaspen.ca
Copy of Invoice:	YES

Additional Reports to

1) Name: Lori Johnson
E-mail: ljohnson@synergyaspen.ca
2) Name: Tanya Allen
E-mail: tallen@synergyaspen.ca

Sample Custody

Sampled by: Collin Batchelor
Company: SynergyAspen Environmental

I authorize Element to proceed with the work indicated on this form:

Signature:
Date/Time: 14-Jan-22

RUSH Priority

- ☐ Same Day (200%)
- ☐ Next Day/Two Day (100%)
- ☐ Three or Four Days (50%)
- ☑ 5 to 7 Days (Regular TAT)

Date Required

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples. If not all samples require RUSH, please indicate in the special instructions.

Report Results

- ☑ Email
- ☐ Online
- ☐ Fax
- ☑ QA/QC
- ☑ PDF
- ☑ Excel

Requirements

- ☐ HCDWORG
- ☐ SPIGEC
- ☑ AB Tier 1
- ☐ BCCSR

Other (list below)

Special Instructions/Comments (please include contact information including phone number if different from above).

Note corrected COC number at bottom, paper copy that came to the lab said "G1L0110A01"

	Site I.D.	Sample Description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	PS1,05 - GSA	PS24	CCMEC (BTEX, F1-F4)	PAH2 (PAHs)	TT43 (Metals)	ABT1SAL-S (Salinity)	Glycol	Methanol	S32KBC.05 - Salinity	S30BC - Muskeg Salinity	Hold
			in m							Enter tests above (✓ relevant samples below)										
1	PAR6207	EXC22-01-01	0.5	0.6	14-Jan-22	SOIL	GRAB	4	X			X								
2	PAR6207	EXC22-01-02	0.5	0.6	14-Jan-22	SOIL	GRAB	4	X			X								
3	PAR6207	EXC22-01-03	0.5	0.6	14-Jan-22	SOIL	GRAB	4	X			X								
4	PAR6207	EXC22-01-04	0.5	0.6	14-Jan-22	SOIL	GRAB	4	X			X								
5	PAR6207	EXC22-01-05	0.5	0.6	14-Jan-22	SOIL	GRAB	4	X			X								
6	PAR6207	EXC22-01-06	0.5	0.6	14-Jan-22	SOIL	GRAB	4	X			X								
7	PAR6207	EXC22-01-07	1.5	1.6	14-Jan-22	SOIL	GRAB	4	X			X								
8	PAR6207	EXC22-01-08	1.5	1.6	14-Jan-22	SOIL	GRAB	4	X			X								
9	PAR6207	EXC22-01-09	1.5	1.6	14-Jan-22	SOIL	GRAB	4	X			X								
10	PAR6207	EXC22-01-10	1.5	1.6	14-Jan-22	SOIL	GRAB	4	X			X								
11	PAR6207	EXC22-01-11	1.5	1.6	14-Jan-22	SOIL	GRAB	4	X			X								
12	PAR6207	EXC22-01-12	1.5	1.6	14-Jan-22	SOIL	GRAB	4	X			X								
13	PAR6207	EXC22-01-13	2.5	2.6	14-Jan-22	SOIL	GRAB	4	X			X								
14	PAR6207	EXC22-01-14	2.5	2.6	14-Jan-22	SOIL	GRAB	4	X			X								
15	PAR6207	EXC22-01-15	2.5			SOIL	GRAB	4	X			X								

Please indicate any potentially hazardous samples

Submission of this form acknowledges acceptance of Element's Standard of terms and conditions (https://www.element.com/terms/terms-and-conditions)

Page 1 of 2 G1L0115A01

Lot: 1547429 COC



Temp. received: °C
Date/Time stamp:
Delivery Method:
Waybill:
Received by:

Special Instructions/Comments (please include contact information including ph. # if different from above).

AGREEMENT 2911

Site I.D.	Sample description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	PS1,05 - GSA	PS24	CCMEC (BTEX, F1-F4)	PAH2 (PAHs)	TT43 (Metals)	ABT1SAL-S (Salinity)	Glycol	Methanol	S32KBC,05 - Salinity	S30BC - Muskeg Salinity	Hold
		in m							Enter tests above (✓ relevant samples below)										
PAR6207	EXC22-01-16	2.5	2.6	14-Jan-22	SOIL	GRAB	4	X			X								
PAR6207	EXC22-01-17	2.5	2.6	14-Jan-22	SOIL	GRAB	4	X			X								
PAR6207	EXC22-01-18	2.5	2.6	14-Jan-22	SOIL	GRAB	4	X			X								
PAR6207	EXC22-01-19			14-Jan-22	SOIL	GRAB	4	X			X								
PAR6207	EXC22-01-20	3.1	3.2	15-Jan-22	SOIL	GRAB	4	X			X								
PAR6207	EXC22-01-21	3.1	3.2	15-Jan-22	SOIL	GRAB	4	X			X								
PAR6207	EXC22-01-22			15-Jan-22	SOIL	GRAB	4	X			X								
PAR6207	PSA22-01-01	0.8	0.9	15-Jan-22	SOIL	GRAB	1	X	X										
PAR6207	PSA22-01-02	1.8	1.9	15-Jan-22	SOIL	GRAB	1	X	X										
PAR6207	PSA22-01-03	2.8	2.9	15-Jan-22	SOIL	GRAB	1	X	X										
PAR6207	PSA22-01-04	3.8	3.9	15-Jan-22	SOIL	GRAB	1	X	X										
PAR6207	PSA22-01-05	4.8	4.9	15-Jan-22	SOIL	GRAB	1	X	X										
PAR6207	PSA22-01-06	5.8	5.9	15-Jan-22	SOIL	GRAB	1	X	X										

Please indicate any potentially hazardous samples

Control # G1L0115A02

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Project Information

Project ID:	PAR6207
Project Name:	Remediation
Project Location:	F-36
Legal Location:	F-36
PO/AFE#:	
Proj. Acct. Code:	
Quote #:	

Invoice To

Company:	Paramount c/o SynergyAspen
Address:	9904 106 St
	Fort St John. BC, V1J 1V8
Attention:	Marsha Pereira
Phone:	236-818-3614
Cell:	
Fax:	
E-mail:	mpereira@synergyaspen.ca
Agreement ID:	2911
Copy of Report:	YES

Report To

Company:	SynergyAspen Environmental
Address:	9904 106 St
	Fort St John, BC, V1J 1V8
Attention:	Marsha Pereira
Phone:	236-818-3614
Cell:	
Fax:	
E-mail 1:	mpereira@synergyaspen.ca
E-mail 2:	projectcoordinator@synergyaspen.ca
Copy of Invoice:	YES

Additional Reports to

1) Name:	Lori Johnson
E-mail:	ljohnson@synergyaspen.ca
2) Name:	Tanya Allen
E-mail:	tallen@synergyaspen.ca

Sample Custody

Sampled by:	Collin Batchelor
Company:	SynergyAspen Environmental

I authorize Element to proceed with the work indicated on this form:

Signature:

Date/Time: 14-Jan-22

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- ☐ Same Day (200%)
- ☐ Next Day/Two Day (100%)
- ☐ Three or Four Days (50%)
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- ☑ Email
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Requirements

- ☐ HCDWORG
- ☐ SPIGEC
- ☑ AB Tier 1
- ☐ BCCSR

Other (list below)

Special Instructions/Comments (please include contact information including phone number if different from above).

Note corrected COC number at bottom, paper copy that came to the lab with the samples said "G1L0110A01"

	Site I.D.	Sample Description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	PS1,05 - GSA	PS24	CCMEC (BTEX, F1-F4)	PAH2 (PAHs)	TT43 (Metals)	ABT1SAL-S (Salinity)	Glycol	Methanol		S32KBC,05 - Salinity	S30BC - Muskeg Salinity	Hold
			in m							Enter tests above (✓ relevant samples below)											
1	PAR6207	EXC22-02-01	0.5	0.6	14-Jan-22	SOIL	GRAB	4	X			X	X								
2	PAR6207	EXC22-02-02	0.5	0.6	14-Jan-22	SOIL	GRAB	4	X			X	X								
3	PAR6207	EXC22-02-03	0.5	0.6	14-Jan-22	SOIL	GRAB	4	X			X	X								
4	PAR6207	EXC22-02-04	0.5	0.6	14-Jan-22	SOIL	GRAB	4	X			X	X								
5	PAR6207	EXC22-02-05	1.5	1.6	14-Jan-22	SOIL	GRAB	4	X			X	X								
6	PAR6207	EXC22-02-06	1.5	1.6	14-Jan-22	SOIL	GRAB	4	X			X	X								
7	PAR6207	EXC22-02-07	1.5	1.6	14-Jan-22	SOIL	GRAB	4	X			X	X								
8	PAR6207	EXC22-02-08	1.5	1.6	14-Jan-22	SOIL	GRAB	4	X			X	X								
9	PAR6207	EXC22-02-09	2.5	2.6	14-Jan-22	SOIL	GRAB	4	X			X	X								
10	PAR6207	EXC22-02-10	2.5	2.6	14-Jan-22	SOIL	GRAB	4	X			X	X								
11	PAR6207	EXC22-02-11	2.5	2.6	14-Jan-22	SOIL	GRAB	4	X			X	X								
12	PAR6207	EXC22-02-12	2.5	2.6	14-Jan-22	SOIL	GRAB	4	X			X	X								
13	PAR6207	EXC22-02-13	3.5	3.6	14-Jan-22	SOIL	GRAB	4	X			X	X								
14	PAR6207	EXC22-02-14	3.5	3.6	14-Jan-22	SOIL	GRAB	4	X			X	X								
15	PAR6207	EXC22-02-15	3.5	3.6	14-Jan-22	SOIL	GRAB	4	X			X	X								

Please indicate any potentially hazardous samples

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G1L0114A01

Lot: 1547442 COC

Temp. received: °C

Date/Time stamp:

Method:

Waybill:

Received by:

Special Instructions/Comments (please include contact information including ph. # if different from above).

AGREEMENT 2911

Site I.D.	Sample description	Depth start	Depth end	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	PS1,05 - GSA	PS24	CCMEC (BTEX, F1-F4)	PAH2 (PAHs)	TT43 (Metals)	ABT1SAL-S (Salinity)	Glycol	Methanol	S32KBC,05 - Salinity	S30BC - Muskeg Salinity	Hold
		in m							Enter tests above (✓ relevant samples below)										
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PAR6207	EXC22-02-17	4.5	4.6	14-Jan-22	SOL	GRAB	4	X			X	X							
PAR6207	EXC22-02-18	4.5	4.6	14-Jan-22	SOIL	GRAB	4	X			X	X							
PAR6207	EXC22-02-19	4.5	4.6	14-Jan-22	SOL	GRAB	4	X			X	X							
PAR6207	EXC22-02-20	4.5	4.6	14-Jan-22	SOIL	GRAB	4	X			X	X							
PAR6207	EXC22-02-21	4.7	4.7	14-Jan-22	SOL	GRAB	4	X			X	X							
PAR6207	EXC22-02-22			14-Jan-22	SOIL	GRAB	4	X			X	X							
PAR6207	EXC22-02-23			14-Jan-22	SOIL	GRAB	4	X			X	X							
PAR6207	SP22-02-01			14-Jan-22	SOIL	GRAB	4	X			X	X							
PAR6207	SP22-02-02			14-Jan-22	SOIL	GRAB	4	X			X	X							
PAR6207	SP22-02-03			14-Jan-22	SOIL	GRAB	4	X			X	X							
PAR6207	SP22-02-04			14-Jan-22	SOIL	GRAB	4	X			X	X							
PAR6207	SP22-02-05			14-Jan-22	SOIL	GRAB	4	X			X	X							

Please indicate any potentially hazardous samples

Control # G1L0114A02

element

NORTH SHORE
Environmental Consultants

Paramount Resources Ltd.
Para et al Fort Liard O-35 60°10' 123°15'
Phase 1 Environmental Site Assessment
March 2017



Paramount Resources Ltd.
4700 Bankers Hall West
888 3rd Street SW
Calgary, Alberta T2P 5C5

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INTRODUCTION

Paramount Resources Ltd. (Paramount) retained North Shore Environmental Consultants Inc. (North Shore) to conduct a Phase 1 Environmental Site Assessment (ESA) for the Para et al Fort Liard O-35 gas well located in the Northwest Territories (NWT) at Unit O, Section 35 Grid Area 60° 10', 123° 15' (Site).

The purpose of the Phase 1 ESA was to assess and qualify potential environmental concerns associated with the Site through a historic records review and site visit. The Phase 1 ESA was conducted in general accordance with the Canadian Standards Association (CSA) *Standard Z678-01: Phase I Environmental Site Assessment* (CSA, 2001). The Alberta Energy Regulator (AER) *Assessing Drilling Waste Disposal Areas: Compliance Option for Reclamation Certification* (AER, 2014) guidelines were used to assess the drilling waste associated with the Site.

FINDINGS

The Para et al Fort Liard O-35 well was drilled between November 2, 1999 and December 4, 1999 to a depth of 2121 m. The rig was released on December 29, 1999. The well produced sweet natural gas between 2000 and 2005 before the site was deactivated by Paramount in April 2008. Fluids were transported from the site via pipeline to the Paramount Maxhamish d-36-I compressor station in BC. The wellsite is accessible by helicopter and winter roads.

Infrastructure identified in association with the site includes the following: wellhead, flare knockout drum with vent stack, pipeline, flowlines, meter run, separator methane pump building with vent stack, pig launcher, and methanol tank in containment dyke. According to the Paramount June 2009 As-built sketch of the area, a borrow pit/remote sump was located southeast of the wellsite along the access road and a campsite area was located east of the borrow pit/remote sump. There were no log decks identified in association with the wellsite.

Drilling Waste Disposal

According to the Paramount Resources Ltd. Final Well Report, the surface hole gel-chem drilling mud was hauled off site and treated at a remote sump. As-built diagrams show the remote sump/borrow pit was located southeast of the wellsite on the south side of the access road. The invert mud used for the intermediate section of the well was re-used at another location.

The main hole was drilled underbalanced with nitrogen as a carrying medium; however, the exact location of disposal of the main hole waste is not known. As a worst case scenario, it is assumed the main hole drilling waste was also disposed of at the remote sump.

Due to a lack of formal drilling waste disposal documentation, a Compliance Option 2 checklist and associated calculations were completed. The metal and salt calculations were completed only for the surface and main hole drilling mud additives as the intermediate hole waste was hauled off site. Drill stem tests (DSTs) 2 to 6 were run during main hole drilling and have been included in the calculations. The combined surface and main hole depths were used for the calculations and the drilling waste exceeds the barite and salt calculation criteria.

File review documentation indicated that the remote sump was lined; however, there is no information available identifying how the drilling waste at the remote site was treated or disposed of. Further investigation of the remote sump area is required. A September 2000 Environmental Inspection report completed by Indian and Northern Affairs noted the sump area was slumped.

DSTs were conducted during drilling of the intermediate and main hole sections of the well and recovered drilling mud and slightly gasified drilling mud. Well Testing and DST Evaluation reports indicated the well was 'vented to the pit' during DST testing and as a result further assessment of the drilling flare pit is recommended.

Spills & Complaints

A review of the NWT Resource Wildlife and Economic Development's Hazardous Material Spill Database identified the following spill associated with the O-35 wellsite:

Spill No.	Date	Spill Location	Product Released	Volume	Source
2009053	February 3, 2009	O-35 Wellsite	Diesel Fuel	1000 L	Storage Tank <4000 L

An August 2008 Well Inspection Report completed by the National Energy Board noted a small amount of soil staining around the wellhead where equipment had been located.

An NWT Spill Report identified on off lease spill along the access road into the F-36 wellsite between January 21 and 23, 2000. It was estimated that 800 L of waste was released on the access road during rig move events and accumulated in two low spots along the road; however the exact locations are not known. There was contracting information available with respect to the type of material released. One spill report indicated that the spill material may have contained hydrocarbons and had a hydrocarbon odor while another spill report identified the material as drilling fluid. Snow was windrowed to the road centre and then cleaned up and taken to the remote drilling waste lined sump at O-35.

Previous Assessments/Reports

Alpine Environmental (Alpine) completed an Annual Environmental Site Assessment report in July 2003. The purpose of the assessment was to visually inspect the lease and, if any areas of concern were observed, field screen soil and obtain samples for laboratory analysis. Eight hand auger soil samples were collected from two large areas with minimal vegetation coverage to the north and southeast of the facilities area and from a dry trench to the east of the methanol tanks. One sample was analysed for hydrocarbons, metals and salinity. The results of the assessment indicated that no environmental impacts were identified but further maintenance work at the site was required.

In 2005, a second Annual ESA report was completed for the site by Alpine. The report concluded that there were no indications on site that further sampling was required. Although no environmental impacts were identified during the 2005 assessment, further maintenance work at the site was still required.

Interviews

There were no Paramount operations personnel with historic knowledge of drilling or production activities at the Site available for an interview.

Site Visit

A site visit was completed on February 6, 2017 under snow conditions. The site was generally level and vegetation identified from the previous year's growing season through the snow included yellow rattle, fescue, will, spruce, pine aspen and alder and appeared to be consistent with off site areas. Infrastructure present on site consisted of a 400 bbl tanks in containment, above and below ground pipelines, riser, pigging station, flare stack and knock out drum, methanol pump, meter shack, pilings and risers. The borrow pit/remote sump area located to the east of the site was well vegetated.

CONCLUSIONS AND RECOMMENDATIONS

Based on the information gathered for this Phase 1 ESA from the historic records review and the site inspection, North Shore concludes that there is a potential for environmental impact in connection with the site. A Phase 2 ESA is recommended to assess the following areas of potential concern:

- Well centre;
- Production facility/flare stack areas;
- Former spill areas at the well centre and storage tank areas;
- Remote drilling waste disposal area at O-35; and
- Potential drilling flare pit area.

DISCLOSURE

North Shore Environmental Consultants Inc. (North Shore) has prepared this report taking into account government regulations available at the time of the assessment. North Shore has not made an independent verification of historical or analytical results provided by third parties and therefore makes no assurances regarding the accuracy of such information. It has assumed such information is correct. Where indicated or implied the conclusions are based on visual observation and/or analytical testing conducted at the time of the assessment. The conclusions do not apply to any areas of the site not investigated.

This report is intended for the exclusive use of the company, organization, or individual to whom it is addressed and may not be relied upon by any third party without the express written permission of North Shore. The investigation and reporting has been conducted with a reasonable level of attention and skill, in accordance with standards prevailing in the environmental consulting profession at the time of report date in the location in which the report was prepared.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. North Shore accepts no responsibility for damages, if any, suffered by any third party as a result of the use of this report or any decisions made or actions based on this report.

In the preparation of this report, selected Alberta Energy Regulator (AER) reference material has been gathered from AbaData™ (property of Abacus Datagraphics Ltd.), which is an online information source. The information provided by AbaData is received directly from the AER, electronically updated on a monthly basis and is assumed to be correct.

CLOSURE

North Shore appreciated the opportunity to work on this project. If we can provide clarification of any part of this report, please contact the undersigned at (780) 467-3354.

This report was prepared by:



_____
Ann Tuson, R.T.(Ag.)
Environmental Consultant

Reviewed By:



_____
Angela Bricker, B.Sc., P.Ag.
Environmental Consultant

REFERENCES

Alberta Energy Regulator (AER). 2015. *Directive 050: Drilling Waste Management*. Retrieved from: https://www.aer.ca/rules-and-regulations/directives/directive-050

Alberta Energy Regulator (AER). 2014. *Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification*. Edmonton, Alberta. March 2014.

Alpine Environmental (Alpine). 2005. *Annual 2005 Environmental Site Assessment Report F-36 Wellsite, Northwest Territories Calgary, Alberta.* October 2005

Petroleum Services Association of Canada. 2016. *Drilling Fluid Product Listing for Potential Toxicity Information*. Retrieved from: www.psac.ca/mudlist/pdf/mud_list.pdf

Mackenzie Valley Land and Water Board. 2017. *Mackenzie Valley Land and Water Board – Public Registry – Online Review System*. Accessed January 2017. Retrieved from: https://mvlwb.com/

NWT Environment and Natural Resources. 2017. *Hazardous Materials Spills Database.* Accessed January 2017. Retrieved from: http://apps.enr.gov.nt.ca/app/spills/epd_spills/asp/login.asp

Government of NWT. 2017. *Office of the Regulator of Oil and Gas Operations – Public Registry.* Accessed January 2017. Retrieved from: http://www.orogo.gov.nt.ca/registry

Government of NWT. 2017. *Northwest Territories Geological Survey* Accessed January 2017. Retrieved from: http://www.nwtgeoscience.ca/

List of Appendices

Appendix A Survey Plan
Site Diagram

Appendix B Spill Report
Aerial Photographs
Construction/Operations Sketch
Correspondence

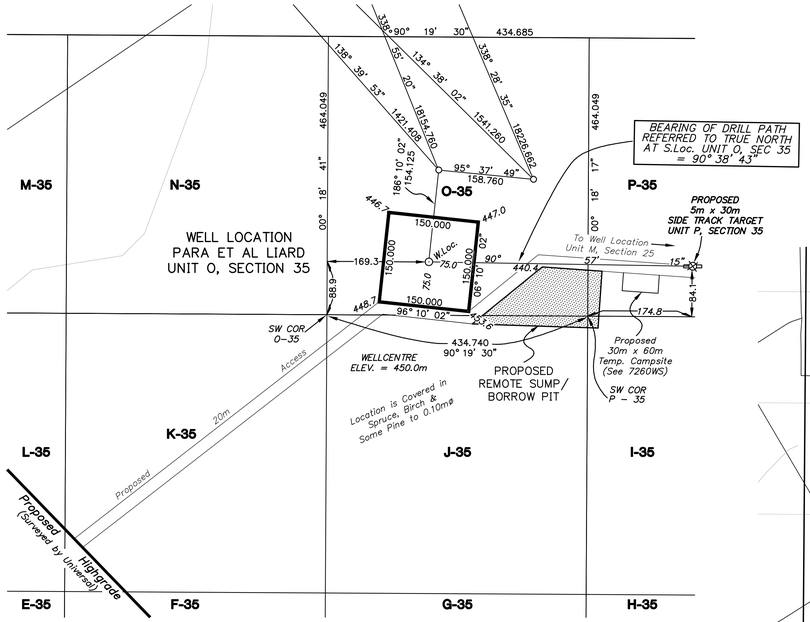
Appendix C Drilling Waste Documentation

Appendix D Site Visit Photos

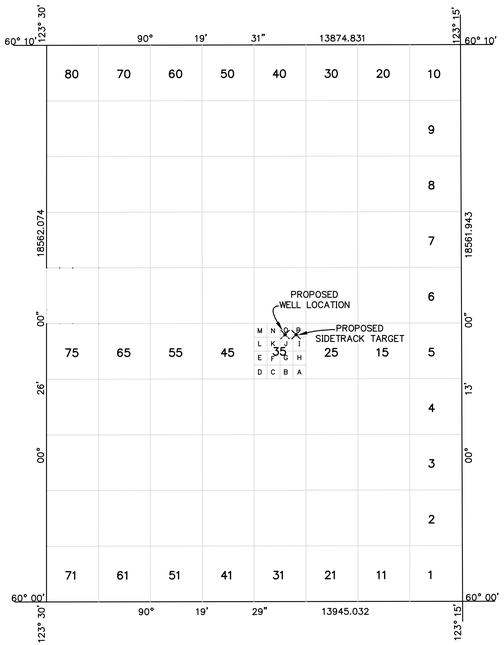


APPENDIX A

Survey Plan
Site Diagram



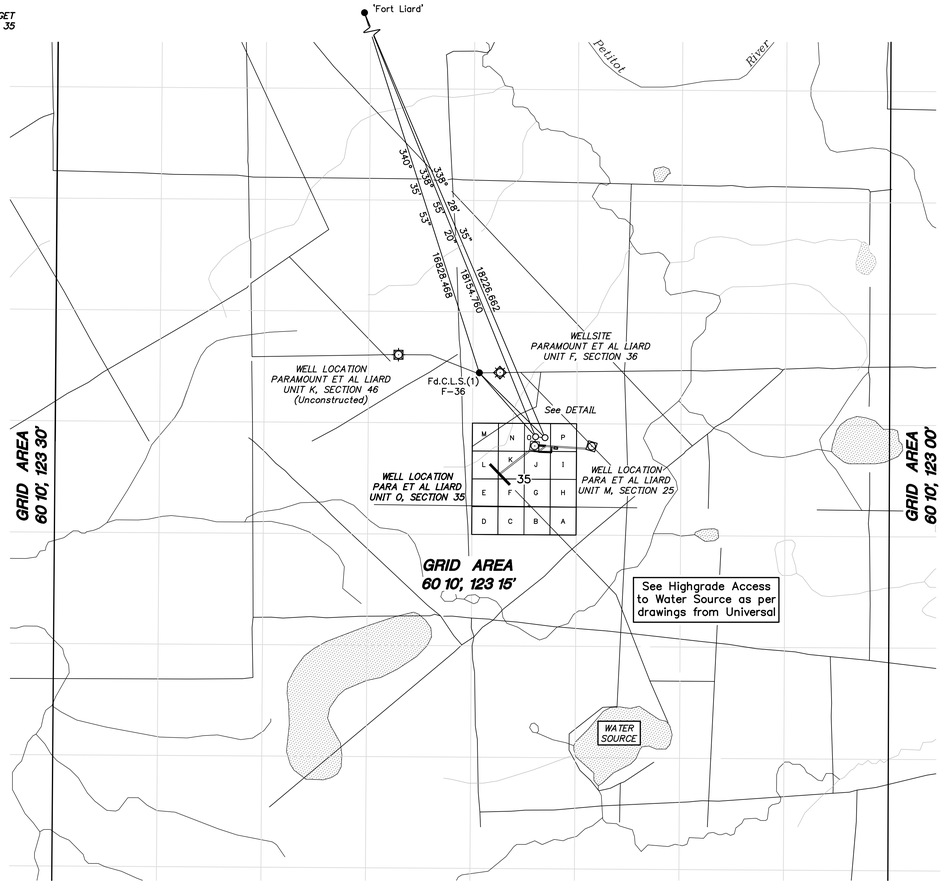
DETAIL
UNIT O, SECTION 35
SCALE 1:5,000



GRID AREA 60°10', 123°15'
SCALE 1:100,000

AREAS REQUIRED:

WELLSITE:	150mx150m =	2.25 ha.
REMOTE SUMP & BORROW PIT:	VARIABLE =	1.51 ha.
TOTAL:		3.76 ha.



All coordinates shown are on 1927 North American Datum.
Wellsite control established using differentially corrected GPS observations.
Final coordinate values for control were transformed from NAD83 datum to NAD27 datum using National Transformation Version 2 program.
Geodetic Survey of Canada published coordinate values for monument 'Fort Liard' were held fixed. Adjusted values for Fd.CLS(1) F-36 Grid Area 60°10', 123°15' and comparison to published coordinates are shown below.

GEOGRAPHIC AND UTM COORDINATES, (1927 NAD)				
Station	Latitude	Longitude(W)	Northings	Eastings
CONTROL MONUMENTS				
Fort Liard (Pub. & Fixed)	60°13'59.011"	123°28'31.881"	6677255.686	473662.363
Fd.CLS(1) F-36 (Adj.)	60°14'15.436"	123°27'39.795"	6661390.271	479250.101
CLS(1) F-36 (Pub.)	60°05'27.349"	123°22'22.878"	6661390.164	479250.101
GRID AREA				
NE	60° 10' 00"	123° 15' 00"	6669792.783	486125.259
NW	60° 10' 00"	123° 30' 00"	6669871.559	472250.651
SE	60° 00' 00"	123° 15' 00"	6651230.973	486055.060
SW	60° 00' 00"	123° 30' 00"	6651310.016	472110.252
O-35, NE	60°05'00.207"	123°21'05.624"	6660543.935	480439.341
O-35, NW	60°05'00.211"	123°21'33.749"	6660546.401	480004.663
O-35, SE	60°04'45.207"	123°21'05.624"	6660079.893	480436.873
O-35, SW	60°04'45.211"	123°21'33.749"	6660082.359	480002.140
TRAVERSE STATIONS				
O-35-1	60°04'52.562"	123°21'11.558"	6660307.924	480346.367
O-35-2	60°04'53.038"	123°21'21.780"	6660323.492	480188.454
PROPOSED WELL				
O-35	60°04'48.084"	123°21'22.797"	6660170.331	480171.904
PROPOSED SIDETRACK TARGET				
P-35	60°04'47.923"	123°20'54.323"	6661063.000	480612.000

REV.No.	DESCRIPTION	DATE
1	ADDED SIDETRACK TARGET	05/01/28

McELHANNEY
LAND SURVEYS LTD.
8808 – 72nd Street
Fort St. John, British Columbia
Phone:(250)787-0356, Fax(250)787-0310
McElhanney

DATE : 99/07/02 JOB No.: 3111-07257WS RT BRC

PLAN AND FIELD NOTES

OF SURVEY OF

PROPOSED EXPLORATORY WELL

PARA ET AL LIARD

IN UNIT O, SECTION 35

GRID AREA 60° 10', 123° 15'

(DIRECTIONALLY DRILLED TO SIDETRACK TARGET IN UNIT P, SECTION 35)

NORTHWEST TERRITORIES
CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50,000
0m 500m 1000m 2000m 3000m 4000m 5000m

SURVEYED FOR
PARAMOUNT RESOURCES LTD.

BY : R.O. BLACKALL, CLS
JUNE, 1999.

LEGEND
UTM coordinates are computed for Zone 10, central meridian 123° W.
Bearings were derived from differentially corrected GPS Observations and are referred to Meridian 123° W.
Distances are expressed in metres and decimals thereof.
Distances shown in traverse are measured distances reduced to the horizontal at general ground level.
For the computation of coordinates measured distances have been reduced to the UTM plane by multiplying them by an average combined scale factor of 0.9995353. Coordinates were then adjusted to fit the control.
Distances shown on grid area subdivisions are UTM plane.
Authorized control monuments found ..... ●
Monuments placed ..... ○
Mkr. denotes metal marker post 2.0m long placed 0.30m N.
Elevations were derived from Geodetic of Canada Monument 'Fort Liard' Elev. = 216.299m

Survey was completed prior to drilling; therefore well as drilled may not necessarily agree with proposed location.

I, R.O. Blackall, of the City of Fort St. John, British Columbia, Canada Lands Surveyor, make oath and say that I have in my own proper person, according to law and the instructions of the Surveyor General of Canada Lands, faithfully and correctly executed the survey shown by this plan and field notes, and that the said plan and field notes are correct and true to the best of my knowledge and belief.
SO HELP ME GOD

R.O. Blackall, CLS

Sworn before me at Fort St. John, this 06th day of July, 1999.

THIS SURVEY WAS EXECUTED DURING THE PERIOD
JUNE 25th TO JUNE 27th, 1999. BY R.O. BLACKALL, CLS

PARAMOUNT RESOURCES LIMITED

WITNESS

DATE

MOUNT COTY

MCKAY LAKES

123°30'

60°20',123°15'

60°20',123°00'

STAGING AREA

CAMP

MAINTENANCE YARD

RESIDENCE

BARGE SITE

CAMP SITE

I-02 DECKING SITE

CAMP

BRIDGE 5X15m

FORT LIARD HIGHWAY

Betalamea Lake

Petitot River

FORT LIARD

A-47 (NOT DRILLED)

I-46

CAMP

F-36

DECKING SITE BORROW PIT

123°30'

60°10',123°00'

O-35

CAMP

M-25 (NOT DRILLED)

BORROW PIT & SUMP

60°10',123°15'

BORROW PIT

BRIDGE 18.4X5m

Water Source #3 (Mea Goh Cho Lake)

STANLEY BERTRAND TRAPPER CABIN

BRIDGE

CAMP

N-01

BORROW PIT

CAMP

A-01

NORTHWEST TERRITORIES

BRITISH COLUMBIA

94O13I

94O14L

94O14K

94O14J

94O14I

MAXHAMISH COMPRESSOR

LEGEND

- SEISMIC
- AIRSTRIP - (FOREIGN)
- AIRSTRIP
- PIPELINE R/W
- PIPELINE R/W FOREIGN
- ACCESS ROAD - (FOREIGN)
- WINTER ACCESS ROAD
- ALL SEASON ACCESS ROAD
- CONTOUR
- LEASE - (TIED-IN)
- LEASE - (NOT TIED-IN)
- LEASE - (FOREIGN)
- LEASE - RECLAIMED
- BORROW PIT
- CAMP SITE
- SUMP / PIT
- DECKING SITE
- BATTERY SITE
- OTHER CLEARING
- BRIDGE
- TOWER

SCALE 1:50,000

1250 0 1250 2500 3750 5000 METERS

2500 0 5000 10000 15000 FEET

N

DISCLAIMER: The information contained herein is compiled from various government and industry sources. The Universal Group of Companies and its data suppliers provide no warranty regarding the accuracy or completeness of this information. No liability can be assumed by The Universal Group of Companies or its data suppliers resulting from the use or interpretation of this information, or from any decisions made based on this information.

Paramount resources ltd.

FORT LIARD SOUTH

As-Built June 2009

94O14I (BC P&NG GRID) to

SE1/4 60°20',123°30' (NWT GRID)

REV.	DESCRIPTION	INI.	DATE
3	Updated map title	BPV	03-JUN-09
2	Removed I-03 W/S & updated map title	BPV	12-SEP-07
1	Added Bridge in Sec.12 and Road in Sec.1 & 11.	BPV	05-DEC-06
0	Original construction (from 2005 map)	WGT	13-JUN-06

SPECIFICATIONS	
Datum:	NAD 83
Projection:	UTM
NTS Ref:	95B
Zone:	10
Scale:	1:50 000
C.I.:	100m
Filename:	050399G01_2009
Model:	50K Ft Liard South
Job No:	05-0399G

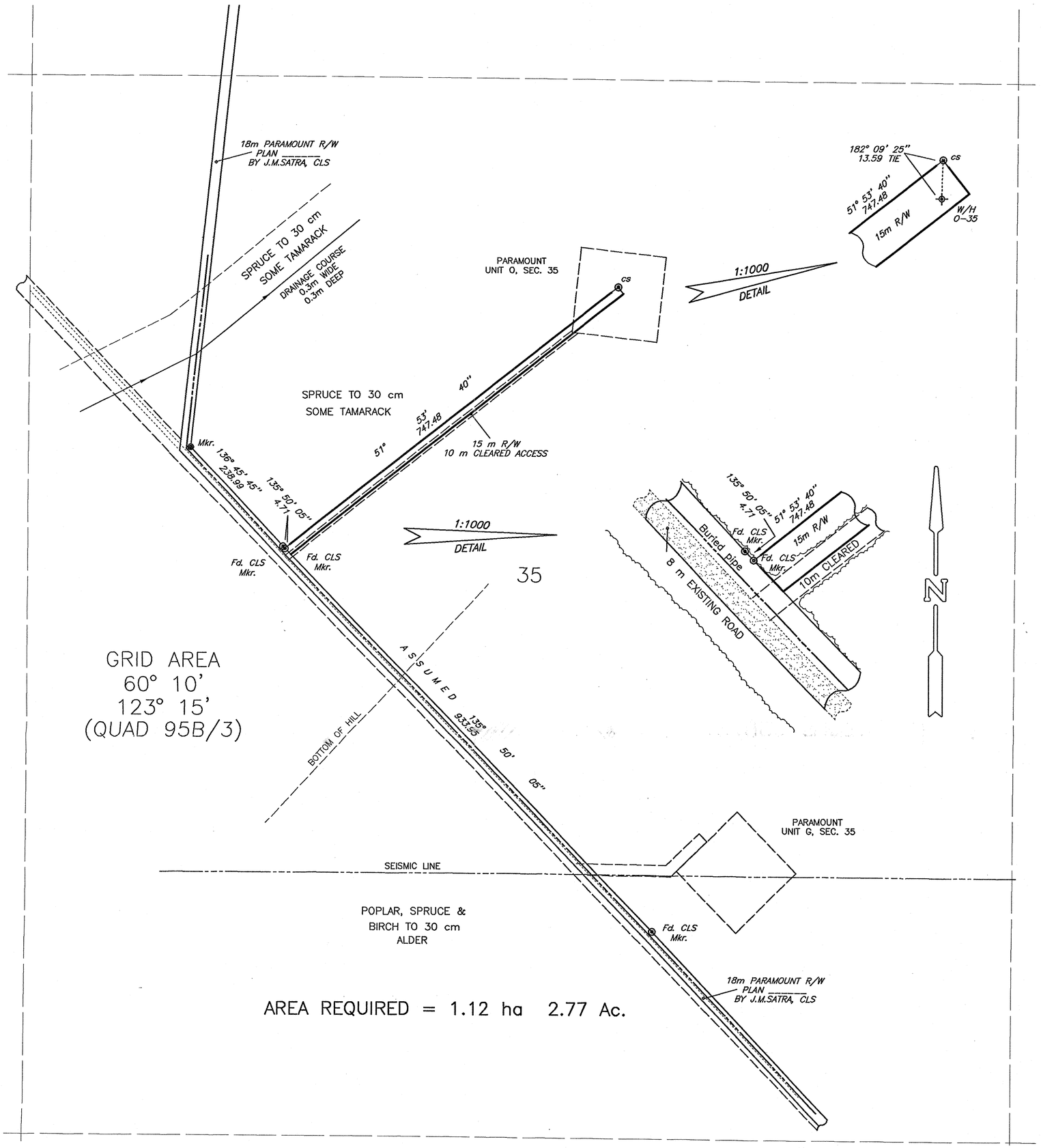
IMAGERY (Air Photo / Satellite)	
Date:	2000
Type:	1m Orthophoto

PREPARED BY:

UNIVERSAL GEOSYSTEMS U.G.S. SPATIAL INFORMATION SERVICES

Ph:. 262-1336
Fax: 262-1308
www.universalsurveys.com

REV. 3



PARAMOUNT RESOURCES LTD.

Plan Showing Pre-Construction Information for

PIPE LINE RIGHT-OF-WAY

within theoretic

SECTION 35

GRID AREA 60° 10', 123° 15'

(QUAD 95B/3)

NORTHWEST TERRITORY

CONSTRUCTION REFERENCE DRAWINGS

TYPE	LOCATION	PLAN No.	COMMENT
FOREIGN PIPE LINES			
CABLES			
ROADS			
POWER LINES			
OTHER			

NOTE: THIS PLAN REPRESENTS THE BEST INFORMATION AVAILABLE AT THE TIME OF ISSUE AS TO FOREIGN LINES EITHER CROSSED OR WITHIN 30 METRES OF THE SUBJECT RIGHT-OF-WAY. ADDITIONAL BURIED FACILITIES NOT SHOWN ON THIS PLAN MAY HAVE BEEN MISSED OR MAY HAVE BEEN INSTALLED AFTER THIS PLAN HAD BEEN ISSUED. AN ADDITIONAL SEARCH FOR SPECIFIC BURIED FACILITIES UTILIZING ALL RESOURCES MUST BE PERFORMED JUST PRIOR TO CONSTRUCTION.

NUMBER OF CROSSING PLANS ASSOCIATED WITH THIS DRAWING 0

TOTAL LENGTH OF RIGHT-OF-WAY ALONG POSTED BOUNDARY = 747.48 metres

PARAMOUNT

No.	REVISION	APP'D	DATE
A	ISSUED FOR APPROVAL		SEPT. 5/00

Scale = 1:5000	UNIVERSAL SURVEYS INC.	Plan No.: 4 of 5
Date : SEPT. 5/00	15111 – 123 rd Avenue	Job No.: 00-1074
Dwn By: JMS / Ck'd By: JD	Edmonton, Alberta, T5V 1J7	Acad File No.: 001074C04
	Phone : (780) 454-3030	A REV

MIXEDWOOD
FOREST

P/L ROW

FLARE KNOCKOUT TANK

METHANK
PUMP BLDG.

PIG RUN

CUTLINE

REMOTE SUMP

MIXEDWOOD
FOREST

MIXEDWOOD
FOREST

COLLAR

METHANE TANK

FORMER
METHANE TANK

FLARE PIT

O-35 LEASE BOUNDARY

ACCESS ROAD ROW FROM SURVEY

ACCESS ROW FROM SURVEY

MIXEDWOOD
FOREST

LEGEND

- O-35 WELL CENTRE
- UNDERGROUND PIPELINE
- FLARE STACK

NOTES:

LOCATIONS ARE APPROXIMATE.

DATE OF SITE VISIT: FEBRUARY 6, 2017.

DRAWING SHOULD BE PRINTED ON 11x17 PAPER FOR ACCURATE SCALING.

0 5 10 20 30m

Scale 1 : 800

SITE VISIT DIAGRAM

NORTH SHORE
Environmental Consultants

Date: 21-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. O-35 (NORTHWEST TERRITORIES)	Figure: 1
File name: O-35_17PH2P-C.dwg	Requested by: DM		

File: O-35_17PH2P.dwg Date: March-24-17 2:57:22 PM

MIXEDWOOD
FOREST

CUTLINE

MIXEDWOOD
FOREST

O-35 LEASE BOUNDARY

ACCESS ROAD ROW FROM SURVEY

BORROW PIT

DWDA

MIXEDWOOD
FOREST

MIXEDWOOD
FOREST

DRAWING SHOULD BE PRINTED ON 11x17
PAPER FOR ACCURATE SCALING.

0 5 10 20 30m

Scale 1 : 750

NOTES:

LOCATIONS ARE APPROXIMATE

DATE OF SITE VISIT: FEBRUARY 6, 2017.

NORTH SHORE
Environmental Consultants

REMOTE SUMP SITE VISIT DIAGRAM

Date: 24-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. O-35 (NORTHWEST TERRITORIES)	Figure: 2
File name: 0-35_17PH2P-A.dwg	Requested by: DM		

APPENDIX B

Spill Report
Aerial Photographs
Construction/Operations Sketches
Correspondence

Hazardous Materials Spill Database

Environment Division of ENR
Scotia 6, 5102-50th Avenue; Yellowknife, NT X1A 3S8
Phone: (867) 873-7654 Fax: (867) 873-0221

Sorted By: Location for the year (s): 2017

Spill No.	Date	Ter	Region	Location	Site Description	Commodity	Quantity	Source	Agency
2009053	2009-02-03	NT	DEH	-	Para Et Al (0-35) 60:4:48N 123:21:227W	Diesel Fuel	1000 L	ST<	INAC

Total Spills on this Report: 1

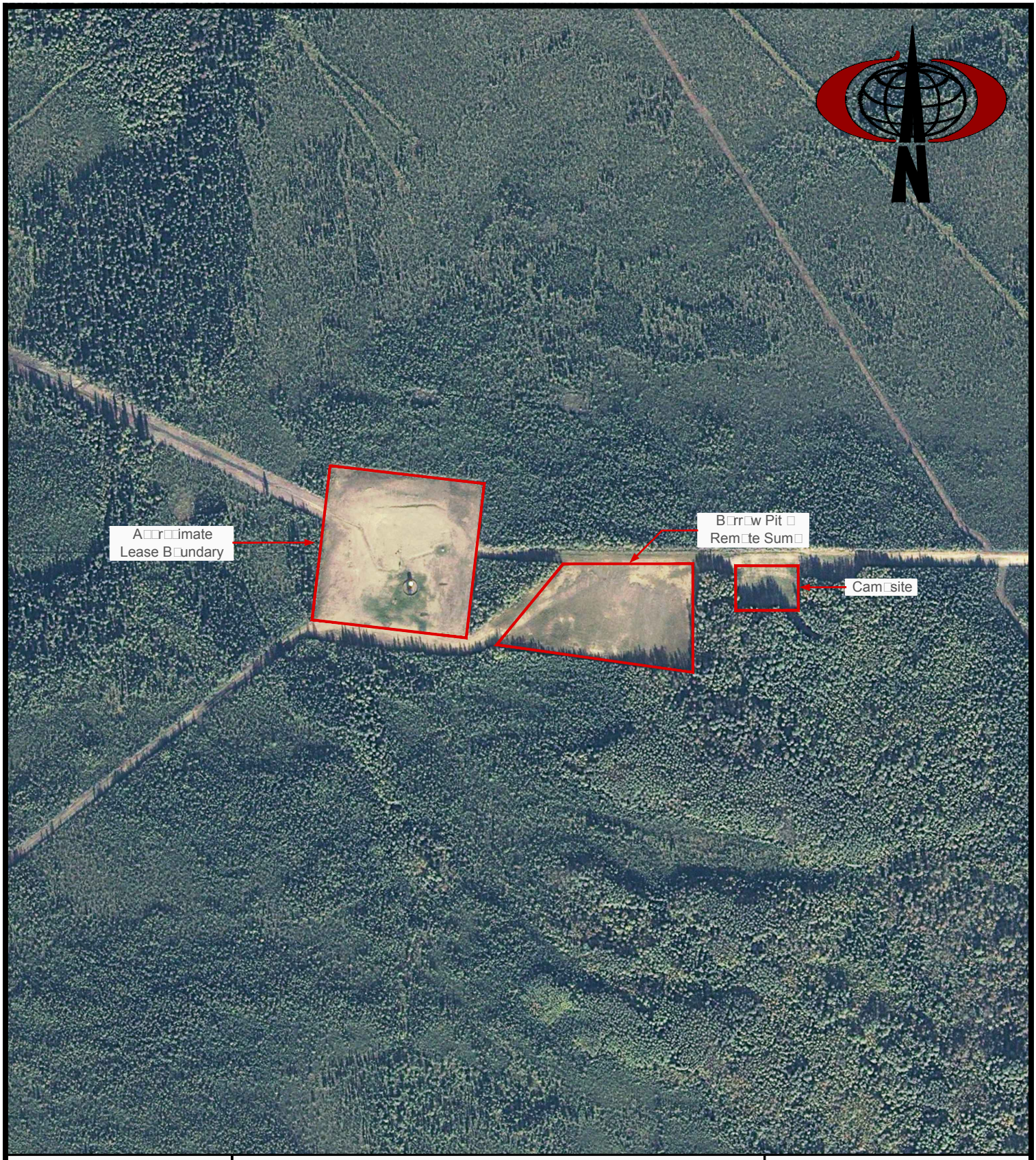
This report contains information regarding spills that were reported to the NWT 24-Hour Spill Line. The absence of information on any particular location in no way guarantees that contamination has not occurred at that location.

LEGEND

Region:
BAF - Baffin
DEH - Deh Cho
INU - Inuvik
KEE - Keewatin
KIT - Kitikmeot
NSL - North Slave
SAH - Sahtu
SSL - South Slave

Source:
AIR - Aircraft
DRUM - Drum or Barrel
MV - Marine Vessel
NS - Natural Seepage
OTH - Other Transportation
PL - Pipe or Line
RT - Rail Train
SL - Sewage Lagoon
ST< - Storage Tank <4000 litres
ST> - Storage Tank >4000 litres
TP - Tailings Pond
TRU - Truck
UK - Unkown
WELL - Wet Wells, Flaring
Boom

Agency:
CCG - Canadian Coast Guard
EP - Environment Canada
GN - Government of Nunavut
GNWT - Government of Northwest Territories
ILA - Inuvialiut Land Administration
INAC - Indian and Northern Affairs Canada
NEB - National Energy Board



NORTH SHORE
Environmental Consultants

□143□201 Kas□a R□ad
S□erw□□d Par□□AB
T8A 2□6

□aramount Resour□es □td□

Para et al F□rt Liard O-35

2001 Satellite Imagery

0 50 100 200
SCALE IN METERS

S□ale: 1:5000

NOTE: SCALE IS APPROXIMATE ± 1m



NORTH SHORE
Environmental Consultants

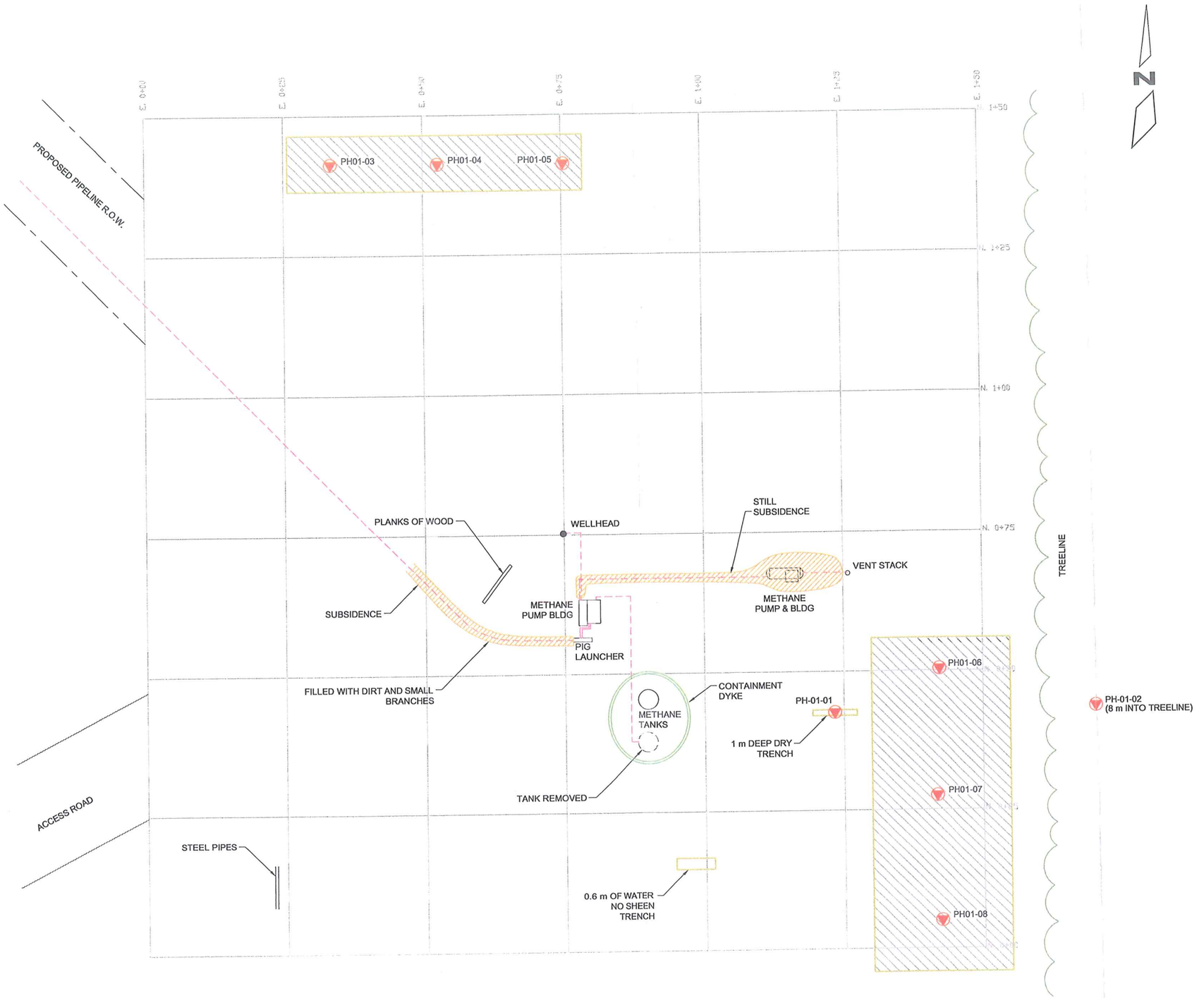
□143□201 Kas□a R□ad
S□erw□□d Par□□AB
T8A 2□6

□aramount Resour□es □td□

Para et al F□rt Liard O-35

2001 Satellite Imagery

S□ale: N□t t□ S□ale



LEGEND

PROBEHOLE (0.0-0.3 m DEPTHS)

MINIMAL VEGETATION WITH SCATTERED BRANCHES

0 5 10 15 20 25m

NO.	DESCRIPTION	DATE	BY	APP'D
5				
4				
3				
2				
1				

REVISIONS

ALPINE ENVIRONMENTAL

CLIENT:

NAHENDEH LAND AND ENVIRONMENTAL SERVICES

PROJECT:

0-35 WELLSITE

FIGURE 2
SITE PLAN WITH PROBEHOLE LOCATIONS

PROJECT AC1428	DESIGNED SG	SCALE 1: 750
DATE 2002-07-28	DRAWN TN/DS	XREF
DWG No AC1428-01	CHECKED SM	APPROVED

From: Ann Tuson
To: Ann Tuson
Subject: FW: Looking for Production Information
Date: Thursday, January 26, 2017 12:11:13 PM
Attachments: image001.jpg

From: Kristen Cameron [mailto:Kristen_Cameron@gov.nt.ca]
Sent: Thursday, January 26, 2017 10:42 AM
To: Brent Walchuk
Cc: DST_ITI_OROGO
Subject: RE: Looking for Production Information

Brent,

I have included a table below that shows the annual production statistics gathered by the NEB for the Fort Liard fields.

There are four fields:

- Liard Wells: Liard F-25A, K-29, M-25, 2K29, 3K-29, 2M-25, K29A
- Liard North Wells: North Liard P-66A
- Fort Liard SE Wells: SE Fort Liard N-01
- Fort Liard Wells: Fort Liard F-36, O-35

There is monthly data by well, but it would take me a while to compile the historical records for release. Please let me know if this information suits your purpose, and feel free to call if you have any questions.

Field Name	Year	Annual Wellhd Gas Prod (10^3m^3)	Annual Oil Prod (m^3)	Annual Cond Prod (m^3)	Annual Wtr Prod (m^3)
Liard Wells:	Liard F-25A, K-29, M-25, 2K29, 3K-29, 2M-25, K29A				
Liard	2000	490,079.2	-	-	21,530.9
Liard	2001	1,213,623.8	-	-	75,896.1
Liard	2002	834,139.7	-	-	144,375.2
Liard	2003	680,340.6	-	-	215,589.5
Liard	2004	465,409.7	-	4,002.3	-
Liard	2005	203,286.2	-	-	114,509.2
Liard	2006				
Liard	2007				
Liard	2008				
Liard	2009				
Liard	2010				
Liard North Wells:	North Liard P-66A				
Liard North	2000	60,113.4			23,386.8
Liard North	2001	1,824.0			5,488.5
Liard North	2002				

Fort Liard SE Wells:		SE Fort Liard N-01			
Fort Liard SE	2001	33,153.6	-	-	259.4
Fort Liard SE	2002	61,898.6	-	422.3	778.4
Fort Liard SE	2003	51,128.2	-	566.2	1,666.5
Fort Liard SE	2004	48,152.9	-	44.6	421.2
Fort Liard SE	2005	38,799.0	-	-	46.0
Fort Liard SE	2006	-	-	-	-
Fort Liard SE	2007	-	-	-	-
Fort Liard SE	2008	-	-	-	-
Fort Liard SE	2009	-	-	-	-
Fort Liard SE	2010	-	-	-	-
Fort Liard Wells:		Fort Liard F-36, O-35			
Fort Liard	2000	81,792.3	-	-	-
Fort Liard	2001	57,173.5	-	-	-
Fort Liard	2002	35,705.4	-	-	-
Fort Liard	2003	15,721.4	-	-	-
Fort Liard	2004	10,422.3	-	-	-
Fort Liard	2005	50,737.9	-	-	-
Fort Liard	2006				
Fort Liard	2007				
Fort Liard	2008				
Fort Liard	2009				
Fort Liard	2010				

- Kristen

From: Brent Walchuk [mailto:bwalchuk@northshoreenv.com]
Sent: Monday, January 23, 2017 07:50
To: Kristen Cameron
Cc: Ann Tuson
Subject: RE: Looking for Production Information

Thanks Kristen. If there are any issues sending the information via email let me know and we could send it through North Shore's FTP site.

Thanks,

Brent

From: Kristen Cameron [mailto:Kristen_Cameron@gov.nt.ca]
Sent: Friday, January 20, 2017 3:29 PM
To: Brent Walchuk
Cc: Ann Tuson
Subject: RE: Looking for Production Information

Brent,

Thanks for sending the specifics. If the information is readily available, we may have it in a few days, but it can sometimes take a couple of weeks if it has been archived.

In the meantime, I have found production reports for 2005 and 2006. I will see what information I can send you from those reports.

- Kristen

From: Brent Walchuk [mailto:bwalchuk@northshoreenv.com]
Sent: Friday, January 20, 2017 10:15
To: Kristen Cameron
Cc: Ann Tuson
Subject: RE: Looking for Production Information

Hi Kristen,

Thank you for the quick response. The production records that we are looking for are from the early 2000's. Specifically, we are looking for information for the Paramount Resources wells O-35, N-01, I-46, F-36, and A-01. From the information we currently have it looks like these wells produced between 2002 and 2007. I believe there will only be production information for F-36, O-35, and N-01. The other two wells were drilled and abandoned.

Would you be able to see if there are production records for these wells?

Thanks,

Brent

From: Kristen Cameron [mailto:Kristen_Cameron@gov.nt.ca]
Sent: Friday, January 20, 2017 10:09 AM
To: Brent Walchuk
Cc: Ann Tuson
Subject: RE: Looking for Production Information

Hello, Brent,

Thank you for contacting OROGO. As of April 2014, the Regulator has jurisdiction for the regulation of oil and gas works and activities in the onshore Northwest Territories (NWT), with the exception of the Inuvialuit Settlement Region and lands that were not transferred from the Government of Canada to the Government of the Northwest Territories.

Production statistics by field for 2014, 2015, and 2016 are available on our website at www.orogo.gov.nt.ca on the 'Documents' page. The files are listed alphabetically. *Production Statistic Reports* are on page 3, and there is one document for each year. However, all production since 2014 has been from the Cameron Hills field. There has been no recent production in the Fort Liard area. If you need historical production data, let me know and I will see if we can obtain it.

Please feel free to call me if you have any questions.

Kristen Cameron
Manager, Information Office | Gestionnaire, bureau d'information
Office of the Regulator of Oil and Gas Operations | Bureau de l'organisme de réglementation des opérations pétrolières et gazières
Government of the Northwest Territories | Gouvernement des Territoires du Nord-Ouest
PO Box 1320
Yellowknife NT X1A 2L9
Tel | Tél : 867-767-9097 x78004
Fax | Téléc : 867-920-0798
Web | Site Web : www.orogo.gov.nt.ca
NWT-NU Spill Line: 867-920-8130
OROGO Incident Reporting Line | Pour signaler un incident: 867-445-8551

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From: Brent Walchuk [mailto:bwalchuk@northshoreenv.com]
Sent: Thursday, January 19, 2017 16:48
To: Kristen Cameron
Cc: Ann Tuson
Subject: Looking for Production Information

Hi Kristen,

North Shore is currently completing Phase 1 ESAs for some wellsites in the Fort Liard area. We are relatively new to working in the Northwest Territories and we are trying to track down production information for the wells. Would this information be available in the OROGO Public Registry? Any help or information that you can provide would be greatly appreciated.

Thanks,

Brent

Brent Walchuk, B.Sc., P.Ag.
Remediation/Reclamation Supervisor
North Shore Environmental Consultants Inc.
#143, 201 Kaska Road
Sherwood Park, AB T8A 1K5
Office: (780) 467-3354 ext. 120

Cell: (780) 271-0870

Brent Walchuk
Environmental Consultant
#143, 201 Kaska Road
Sherwood Park, Alberta T8A 2J6
Tel: 1-780-467-3354 Cell:1-780-271-0870 Fax: 1-780-464-9622
bwalchuk@northshoreenv.com **http://www.northshoreenv.com**

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APPENDIX C

Drilling Waste Documentation

Dual Phase Induction Log:	1456 - 2100 mKB
Compensated Z-Denilog / Compensated Neutron Log:	1456 - 2105 mKB
Multipole Array Acoustilog:	1456- 2110 mKB
Cement Volume Log:	1456 - 2102 mKB

GAS, OIL, & WATER ANALYSES: Water analysis form the swabbing of the perforated section of the Mattson formation are included in the Attachment section.

FORMATION STIMULATION: N/A

FORMATION AND TEST RESULTS: N/A

DETAILED TEST PRESSURE DATA READINGS: N/A

E. ENVIRONMENTAL CONSIDERATIONS

There were no outstanding environmental considerations on this well. The gel-chem mud system used on the surface hole was hauled and treated at a remote sump. The invert mud system used for the intermediate hole was re-used at another location. The main hole was drilled underbalanced with noitrogen as a carrying medium. In January 2001 the site was recontoured and there are plans for any more work until this well is to be abandoned and reclaimed.

Compliance Option 2
Drilling Waste Disposal Assessment Checklist

Compliance Option 2 - Drilling Waste Disposal Assessment Checklist

If any response to the checklist questions leads to a Phase 2 ESA requirement or there is insufficient information to complete the Compliance Option Two Checklist, a Phase 2 ESA must be conducted in accordance with Compliance Option Three.

1. General Disposal and Drilling Fluid Information:
The well licensee should be able to review various sources of information pertaining to the drilling activities on-site. Many information sources, other than the *Notification of Drilling Waste Disposal*, *Drilling Waste Management Disposal Form*, or *Drilling Waste Pipeline Disposal Form* can be reviewed for information relating to the drilling waste disposal and drilling fluid systems. These can include Tour Reports, daily drilling records, well files, and contractor invoices.

1.0 Well Information:

Unique Identifier (UI)	Para et al Fort Liard O-35
Spud Date	November 2, 1999
Well Depth	2121 m

1.1 Disposal Method (if known)*: Off site disposal

* If waste was disposed at an AER or ESRD approved facility, list supporting documentation under Reference Documents.

1.2 Disposal Location (if known)**: Gel-chem remote sump located southeast of the wellsite and invert was re-used at another location.

** If checklist indicates that a Phase 2 ESA (Compliance Option Three) is required, it must be undertaken at the disposal location. If the disposal location is unknown, the Phase 2 ESA must be undertaken at the wellsite.

For the purpose of this form: if the disposal method and/or location remains unknown after all available information sources have been checked, the drilling waste disposal location is assumed to be on-site.

	Yes	No
1.3 Were there other drilling waste disposal events on the site (e.g. wellbore re-entry or another well drilled, using fluids containing drilling fluid additives)?	☐	☒
If yes, were the disposal areas separate from one another?	☐ Drilling waste information must be evaluated for each disposal.	☐ Drilling waste information must be evaluated by combining the drilling fluid additives and well depths. If drilling waste information is missing or incomplete for one or both wells, a Phase 2 (Compliance Option Three) is required.
	Yes	**No**

	Yes	No
1.4 Was a remote site used? If, Yes, is the remote site included in this reclamation application? If not included, is the remote site a multi-well disposal location?	☒ ☒ ☐ In Comments section, indicate which well the remote site will be tied to for the purposes of reclamation	☐ ☐ ☐ Single well remote disposal site must be included with reclamation certificate application, unless it already has received a Reclamation Certificate.
1.5 Has the well licensee reviewed the Daily Drilling Records and other available drilling documentation?	☒	☐ Phase 2 required
1.6 Can it be determined from the available records what type of drilling fluid system was used?	☒	☐ Phase 2 required
1.7 Were water-based drilling fluids used for all sections (i.e., gel chemical drilling fluid systems)? If No, is there evidence that demonstrates the non-water based wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., appropriately approved waste management facility)?	☒ ☐	☐ ☐ Phase 2 required
1.8 Is a mud list available? If Yes, can all the additives on the mud list be identified and described? Record the additives and their description (e.g., chrome-free lignosulfonate, aldehyde-based bactericide, etc.) on the attached form.	☒ ☒	☐ Phase 2 required ☐ Phase 2 required

	Yes	No
1.9 Do the Daily Drilling Records show evidence of a flow or kick that may have resulted in the introduction of produced fluids (i.e., hydrocarbons or salts) into the drilling fluids?	☐	☒
If Yes, is there information/documentation available to demonstrate that they were appropriately treated or disposed of as per *Directive 50* or *Directive 58* (i.e., approved waste management facility)?	☐	☐ Phase 2 required
1.10 Do the Daily Drilling Records show evidence of returned drill stem test fluids?	☒	☐
If Yes, is there information/documentation available to demonstrate that they were appropriately treated or disposed of as per *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐	☒
If treatment or disposal as per *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* cannot be confirmed, is there sufficient information/documentation available to complete the DST calculations?	☒ Show calculation on attached form	☐ Phase 2 required
1.11 Were cement returns buried on-site or at a remote site linked to the well?	☐	☐

2. Hydrocarbon Management

	Yes	No
2.1 Was hydrocarbon-based drilling fluid used?	☒	☐
If Yes, is there evidence that wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☒	☐ Phase 2 required

	Yes	No
2.2 Was the well a horizontal oil well? If Yes, is there evidence that wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐ ☐	☒ ☐ Phase 2 required
2.3 Was the well drilled using under-balanced techniques? If Yes, is there information/documentation available to demonstrate that the drilling wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☒ ☐	☐ ☒ Phase 2 required
2.4 Was hydrocarbon added to the drilling fluid? If Yes, was the hydrocarbon contaminated drilling waste disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☒ ☒	☐ ☐ Phase 2 required

3. Metals (Trace Elements) Management

	Yes	No
3.1 Was the disposal completed before November 1, 2012?	☒ Complete questions 3.2 to 3.5	☐ Go to question 3.6
3.2 Was barite added to the drilling fluid? If Yes, did it meet the requirements specified in the attached metal calculation table?	☒ ☐ Show calculation on attached form	☐ ☒ Phase 2 required

	Yes	No
3.3 Was zinc carbonate added to the drilling fluid?	☐	☒
If Yes, did it meet the requirements specified in the attached metal calculation table?	☐ Show calculation on attached form	☐ Phase 2 required
3.4 Were chrome-based thinners added to the drilling fluid?	☒	☐
If Yes, did it meet the requirements specified in the attached metal calculation table?	☒ Show calculation on attached form	☐ Phase 2 required
3.5 Were any other additives used that would have triggered testing for metals under Section 3 or 5 of *Directive 50 (1996 version)*?	☐	☒
If Yes, are waste analytical data and application rates (land treatment, landspreading) or maximum application (mix-bury-cover) available?	☐	☐ Phase 2 required
If above data are available, did the application rate or maximum application meet *Directive 50* requirements?	☐	☐ Phase 2 required
3.6 Did metal concentrations in the waste trigger a requirement for post-disposal sampling?	☐	☐
If yes, did all post-disposal samples meet the soil metal endpoints specified in Section 3 of *Directive 50* (2012 version)?	☐	☐ Phase 2 required

4. Salinity Management

	Yes	No
4.1 Does the water based drilling waste meet the requirements specified in the attached Salt Calculation Table?	☐ Show calculation on attached form	☒ Phase 2 required
4.2 Was a salt zone encountered during drilling?	☐	☒
If Yes, is there evidence that demonstrates the drilling wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., appropriately approved waste management facility)?	☐	☐ Phase 2 required

Surface Gel-chem Drilling Mud Additive List

Product Name	Amount Used	Brief Description of Product
Gel	128 sacks	Viscosifier
SAPP	1 sack	Thinner/Dispersant
Lime	1 sack	Alkalinity pH Control
Caustic Soda	2 sacks	Alkalinity pH Control
Desco	1 sack	Chrome-based Thinner/Dispersant
Detergent	6 sacks	Surface Active Agent
Sawdust	35 sacks	Lost Circulation Material
Soda Ash	4 sacks	Calcium Remover

Intermediate Hole Drilling Mud Additive List

Product Name	Amount Used	Brief Description of Product
Invert	232 m^3	Hydrocarbon Lubricant
Calcium Carbonate	58 sacks	Weighting Material
Soluflake	16 sacks	Lost Circulation Material
Carbo Tec	31 sacks	Oil Mud Emulsifier
Calcium Chloride	19 sacks	Shale Control Inhibitor
Bentone 150	20 sacks	Viscosifier
Lime	19 sacks	Alkalinity pH Control
Milbar	128 sacks	Weighting Material (Barite)
Omni Cote	6 sacks	Oil Wetting Agent
Mil Clean	12 sacks	Surface Active Agent
Sawdust	100 sacks	Lost Circulation Material
Barite	10 sacks	Weighting Material
Milgel	18 sacks	Viscosifier

Main Hole Drilling Mud Additive List

Product Name	Amount Used	Brief Description of Product
Xanvis	34 sacks	Viscosifier
Calcium Carbonate	521 sacks	Weighting Material
Milbar	2337 sacks	Weighting Material (Barite)
Desco	6 sacks	Chrome-based Thinner/Dispersant
Barite	555 sacks	Weighting Material

Reference Documents (List all source documents used in the completion of this checklist. Attach additional pages if necessary. Documents must be supplied to the AER if requested.)

Drill Stem Test Reports
Paramount Resources Ltd. Daily Drilling Report
Paramount Fort Liard South As-Built June 2009 Map
Paramount Well File Information
Mackenzie Valley Land and Water Board – Public Registry – Online Review System

Comments (Please provide any additional comments relevant to the decision process within the checklist. Attach additional pages if necessary.)

According to the Paramount Resources Ltd. Final Well Report, the surface hole gel-chem drilling mud was hauled off site and treated at a remote sump. As-built diagrams show the remote sump/borrow pit was located southeast of the wellsite on the south side of the access road.

The invert mud used for the intermediate section of the well was re-used at another location.

The main hole was drilled underbalanced with nitrogen as a carrying medium; however, the exact location of disposal of the main hole waste is not known. As a worst case scenario, it is assumed the main hole drilling waste was also disposed of in the remote sump.

Due to a lack of formal drilling waste disposal documentation, a Compliance Option 2 checklist and associated calculations were completed. The metal and salt calculations were completed only for the surface and main hole drilling mud additives as the intermediate hole waste was hauled off site. Drill stem tests #2-6 were run during main hole drilling and have been included in the calculations. The combined surface and main hole depths were used for the calculations.

The drilling waste exceeds the barite and salt calculation criteria.

File review documentation indicated that the remote sump was lined; however, there is no information available identifying how the drilling waste at the remote site was treated or disposed of. Further investigation of the remote sump area is required.

Location: Para et al Fort Liard O-35 **Spud:** 2-Nov-99

Metal Calculations for Compliance Options One and Two

Note: Different default mix ratios are provided depending on whether the well was drilled before or after October 22, 1996. The 1996 version of *Guide 50* , *Drilling Waste Management,* which was issued by the Energy Resources Conservation Board on this date, increased the minimum mix ratio requirement from 1:1 to 3:1.

Barite:

Directions: Fill in the number of sacks and adjust for sack weight if different than 40 kg. Enter the Well Depth in metres. The spreadsheet will calculate the number of sacks per metre. This value must be less than or equal to **0.22** If the value exceeds the objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Total Number of Sacks (40 kg/sack*)		Well Depth (m)		Mix Ratio**		Sacks per Metre	
2892	÷	1172	÷	3	=	0.823	Exceeds

* Sack weight may be adjusted by dividing the number of sacks by 40 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter “3”. If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

Location: Para et al Fort Liard O-35 **Spud:** 2-Nov-99

Chromium-based Thinner:

Alternative 1:

If waste chromium, mix ratio and waste bulk density data are available use the following calculator to estimate post-disposal chromium concentration.

Directions: Enter the Total Chromium Concentration in mg/kg measured in the waste, the Waste Dry Bulk Density in kg/m3, and Mix Ratio in the appropriate cells. The spreadsheet will calculate the Post-Disposal Chromium Concentration. If this value is greater than 64 mg/kg, a Phase 2 ESA (Compliance Option 3) is required.

Waste Chromium Concentration (mg/kg)		Waste Dry Bulk Density* (kg/m^3)		Mix Ratio						Post-Disposal Cr Concentration (mg/kg)
	x		÷		÷	1500	+	30	=	#DIV/0!

* Waste Dry Bulk Density = (Waste Specific Gravity – 1) x 1600

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

Alternative 2:

If the above data is not available use the following equation to calculate the number of sacks of chrome thinner added per meter drilled. If the number of sacks exceeds the limits below, a Phase 2 is required.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Well Depth in metres. The spreadsheet will calculate the number of sacks per metre. This value must be less than or equal to **0.020.** If the value exceeds the objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Total Number of Sacks (25 kg/sack*)		Well Depth (m)		Mix Ratio**		Sacks per Metre	
7	÷	1172	÷	3	=	0.00199	Meets

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

= Required Field

Location: Para et al Fort Liard O-35 **Spud:** 2-Nov-99

Salt Calculations for Option 2:

Alternative 2

If the volume of drilling waste is not known, use the following calculator to determine the NaOH Equivalent Sacks per metre of well depth. This value must be less than **0.0260** for wells drilled before October 22 1996, or **0.0350** for wells drilled on or after this date. If the value exceeds the target, a Phase 2 ESA (Compliance Option 3) must be conducted.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Well Depth in metres. The spreadsheet will calculate the NaOH Equivalent Sacks per Metre.

Additive	Number of sacks (25 kg/sack*)		NaOH Equivalency Factor		NaOH Equivalent Sacks
Caustic Soda	2	X	1.00	=	2
Soda Ash	4	X	0.75	=	3
Sodium Chloride		X	0.68	=	0
Sodium Bicarbonate		X	0.95	=	0
Sodium Silicate		X	1.37	=	0
Sodium acid pyrophosphate (SAPP)	1	X	0.22	=	0.22
Calcium Chloride		X	0.72	=	0
Calcium Nitrate		X	0.34	=	0
Envirofloc		X	0.41	=	0
Gypsum**		X	0.59	=	0
Lime**	1	X	1.08	=	1.08
** Max = 0.02 x well depth (m)					
Potassium chloride		X	0.54	=	0
Potassium sulphate		X	0.46	=	0
Caustic potash		X	0.71	=	0
Potassium formate		X	0.47	=	0
Potassium silicate		X	0.32	=	0
Potassium nitrate		X	0.40	=	0
Diammonium phosphate		X	0.63	=	0
Ammonium nitrate		X	0.57	=	0
Ammonium sulphate		X	0.61	=	0
Drill Stem Test Returns	193.5528237	X	0.68	=	131.6159201

Total NaOH Equivalent Sacks	=	137.9159201
Well Depth (m)	÷	1172
NaOH Equivalent Sacks per Metre	=	**0.1177**

Result
Meets

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Note: Up to 0.02 sacks of gypsum and lime per metre of well depth should be counted with other salt additives. Because of the limited solubility of gypsum and lime, sacks in excess of this value need not be counted.

= Required Field

Drill Stem Test Return Calculations for Compliance Option Two

Location: Para et al Fort Liard O-35 **Spud:** 2-Nov-99

Alternative 2: Chloride

Directions: Enter the drill stem diameter for the drill stem test (DST) section in millimeters, the length of the DST return (including mud returns) in metres and the chloride concentration of the DST fluid in mg/L. The spreadsheet will calculate the equivalent number of sacks. This value must be entered in the salt calculation in the cell labelled "Drill Stem Test Returns".

Inner Diameter of Pipe (mm)	Length of Drill Stem Test Return (m)	Volume of Returns (m^3)*		Chloride Concentration* (mg/L)				Number of Sacks
70.2	1357	5.24956997	x	250000	÷	7600	=	172.683223
70.2	164	0.63443587	x	250000	÷	7600	=	20.869601
		0	x		÷	7600	=	0
		0	x		÷	7600	=	0
		0	x		÷	7600	=	0
				Total number of sacks			=	193.552824

*If chloride concentration is not specified, use 215,000 mg/L. Chloride concentrations from formation water databases or adjacent wells are currently not acceptable.

= Required Field

APPENDIX D

Site Visit Photos



Photograph 1: View of well head, facing north.



Photograph 2: View of lease from well center, facing north.



Photograph 3: View of lease from well center, facing east.



Photograph 4: View of lease from well center, facing south.



Photograph 5: View of lease from well center, facing west.



Photograph 6: View of flare stack, facing east.



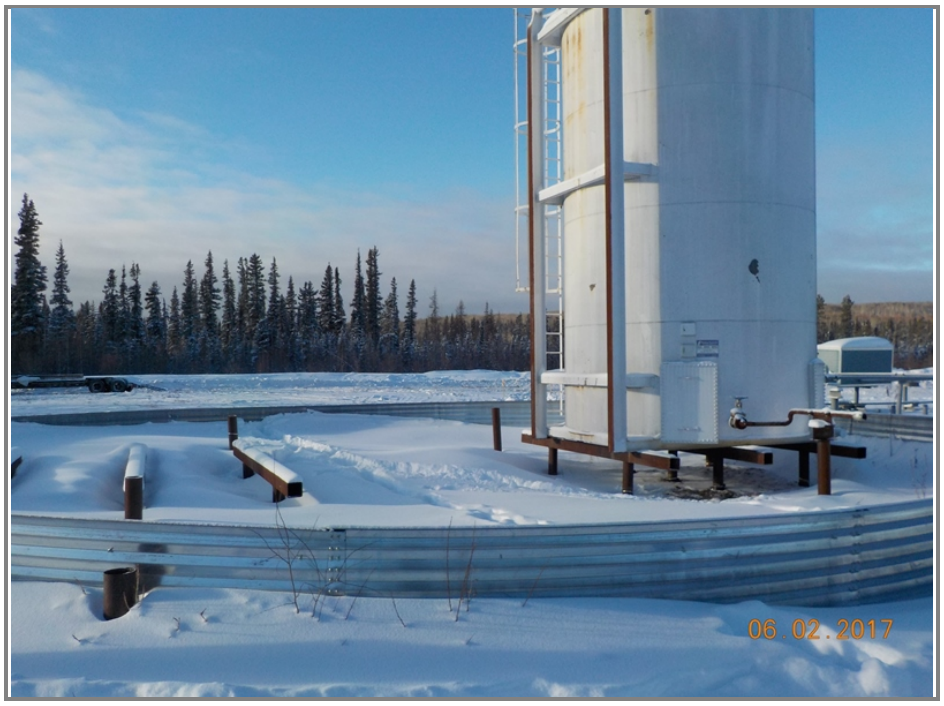
Photograph 7: View of knockout drum, facing east.



Photograph 8: View of pig launcher and methane pump, facing northwest.



Photograph 9: View of tank farm and facilities, facing southwest.



Photograph 10: View of tank farm, facing west.



Photograph 11: View of tank farm, facing east.



Photograph 12: View of methane pump, facing west.



Photograph 13: View of pig run, facing west.



Photograph 14: Close up view of tank farm, facing east.

May 10, 2017

Paramount Resources Ltd.
4700 Bankers Hall West
888 3rd Street SW
Calgary, Alberta T2P 5C5

Attention: **Larry Yoon, B.Sc., P.Biol.**
Environmental Specialist

Reference: **O-35 (60°10', 123°15') NWT**
Phase 2 Environmental Site Assessment

North Shore Environmental Consultants Inc. is pleased to submit our Phase 2 Environmental Site Assessment Report for the O-35 wellsite (60°10', 123°15') belonging to Paramount Resources Ltd.

North Shore appreciated the opportunity to work on this project and if we can provide clarification of any part of this report, please call the undersigned at (780) 467-3354.

Yours truly,

North Shore Environmental Consultants Inc.



Brent Walchuk B.Sc., P.Ag.
Remediation/Reclamation Supervisor

NORTH SHORE
Environmental Consultants

Paramount Resources Ltd.
Para et al Fort Liard O-35 60°10' 123°15'
Phase 2 Environmental Site Assessment
May 2017



Paramount Resources Ltd.
4700 Bankers Hall West
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Calgary, Alberta T2P 5C5

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North Shore Environmental Consultants Inc. (North Shore) was retained by Paramount Resources Ltd. (Paramount) to conduct a Phase 2 Environmental Site Assessment (ESA) at the O-35 (60°10', 123°15') wellsite (Site) and remote drilling waste disposal area (DWDA) located near Fort Liard, NWT. The objective of the Phase 2 ESA was to assess areas of potential environmental concern identified during the Phase 1 ESA conducted by North Shore in March 2017. Assessment activities included collecting soil samples to determine if select compounds used or produced on the Site exceed the applicable remediation guidelines. The areas of potential environmental concern included the following:

- Well centre;
- Production facility/flare stack areas;
- Former spill areas at the well centre and storage tank areas;
- Remote DWDA at O-35; and
- Potential drilling flare pit area.

Between February 6, 2017 and February 8, 2017, 63 drilling (solid-stem) boreholes and one hand auger borehole were advanced at the Site and DWDA. Based on a review of the analytical data, field observations, and field screening information from the Phase 2 ESA, several analyzed soil parameters did not meet the applicable remediation guidelines. Additionally, soil impacts that were identified during the Phase 2 ESA were not fully delineated.

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1 INTRODUCTION

North Shore Environmental Consultants Inc. (North Shore) was retained by Paramount Resources Ltd. (Paramount) to conduct a Phase 2 Environmental Site Assessment (ESA) at the O-35 (60°10', 123°15') wellsite (Site) and remote drilling waste disposal area (DWDA) located near Fort Liard, Northwest Territories (NWT).

1.1 Objective

The objective of the Phase 2 ESA was to assess areas of potential environmental concern identified during the Phase 1 ESA conducted by North Shore in March 2017 (North Shore, 2017). Assessment activities included collecting soil samples to determine if select compounds used or produced on the Site exceed the applicable remediation guidelines.

1.2 Scope of Work

The scope of work for the Phase 2 ESA included the following:

- Review background information to assist with establishing site specific protocols.
- Obtain the necessary written agreements from third-party licensees in the area.
- Hire a private utility locating surrounding the proposed ground disturbance locations in the proposed work area and control area (30 meter (m) buffer around the work area).
- Conduct a tailgate safety meeting prior to initiating work each day at the Site. This includes North Shore personnel and any other contractors' onsite.
- Advance 64 borehole locations to investigate background soil conditions and areas of potential environmental concern identified in the Phase 1 ESA (North Shore, 2017).
- Collect samples from each borehole, field screen, and log according to Canadian System of Soil Classification.
- Submit selected soil samples for laboratory analysis to confirm the absence or identify the presence of oil and gas related impacts.
- Prepare a report documenting the findings of the Phase 2 ESA and compare laboratory results with applicable soil remediation guidelines.

2 BACKGROUND

2.1 Site Description

The Site and DWDA are located at Unit O, Section 35 Grid Area 60°10', 123°15' approximately 40 kilometres (km) southeast of Fort Liard, NWT. The Site is located approximately 8 km north of the NWT/British Columbia (BC) border. A location map of the Site is included as Figure 1 and a survey plan is included in Appendix A.

2.2 Land Use and Receptors

The lease is situated on Crown land in a mixed-wood forested area. The Site has not been reclaimed, but natural encroachment from the surrounding forest is evident throughout the lease and DWDA area. An aerial photograph or satellite image of the quarter section is included as Figure 2. Site photographs are included as Appendix B.

2.3 Site History and Infrastructure

The Para et al Fort Liard O-35 well was spudded on November 2, 1999 and drilled until December 4, 1999 to a depth of 2121 metres (m). The rig was released on December 29, 1999. The well produced sweet natural gas between 2000 and 2005 before the site was deactivated by Paramount in April 2008. Fluids were transported from the site via pipeline to the Paramount Maxhamish d-36-I compressor station in BC. The wellsite is accessible by helicopter and winter roads.

Infrastructure identified in association with the site includes the following: wellhead, flare knockout drum with vent stack, pipeline, flowlines, meter run, separator methane pump building with vent stack, pig launcher, methanol tank in containment dyke and 60 m^3 aboveground storage tank in metal containment. According to the Paramount June 2009 As-built sketch of the area, a borrow pit/remote sump was located southeast of the wellsite along the access road and a campsite area was located east of the borrow pit/remote DWDA. There were no log decks identified in association with the wellsite.

2.4 Previous Environmental Work

A Phase 1 ESA was completed by North Shore in March 2017 (North Shore, 2017). Areas of potential of environmental concern that were recommended for investigation included:

- Well centre;
- Production facility/ flare stack areas;
- Former spill areas at the well centre and storage tank areas;
- Remote DWDA at O-35; and
- Potential drilling flare pit area.

3 METHODOLOGY

3.1 Safe Work Procedures

North Shore personnel adhered to Paramount's policies and procedures to complete the assessment and investigation program. Standard oilfield personal-protective equipment (hard hat, steel-toed boots, safety glasses, and fire retardant coveralls) were worn by all personnel on-site. A calibrated four way gas monitor for H_2S, O_2, CO, and organic vapours was also carried by each person participating in the field work. Nitrile gloves were worn when handling soil samples. All personnel onsite were required to possess copies of the applicable safety certification (Ground Disturbance

Level 2, H_2S Alive, Transportation of Dangerous Goods, Workplace Hazardous Material Information System, and Standard Level First Aid). North Shore personnel acquired a Paramount Resources Safe Work Permit prior to commencing fieldwork and a tailgate safety meeting was conducted at the beginning of each work day.

Prior to initiating any ground disturbance, a file review was completed and the proposed assessment area was swept by a third party company for the presence of buried facilities.

All ground disturbance documentation was peer reviewed prior to commencing the fieldwork. A hydrovac was not used prior to drilling, all above ground infrastructure was still in place and boreholes were advanced 5 m from any underground facilities.

3.2 Drilling Program

3.2.1 Borehole Drilling

Between February 6 and 8, 2017, 64 boreholes (17C01-17C03, 17BH01 to 17BH60 and 17HA01) were advanced as part of the drilling program (Figures 3 and 4). Boreholes were completed using a track-mounted drilling rig equipped with 15 cm solid-stem. One borehole was advanced using a hand auger. Boreholes were completed to a maximum depth of 6.0 metres below ground level (mbgl), depending on the assessment location and subsurface conditions. Delineation of potentially impacted areas was based on field screening, visual cues, and professional judgment. Vertical and horizontal delineations were completed to determine the spatial extent of the potentially impacted material. If potentially impacted material was identified during borehole logging, vertical delineation was completed by sampling parameters above the suspected impact zone and to a depth of 1.0 m below the suspected lowest point of contamination. Horizontal delineation was completed by advancing boreholes in 5.0 m horizontal increments in each direction (north, south, east, and west) until clean material, as determined by field screening and professional judgment, was identified. Select delineation samples were collected for laboratory analyses.

The GPS location, reference from a fixed point, and rationale of each borehole is included in the borehole logs in Appendix C. Borehole locations are shown in Figure 3 (Wellsite) and Figure 4 (DWDA).

3.3 Soil Sampling

Throughout the sample collection process, North Shore adhered to sampling procedures described in the Canadian Council of Ministers of Environment (CCME) Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites (CCME, 1993). Samples of the recovered soil were visually inspected for evidence of impact such as free product, staining, or discoloration. The outermost layer of the samples was trimmed using a soil tool to avoid cross-contamination. North Shore personnel wore a pair of clean, chemical resistant nitrile gloves for each soil sample collected as an added preventative cross-contamination measure.

Soil vapor concentrations were field screened for volatile hydrocarbon constituents using an RKI Eagle gas detector (RKI Eagle), calibrated with a 400 parts per million (ppm) concentration of hexane gas with the methane elimination switch turned on. Samples selected for vapor screening were placed

into plastic bags, sealed, agitated, and allowed to volatilize. Volatile organic compounds (VOCs) that accumulated within the headspace were then measured in ppm or percent of the lower explosive limit (LEL) and recorded on the borehole logs.

Soil samples were also field screened for salinity related parameters by measuring electrical conductivity (EC) using a Spectrum Technologies Inc. Field Scout Soil and Water EC Metre (EC Probe). Prior to sampling, the EC probe was calibrated with a 2.76 dS/m calibration solution. Once the soil on the auger had been trimmed, the EC probe was inserted directly into the soil media in order to obtain an insitu EC reading. The EC reading was allowed to stabilize for three seconds before being recorded in the field documents.

All soil samples were placed in sealable plastic bags for field screening organic vapors and inorganic analyses. Soil samples for volatile organic analyses included field preservation with methanol and glass jars with Teflon-lined lids for all other organic analyses. Jarred samples were packed tightly to minimize headspace, help prevent the loss of VOCs, and minimize biodegradation. All samples collected were labeled and placed in a cooler with ice or ice packs to maintain a temperature as close to 4°C as possible. Soil samples were transported to an accredited laboratory for analysis. Standard chain of custody protocols were followed during the transport of the samples.

Soil characteristics at each borehole location were described using classification procedures and terminology from The Canadian System of Soil Classification (Soil Classification Working Group, 1998). Borehole logs containing the soil profile descriptions are included in Appendix C.

3.4 Quality Assurance and Quality Control

3.4.1 Laboratory QA/QC

Soil samples collected during the February 6 to February 8, 2017 sampling event were submitted to AGAT Laboratory (AGAT) in Calgary, Alberta for analysis. The analytical suite was selected based on regulated compounds that are typically found on oil and gas sites.

AGAT is a Standards Council of Canada (SCC), ISO 9000 Series and ISO/IEC 17025 accredited laboratory and Canadian Association of Environmental Analytical Laboratories (CAEAL) accredited laboratory that uses ESRD recognized methods to conduct laboratory analyses. Method blanks, control standards samples, Certified Reference Material (CRM) standards, method spikes, replicates, duplicates, and instrument blanks are routinely analyzed as part of the QA/QC program at the laboratory. AGAT has indicated that analytical data is only released if it passes the laboratory QA/QC procedures. A summary of the QA/QC procedures adopted by AGAT during the analyses of samples for petroleum hydrocarbon concentrations, salinity parameters, and metals concentrations is included in Appendix D.

4 COMPARISON GUIDELINES

4.1 Assessment Guidelines

Selection of the appropriate set of guidelines is based on the texture of the dominant soil type along with current and potential future land use as determined in the assessment. Where both fine and

coarse grain strata are present, grain size is determined by the stratum governing horizontal and vertical migration to a receptor. Eleven soil samples collected from depths ranging from 0.0 to 4.9 mbgl were analyzed for particle size (75 micron sieve). All of the samples were reported to be fine-grained. As such, fine-grained guidelines were applied to the Site and DWDA.

As per the direction of Paramount, the guidelines for residential land use were applied to the Site and laboratory values were compared to the following:

- Soil regulated metals, glycol, benzene, toluene, ethylbenzene, and xylenes (BTEX), PHC fractions F1-F4 and polycyclic aromatic hydrocarbons (PAH) results were compared to the Canadian Council of Ministers of the Environment (CCME) - Tier 1 Soil Remediation Guidelines (CCME, 2017).
- Saturated paste boron and methanol results were compared to the AEP Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Tier 1 Guidelines; AEP, 2016a).
- Soil EC, Sodium Adsorption Ration (SAR) and pH values were compared to Environmental Guidelines for Contaminated Site Remediation (EGCSR, 2003) Environment Division. Government of the Northwest Territories (EGCSR, 2003).
- Soil EC and SAR values in the DWDA were compared to the Alberta Environment (AENV) 2012. Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification or if control soils exceed these guidelines, to maximum control concentrations (SCAR Guidelines, AENV, 2001).

4.2 Background Control Characterization and Salinity Guidelines

During the Phase 2 ESA, three control boreholes (17C01 to 17C03) were advanced in undisturbed background locations to a maximum depth of 6.0 mbgl. The purpose of the control sampling was to characterize background soil conditions and to determine the generic salt remediation guideline values for the Site.

One topsoil and nine subsoil samples were collected from the three control locations and selected samples were submitted for detailed salinity and/or trace metal analyses.

All control detailed salinity analytical results complied with the EGCSR Guidelines. The onsite values were compared to the same general EC and SAR range. All control samples reported metals values that met the applicable remediation guidelines (Tables 1 through 3).

5 RESULTS OF FIELD INVESTIGATION

5.1 Stratigraphy

Based on the boreholes advanced during the drilling program, soil conditions generally consisted of clay over heavy clay to 4.5 mbgl.

5.2 Soil Results

Soil results for areas of concern are summarized in Sections 5.2.1 through 5.2.5. The laboratory analyses for soil samples are presented in Tables 1 through 5 along with the applicable comparison guidelines. A summary of the analytical testing procedures of the laboratory is presented on the laboratory certificates enclosed in Appendix D.

5.2.1 Well Centre Area

Five boreholes (17BH02 through 17BH06) were advanced to assess and delineate the well centre area to a maximum depth of 4.5 mbgl. The boreholes were advanced prior to abandonment; therefore the wellhead was still in place. Ground cover in the area was uniform and similar to the surrounding lease. VOC field screening results from the well centre samples were all less than 15 ppm. EC field screening results from well centre samples ranged from 0.32 to 0.75 dS/m.

Two samples (17BH02 1.3-1.5 mbgl and 17BH02 2.2-2.5 mbgl) were submitted for hydrocarbons analysis, detailed salinity and metal analyses. All analyzed parameters complied with the applicable guidelines.

5.2.2 Production Facilities Area

Five boreholes (17BH07 through 17BH11) and one hand auger borehole (17HA01) were advanced within former production facilities area. Boreholes were advanced to a maximum depth of 3.0 mbgl. VOC measurements from the soil samples were all less than 45 ppm and EC field screening values ranged from 0.03 to 0.87 dS/m.

Six samples were submitted for hydrocarbons, detailed salinity, metals, glycols and methanol analyses. One sample (17BH08 1.3-1.5 mbgl) reported an arsenic value of 13.0 mg/kg which exceeded applicable criteria. Sample 17BH10 0.8-1.0 mbgl reported a selenium value of 1.1 mg/kg which exceeds the guideline of 1.0 mg/kg. However, when the value is rounded to the equivalent number of significant figures as the guideline, the sample has a concentration equivalent to the applicable guideline. All other samples submitted for analysis met the applicable guidelines. Neither vertical nor lateral delineation of the arsenic exceedance were achieved.

5.2.3 Flare Stack/ Flare Knockout Area

Two boreholes (17BH12 and 17BH13) were advanced within the flare stack area and flare knockdown area. Boreholes were advanced to a maximum depth of 3.0 mbgl. VOC measurements were all less than 5 ppm. EC field screening results from the soil samples ranged from 0.21 to 0.84 dS/m.

Two samples were submitted for hydrocarbon analysis, detailed salinity, metals and PAH analysis, while one sample was submitted for glycols and methanol analysis. One sample (17BH13 0.3-0.5 mbgl) reported an arsenic value of 12.6 mg/kg which exceeded criteria. All other samples submitted for analysis met the applicable guidelines. Neither vertical nor lateral delineation were achieved.

5.2.4 Flare Pit Area

Eight boreholes (17BH01 and 17BH14 through 17BH20) were advanced to assess and delineate the flare pit area, to a maximum depth of 4.5 mbgl. VOC measurements were all less than 25 ppm and EC field screening values ranged from 0.21 to 1.12 dS/m.

Thirteen samples were submitted for hydrocarbons, eight samples were submitted for detailed salinity and metals, and twelve samples were submitted for PAH analyses. One sample (17BH01 2.8-3.0 mbgl) reported a benzene value of 0.010 mg/kg and ethylbenzene value of 0.83 mg/kg which exceeded criteria. Three samples reported total barium values of 631 mg/kg, 874 mg/kg and 1240 mg/kg, however met the fusion barium guideline based on the extractable barium result. Sample 17BH01 at 4.3-4.5 mbgl reported a selenium value of 1.2 mg/kg, which exceeds the Tier 1 guideline of 1.0 mg/kg. However, when the value is rounded to the equivalent number of significant figures as the guideline, the sample has a concentration equivalent to the applicable guideline. Two samples from 17BH01 and one sample from 17BH18 reported PAH exceedances. All other samples submitted for analysis met the applicable guidelines. Both vertical and lateral delineation were achieved.

5.2.5 Remote Drilling Waste Disposal Area

A total of 40 boreholes were advanced to identify and delineate the remote DWDA. Specifically, drilling waste material was identified in five boreholes (17BH52, 17BH53, 17BH55, 17BH57 and 17BH60). Four delineation boreholes (17BH54, 17BH56, 17BH58, and 17BH59) were advanced around the periphery of the suspected DWDA to a maximum depth of 4.5 mbgl. Borehole 17BH48 was advanced in the borrow pit area and 17BH21 was advanced in a disturbed area from the 2001 aerial photograph. Boreholes were advanced to a maximum depth of 4.5 mbgl. VOC measurements from the soil samples were all less than 100 ppm and EC field screening values ranged from 0.02 to 1.21 dS/m.

Fourteen samples from the drilling waste were submitted for hydrocarbons, eight samples were submitted for detailed salinity and five samples were submitted for metals analyses. Four samples exceeded applicable criteria for hydrocarbons (toluene, ethylbenzene and fraction F2). All five samples exceeded total barium criteria, however met the fusion barium guideline based on the extractable barium result. One sample (17BH25 at 3.0-3.5 mbgl) reported an arsenic value of 12.2 mg/kg, which exceeds the guideline of 12 mg/kg. However, when the value is rounded to the equivalent number of significant figures as the guideline, the sample has a concentration equivalent to the applicable guideline. All other samples submitted for analysis met the applicable guidelines. Neither vertical nor lateral delineation was achieved.

5.3 Quality Assurance/Quality Control

Quality assurance and quality control for analytical data was also assessed by comparing analytical results from select samples to duplicate samples obtained from the same sample location. Primary and duplicate samples were compared and the relative percent differences (RPD) were calculated.

RPD criteria have been applied to field duplicates in order to evaluate the precision of the results. If both the original and duplicate sample concentrations are greater than or equal to five times the laboratory detection limit for a given parameter, the RPD must be less than or equal to 40% (water)

and 60% (soils) (CCME, 2016). If the results lie outside of the range, they should be considered estimates only. The results of North Shore's QA/QC program are discussed in Section 5.3.1.

5.3.1 North Shore Environmental's QA/QC Program

Three soil sampling QA/QC measurements were conducted by duplicating soil samples 17C01 2.8 – 3.0 mbgl, 17BH02 1.3-1.5 mbgl and 17C03 0.3 – 0.5 mbgl (referred to as Dup A 2.8-3.0 mbgl, Dup B 1.3-1.5 mbgl and Dup C 0.3-0.5 mbgl). Laboratory comparisons reported good reproducibility for all benzene, toluene, ethylbenzene and total xylene (BTEX), petroleum hydrocarbon (PHC) (F1 – F4), particle size, metals, soluble ions, pH, EC and SAR values, with the exception of the Dup C SAR value. RPD value calculations and results for the QA/QC measurements are included in Tables 6 through 8.

6 SUMMARY AND CONCLUSIONS

Between February 6, 2017 and February 8, 2017, 63 drilling (solid-stem) boreholes and one hand auger borehole were advanced at the Site. Based upon the results of the Phase 2 ESA, the following conclusions were made:

- Background Controls - All soil samples reported EC levels, pH, SAR values and metal values which met the EGCSR Guidelines.
- Well Centre - Two samples were submitted for BTEX, PHC fractions F1-F4, detailed salinity, and metal analyses. All analyzed parameters complied with the applicable guidelines.
- Former Production area - Six boreholes were advanced within the former production areas. Six soil samples were submitted for BTEX, PHC fractions F1-F4, detailed salinity parameters, metal analysis, glycol analysis and methanol analysis. One sample exceeded criteria for arsenic. All other samples complied with the applicable guidelines.
- Flare stack/ Flare knockdown area - Two boreholes were advanced within the flare stack and flare knockdown area. Two soil samples were submitted for BTEX, PHC fractions F1-F4, detailed salinity parameters, metal analysis and PAH fractions. One sample was submitted for glycols and methanol analyses. One sample exceeded criteria for arsenic. All other samples complied with the applicable guidelines.
- Flare pit area - Thirteen samples were submitted for hydrocarbons, eight samples were submitted for detailed salinity and metals analysis, and twelve samples were submitted for PAHs analysis. One sample (17BH01 2.8-3.0 mbgl) reported a benzene value of 0.010 mg/kg and ethylbenzene value of 0.83 mg/kg which exceeded criteria. Two samples from 17BH01 and one sample from 17BH18 reported PAH exceedances. All other samples submitted for analysis met the applicable guidelines.
- Remote DWDA - Drilling waste material was identified in five boreholes (17BH52, 17BH53, 17BH55, 17BH57 and 17BH60). Borehole 17BH48 was advanced in the borrow pit area and 17BH21 was advanced in a disturbed area from the 2001 aerial photograph. Fourteen samples from the DWDA were submitted for hydrocarbons, eight samples were submitted for detailed salinity and five samples were submitted for metals analysis. Four samples exceeded applicable criteria for hydrocarbons (toluene, ethylbenzene and fraction F2). All other samples met applicable guidelines.

Based on a review of the analytical data, field observations, and field screening information from the Phase 2 ESA, several analyzed soil parameters did not meet the applicable remediation guidelines. Additionally, soil impacts that were identified during the Phase 2 ESA were not fully delineated.

7 DISCLOSURE

North Shore Environmental Consultants Inc. (North Shore) has prepared this report taking into account government regulations available at the time of the assessment. North Shore has not made an independent verification of historical or analytical results provided by third parties and therefore makes no assurances regarding the accuracy of such information. It has assumed such information is correct. Where indicated or implied the conclusions are based on visual observation and/or analytical testing conducted at the time of the assessment. The conclusions do not apply to any areas of the site not investigated.

This report is intended for the exclusive use of the company, organization, or individual to whom it is addressed and may not be relied upon by any third party without the express written permission of North Shore. The investigation and reporting has been conducted with a reasonable level of attention and skill, in accordance with standards prevailing in the environmental consulting profession at the time of report date in the location in which the report was prepared.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. North Shore accepts no responsibility for damages, if any, suffered by any third party as a result of the use of this report or any decisions made or actions based on this report.

8 CLOSURE

North Shore appreciated the opportunity to work on this project. If we can provide clarification of any part of this report, please contact the undersigned at (780) 467-3354.

This report was prepared by:



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9 REFERENCES

Alberta Environment (AENV). 2012. *Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification*. ISBN: 978-1-4601-0442-2. July 2012.

Alberta Environment (AENV). 2001. Soil Quality Guidelines for Unrestricted Land Use from "Salt Contamination Assessment and Remediation Guidelines. Environmental Sciences Division. Edmonton, Alberta. Publication No. T/606. May 2001.

Alberta Environment and Parks (AEP). 2016a. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 197 pp. February 2, 2016. ISBN:978-1-4601-2695-0. (On-line Edition) Website http://aep.alberta.ca

Canadian Council of Ministers of Environment (CCME) 1993. Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites (CCME 1993).

Canadian Council of Ministers of the Environment (CCME). 2016. Volume 1 Guidance Manual: Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment. PN 1551. ISBN 978-1-77202-026-7 PDF. 2016.

Canadian Council of Ministers of Environment (CCME) 2017. Canadian Environmental Quality Guidelines Summary Table. Accessed On-line March, 2017. (CCME 2017).

Environmental Guidelines for Contaminated Site Remediation (EGCSR). 2003. Department of Environment and Natural Resources – Government of the Northwest Territories. (On-line Edition) Website http://www.enr.gov.nt.ca/sites/default/files/guidelines/siteremediation.pdf

North Shore Environmental Consultants. 2017. *Phase 1 Environmental Site Assessment Para et al Fort Liard O-35* Fort Liard, Northwest Territories. March 2017.

Soil Classification Working Group. 1998. *The Canadian System of Soil Classification*. 3rd edition. Agriculture and Agri-Food Canada. Publication 1646 (revised). 187pp.

TABLES

Paramount Resources Ltd.
Table 1. Soil - BTEX, Petroleum Hydrocarbons (F1-F4) and Grain Size
Phase 2 Environmental Site Assessment Report O-35
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	BTEX and PHC (F1-F4)										
			Benzene	Toluene	Ethylbenzene	Total Xylenes	Fraction 1[2]	Fraction 2	Fraction 3	Fraction 4[3]	Chrom. returned to baseline	% Moisture	Grain Size 75 µm Sieve
CCME Surface Soil Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**150**	**1300**	**5600**	**NC**	**NC**	**NC**
CCME Subsurface Soils Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**230**	**3500**	**10000**	**NC**	**NC**	**NC**
BACKGROUND CONTROLS													
17C01	0.8-1.0	06-Feb-17											Fine (30)
17C01	3.2-3.4	06-Feb-17											Fine (27)
17C01	4.7-4.9	06-Feb-17											Fine (28)
17C02	0.0-0.2	06-Feb-17											Fine (3)
17C02	1.7-1.9	06-Feb-17											Fine (24)
17C02	3.2-3.4	06-Feb-17											Fine (26)
17C03	0.3-0.5	07-Feb-17											Fine (33)
17C03	2.2-2.5	07-Feb-17											Fine (27)
17C03	4.3-4.5	07-Feb-17											Fine (26)
WELL CENTRE AREA													
17BH02	1.3-1.5	06-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	75	<10	Yes	13	
17BH02	2.2-2.5	06-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	19	<10	Yes	14	
PRODUCTION FACILITIES AREA													
17BH07	0.8-1.0	06-Feb-17	<0.005	<0.05	<0.01	<0.05	20	<10	17	<10	Yes	12	
17BH08	0.8-1.0	06-Feb-17	<0.005	<0.05	0.01	<0.05	<10	<10	<10	<10	Yes	14	
17BH09	0.8-1.0	06-Feb-17	<0.005	<0.05	0.01	<0.05	<10	<10	32	<10	Yes	14	
17BH10	0.8-1.0	06-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	24	<10	Yes	16	
17BH11	0.8-1.0	06-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	11	46	11	Yes	15	
17HA01	0.0-0.1	06-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	9	
FLARE STACK/FLARE KNOCKOUT TANK AREA													
17BH12	0.8-1.0	06-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	36	<10	Yes	16	
17BH13	0.8-1.0	06-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	13	
FLARE PIT AREA													
17BH01	1.3-1.5	06-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	35	81	<10	Yes	17	
17BH01	2.8-3.0	06-Feb-17	**0.010**	<0.05	**0.83**	0.93	41	66	130	13	Yes	16	
17BH01	4.3-4.5	06-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	15	50	14	Yes	12	
17BH14	2.8-3.0	07-Feb-17	0.005	<0.05	<0.01	<0.05	<10	47	154	<10	Yes	13	
17BH15	2.8-3.0	07-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	105	<10	Yes	11	
17BH16	2.8-3.0	07-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	105	<10	Yes	11	
17BH18	0.3-0.5	07-Feb-17	<0.005	<0.05	0.02	<0.05	<10	<10	37	15	Yes	15	
17BH18	1.3-1.5	07-Feb-17	<0.005	<0.05	0.02	<0.05	<10	48	174	27	Yes	17	
17BH18	2.2-2.5	07-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	202	353	27	Yes	18	
17BH19	1.3-1.5	07-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	45	<10	Yes	17	
17BH19	2.8-3.0	07-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	203	283	17	Yes	17	
17BH20	1.3-1.5	07-Feb-17	<0.005	<0.05	<0.01	<0.05	<10						
17BH20	2.8-3.0	07-Feb-17	<0.005	<0.05	<0.01	<0.05	<10						
REMOTE DRILLING WASTE DISPOSAL AREA													
17BH21	1.7-1.9	07-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	11	<10	Yes	12	
17BH25	1.7-1.9	07-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	13	
17BH48	1.7-1.9	08-Feb-17	<0.005	**0.12**	<0.01	<0.05	<10	<10	49	<10	Yes	29	
17BH52	1.5-2.0	08-Feb-17	<0.005	<0.05	**0.23**	1.15	<10	**462**	437	38	Yes	15	
17BH53	1.5-1.8	08-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	14	13	<10	Yes	14	
17BH54	1.7-1.9	08-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	11	
17BH55	1.6-2.0	08-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	11	30	<10	Yes	15	
17BH56	1.7-1.9	08-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	12	
17BH57	2.2-3.0	08-Feb-17	<0.005	<0.05	**0.24**	<0.05	<10	**733**	305	20	Yes	16	
17BH57	3.0-3.5	08-Feb-17	<0.005	<0.05	**0.25**	0.23	<10	**297**	254	25	Yes	18	
17BH58	2.2-2.5	08-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	13	
17BH58	3.2-3.4	08-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	46	<10	Yes	12	
17BH59	2.2-2.5	08-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	21	<10	Yes	12	
17BH59	3.2-3.4	08-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	12	

Rev: 17.01.25

Notes:

Land Use: **Residential** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Fraction 1 petroleum hydrocarbons (C6-C10) minus benzene, toluene, ethylbenzene and xylene concentrations

[3] - Fraction 4 petroleum hydrocarbons (C34-C50 or >C34) as determined by high temperature gas chromatography

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 2. Soil - Regulated Metals
Phase 2 Environmental Site Assessment Report O-35
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Antimony (Sb)	Arsenic (As)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Fusion Barium (Ba) - True Total	Beryllium (Be)	Boron (B) Sat Paste (mg/L)	Cadmium (Cd)	Chromium (Cr) - Total	Hexavalent Chromium (Cr+6)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
CCME Guidelines[1] (mg/kg)			**20**	**12**	**500**	**NC**	**NC**	**4**	**NC**	**10**	**64**	**0.4**	**50**	**63**	**140**	**6.6**	**10**	**45**	**1**	**20**	**1**	**50**	**23**	**130**	**200**
AEP Tier 1 2016 Guidelines[2] (mg/kg)						**250**	**10000**																		
BACKGROUND CONTROLS																									
17C01	0.0-0.2	06-Feb-17		9.8	268																				
17C01	0.3-0.5	06-Feb-17		9.6	287														0.6						
17C01	0.8-1.0	06-Feb-17		9.6	375														0.6						
17C02	0.8-1.0	06-Feb-17		11.4	236																				
17C02	1.3-1.5	06-Feb-17		10.9															0.6						
17C02	1.7-1.9	06-Feb-17		8.8	292														0.6						
17C02	2.2-2.5	06-Feb-17		10.4															0.8						
17C02	2.8-3.0	06-Feb-17		9.6	225																				
17C03	0.3-0.5	07-Feb-17		11.1	185																				
17C03	1.7-1.9	07-Feb-17		8.7	209																				
17C03	3.2-3.4	07-Feb-17		9.0	168																				
WELL CENTRE AREA																									
17BH02	1.3-1.5	06-Feb-17	0.7	11.6	279			0.8	<0.5	<0.5	20.1	<0.3	10.2	22.2	12.0	<0.5	2.7	27.5	0.6	<0.5	<0.5	0.5	1.4	30.7	92
17BH02	2.2-2.5	06-Feb-17	0.7	9.5	299			0.8	<0.5	0.5	18.4	<0.3	10.0	22.9	12.7	<0.5	2.7	28.0	0.7	<0.5	<0.5	0.5	1.6	28.2	93
PRODUCTION FACILITIES AREA																									
17BH07	1.3-1.5	06-Feb-17	0.6	11.9	266			0.7	<0.5	<0.5	18.0	<0.3	10.7	21.1	12.0	<0.5	2.5	27.8	0.6	<0.5	<0.5	<0.5	1.6	33.2	88
17BH08	1.3-1.5	06-Feb-17	0.6	**13.0**	248			0.7	<0.5	0.8	15.9	<0.3	11.5	24.3	13.2	<0.5	4.6	30.6	0.9	<0.5	<0.5	<0.5	2.1	27.6	111
17BH09	0.8-1.0	06-Feb-17	0.6	10.8	312			0.7	<0.5	<0.5	18.7	<0.3	10.0	21.8	12.2	<0.5	3.0	26.9	0.7	<0.5	<0.5	<0.5	1.6	30.6	92
17BH10	0.8-1.0	06-Feb-17	0.6	10.9	287			0.7	<0.5	<0.5	18.0	<0.3	10.2	21.0	12.1	<0.5	2.7	26.5	**1.1**	<0.5	<0.5	<0.5	1.6	29.4	91
17BH11	1.3-1.5	06-Feb-17	0.6	10.3	283			0.7	<0.5	<0.5	18.1	<0.3	9.6	23.3	12.6	<0.5	2.7	26.9	0.7	<0.5	<0.5	<0.5	1.5	29.8	91
17HA01	0.0-0.1	06-Feb-17	<0.5	6.0	161			<0.5	<0.5	<0.5	14.5	<0.3	7.3	13.4	7.1	<0.5	2.9	16.3	<0.5	<0.5	<0.5	0.5	1.1	23.9	176
FLARE STACK/FLARE KNOCKOUT TANK AREA																									
17BH12	1.3-1.5	06-Feb-17	0.6	11.0	263			0.7	<0.5	<0.5	17.2	<0.3	9.7	22.7	11.7	<0.5	2.5	25.7	0.8	<0.5	<0.5	<0.5	1.6	29.0	90
17BH13	0.3-0.5	06-Feb-17	0.7	**12.6**	289			0.8	<0.5	<0.5	20.2	<0.3	11.5	22.3	13.1	<0.5	2.4	28.3	0.6	<0.5	<0.5	<0.5	1.3	35.2	94
FLARE PIT AREA																									
17BH01	1.3-1.5	06-Feb-17	0.6	11.4	**874**	45	1760	0.7	<0.5	<0.5	18.5	<0.3	9.3	20.2	11.1	<0.5	2.2	25.5	0.7	<0.5	<0.5	0.8	1.2	32.0	89
17BH01	2.8-3.0	06-Feb-17	0.6	9.7	**631**	23	2000	0.6	<0.5	<0.5	15.5	<0.3	8.9	19.5	11.2	<0.5	2.4	24.7	1.0	<0.5	<0.5	0.5	1.4	25.8	83
17BH01	4.3-4.5	06-Feb-17	0.6	9.9	235			0.7	<0.5	<0.5	16.9	<0.3	9.3	20.3	10.9	<0.5	2.6	25.8	**1.2**	<0.5	<0.5	0.5	1.7	26.5	91
17BH18	0.3-0.5	07-Feb-17	0.6	10.8	292			0.7	<0.5	<0.5	17.2	<0.3	9.4	19.5	11.5	<0.5	2.3	24.8	0.7	<0.5	<0.5	0.8	1.4	29.8	84
17BH18	1.3-1.5	07-Feb-17	0.7	11.9	394			0.7	<0.5	<0.5	16.0	<0.3	8.3	17.4	11.5	<0.5	2.3	21.7	0.6	<0.5	<0.5	0.5	1.2	28.2	79
17BH18	2.2-2.5	07-Feb-17	0.6	10.6	**1240**	74	2730	0.7	<0.5	<0.5	18.2	<0.3	9.4	20.8	11.3	<0.5	2.2	25.5	0.6	<0.5	<0.5	<0.5	1.2	31.5	87
17BH19	1.3-1.5	07-Feb-17	0.6	9.0	310			0.6	<0.5	<0.5	18.3	<0.3	8.0	17.2	11.6	<0.5	2.0	21.4	0.6	<0.5	<0.5	<0.5	1.2	29.7	80
17BH19	2.8-3.0	07-Feb-17	0.6	11.0	463			0.7	<0.5	<0.5	17.5	<0.3	8.8	19.3	11.5	<0.5	2.1	24.5	0.6	<0.5	<0.5	<0.5	1.2	30.8	96
REMOTE DRILLING WASTE DISPOSAL AREA																									
17BH52	1.5-2.0	08-Feb-17	0.5	10.7	**1530**	38	1880	0.7	<0.5	<0.5	18.1	<0.3	8.6	19.9	10.9	<0.5	2.3	23.7	0.6	<0.5	<0.5	0.5	1.3	30.2	82
17BH53	1.5-1.8	08-Feb-17	0.6	11.6	**581**	19	1330	0.7	<0.5	<0.5	18.3	<0.3	9.8	20.5	11.3	<0.5	2.3	25.7	0.7	<0.5	<0.5	<0.5	1.4	32.6	84
17BH55	1.6-2.0	08-Feb-17	0.5	11.8	**582**	26	1330	0.7	<0.5	<0.5	18.1	<0.3	9.6	20.8	11.4	<0.5	2.3	26.7	0.6	<0.5	<0.5	<0.5	1.3	31.7	84
17BH57	2.2-3.0	08-Feb-17	0.5	10.8	**641**	49	1320	0.8	<0.5	<0.5	18.7	<0.3	9.1	18.8	11.1	<0.5	2.2	24.1	0.6	<0.5	<0.5	<0.5	1.4	32.2	78
17BH57	3.0-3.5	08-Feb-17	0.5	**12.2**	**700**	72	1130	0.7	<0.5	<0.5	16.8	<0.3	9.1	19.5	10.8	<0.5	2.4	24.8	0.6	<0.5	<0.5	<0.5	1.2	29.1	85

Rev: 17.01.25

Notes:

Land Use: **Residential** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Alberta Environment and Parks (AEP). 2016. Alberta Tier 1 Soil and Groundwater Remediation Guidelines

Bold - Value exceeds specified guideline

Bold - When the value is rounded to the equivalent number of significant figures as the guideline, the sample has a concentration equivalent to the applicable guideline

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 3. Soil - Detailed Salinity
Phase 2 Environmental Site Assessment Report O-35
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Lab pH (6.0-8.5)[1]	Lab EC (dS/m)	SAR	Saturation %	Soluble Ions						Guideline
							Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO4) mg/kg	
CCME Guidelines[1]					<5								1
EGCSR Guidelines[2]			6-8	<2	<5								2
BACKGROUND CONTROLS													
17C01	0.8-1.0	06-Feb-17	7.62	0.36	0.38	75	8	28	7	<2	6	41	1,2
17C01	3.2-3.4	06-Feb-17	7.82	0.56	0.46	47	7	26	8	5	6	74	1,2
17C01	4.7-4.9	06-Feb-17	7.82	0.75	0.63	54	13	40	12	10	6	127	1,2
17C02	0.0-0.2	06-Feb-17	7.15	0.28	0.12	59	<2	22	4	<2	3	2	1,2
17C02	1.7-1.9	06-Feb-17	7.48	0.25	0.18	46	<2	12	3	<2	<2	8	1,2
17C02	3.2-3.4	06-Feb-17	7.65	0.56	0.40	52	7	29	8	6	8	88	1,2
17C03	0.3-0.5	07-Feb-17	7.31	0.32	1.33	39	11	9	2	<2	5	10	1,2
17C03	2.2-2.5	07-Feb-17	7.37	0.34	0.55	44	6	14	3	<2	<2	31	1,2
17C03	4.3-4.5	07-Feb-17	7.51	1.16	0.51	49	13	71	15	11	11	285	1,2
WELL CENTRE AREA													
17BH02	1.3-1.5	06-Feb-17	7.68	0.34	0.42	51	6	20	4	<2	<2	31	1,2
17BH02	2.2-2.5	06-Feb-17	7.39	0.41	1.51	45	16	13	3	<2	8	18	1,2
PRODUCTION FACILITIES AREA													
17BH07	1.3-1.5	06-Feb-17	7.32	0.30	0.32	48	4	15	4	<2	<2	17	1,2
17BH08	1.3-1.5	06-Feb-17	7.29	0.40	0.27	60	5	28	7	4	<2	35	1,2
17BH09	0.8-1.0	06-Feb-17	7.32	0.56	0.31	60	7	40	10	<2	4	94	1,2
17BH10	0.8-1.0	06-Feb-17	7.38	0.70	0.32	50	7	45	10	<2	4	124	1,2
17BH11	1.3-1.5	06-Feb-17	7.44	0.50	0.28	51	5	29	7	2	4	63	1,2
17HA01	0.0-0.1	06-Feb-17	7.36	0.69	0.10	49	2	50	7	7	5	8	1,2
FLARE STACK/FLARE KNOCKOUT TANK AREA													
17BH12	1.3-1.5	06-Feb-17	7.44	0.78	0.28	49	6	47	12	2	7	120	1,2
17BH13	0.3-0.5	06-Feb-17	7.48	0.32	0.69	48	8	13	4	<2	3	19	1,2

Paramount Resources Ltd.
Table 3. Soil - Detailed Salinity
Phase 2 Environmental Site Assessment Report O-35
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Lab pH (6.0-8.5)[1]	Lab EC (dS/m)	SAR	Saturation %	Soluble Ions						Guideline
							Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO4) mg/kg	
CCME Guidelines[1]					<5								1
EGCSR Guidelines[2]			6-8	<2	<5								2
FLARE PIT AREA													
17BH01	1.3-1.5	06-Feb-17	7.40	0.51	1.12	44	14	19	5	<2	24	13	1,2
17BH01	2.8-3.0	06-Feb-17	7.55	0.85	1.16	60	28	47	14	4	91	203	1,2
17BH01	4.3-4.5	06-Feb-17	7.62	1.22	0.56	51	15	67	22	10	7	277	1,2
17BH18	0.3-0.5	07-Feb-17	7.50	0.57	0.34	51	6	34	8	<2	8	70	1,2
17BH18	1.3-1.5	07-Feb-17	7.36	0.55	0.54	46	8	28	7	<2	18	23	1,2
17BH18	2.2-2.5	07-Feb-17	7.48	0.48	0.81	46	11	20	5	<2	21	12	1,2
17BH19	1.3-1.5	07-Feb-17	7.32	0.50	0.17	45	3	28	8	<2	8	16	1,2
17BH19	2.8-3.0	07-Feb-17	7.42	0.62	0.57	48	10	32	8	<2	23	41	1,2
REMOTE DRILLING WASTE DISPOSAL AREA													
17BH21	1.7-1.9	07-Feb-17	7.34	0.24	0.23	46	2	12	3	<2	<2	11	3
17BH25	1.7-1.9	07-Feb-17	7.36	0.25	0.22	48	2	13	3	<2	<2	11	3
17BH48	1.7-1.9	08-Feb-17	6.50	0.49	0.15	59	3	38	9	4	4	16	3
17BH52	1.5-2.0	08-Feb-17	7.39	0.57	1.47	57	24	25	6	<2	52	59	3
17BH53	1.5-1.8	08-Feb-17	7.29	0.56	0.54	48	9	30	6	<2	7	90	3
17BH55	1.6-2.0	08-Feb-17	7.4	0.54	0.70	45	10	26	5	<2	11	74	3
17BH57	2.2-3.0	08-Feb-17	7.37	1.20	5.05	49	73	23	5	<2	150	36	3
17BH57	3.0-3.5	08-Feb-17	7.41	0.97	3.94	48	54	21	5	<2	116	33	3

Rev: 17.01.25

Notes:

Land Use: **Residential** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Environmental Guidelines for Contaminated Site Remediation (EGCSR). 2003

[3] - 2012 Alberta "Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification" as per Alberta Directive 50 Equivalent Guidelines

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NA - Not Applicable

NS - Not Specified

3.

2012 Alberta "Assessing Drilling Waste Disposal Areas: Compliance Options for Remediation Certification		
Value Ratings	**Pass**	**Fail**
Topsoil		
EC dS/m	**<2**	**>2**
SAR	**<6**	**>6**
Below Topsoil to 1 meter		
EC dS/m	**<3**	**>3**
SAR	**<8**	**>8**
Below 1 meter		
EC dS/m	**<6**	**>6**
SAR	**<10**	**>10**

Paramount Resources Ltd.
Table 4. Soil - Polycyclic Aromatic Hydrocarbons
Phase 2 Environmental Site Assessment Report O-35
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b+j+k)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	B[a]P TPE	IACR (Fine/Coarse)
CCME Guidelines[1] (mg/kg)			**0.013**	**NC**	**0.28**	**0.25**	**0.046**	**2.5**	**20**	**10**	**1**	**6.2**	**1**	**6.2**	**20**	**1**	**1**	**NC**	**5.3**	**≤1**
FLARE STACK/FLARE KNOCKOUT AREA																				
17BH12	0.8-1.0	06-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	0.02	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH13	0.8-1.0	06-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
FLARE PIT AREA																				
17BH01	1.3-1.5	06-Feb-17	<0.005	<0.005	<0.005	0.05	**0.07**	<0.004	<0.01	0.04	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH01	2.8-3.0	06-Feb-17	**0.823**	<0.005	<0.005	**0.41**	**0.48**	<0.004	0.10	0.43	0.03	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.12
17BH01	4.3-4.5	06-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	0.01	0.03	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH14	2.8-3.0	07-Feb-17	0.032	<0.005	<0.005	<0.02	0.04	<0.004	0.02	0.04	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	0.05	0.023	0.11
17BH15	2.8-3.0	07-Feb-17	0.006	<0.005	<0.005	<0.02	0.02	<0.004	0.02	0.04	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH16	2.8-3.0	07-Feb-17	0.008	<0.005	<0.005	<0.02	0.03	<0.004	0.02	0.04	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	<0.11
17BH19	1.3-1.5	07-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	0.03	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH20	1.3-1.5	07-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH20	2.8-3.0	07-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	0.02	0.03	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH18	0.3-0.5	07-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH18	1.3-1.5	07-Feb-17	0.005	<0.005	<0.005	<0.02	<0.02	<0.004	0.03	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH18	2.2-2.5	07-Feb-17	<0.005	<0.005	<0.005	0.05	**0.08**	<0.004	0.01	0.06	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11

Rev: 17.01.25

Notes:

Land Use: **Residential** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 5. Soil - Glycols and Methanol
Phase 2 Environmental Site Assessment Report O-35
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Ethylene Glycol	Diethylene Glycol	Triethylene Glycol	Tetraethylene Glycol	Propylene Glycol	Methanol	% Moisture
CCME Guidelines[1] (mg/kg)			**960**					**NC**	**NC**
AEP Tier 1 2016 Soil Guidelines[2] (mg/kg)			**62**					**37**	
PRODUCTION FACILITIES AREA									
17BH07	0.0-0.2	06-Feb-17	<10	<10	<10	<10	<10	<0.5	
17BH08	0.0-0.2	06-Feb-17	<10	<10	<10	<10	<10	<0.5	
17BH09	0.0-0.2	06-Feb-17	<10	<10	<10	<10	<10	<0.5	
17BH10	0.0-0.2	06-Feb-17	<10	<10	<10	<10	<10	<0.5	
17BH11	0.0-0.2	06-Feb-17	<10	<10	<10	<10	<10	<0.5	
17HA01	0.0-0.1	06-Feb-17	<10	<10	<10	<10	<10	<0.5	9
FLARE STACK/FLARE KNOCKOUT TANK AREA									
17BH12	0.0-0.2	06-Feb-17	<10	<10	<10	<10	<10	<0.5	

Rev: 17.01.25

Notes:

Land Use: **Residential** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Alberta Environment and Parks (AEP). 2016. Alberta Tier 1 Soil and Groundwater Remediation Guidelines

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 6. Soil - Quality Control - BTEX and Petroleum Hydrocarbons (F1-F4)
Phase 2 Environmental Site Assessment Report O-35
May 2017

Sample ID	Sample Date (dd-mm-yy)	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	Fraction 1 mg/kg	Fraction 2 mg/kg	Fraction 3 mg/kg	Fraction 4 mg/kg	Grain Size 75 µm Sieve
17C03 0.3-0.5	07-Feb-17									33
Dup C 0.3-0.5	07-Feb-17									36
Detection Limit		---	---	---	---	---	---	---	---	1
Difference		---	---	---	---	---	---	---	---	-3
Relative Percent Difference		---	---	---	---	---	---	---	---	-8.70
Duplicate Sample Results		---	---	---	---	---	---	---	---	Good

Sample ID	Sample Date (dd-mm-yy)	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	F1 (C6-C10) mg/kg	F2 (C10-C16) mg/kg	Fraction 3 mg/kg	Fraction 4 mg/kg	Grain Size 75 µm Sieve
17BH02 1.3-1.5	06-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	75	<10	
Dup B 1.3-1.5	06-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	130	<10	
Detection Limit		0.005	0.05	0.01	0.05	10	10	10	10	---
Difference		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	-55	#VALUE!	---
Relative Percent Difference		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	-53.66	#VALUE!	---
Duplicate Sample Results		---	---	---	---	---	---	Good	---	---

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 7. Soil - Quality Control - Regulated Metals
Phase 2 Environmental Site Assessment Report O-35
May 2017

Sample ID	Sample Date	Antimony (An)	Arsenic (As)	Barium (Ba)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Beryllium (Be)	Boron (B)	Cadmium (Cd)	Chromium (Cr) - Total	Chromium (Cr) - Hex.	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
	(dd-mm-yy)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
17BH02 1.3-1.5	06-Feb-17	0.7	11.6	279			0.8	<0.5	<0.5	20.1	<0.3	10.2	22.2	12.0	<0.5	2.7	27.5	0.6	<0.5	<0.5	0.5	1.4	30.7	92
Dup B 1.3-1.5	06-Feb-17	0.7	11.9	292			0.7	<0.5	<0.5	18.5	<0.3	9.6	20.6	12.3	<0.5	2.7	26.2	0.6	<0.5	<0.5	0.5	1.4	30.5	86
Detection Limit		0.5	0.5	0.5	---	---	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Difference		0.0	0.3	13	---	---	-0.1	######	######	-1.6	######	-0.6	-1.6	0.3	######	0	-1.3	0	######	######	0	0	-0.2	6
Relative Percent Difference		0.00	2.55	4.55	---	---	-13.33	######	######	-8.29	######	-6.06	-7.48	2.47	######	0.00	-4.84	0.00	######	######	0.00	0.00	-0.65	6.74
Duplicate Sample Results		Good	Good	Good	---	---	Good	---	---	Good	---	Good	Good	Good	---	Good	Good	Good	---	---	Good	Good	Good	Good

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 8. Soil - Quality Control - Detailed Salinity
Phase 2 Environmental Site Assessment Report O-35
May 2017

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluable Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17C03 0.3-0.5	07-Feb-17	7.31	0.32	1.33	11	9	2	<2	5	10
Dup C 0.3-0.5	07-Feb-17	7.36	0.25	0.33	3	10	2	<2	2	13
Detection Limit		0.02	0.05	---	2	1	1	2	2	2
Difference		-0.05	0.07	1	8	-1	0	#VALUE!	3	-3
Relative Percent Difference		-0.68	24.56	120.48	114.29	-10.53	0.00	#VALUE!	85.71	-26.09
Duplicate Sample Results		Good	Good	Poor	---	Good	Good	---	NA	Good

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluable Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17BH02 1.3-1.5	06-Feb-17	7.68	0.34	0.42	6	20	4	<2	<2	31
Dup B 1.3-1.5	06-Feb-17	7.54	0.35	0.45	6	21	4	<2	3	32
Detection Limit		0.02	0.05	---	2	1	1	2	2	2
Difference		0	0	-0.03	0	1	0	#VALUE!	#VALUE!	-1
Relative Percent Difference		-1.84	2.90	-6.90	0.00	4.88	0.00	#VALUE!	#VALUE!	-3.17
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	---	---	Good

Rev: 17.01.25

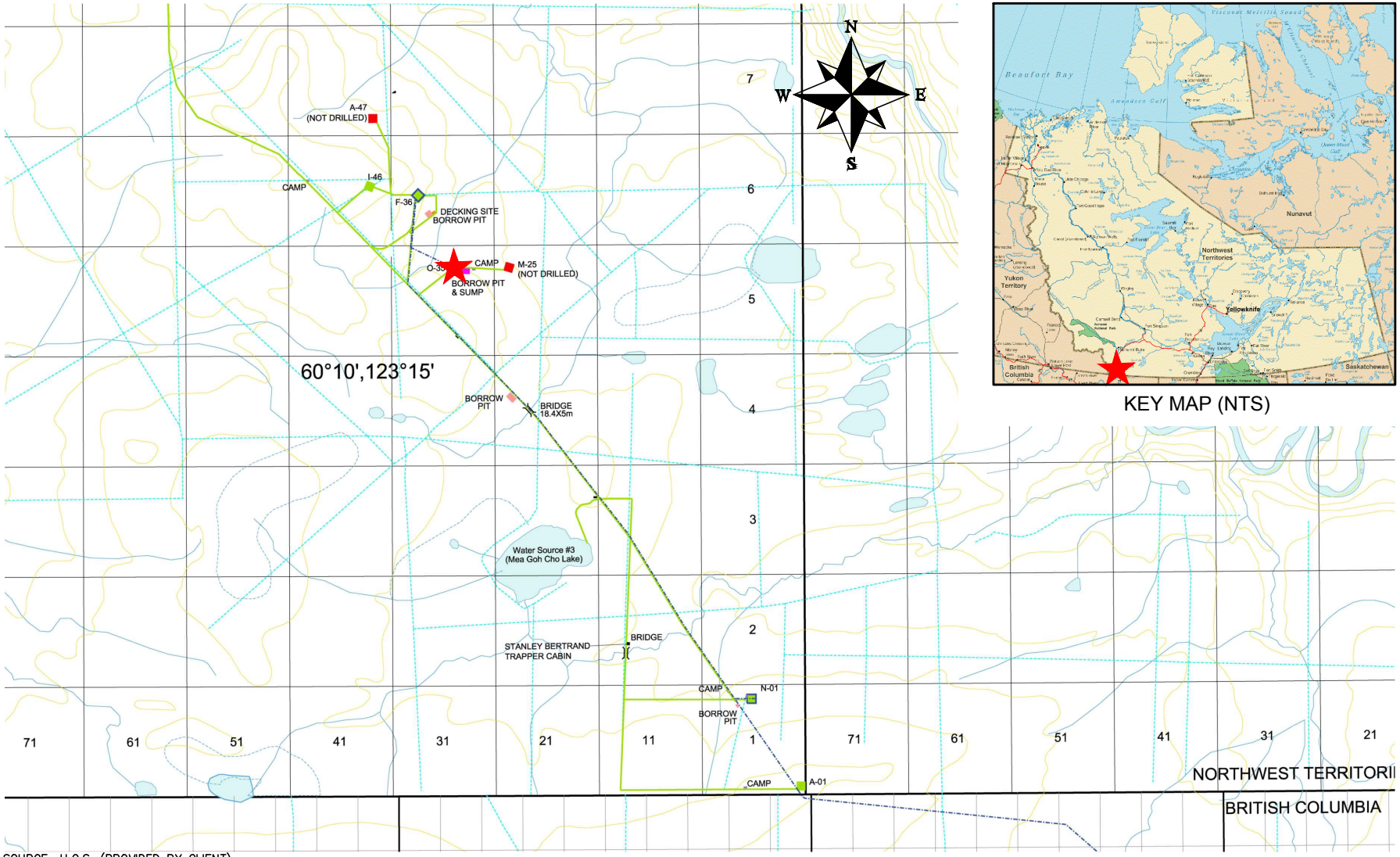
Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply



FIGURES

File: O-35_SLM.DWG Date: March-20-17 7:14:37 AM



KEY MAP (NTS)

SOURCE: U.G.S. (PROVIDED BY CLIENT)

LEGEND

★ SITE LOCATION

0 1000 2000 4000m

Scale 1 : 100 000

NORTH SHORE
Environmental Consultants

Date: 19-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. O-35 (NORTHWEST TERRITORIES)	Figure: 1
File name: O-35_SLM-A.dwg	Requested by: DM		

SITE LOCATION MAP

File: O-35_17PH2.dwg Date: March-24-17 2:50:52 PM



SEPTEMBER 2001 SATELLITE AERIAL PHOTO SOURCE: DIGITALGLOBE (IKONOS)

LEGEND

O-35 WELL CENTRE

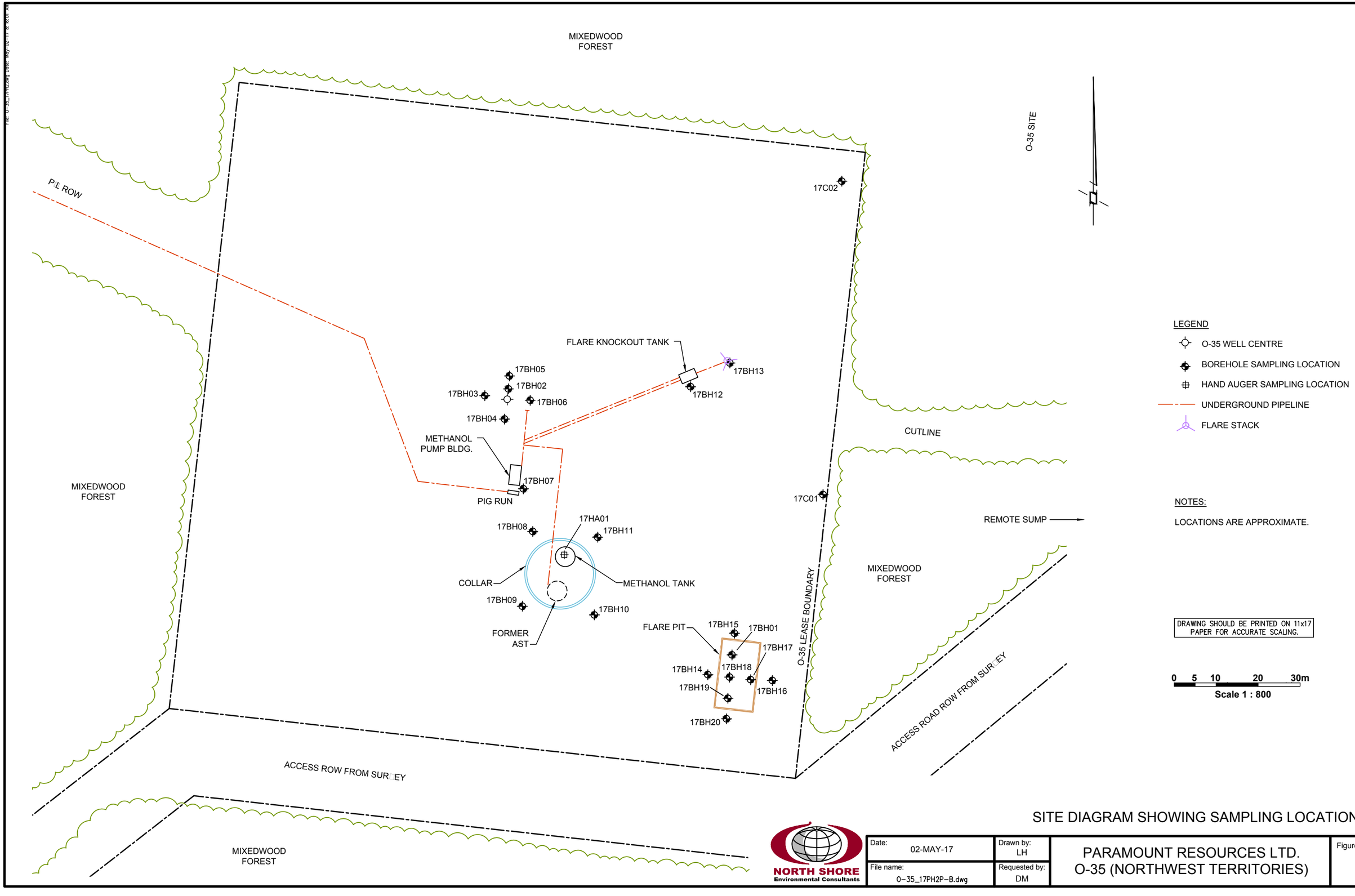
0 50 100 200m

Scale 1 : 5000

AERIAL OVERVIEW

NORTH SHORE Environmental Consultants

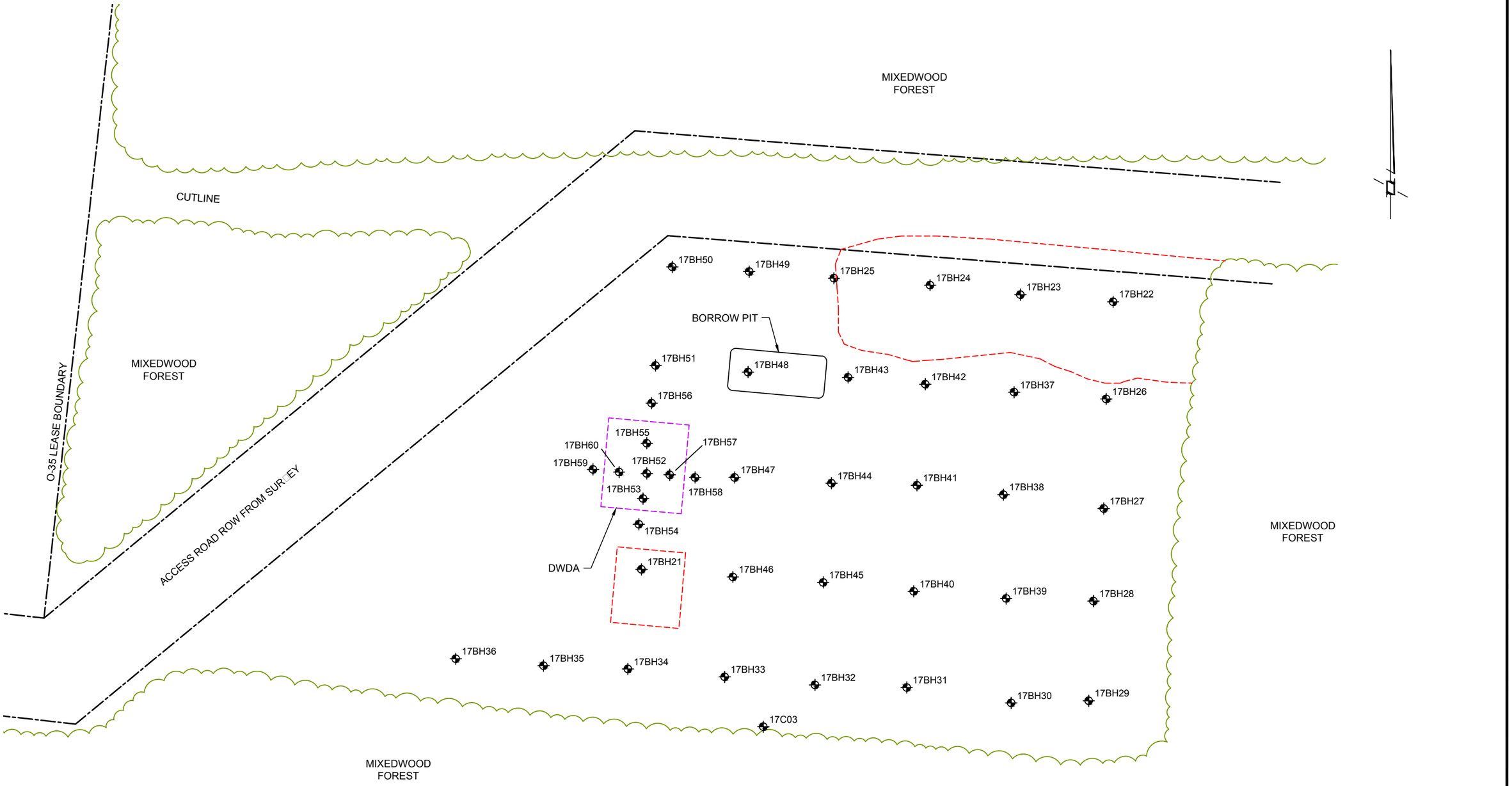
Date: 24-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. O-35 (NORTHWEST TERRITORIES)	Figure: 2
File name: O-35_17PH2P-A.dwg	Requested by: DM		



SITE DIAGRAM SHOWING SAMPLING LOCATIONS

NORTH SHORE Environmental Consultants

Date: 02-MAY-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. O-35 (NORTHWEST TERRITORIES)	Figure: 3
File name: O-35_17PH2P-B.dwg	Requested by: DM		



DRAWING SHOULD BE PRINTED ON 11x17 PAPER FOR ACCURATE SCALING.

0 5 10 20 30m

Scale 1 : 750

LEGEND

- BOREHOLE SAMPLE LOCATION
- DISTURBED AREA (FROM 2001 AERIAL PHOTO)

NOTES:

LOCATIONS ARE APPROXIMATE.

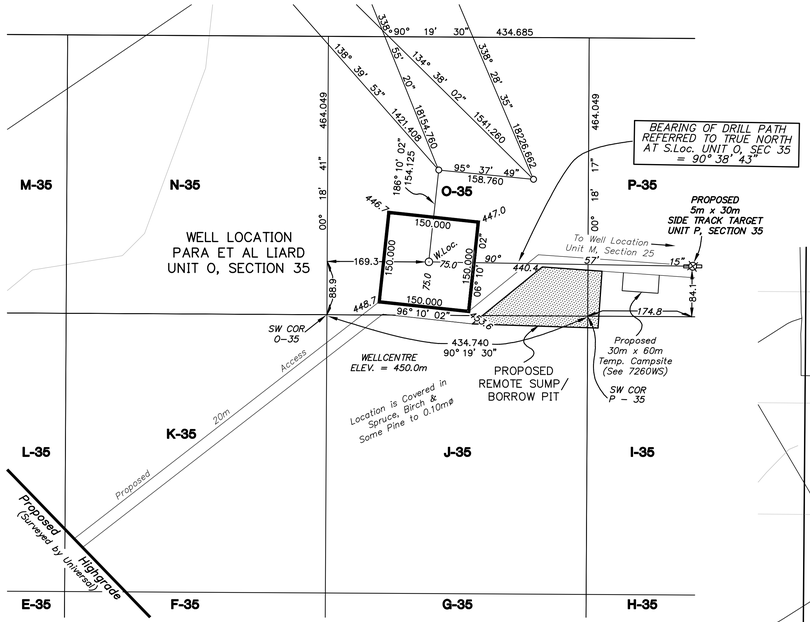
REMOTE SUMP DIAGRAM SHOWING SAMPLING LOCATIONS

NORTH SHORE Environmental Consultants

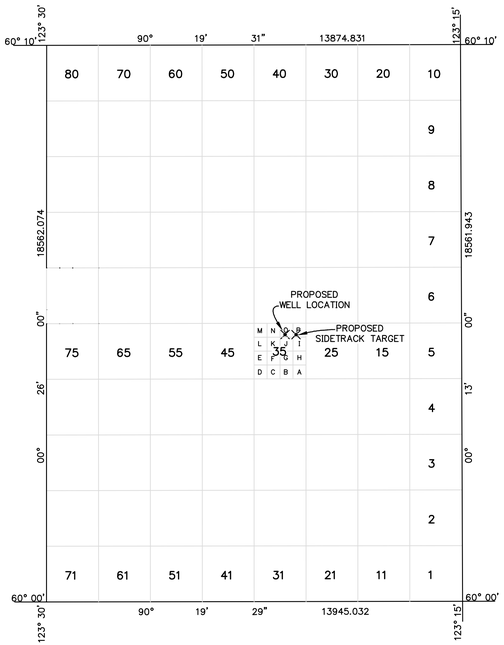
Date: 27-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. O-35 (NORTHWEST TERRITORIES)	Figure: 4
File name: O-35_17PH2-C.dwg	Requested by: DM		

APPENDIX A

Survey Plan



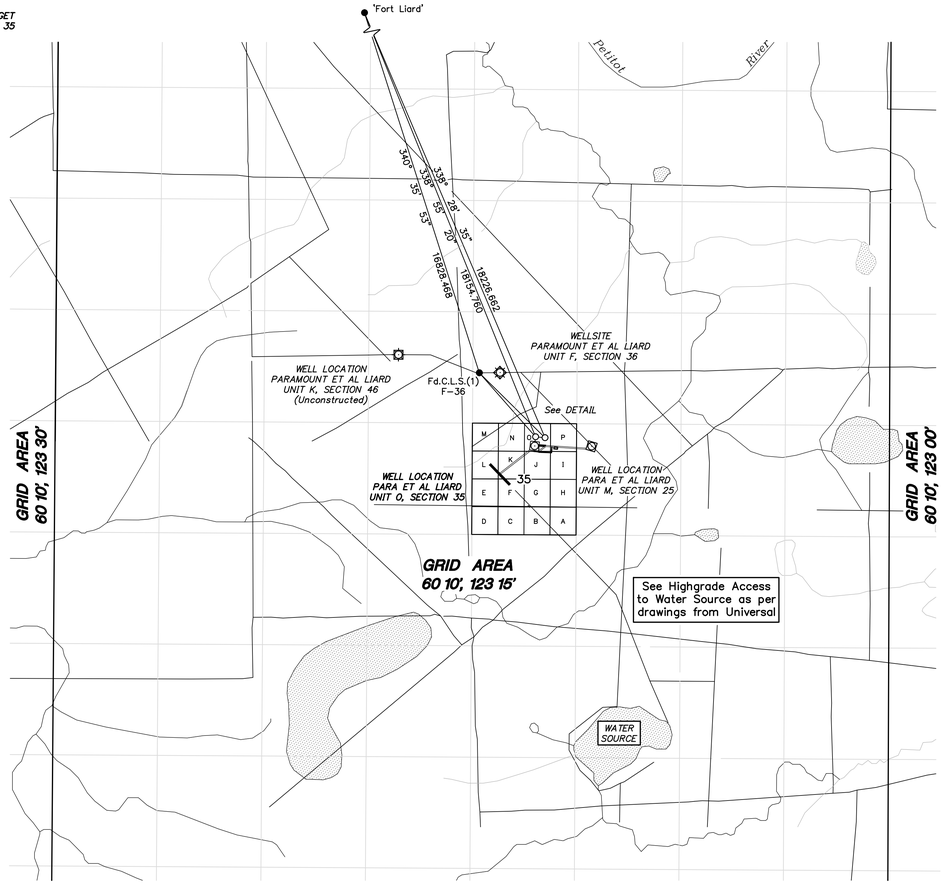
DETAIL
UNIT O, SECTION 35
SCALE 1:5,000



GRID AREA 60°10', 123°15'
SCALE 1:100,000

AREAS REQUIRED:

WELLSITE:	150mx150m =	2.25 ha.
REMOTE SUMP & BORROW PIT:	VARIABLE =	1.51 ha.
TOTAL:		3.76 ha.



All coordinates shown are on 1927 North American Datum.
Wellsite control established using differentially corrected GPS observations.
Final coordinate values for control were transformed from NAD83 datum to NAD27 datum using National Transformation Version 2 program.
Geodetic Survey of Canada published coordinate values for monument 'Fort Liard' were held fixed. Adjusted values for Fd.CLS(1) F-36 Grid Area 60°10', 123°15' and comparison to published coordinates are shown below.

GEOGRAPHIC AND UTM COORDINATES, (1927 NAD)				
Station	Latitude	Longitude(W)	Northings	Eastings
CONTROL MONUMENTS				
Fort Liard (Pub. & Fixed)	60°13'59.011"	123°28'31.881"	6677255.686	473662.363
Fd.CLS(1) F-36 (Adj.)	60°14'15.436"	123°27'39.795"	6661390.271	479250.101
CLS(1) F-36 (Pub.)	60°05'27.349"	123°22'22.878"	6661390.164	479250.101
GRID AREA				
NE	60° 10' 00"	123° 15' 00"	6669792.783	486125.259
NW	60° 10' 00"	123° 30' 00"	6669871.559	472250.651
SE	60° 00' 00"	123° 15' 00"	6651230.973	486055.060
SW	60° 00' 00"	123° 30' 00"	6651310.016	472110.252
O-35, NE	60°05'00.207"	123°21'05.624"	6660543.935	480439.341
O-35, NW	60°05'00.211"	123°21'33.749"	6660546.401	480004.663
O-35, SE	60°04'45.207"	123°21'05.624"	6660079.893	480436.873
O-35, SW	60°04'45.211"	123°21'33.749"	6660082.359	480002.140
TRAVERSE STATIONS				
O-35-1	60°04'52.562"	123°21'11.558"	6660307.924	480346.367
O-35-2	60°04'53.038"	123°21'21.780"	6660323.492	480188.454
PROPOSED WELL				
O-35	60°04'48.084"	123°21'22.797"	6660170.331	480171.904
PROPOSED SIDETRACK TARGET				
P-35	60°04'47.923"	123°20'54.323"	6661063.000	480612.000

REV.No.	DESCRIPTION	DATE
1	ADDED SIDETRACK TARGET	05/01/28

McELHANNEY
LAND SURVEYS LTD.
8808 – 72nd Street
Fort St. John, British Columbia
Phone:(250)787-0356, Fax(250)787-0310
McElhanney

DATE : 99/07/02 JOB No.: 3111-07257WS RT BRC

PLAN AND FIELD NOTES

OF SURVEY OF

PROPOSED EXPLORATORY WELL

PARA ET AL LIARD

IN UNIT O, SECTION 35

GRID AREA 60° 10', 123° 15'

(DIRECTIONALLY DRILLED TO SIDETRACK TARGET IN UNIT P, SECTION 35)

NORTHWEST TERRITORIES
CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50,000
0m 500m 1000m 2000m 3000m 4000m 5000m

SURVEYED FOR
PARAMOUNT RESOURCES LTD.

BY : R.O. BLACKALL, CLS
JUNE, 1999.

LEGEND
UTM coordinates are computed for Zone 10, central meridian 123° W.
Bearings were derived from differentially corrected GPS Observations and are referred to Meridian 123° W.
Distances are expressed in metres and decimals thereof.
Distances shown in traverse are measured distances reduced to the horizontal at general ground level.
For the computation of coordinates measured distances have been reduced to the UTM plane by multiplying them by an average combined scale factor of 0.9995353. Coordinates were then adjusted to fit the control.
Distances shown on grid area subdivisions are UTM plane.
Authorized control monuments found ..... ●
Monuments placed ..... ○
Mkr. denotes metal marker post 2.0m long placed 0.30m N.
Elevations were derived from Geodetic of Canada Monument 'Fort Liard' Elev. = 216.299m

Survey was completed prior to drilling; therefore well as drilled may not necessarily agree with proposed location.

I, R.O. Blackall, of the City of Fort St. John, British Columbia, Canada Lands Surveyor, make oath and say that I have in my own proper person, according to law and the instructions of the Surveyor General of Canada Lands, faithfully and correctly executed the survey shown by this plan and field notes, and that the said plan and field notes are correct and true to the best of my knowledge and belief.
SO HELP ME GOD

R.O. Blackall, CLS

Sworn before me at Fort St. John, this 06th day of July, 1999.

THIS SURVEY WAS EXECUTED DURING THE PERIOD
JUNE 25th TO JUNE 27th, 1999. BY R.O. BLACKALL, CLS

PARAMOUNT RESOURCES LIMITED

WITNESS

DATE

MOUNT COTY

MCKAY LAKES

123°30'

60°20',123°15'

60°20',123°00'

STAGING AREA

CAMP

MAINTENANCE YARD

RESIDENCE

BARGE SITE

CAMP SITE

I-02 DECKING SITE

CAMP

BRIDGE 5X15m

FORT LIARD HIGHWAY

Betalamea Lake

Petitot River

FORT LIARD

A-47 (NOT DRILLED)

I-46

CAMP

F-36

DECKING SITE BORROW PIT

123°30'

60°10',123°00'

O-35

CAMP

M-25 (NOT DRILLED)

BORROW PIT & SUMP

60°10',123°15'

BORROW PIT

BRIDGE 18.4X5m

Water Source #3 (Mea Goh Cho Lake)

STANLEY BERTRAND TRAPPER CABIN

BRIDGE

CAMP

N-01

BORROW PIT

CAMP

A-01

NORTHWEST TERRITORIES

BRITISH COLUMBIA

94O13I

94O14L

94O14K

94O14J

94O14I

MAXHAMISH COMPRESSOR

LEGEND

- SEISMIC
- AIRSTRIP - (FOREIGN)
- AIRSTRIP
- PIPELINE R/W
- PIPELINE R/W FOREIGN
- ACCESS ROAD - (FOREIGN)
- WINTER ACCESS ROAD
- ALL SEASON ACCESS ROAD
- CONTOUR
- LEASE - (TIED-IN)
- LEASE - (NOT TIED-IN)
- LEASE - (FOREIGN)
- LEASE - RECLAIMED
- BORROW PIT
- CAMP SITE
- SUMP / PIT
- DECKING SITE
- BATTERY SITE
- OTHER CLEARING
- BRIDGE
- TOWER

SCALE 1:50,000

1250 0 1250 2500 3750 5000 METERS

2500 0 5000 10000 15000 FEET

N

DISCLAIMER: The information contained herein is compiled from various government and industry sources. The Universal Group of Companies and its data suppliers provide no warranty regarding the accuracy or completeness of this information. No liability can be assumed by The Universal Group of Companies or its data suppliers resulting from the use or interpretation of this information, or from any decisions made based on this information.

Paramount resources ltd.

FORT LIARD SOUTH

As-Built June 2009

94O14I (BC P&NG GRID) to

SE1/4 60°20',123°30' (NWT GRID)

REV.	DESCRIPTION	INI.	DATE
3	Updated map title	BPV	03-JUN-09
2	Removed I-03 W/S & updated map title	BPV	12-SEP-07
1	Added Bridge in Sec.12 and Road in Sec.1 & 11.	BPV	05-DEC-06
0	Original construction (from 2005 map)	WGT	13-JUN-06

SPECIFICATIONS	
Datum:	NAD 83
Projection:	UTM
NTS Ref:	95B
Zone:	10
Scale:	1:50 000
C.I.:	100m
Filename:	050399G01_2009
Model:	50K Ft Liard South
Job No:	05-0399G

IMAGERY (Air Photo / Satellite)	
Date:	2000
Type:	1m Orthophoto

PREPARED BY:

UNIVERSAL GEOSYSTEMS U.G.S. SPATIAL INFORMATION SERVICES

Ph:. 262-1336
Fax: 262-1308
www.universalsurveys.com

REV. 3

APPENDIX B

Site Photographs



Photograph 1: View from well centre, facing north.



Photograph 2: View from well centre, facing east.



Photograph 3: View from well centre, facing south.



Photograph 4: View from well centre, facing west.



Photograph 5: View of the wellhead, facing southeast.



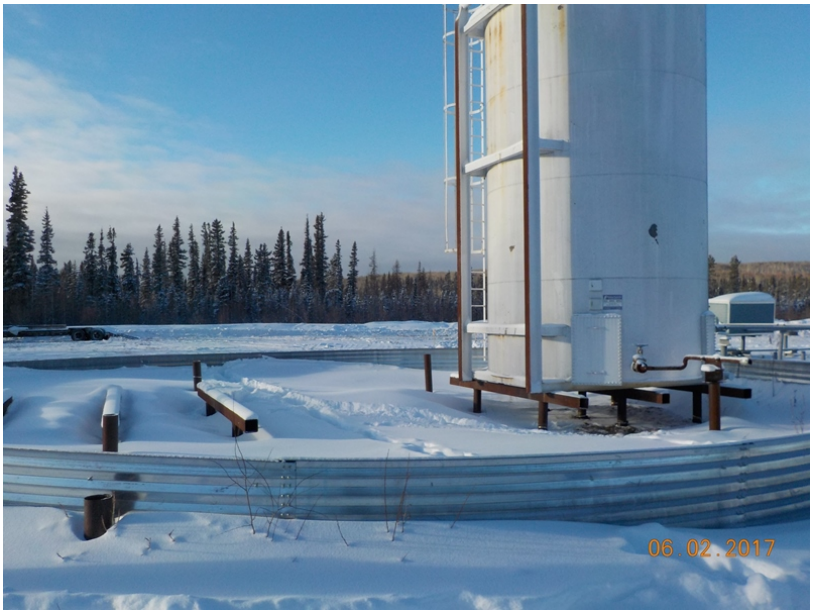
Photograph 6: View of the flare stack, facing northeast.



Photograph 7: View of the knockout drum area, facing northeast.



Photograph 8: View of facilities around well centre, facing northwest.



Photograph 9: View of the tank farm, facing west.



Photograph 10: View of facilities from the flare stack, facing southwest.



Photograph 11: View of the gridded remote drilling waste disposal area, facing north.



Photograph 12: View of the subsided borrow pit area located on the remote drilling waste disposal area (17BH48).



Photograph 13: View of the subsided borrow pit area located on the remote drilling waste disposal area (17BH48), photo facing southwest.



Photograph 14: View of C01 soil profile.

APPENDIX C

Borehole Logs

Borehole Log: 17C01

Client: Paramount Resources Ltd.

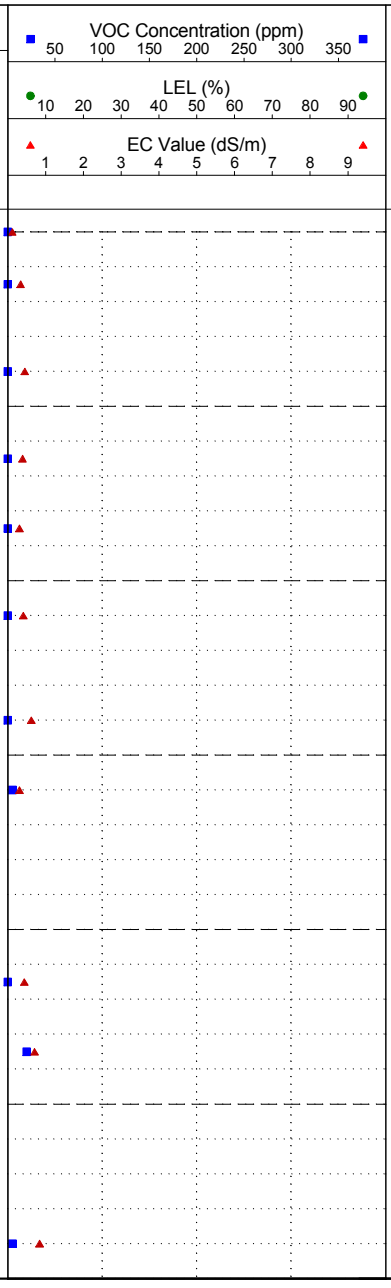
Project: Phase 2 Environmental Site Assessment

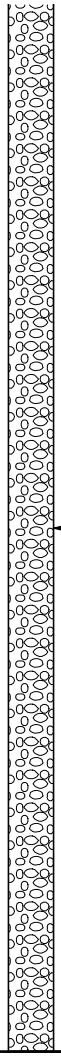
Legal Location: O-35

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, disturbed, iron and sand inclusions	0.00 - 0.20	1	B	M
			0.30 - 0.50	2	B	M
			0.80 - 1.00	3	B	M, PS, SAL
1		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed	1.30 - 1.50	4	B	
			1.70 - 1.90	5	B	
2			2.20 - 2.50	6	B	
		Dup A @ 2.8-3.0m	2.80 - 3.00	7,8	B	
3			3.20 - 3.40	9	B	PS, SAL
4			4.30 - 4.50	10	B	
			4.70 - 4.90	11	B	PS, SAL
5						
			5.80 - 6.00	12	B	
6		End of Borehole at 6.00 m.				





Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660341 E: 480133

Drill Date: 2/6/2017 (mm/dd/yy)

From Benchmark: 75m East, 10m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17C02

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0		Silty clay loam, yellowish brown (10YR 5/6), weak, fine, granular, moist, friable, 2-5% fine gravel <8mm, disturbed, roots, sand inclusions	0.00 - 0.20	13	B	PS, SAL		
			0.30 - 0.50	14	B			
		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, undisturbed, iron and sand inclusions	0.80 - 1.00	15	B	M		
1			1.30 - 1.50	16	B	M		
			1.70 - 1.90	17	B	M, PS, SAL		
2			2.20 - 2.50	18	B	M		Drill Cuttings
			2.80 - 3.00	19	B	M		
3			3.20 - 3.40	20	B	PS, SAL		
		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, iron and sand inclusions						
4			4.30 - 4.50	21	B			

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660415 E: 480154

Drill Date: 2/6/2017 (mm/dd/yy)

From Benchmark: 70m East, 65m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

NORTH SHORE
Environmental Consultants

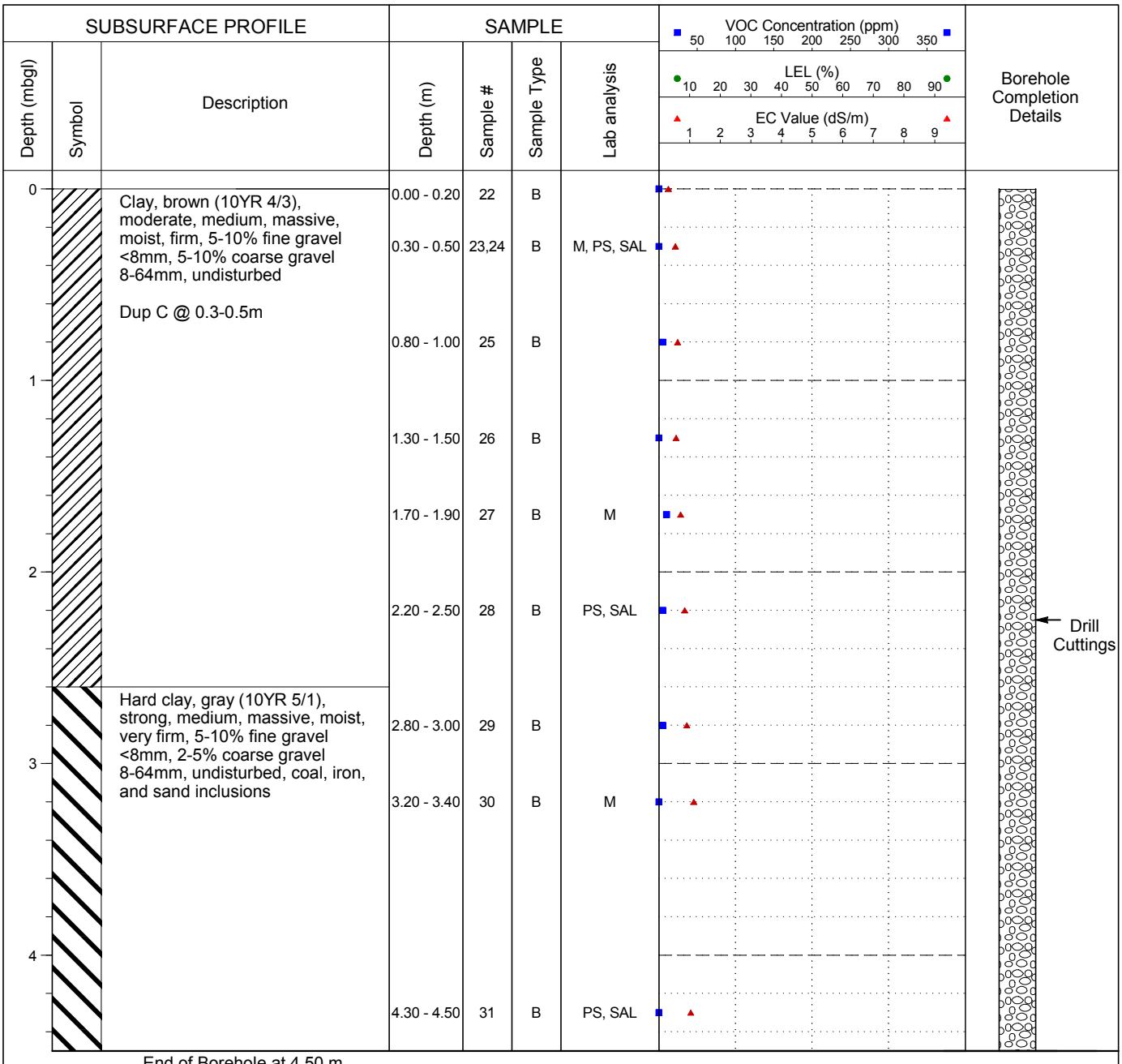
Borehole Log: 17C03

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Background Control



Legend
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SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660267 E: 480245

Drill Date: 2/7/2017 (mm/dd/yy)

From Benchmark: 158m East, 48m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17HA01

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Production Facilities Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sand (coarse), light brown (10YR 6/3), moist, loose, 50-70% fine gravel <8mm, disturbed, gravel under tank	0.00 - 0.20	32	B+J	GLY, HC, M, MTH, SAL		Drill Cuttings

End of Borehole at 0.10 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660340 E: 480094

Drill Date: 2/6/2017 (mm/dd/yy)

From Benchmark: 17m East, 36m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH01

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Flare Pit Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, iron and sand inclusions	0.00 - 0.20	33	B			
			0.30 - 0.50	34	B			
			0.80 - 1.00	35	B			
1			1.30 - 1.50	36	B+J	HC, M, PAH, SAL		
			1.70 - 1.90	37	B			
2			2.20 - 2.50	38	B			Drill Cuttings
		Clay, dark gray (10YR 4/1), weak, fine, massive, wet, sticky, disturbed, gray and black discolouration, wood	2.80 - 3.00	39	B+J	HC, M, PAH, SAL		
3			3.20 - 3.40	40	B			
		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm						
4			4.30 - 4.50	41	B+J	HC, M, PAH, SAL		

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660309 E: 480131

Drill Date: 2/6/2017 (mm/dd/yy)

From Benchmark: 60m East, 55m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

NORTH SHORE
Environmental Consultants

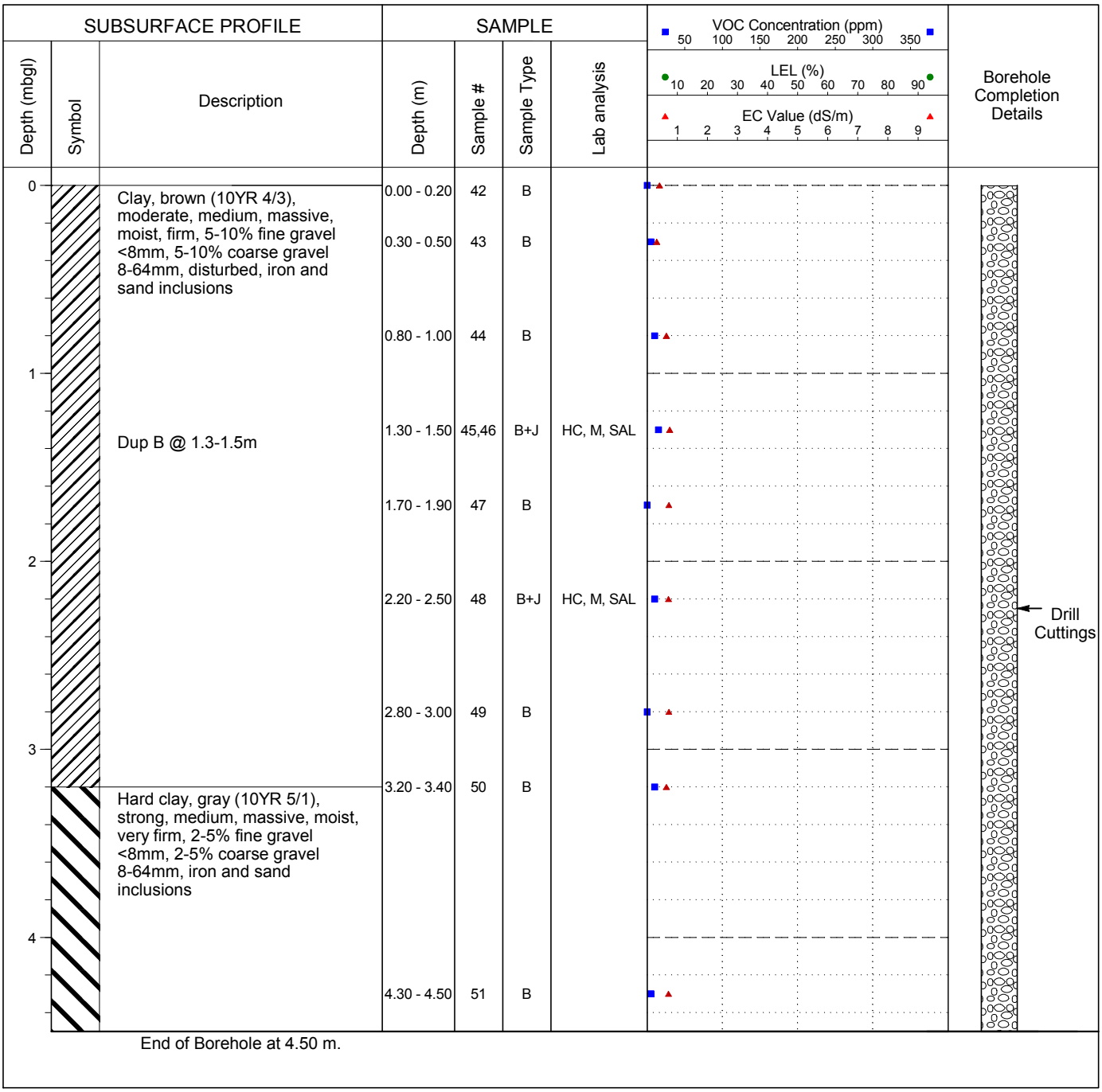
Borehole Log: 17BH02

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Well Centre Area



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PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660373 E: 480077

Drill Date: 2/6/2017 (mm/dd/yy)

From Benchmark: 2m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH03

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed, iron and sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
			0.30 - 0.50					
0.5								
			0.80 - 1.00					
1.0								
			1.30 - 1.50	52	B+J			Drill Cuttings
1.5								
			1.70 - 1.90					
2.0								
			2.20 - 2.50	53	B+J			
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660368 E: 480070

Drill Date: 2/6/2017 (mm/dd/yy)

From Benchmark: 5m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH04

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed, iron and sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
			0.30 - 0.50					
0.5								
			0.80 - 1.00					
1.0								
			1.30 - 1.50	54	B+J			
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50	55	B+J			
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660362 E: 480075

Drill Date: 2/6/2017 (mm/dd/yy)

From Benchmark: 5m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH05

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed, iron and sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
0.5			0.30 - 0.50					
1.0			0.80 - 1.00					
1.5			1.30 - 1.50	56	B+J			Drill Cuttings
2.0			1.70 - 1.90					
2.5			2.20 - 2.50	57	B+J			
3.0			2.80 - 3.00					

End of Borehole at 3.00 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660376 E: 480078

Drill Date: 2/6/2017 (mm/dd/yy)

From Benchmark: 5m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH06

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed, iron and sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
			0.30 - 0.50					
0.5								
			0.80 - 1.00					
1.0								
			1.30 - 1.50	58	B+J			
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50	59	B+J			
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660367 E: 480082

Drill Date: 2/6/2017 (mm/dd/yy)

From Benchmark: 5m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH07

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Production Facilities Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed, sand inclusions	0.00 - 0.20	60	B+J	GLY, MTH		
			0.30 - 0.50	61	B			
0.5								
			0.80 - 1.00	62	B+J	HC		
1.0								
			1.30 - 1.50	63	B	M, SAL		
1.5								Drill Cuttings
			1.70 - 1.90	64	B			
2.0								
		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron and sand inclusions	2.20 - 2.50	65	B+J			
2.5								
			2.80 - 3.00	66	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660348 E: 480081

Drill Date: 2/6/2017 (mm/dd/yy)

From Benchmark: 6m East, 20m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH08

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed, iron and sand inclusions	0.00 - 0.20	67	B+J	GLY, MTH		
			0.30 - 0.50	68	B			
0.5								
			0.80 - 1.00	69	B+J	HC		
1.0								
			1.30 - 1.50	70	B	M, SAL		
1.5								Drill Cuttings
			1.70 - 1.90	71	B			
2.0								
			2.20 - 2.50	72	B+J			
2.5								
			2.80 - 3.00	73	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660340 E: 480081

Drill Date: 2/6/2017 (mm/dd/yy)

From Benchmark: 10m East, 30m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH09

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed, iron and sand inclusions	0.00 - 0.20	74	B+J	GLY, MTH		
			0.30 - 0.50	75	B			
0.5								
			0.80 - 1.00	76	B+J	HC, M, SAL		
1.0								
			1.30 - 1.50	77	B			
1.5								Drill Cuttings
			1.70 - 1.90	78	B			
2.0								
			2.20 - 2.50	79	B+J			
2.5								
			2.80 - 3.00	80	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660327 E: 480079

Drill Date: 2/6/2017 (mm/dd/yy)

From Benchmark: 9m East, 48m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH10

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3)	0.00 - 0.20	81	B+J	GLY, MTH		
			0.30 - 0.50	82	B			
0.5								
		Sandy loam, reddish brown (2.5YR 4/3), single-grained, wet, non-sticky, 20-30% fine gravel <8mm, 15-20% coarse gravel 8-64mm, sand inclusions, groundwater table from 0.8-2.5m	0.80 - 1.00	83	B+J	HC, M, SAL		
1.0								
			1.30 - 1.50	84	B			
1.5								Drill Cuttings
			1.70 - 1.90	85	B			
2.0								
			2.20 - 2.50	86	B+J			
2.5		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, iron and sand inclusions						
			2.80 - 3.00	87	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660325 E: 480091

Drill Date: 2/6/2017 (mm/dd/yy)

From Benchmark: 26m East, 48m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH11

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed, iron and sand inclusions	0.00 - 0.20	88	B+J	GLY, MTH		
			0.30 - 0.50	89	B			
0.5								
			0.80 - 1.00	90	B+J	HC		
1.0								
			1.30 - 1.50	91	B	M, SAL		
1.5		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron and sand inclusions						Drill Cuttings
			1.70 - 1.90	92	B			
2.0								
			2.20 - 2.50	93	B+J			
2.5								
			2.80 - 3.00	94	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660333 E: 480093

Drill Date: 2/6/2017 (mm/dd/yy)

From Benchmark: 25m East, 30m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH12

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Flare Stack/Knockout Tank Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Sand (coarse), yellowish brown (10YR 5/6), single-grained, moist, loose, 20-30% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed, sand inclusions	0.00 - 0.20	95	B+J	GLY, MTH		
			0.30 - 0.50	96	B			
0.5		Clay, gray (10YR 5/1), moderate, medium, massive, wet, slightly sticky, 5-10% fine gravel <8mm, 2-5% coarse gravel 8-64mm, disturbed, wet possibly from ponding water under facility						
			0.80 - 1.00	97	B+J	HC		
1.0								
			1.30 - 1.50	98	B	M, SAL		
1.5								Drill Cuttings
			1.70 - 1.90	99	B			
2.0								
			2.20 - 2.50	100	B+J			
2.5								
		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm	2.80 - 3.00	101	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660366 E: 480119

Drill Date: 2/6/2017 (mm/dd/yy)

From Benchmark: 43m East, 8m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH13

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Flare Stack/Knockout Tank Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, disturbed, sand inclusions	0.00 - 0.20	102	B			
			0.30 - 0.50	103	B	M, SAL		
0.5								
			0.80 - 1.00	104	B+J	HC		
1.0								
			1.30 - 1.50	105	B			
1.5								Drill Cuttings
			1.70 - 1.90	106	B			
2.0								
		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, iron and sand inclusions	2.20 - 2.50	107	B+J			
2.5								
			2.80 - 3.00	108	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660371 E: 480132

Drill Date: 2/6/2017 (mm/dd/yy)

From Benchmark: 52m East, 14m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH14

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Flare Pit Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 5-10% fine gravel <8mm, 2-5% coarse gravel 8-64mm, disturbed, iron and sand inclusions	0.00 - 0.20					
0.5		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.30 - 0.50					
1.0			0.80 - 1.00					
1.5			1.30 - 1.50					Drill Cuttings
2.0			1.70 - 1.90					
2.5			2.20 - 2.50					
3.0		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, iron inclusions	2.80 - 3.00	109	B+J	HC, PAH		
		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660309 E: 480126

Drill Date: 2/7/2017 (mm/dd/yy)

From Benchmark: 55m East, 60m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH15

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Flare Pit Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, wet, slightly sticky, 2-5% fine gravel <8mm, disturbed *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
0.5			0.30 - 0.50					
1.0			0.80 - 1.00					
1.5			1.30 - 1.50					Drill Cuttings
2.0			1.70 - 1.90					
2.5			2.20 - 2.50					
3.0		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed	2.80 - 3.00	110	B+J	HC, PAH		
		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660315 E: 480131

Drill Date: 2/7/2017 (mm/dd/yy)

From Benchmark: 60m East, 50m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH16

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Flare Pit Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, disturbed *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
			0.30 - 0.50					
0.5								
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed	2.80 - 3.00	111	B+J	HC, PAH		
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660010 E: 480133

Drill Date: 2/7/2017 (mm/dd/yy)

From Benchmark: 70m East, 60m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH17

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Flare Pit Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% coarse gravel 8-64mm, 2-5% cobbles 64-256mm, disturbed	0.00 - 0.20					
			0.30 - 0.50					
0.5		*VOC field screening values not obtained due to delineation sampling						
		*Exploratory borehole; no samples obtained	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
		Clay, black (10YR 2/1), 0.1m of waste, on edge of flare	2.80 - 3.00					
3.0		Hard clay, dark gray (10YR 4/1)						

End of Borehole at 3.00 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660308 E: 480133

Drill Date: 2/7/2017 (mm/dd/yy)

From Benchmark: 65m East, 60m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH18

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Flare Pit Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% coarse gravel 8-64mm, disturbed, sand inclusions	0.00 - 0.20	112	B			
			0.30 - 0.50	113	B+J	HC, M, PAH, SAL		
			0.80 - 1.00	114	B			
1		Clay, light gray (10YR 7/1), disturbed, gray and black discolouration	1.30 - 1.50	115	B+J	HC, M, PAH, SAL		
			1.70 - 1.90	116	B			
2			2.20 - 2.50	117	B+J	HC, M, PAH, SAL		Drill Cuttings
		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 2-5% coarse gravel 8-64mm, undisturbed, iron and sand inclusions	2.80 - 3.00	118	B			
3			3.20 - 3.40	119	B			
4			4.30 - 4.50	120	B			

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660303 E: 480125

Drill Date: 2/7/2017 (mm/dd/yy)

From Benchmark: 60m East, 60m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH19

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Flare Pit Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% coarse gravel 8-64mm, disturbed, sand inclusions	0.00 - 0.20	121	B			
			0.30 - 0.50	122	B			
			0.80 - 1.00	123	B			
1		Clay, black (10YR 2/1), moderate, medium, massive, wet, sticky, disturbed, gray and black discolouration, burnt wood	1.30 - 1.50	124	B+J	HC, M, PAH, SAL		
			1.70 - 1.90	125	B			
2			2.20 - 2.50	126	B			Drill Cuttings
			2.80 - 3.00	127	B+J	HC, M, SAL		
3		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 2-5% coarse gravel 8-64mm, 5-10% cobbles 64-256mm, iron and sand inclusions	3.20 - 3.40	128	B			
4			4.30 - 4.50	129	B+J			

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660300 E: 480127

Drill Date: 2/7/2017 (mm/dd/yy)

From Benchmark: 60m East, 65m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH20

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Flare Pit Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed, iron and sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
0.5			0.30 - 0.50					
1.0			0.80 - 1.00					
1.5			1.30 - 1.50	130	B+J	HC, PAH		Drill Cuttings
2.0			1.70 - 1.90					
2.5			2.20 - 2.50					
3.0		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, iron, sand and silt inclusions	2.80 - 3.00	131	B+J	HC, PAH		
		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660289 E: 480128

Drill Date: 2/7/2017 (mm/dd/yy)

From Benchmark: 60m East, 70m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH21

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, disturbed	0.00 - 0.20					
			0.30 - 0.50					
0.5		*VOC field screening values not obtained at all sampling depths due to delineation sampling						
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90	132	B+J	HC, SAL		
2.0								
			2.20 - 2.50					
2.5								
		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, iron, sand and silt inclusions	2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660291 E: 480209

Drill Date: 2/7/2017 (mm/dd/yy)

From Benchmark: 23m East, 130m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH22

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, disturbed	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, iron, sand and silt inclusions	2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660339 E: 480354

Drill Date: 2/7/2017 (mm/dd/yy)

From Benchmark: 220m East, 33m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH23

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, disturbed	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, iron, sand and silt inclusions	2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660340 E: 480325

Drill Date: 2/7/2017 (mm/dd/yy)

From Benchmark: 207m East, 33m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH24

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, disturbed, coal and sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5		Hard clay, dark brown (10YR 3/3), weak, fine, single-grained, moist, very friable, 15-20% fine gravel <8mm, 15-20% coarse gravel 8-64mm, sand inclusions						
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660344 E: 480309

Drill Date: 2/7/2017 (mm/dd/yy)

From Benchmark: 190m East, 33m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH25

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, disturbed	0.00 - 0.20					
			0.30 - 0.50					
0.5		*VOC field screening values not obtained at all sampling depths due to delineation sampling						
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90	133	B+J	HC, SAL		
2.0								
			2.20 - 2.50					
2.5		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, iron, sand and silt inclusions						
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660341 E: 480296

Drill Date: 2/7/2017 (mm/dd/yy)

From Benchmark: 168m East, 33m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH26

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron, sand and silt inclusions						
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660322 E: 480357

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 220m East, 17m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH27

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron, sand and silt inclusions						
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660307 E: 480355

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 220m East, 3m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH28

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron, sand and silt inclusions						
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660292 E: 480355

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 220m East, 23m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH29

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron, sand and silt inclusions						
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660273 E: 480346

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 220m East, 40m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH30

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron, sand and silt inclusions						
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660258 E: 480328

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 205m East, 40m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH31

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron, sand and silt inclusions						
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660258 E: 480309

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 190m East, 40m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH32

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, light brown (10YR 6/3), weak, fine, massive, wet, slightly sticky, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660263 E: 480291

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 168m East, 40m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH33

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron, sand and silt inclusions						
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660264 E: 480274

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 149m East, 40m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH34

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron, sand and silt inclusions						
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660270 E: 480257

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 130m East, 40m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH35

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron, sand and silt inclusions						
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660272 E: 480234

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 112m East, 40m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH36

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20			
			0.30 - 0.50			
0.5		*Exploratory borehole; no samples obtained				
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00			
1.0						
			1.30 - 1.50			
1.5						
			1.70 - 1.90			
2.0		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron, sand and silt inclusions				
			2.20 - 2.50			
2.5						
			2.80 - 3.00			
3.0		End of Borehole at 3.00 m.				

VOC Concentration (ppm): 50 100 150 200 250 300 350

LEL (%): 10 20 30 40 50 60 70 80 90

EC Value (dS/m): 1 2 3 4 5 6 7 8 9

Borehole Completion Details: Drill Cuttings

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660274 E: 480206

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 95m East, 40m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH37

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron, sand and silt inclusions						
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660325 E: 480323

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 205m East, 17m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH38

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20			
			0.30 - 0.50			
0.5		*Exploratory borehole; no samples obtained				
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00			
1.0						
			1.30 - 1.50			
1.5						
			1.70 - 1.90			
2.0		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron, sand and silt inclusions				
			2.20 - 2.50			
2.5						
			2.80 - 3.00			
3.0		End of Borehole at 3.00 m.				

VOC Concentration (ppm): 50 100 150 200 250 300 350

LEL (%): 10 20 30 40 50 60 70 80 90

EC Value (dS/m): 1 2 3 4 5 6 7 8 9

Borehole Completion Details: Drill Cuttings

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660310 E: 480325

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 206m East, 3m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH39

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm,	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5		Loamy sand, yellowish brown (10YR 5/6), single-grained, moist, loose, 15-20% fine gravel <8mm, iron and sand inclusions						
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660295 E: 480325

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 207m East, 23m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH40

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, iron and sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*VOC field screening values not obtained at all sampling depths due to delineation sampling						
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90	134	B+J			
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660277 E: 480327

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 190m East, 23m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH41

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, iron and sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660276 E: 480308

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 189m East, 3m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH42

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm,	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5		Loamy sand, yellowish brown (10YR 5/6), single-grained, moist, loose, 15-20% fine gravel <8mm, iron and sand inclusions						
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660323 E: 480312

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 189m East, 17m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH43

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, iron and sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660320 E: 480286

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 168m East, 17m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH44

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sandy loam, brown (10YR 4/3), weak, fine, single-grained, moist, very friable, 2-5% fine gravel <8mm,	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5		Sandy clay loam, brown (10YR 4/3), moderate, fine, massive, moist, friable, 2-5% fine gravel <8mm						Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660296 E: 480291

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 168m East, 3m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH45

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sandy loam, brown (10YR 4/3), weak, fine, single-grained, moist, very friable, 2-5% fine gravel <8mm,	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5		Sandy clay loam, brown (10YR 4/3), moderate, fine, massive, moist, friable, 2-5% fine gravel <8mm						Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660278 E: 480289

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 169m East, 23m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH46

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, iron and sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660280 E: 480270

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 148m East, 23m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH47

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, iron and sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660299 E: 480274

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 148m East, 3m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH48

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Clay, gray (10YR 5/1), massive, wet, slightly sticky, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, wet due to low area *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
			0.30 - 0.50					
			0.80 - 1.00					
1			1.30 - 1.50					
			1.70 - 1.90	135	B+J	HC, SAL		
2			2.20 - 2.50					
		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed						Drill Cuttings
			2.80 - 3.00					
3			3.20 - 3.40					
4			4.30 - 4.50					

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660314 E: 480262

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 149m East, 17m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH49

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, iron and sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660350 E: 480268

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 148m East, 33m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH50

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, iron and sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660345 E: 480249

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 130m East, 33m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH51

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sandy loam, brown (10YR 5/3), weak, fine, massive, moist, very friable, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, sand inclusions						Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660308 E: 480229

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 130m East, 17m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH52

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	
0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, disturbed, sand inclusions	0.00 - 0.20	136	B			
			0.30 - 0.50	137	B+J			
			0.80 - 1.00	138	B			
1								
		Potential drilling waste, gray (10YR 5/1), weak, fine, massive, wet, slightly sticky, disturbed, gray and black discolouration	1.50 - 2.00	139	B+J	HC, M, SAL		
2		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed						Drill Cuttings
			2.80 - 3.00	140	B			
3			3.20 - 3.40	141	B+J			
4			4.30 - 4.50	142	B			

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660295 E: 480234

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 130m East, 3m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH53

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm	0.00 - 0.20	143	B			
			0.30 - 0.50	144	B			
0.5								
			0.80 - 1.00	145	B			
1.0								
1.5		Potential drilling waste, gray (10YR 5/1), moderate, medium, massive, wet, slightly sticky, disturbed, gray and black discolouration	1.50 - 1.80	146	B+J	HC, M, SAL		Drill Cuttings
		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, iron and sand inclusions						
2.0								
			2.20 - 2.50	147	B			
2.5								
			2.80 - 3.00	148	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660286 E: 480232

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 130m East, 8m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH54

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm,	0.00 - 0.20					
			0.30 - 0.50					
0.5		*VOC field screening values not obtained at all sampling depths due to delineation sampling						
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90	149	B+J	HC		
2.0								
			2.20 - 2.50					
2.5		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, iron and sand inclusions						
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660279 E: 480231

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 130m East, 13m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH55

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, disturbed, iron and sand inclusions	0.00 - 0.20	150	B			
			0.30 - 0.50	151	B			
0.5								
			0.80 - 1.00	152	B			
1.0								
			1.30 - 1.50	153	B			
1.5		Potential drilling waste, gray (10YR 5/1), moderate, medium, massive, wet, slightly sticky, gray and black discolouration	1.60 - 2.00	154	B+J	HC, M, SAL		Drill Cuttings
2.0		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron and sand inclusions	2.20 - 2.50	155	B			
2.5								
			2.80 - 3.00	156	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660299 E: 480235

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 130m East, 4m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH56

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
0.5			0.30 - 0.50					
1.0			0.80 - 1.00					
1.5			1.30 - 1.50					Drill Cuttings
2.0			1.70 - 1.90	157	B+J	HC		
2.5		Sandy loam, brown (10YR 4/3), weak, fine, single-grained, moist, very friable, 15-20% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed	2.20 - 2.50					
3.0		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, iron and sand inclusions	2.80 - 3.00					
		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660304 E: 480233

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 130m East, 9m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

NORTH SHORE
Environmental Consultants

Borehole Log: 17BH57

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, disturbed, iron and sand inclusions	0.00 - 0.20	158	B			
			0.30 - 0.50	159	B			
			0.80 - 1.00	160	B			
1			1.30 - 1.50	161	B			
			1.70 - 1.90	162	B			
2		Potential drilling waste, gray (10YR 5/1), weak, fine, massive, wet, slightly sticky, disturbed, gray and black discolouration	2.20 - 3.00	163	B+J	HC, M, SAL		Drill Cuttings
3			3.00 - 3.50	164	B+J	HC, M, SAL		
		Hard clay, dark gray (10YR 4/1)						
4			4.30 - 4.50	165	B+J			

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660297 E: 480235

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 135m East, 3m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH58

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, iron and sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
			0.30 - 0.50					
			0.80 - 1.00					
1			1.30 - 1.50					
			1.70 - 1.90					
2			2.20 - 2.50	166	B+J	HC		Drill Cuttings
		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, iron and sand inclusions	2.80 - 3.00					
3			3.20 - 3.40	167	B+J	HC		
4			4.30 - 4.50					

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660293 E: 480243

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 140m East, 3m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH59

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, iron and sand inclusions	0.00 - 0.20			
			0.30 - 0.50			
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00			
1			1.30 - 1.50			
			1.70 - 1.90			
2			2.20 - 2.50	168	B+J	HC
		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, iron and sand inclusions	2.80 - 3.00			
3			3.20 - 3.40	169	B+J	HC
4		End of Borehole at 4.50 m.				

VOC Concentration (ppm): 50 100 150 200 250 300 350

LEL (%): 10 20 30 40 50 60 70 80 90

EC Value (dS/m): 1 2 3 4 5 6 7 8 9

Borehole Completion Details: Drill Cuttings

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660292 E: 480222

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 120m East, 3m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH60

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: O-35

Area of Concern: Potential Remote DWDA

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	
0		Clay, grayish brown (10YR 5/2), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, disturbed, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
			0.80 - 1.00					
1		Wood from 1.0-1.2m						
			1.30 - 1.50					
		Potential drilling waste, gray (10YR 5/1), weak, fine, massive, wet, slightly sticky, gray and black discolouration	1.70 - 1.90					
2		*Exploratory borehole; no samples obtained	2.20 - 2.50					Drill Cuttings
		*VOC field screening values not obtained due to delineation sampling						
			2.80 - 3.00					
3			3.20 - 3.40					
		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, coal, iron and sand inclusions						
4			4.30 - 4.50					

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6660292 E: 480226

Drill Date: 2/8/2017 (mm/dd/yy)

From Benchmark: 125m East, 3m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

APPENDIX D

Laboratory Certificates of Analyses

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: PARAMOUNT RESOURCES LTD
4700, 888 3rd ST SW
CALGARY, AB T2P5C5
(403) 290-3600

ATTENTION TO: Larry Yoon

PROJECT: O-35

AGAT WORK ORDER: 17N185998

SOIL ANALYSIS REVIEWED BY: Melinda Guay, Technical Reviewer

TRACE ORGANICS REVIEWED BY: Melinda Guay, Technical Reviewer

DATE REPORTED: Mar 03, 2017

PAGES (INCLUDING COVER): 44

VERSION*: 5

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*NOTES

VERSION 5:Monoethylene glycol has been revised to say: ethylene glycol - February 13th 2017 CS.

Version 2 supersedes version 1 issued on February 13th 2017. Methanol added to samples: 976, 983, 985, 992, 999, 1006 and 013 - February 16th 2017 CS.

Version 3 supersedes version 2 issued on February 16th 2017. Added PAH to samples: 015, 022, 027, 028, 029, 044, 050, 051, BTEX/F1-F4 to: 027, 028, 029, extractable and fusion barium to samples: 953, 956, 037, arsenic and selenium to samples: 931, 932, 944, 945 and 946. Sample: 958 was also re-prepped and re-ran for benzene and confirmed. However value has been updated from 0.0007 to <0.005 - February 23rd 2017 CS.

Version 4 supersedes version 3 issued on February 23rd 2017. Added - total barium to samples: 930, 931, 932, 943, 945, 947, added total arsenic to samples: 930, 943, 947 and BTEX/F1 to samples: 050 and 051 - March 3rd 2017 CS.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)
Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Results relate only to the items tested and to all the items tested
All reportable information as specified by ISO 17025:2005 is available from AGAT Laboratories upon request

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

SAMPLE DESCRIPTION:				17BH01 1.3-1.5	17BH01 2.8-3.0	17BH01 4.3-4.5	17BH02 1.3-1.5	17BH02 2.2-2.5	17BH07 1.3-1.5	17HA01 0-0.1	17BH08 1.3-1.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06
Parameter	Unit	G / S	RDL	8180953	8180956	8180958	8180962	8180964	8180979	8180983	8180988
Antimony	mg/kg		0.5	0.6	0.6	0.6	0.7	0.7	0.6	<0.5	0.6
Arsenic	mg/kg		0.5	11.4	9.7	9.9	11.6	9.5	11.9	6.0	13.0
Barium	mg/kg		0.5	874	631	235	279	299	266	161	248
Beryllium	mg/kg		0.5	0.7	0.6	0.7	0.8	0.8	0.7	<0.5	0.7
Boron (Saturated Paste)	mg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	mg/kg		0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	0.8
Chromium	mg/kg		0.5	18.5	15.5	16.9	20.1	18.4	18.0	14.5	15.9
Chromium, Hexavalent	mg/kg		0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Cobalt	mg/kg		0.5	9.3	8.9	9.3	10.2	10.0	10.7	7.3	11.5
Copper	mg/kg		0.5	20.2	19.5	20.3	22.2	22.9	21.1	13.4	24.3
Lead	mg/kg		0.5	11.1	11.2	10.9	12.0	12.7	12.0	7.1	13.2
Mercury	mg/kg		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg		0.5	2.2	2.4	2.6	2.7	2.7	2.5	2.9	4.6
Nickel	mg/kg		0.5	25.5	24.7	25.8	27.5	28.0	27.8	16.3	30.6
Selenium	mg/kg		0.5	0.7	1.0	1.2	0.6	0.7	0.6	<0.5	0.9
Silver	mg/kg		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	mg/kg		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tin	mg/kg		0.5	0.8	0.5	0.5	0.5	0.5	<0.5	0.5	<0.5
Uranium	mg/kg		0.5	1.2	1.4	1.7	1.4	1.6	1.6	1.1	2.1
Vanadium	mg/kg		0.5	32.0	25.8	26.5	30.7	28.2	33.2	23.9	27.6
Zinc	mg/kg		1	89	83	91	92	93	88	176	111

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

SAMPLE DESCRIPTION:				17BH09 0.8-1.0	17BH10 0.8-1.0	17BH11 1.3-1.5	17BH12 1.3-1.5	17BH13 0.3-0.5	17BH18 0.3-0.5	17BH18 1.3-1.5	17BH18 2.2-2.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-07	2017-02-07	2017-02-07
Parameter	Unit	G / S	RDL	8180994	8181001	8181009	8181016	8181021	8181031	8181034	8181037
Antimony	mg/kg		0.5	0.6	0.6	0.6	0.6	0.7	0.6	0.7	0.6
Arsenic	mg/kg		0.5	10.8	10.9	10.3	11.0	12.6	10.8	11.9	10.6
Barium	mg/kg		0.5	312	287	283	263	289	292	394	1240
Beryllium	mg/kg		0.5	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7
Boron (Saturated Paste)	mg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	mg/kg		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg		0.5	18.7	18.0	18.1	17.2	20.2	17.2	16.0	18.2
Chromium, Hexavalent	mg/kg		0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Cobalt	mg/kg		0.5	10.0	10.2	9.6	9.7	11.5	9.4	8.3	9.4
Copper	mg/kg		0.5	21.8	21.0	23.3	22.7	22.3	19.5	17.4	20.8
Lead	mg/kg		0.5	12.2	12.1	12.6	11.7	13.1	11.5	11.5	11.3
Mercury	mg/kg		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg		0.5	3.0	2.7	2.7	2.5	2.4	2.3	2.3	2.2
Nickel	mg/kg		0.5	26.9	26.5	26.9	25.7	28.3	24.8	21.7	25.5
Selenium	mg/kg		0.5	0.7	1.1	0.7	0.8	0.6	0.7	0.6	0.6
Silver	mg/kg		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	mg/kg		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tin	mg/kg		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	0.5	<0.5
Uranium	mg/kg		0.5	1.6	1.6	1.5	1.6	1.3	1.4	1.2	1.2
Vanadium	mg/kg		0.5	30.6	29.4	29.8	29.0	35.2	29.8	28.2	31.5
Zinc	mg/kg		1	92	91	91	90	94	84	79	87

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

SAMPLE DESCRIPTION:				17BH19 1.3-1.5	17BH19 2.8-3.0	Dup B 1.3-1.5
SAMPLE TYPE:				Soil	Soil	Soil
DATE SAMPLED:				2017-02-07	2017-02-07	2017-02-06
Parameter	Unit	G / S	RDL	8181044	8181047	8181054
Antimony	mg/kg		0.5	0.6	0.6	0.7
Arsenic	mg/kg		0.5	9.0	11.0	11.9
Barium	mg/kg		0.5	310	463	292
Beryllium	mg/kg		0.5	0.6	0.7	0.7
Boron (Saturated Paste)	mg/L		0.5	<0.5	<0.5	<0.5
Cadmium	mg/kg		0.5	<0.5	<0.5	<0.5
Chromium	mg/kg		0.5	18.3	17.5	18.5
Chromium, Hexavalent	mg/kg		0.3	<0.3	<0.3	<0.3
Cobalt	mg/kg		0.5	8.0	8.8	9.6
Copper	mg/kg		0.5	17.2	19.3	20.6
Lead	mg/kg		0.5	11.6	11.5	12.3
Mercury	mg/kg		0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg		0.5	2.0	2.1	2.7
Nickel	mg/kg		0.5	21.4	24.5	26.2
Selenium	mg/kg		0.5	0.6	0.6	0.6
Silver	mg/kg		0.5	<0.5	<0.5	<0.5
Thallium	mg/kg		0.5	<0.5	<0.5	<0.5
Tin	mg/kg		0.5	<0.5	<0.5	0.5
Uranium	mg/kg		0.5	1.2	1.2	1.4
Vanadium	mg/kg		0.5	29.7	30.8	30.5
Zinc	mg/kg		1	80	96	86

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8180953-8181054 Results are based on the dry weight of the sample.

Certified By:

Results relate only to the items tested and to all the items tested

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME/ Tier 1 Metals

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

SAMPLE DESCRIPTION:				17C01 0-0.2	17C02 0.8-1.0	17C02 2.8-3.0
SAMPLE TYPE:				Soil	Soil	Soil
DATE SAMPLED:				2017-02-06	2017-02-06	2017-02-06
Parameter	Unit	G / S	RDL	8180930	8180943	8180947
Arsenic	mg/kg		0.5	9.8	11.4	9.6

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8180930-8180947 Results are based on the dry weight of the sample.

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME/ Tier 1 Metals - As and Se

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

SAMPLE DESCRIPTION:				17C01 0.3-0.5	17C01 0.8-1.0	17C02 1.3-1.5	17C02 1.7-1.9	17C02 2.2-2.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06
Parameter	Unit	G / S	RDL	8180931	8180932	8180944	8180945	8180946
Arsenic	mg/kg		0.5	9.6	9.6	10.9	8.8	10.4
Selenium	mg/kg		0.5	0.6	0.6	0.6	0.6	0.8

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8180931-8180946 Results are based on the dry weight of the sample.

Certified By:

Results relate only to the items tested and to all the items tested

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Particle Size by Sieve

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

		SAMPLE DESCRIPTION:		17C01 0.8-1.0	17C01 3.2-3.4	17C01 4.7-4.9	17C02 0-0.2	17C02 1.7-1.9	17C02 3.2-3.4	Dup A 2.8-3.0
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06
Parameter	Unit	G / S	RDL	8180932	8180937	8180939	8180941	8180945	8180948	8181052
Sieve Analysis - 75 microns	%		1	30	27	28	3	24	26	26
Sieve Texture				Fine	Fine	Fine	Fine	Fine	Fine	Fine

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8180932-8181052 Value reported is amount of sample retained on a 75 micron sieve after wash with water and represents proportion by weight particles larger than indicated sieve size.

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Barium Guidelines

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

SAMPLE DESCRIPTION:				17BH01 1.3-1.5	17BH01 2.8-3.0	17BH18 2.2-2.5
SAMPLE TYPE:				Soil	Soil	Soil
DATE SAMPLED:				2017-02-06	2017-02-06	2017-02-07
Parameter	Unit	G / S	RDL	8180953	8180956	8181037
Barium, Extractable	mg/kg		2	45	23	74
True Barium by Fusion ICP	mg/kg		50	1760	2000	2730

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8180953-8181037 Result is based on the dry weight of the sample.

Certified By:

Results relate only to the items tested and to all the items tested

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

SAMPLE DESCRIPTION:				17C01 0.8-1.0	17C01 3.2-3.4	17C01 4.7-4.9	17C02 0-0.2	17C02 1.7-1.9	17C02 3.2-3.4	17BH01 1.3-1.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06
Parameter	Unit	G / S	RDL	8180932	8180937	8180939	8180941	8180945	8180948	8180953
pH (CaCl2 Extraction)	pH Units		N/A	7.62	7.82	7.82	7.15	7.48	7.65	7.40
Electrical Conductivity (Sat. Paste)	dS/m		0.05	0.36	0.56	0.75	0.28	0.25	0.56	0.51
Sodium Adsorption Ratio	N/A			0.38	0.46	0.63	0.12	0.18	0.40	1.12
Saturation Percentage	%		1	75	47	54	59	46	52	44
Chloride, Soluble	mg/L		5	8	13	12	5	<5	16	54
Calcium, Soluble	mg/L		1	37	55	74	38	26	56	44
Potassium, Soluble	mg/L		2	<2	11	18	<2	2	11	<2
Magnesium, Soluble	mg/L		1	9	16	22	7	7	15	11
Sodium, Soluble	mg/L		2	10	15	24	3	4	13	32
Sulfate, Soluble	mg/L		2	55	157	235	4	17	169	29
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	0	0	0	0	0	0
Calcium, Soluble (meq/L)	meq/L		0.05	1.85	2.74	3.69	1.90	1.30	2.79	2.20
Calcium, Soluble (mg/kg)	mg/kg		1	28	26	40	22	12	29	19
Chloride, Soluble (meq/L)	meq/L		0.06	0.23	0.37	0.34	0.14	<0.06	0.45	1.52
Chloride, Soluble (mg/kg)	mg/kg		2	6	6	6	3	<2	8	24
Magnesium, Soluble (meq/L)	meq/L		0.08	0.74	1.32	1.81	0.58	0.58	1.23	0.91
Magnesium, Soluble (mg/kg)	mg/kg		1	7	8	12	4	3	8	5
Potassium, Soluble (meq/L)	meq/L		0.05	<0.05	0.28	0.46	<0.05	0.05	0.28	<0.05
Potassium, Soluble (mg/kg)	mg/kg		2	<2	5	10	<2	<2	6	<2
Sodium, Soluble (meq/L)	meq/L		0.09	0.43	0.65	1.04	0.13	0.17	0.57	1.39
Sodium, Soluble (mg/kg)	mg/kg		2	8	7	13	<2	<2	7	14
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	1.15	3.27	4.89	0.08	0.35	3.52	0.60
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	41	74	127	2	8	88	13

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

SAMPLE DESCRIPTION:				17BH01 2.8-3.0		17BH01 4.3-4.5	17BH02 1.3-1.5	17BH02 2.2-2.5	17BH07 1.3-1.5	17HA01 0-0.1	17BH08 1.3-1.5
SAMPLE TYPE:				Soil		Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-06		2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06
Parameter	Unit	G / S	RDL	8180956	RDL	8180958	8180962	8180964	8180979	8180983	8180988
pH (CaCl2 Extraction)	pH Units		N/A	7.55	N/A	7.62	7.68	7.39	7.32	7.36	7.29
Electrical Conductivity (Sat. Paste)	dS/m		0.05	0.85	0.05	1.22	0.34	0.41	0.30	0.69	0.40
Sodium Adsorption Ratio	N/A			1.16		0.56	0.42	1.51	0.32	0.10	0.27
Saturation Percentage	%		1	60	1	51	51	45	48	49	60
Chloride, Soluble	mg/L		8	152	5	13	<5	18	<5	11	<5
Calcium, Soluble	mg/L		1	79	1	132	39	29	32	102	46
Potassium, Soluble	mg/L		2	6	2	19	<2	3	3	14	6
Magnesium, Soluble	mg/L		1	24	1	43	8	7	9	14	11
Sodium, Soluble	mg/L		2	46	2	29	11	35	8	4	8
Sulfate, Soluble	mg/L		2	338	2	544	60	39	35	16	58
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	N/A	0	0	0	0	0	0
Calcium, Soluble (meq/L)	meq/L		0.05	3.94	0.05	6.59	1.95	1.45	1.60	5.09	2.30
Calcium, Soluble (mg/kg)	mg/kg		1	47	1	67	20	13	15	50	28
Chloride, Soluble (meq/L)	meq/L		0.06	4.29	0.06	0.37	<0.06	0.51	<0.06	0.31	<0.06
Chloride, Soluble (mg/kg)	mg/kg		2	91	2	7	<2	8	<2	5	<2
Magnesium, Soluble (meq/L)	meq/L		0.08	1.97	0.08	3.54	0.66	0.58	0.74	1.15	0.91
Magnesium, Soluble (mg/kg)	mg/kg		1	14	1	22	4	3	4	7	7
Potassium, Soluble (meq/L)	meq/L		0.05	0.15	0.05	0.49	<0.05	0.08	0.08	0.36	0.15
Potassium, Soluble (mg/kg)	mg/kg		2	4	2	10	<2	<2	<2	7	4
Sodium, Soluble (meq/L)	meq/L		0.09	2.00	0.09	1.26	0.48	1.52	0.35	0.17	0.35
Sodium, Soluble (mg/kg)	mg/kg		2	28	2	15	6	16	4	2	5
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	7.04	0.04	11.3	1.25	0.81	0.73	0.33	1.21
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	203	2	277	31	18	17	8	35

Certified By:

Results relate only to the items tested and to all the items tested

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

SAMPLE DESCRIPTION:				17BH09 0.8-1.0	17BH10 0.8-1.0	17BH11 1.3-1.5	17BH12 1.3-1.5	17BH13 0.3-0.5	17BH18 0.3-0.5	17BH18 1.3-1.5	17BH18 2.2-2.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-07	2017-02-07	2017-02-07
Parameter	Unit	G / S	RDL	8180994	8181001	8181009	8181016	8181021	8181031	8181034	8181037
pH (CaCl2 Extraction)	pH Units		N/A	7.32	7.38	7.44	7.44	7.48	7.50	7.36	7.48
Electrical Conductivity (Sat. Paste)	dS/m		0.05	0.56	0.70	0.50	0.78	0.32	0.57	0.55	0.48
Sodium Adsorption Ratio	N/A			0.31	0.32	0.28	0.28	0.69	0.34	0.54	0.81
Saturation Percentage	%		1	60	50	51	49	48	51	46	46
Chloride, Soluble	mg/L		5	7	7	8	15	7	15	40	45
Calcium, Soluble	mg/L		1	67	90	56	95	27	66	61	43
Potassium, Soluble	mg/L		2	3	3	4	4	2	3	<2	<2
Magnesium, Soluble	mg/L		1	16	20	14	25	8	16	15	11
Sodium, Soluble	mg/L		2	11	13	9	12	16	12	18	23
Sulfate, Soluble	mg/L		2	156	248	124	245	40	137	49	25
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	0	0	0	0	0	0	0
Calcium, Soluble (meq/L)	meq/L		0.05	3.34	4.49	2.79	4.74	1.35	3.29	3.04	2.15
Calcium, Soluble (mg/kg)	mg/kg		1	40	45	29	47	13	34	28	20
Chloride, Soluble (meq/L)	meq/L		0.06	0.20	0.20	0.23	0.42	0.20	0.42	1.13	1.27
Chloride, Soluble (mg/kg)	mg/kg		2	4	4	4	7	3	8	18	21
Magnesium, Soluble (meq/L)	meq/L		0.08	1.32	1.65	1.15	2.06	0.66	1.32	1.23	0.91
Magnesium, Soluble (mg/kg)	mg/kg		1	10	10	7	12	4	8	7	5
Potassium, Soluble (meq/L)	meq/L		0.05	0.08	0.08	0.10	0.10	0.05	0.08	<0.05	<0.05
Potassium, Soluble (mg/kg)	mg/kg		2	<2	<2	2	2	<2	<2	<2	<2
Sodium, Soluble (meq/L)	meq/L		0.09	0.48	0.57	0.39	0.52	0.70	0.52	0.78	1.00
Sodium, Soluble (mg/kg)	mg/kg		2	7	7	5	6	8	6	8	11
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	3.25	5.16	2.58	5.10	0.83	2.85	1.02	0.52
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	94	124	63	120	19	70	23	12

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

SAMPLE DESCRIPTION:				17BH19 1.3-1.5	17BH19 2.8-3.0	Dup A 2.8-3.0	Dup B 1.3-1.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-07	2017-02-07	2017-02-06	2017-02-06
Parameter	Unit	G / S	RDL	8181044	8181047	8181052	8181054
pH (CaCl2 Extraction)	pH Units		N/A	7.32	7.42	7.66	7.54
Electrical Conductivity (Sat. Paste)	dS/m		0.05	0.50	0.62	0.64	0.35
Sodium Adsorption Ratio	N/A			0.17	0.57	0.30	0.45
Saturation Percentage	%		1	45	48	54	52
Chloride, Soluble	mg/L		5	17	47	21	5
Calcium, Soluble	mg/L		1	63	66	67	41
Potassium, Soluble	mg/L		2	2	<2	11	<2
Magnesium, Soluble	mg/L		1	17	16	21	8
Sodium, Soluble	mg/L		2	6	20	11	12
Sulfate, Soluble	mg/L		2	36	85	233	61
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	0	0	0
Calcium, Soluble (meq/L)	meq/L		0.05	3.14	3.29	3.34	2.05
Calcium, Soluble (mg/kg)	mg/kg		1	28	32	36	21
Chloride, Soluble (meq/L)	meq/L		0.06	0.48	1.33	0.59	0.14
Chloride, Soluble (mg/kg)	mg/kg		2	8	23	11	3
Magnesium, Soluble (meq/L)	meq/L		0.08	1.40	1.32	1.73	0.66
Magnesium, Soluble (mg/kg)	mg/kg		1	8	8	11	4
Potassium, Soluble (meq/L)	meq/L		0.05	0.05	<0.05	0.28	<0.05
Potassium, Soluble (mg/kg)	mg/kg		2	<2	<2	6	<2
Sodium, Soluble (meq/L)	meq/L		0.09	0.26	0.87	0.48	0.52
Sodium, Soluble (mg/kg)	mg/kg		2	3	10	6	6
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	0.75	1.77	4.85	1.27
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	16	41	126	32

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8180932-8181054 If sodium results in mg/L are less than detection, SAR is non-calculable and is reported as 0.
Sodium Adsorption Ratio is a calculated parameter. The calculated value is the ratio of the sodium concentration in mmol/L over the square rooted sum of the calcium and magnesium concentrations in mmol/L.
Theoretical Gypsum Requirement is a calculated parameter. The calculation is from “A Comparison of Methods for Gypsum Requirement of Brine-Contaminated Soils”, Canadian Journal of Soil Science, 1998.

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Total Barium

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

SAMPLE DESCRIPTION:				17C01 0-0.2	17C01 0.3-0.5	17C01 0.8-1.0	17C02 0.8-1.0	17C02 1.7-1.9	17C02 2.8-3.0
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06
Parameter	Unit	G / S	RDL	8180930	8180931	8180932	8180943	8180945	8180947
Barium	mg/kg		0.5	268	287	375	236	292	225

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8180930-8180947 Results are based on the dry weight of the sample.

Certified By:

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AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Alcohol Analysis in Soil - Methanol

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

SAMPLE DESCRIPTION:				17BH07 0-0.2	17HA01 0-0.1	17BH08 0-0.2	17BH09 0-0.2	17BH10 0-0.2	17BH11 0-0.2	17BH12 0-0.2
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06
Parameter	Unit	G / S	RDL	8180976	8180983	8180985	8180992	8180999	8181006	8181013
Methanol	mg/kg		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate	Unit	Acceptable Limits								
4-Methyl-2-pentanone	%	50-150		101	102	99	99	98	98	99

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8180976-8181013 Analysis by GC/FID. Results are based on the dry weight of the sample.

Certified By:

Results relate only to the items tested and to all the items tested

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Glycols Analysis in Soil

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

		SAMPLE DESCRIPTION:		17BH07 0-0.2	17HA01 0-0.1	17BH08 0-0.2	17BH09 0-0.2	17BH10 0-0.2	17BH11 0-0.2	17BH12 0-0.2
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06
Parameter	Unit	G / S	RDL	8180976	8180983	8180985	8180992	8180999	8181006	8181013
Propylene Glycol	mg/kg		10	<10	<10	<10	<10	<10	<10	<10
Ethylene Glycol	mg/kg		10	<10	<10	<10	<10	<10	<10	<10
Diethylene Glycol	mg/kg		10	<10	<10	<10	<10	<10	<10	<10
Triethylene Glycol	mg/kg		10	<10	<10	<10	<10	<10	<10	<10
Tetraethylene Glycol	mg/kg		10	<10	<10	<10	<10	<10	<10	<10
Surrogate	Unit	Acceptable Limits								
Heptanol	%	50-150		77	96	83	89	93	95	99

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8180976-8181013 Analysis by GC/FID.
Results are based on the dry weight of the sample.

Certified By:

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AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1) in Soil

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

		SAMPLE DESCRIPTION:		17BH20 1.3-1.5	17BH20 2.8-3.0
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2017-02-07	2017-02-07
Parameter	Unit	G / S	RDL	8181050	8181051
Benzene	mg/kg		0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10
Surrogate	Unit	Acceptable Limits			
Toluene-d8 (BTEX)	%	50-150		105	104
Ethylbenzene-d10 (BTEX)	%	50-150		72	51

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8181050-8181051 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
Total C6 - C10 results are corrected for BTEX.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
Linearity is within 15%.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

		SAMPLE DESCRIPTION:		17BH01 1.3-1.5	17BH01 2.8-3.0	17BH01 4.3-4.5	17BH02 1.3-1.5	17BH02 2.2-2.5	17BH07 0.8-1.0	17HA01 0-0.1	17BH08 0.8-1.0
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06
Parameter	Unit	G / S	RDL	8180953	8180956	8180958	8180962	8180964	8180978	8180983	8180987
Benzene	mg/kg		0.005	<0.005	0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	0.83	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Xylenes	mg/kg		0.05	<0.05	0.93	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	41	<10	<10	<10	20	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	39	<10	<10	<10	20	<10	<10
C10 - C16 (F2)	mg/kg		10	35	66	15	<10	<10	<10	<10	<10
C16 - C34 (F3)	mg/kg		10	81	130	50	75	19	17	<10	<10
C34 - C50 (F4)	mg/kg		10	<10	13	14	<10	<10	<10	<10	<10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	17	16	12	13	14	12	9	14
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		93	90	82	79	80	94	100	94
Ethylbenzene-d10 (BTEX)	%	50-150		105	98	92	87	91	103	100	146
o-Terphenyl (F2-F4)	%	50-150		53	55	57	51	77	62	88	51

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

SAMPLE DESCRIPTION:				17BH09 0.8-1.0	17BH10 0.8-1.0	17BH11 0.8-1.0	17BH12 0.8-1.0	17BH13 0.8-1.0	17BH14 2.8-3.0	17BH15 2.8-3.0	17BH16 2.8-3.0
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-07	2017-02-07	2017-02-07
Parameter	Unit	G / S	RDL	8180994	8181001	8181008	8181015	8181022	8181027	8181028	8181029
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	<10	11	<10	<10	47	<10	<10
C16 - C34 (F3)	mg/kg		10	32	24	46	36	<10	154	105	105
C34 - C50 (F4)	mg/kg		10	<10	<10	11	<10	<10	<10	<10	<10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	14	16	15	16	13	13	11	11
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		94	94	94	79	94	103	106	86
Ethylbenzene-d10 (BTEX)	%	50-150		136	120	111	57	127	58	92	72
o-Terphenyl (F2-F4)	%	50-150		67	51	63	65	57	97	94	93

Certified By:

Results relate only to the items tested and to all the items tested

AGAT Laboratories
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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

SAMPLE DESCRIPTION:				17BH18 0.3-0.5	17BH18 1.3-1.5	17BH18 2.2-2.5	17BH19 1.3-1.5	17BH19 2.8-3.0	Dup B 1.3-1.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-07	2017-02-07	2017-02-07	2017-02-07	2017-02-07	2017-02-06
Parameter	Unit	G / S	RDL	8181031	8181034	8181037	8181044	8181047	8181054
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	48	202	<10	203	<10
C16 - C34 (F3)	mg/kg		10	37	174	353	45	283	130
C34 - C50 (F4)	mg/kg		10	15	27	27	<10	17	<10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	15	17	18	17	17	13
Surrogate	Unit	Acceptable Limits							
Toluene-d8 (BTEX)	%	50-150		94	93	94	93	94	91
Ethylbenzene-d10 (BTEX)	%	50-150		150	126	117	118	122	95
o-Terphenyl (F2-F4)	%	50-150		73	64	68	66	60	65

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

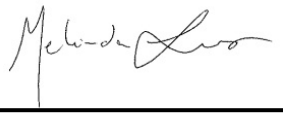
Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8180953-8180978 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

8180983 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
C>10 – C16 (F2- Napthalene) is a calculated parameter. The calculated value is F2 - Napthalene (if requested).
C>16 - C34 (F3-PAH) is a calculated parameter. The calculated value is F3-PAH (if requested).
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.
Extraction and holding times were met for this sample.

8180987-8181054 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.

Certified By:



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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:

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AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbon Analysis in Soil

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

SAMPLE DESCRIPTION:				17BH01 1.3-1.5	17BH01 2.8-3.0	17BH01 4.3-4.5	17BH12 0.8-1.0	17BH13 0.8-1.0	17BH14 2.8-3.0	17BH15 2.8-3.0	17BH16 2.8-3.0
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-06	2017-02-07	2017-02-07	2017-02-07
Parameter	Unit	G / S	RDL	8180953	8180956	8180958	8181015	8181022	8181027	8181028	8181029
Naphthalene	mg/kg		0.005	<0.005	0.823	<0.005	<0.005	<0.005	0.032	0.006	0.008
2-Methylnaphthalene	mg/kg		0.005	0.015	1.06	0.012	<0.005	<0.005	0.062	0.017	0.018
Quinoline	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluorene	mg/kg		0.02	0.05	0.41	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	mg/kg		0.02	0.07	0.48	<0.02	<0.02	<0.02	0.04	0.02	0.03
Anthracene	mg/kg		0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Fluoranthene	mg/kg		0.01	<0.01	0.10	0.01	<0.01	<0.01	0.02	0.02	0.02
Pyrene	mg/kg		0.01	0.04	0.43	0.03	0.02	<0.01	0.04	0.04	0.04
Acridine	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[a]anthracene	mg/kg		0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chrysene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[b+j]fluoranthene	mg/kg		0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Benzo[k]fluoranthene	mg/kg		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo[a]pyrene	mg/kg		0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Indeno[1,2,3-cd]pyrene	mg/kg		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Dibenzo[ah]anthracene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo[ghi]perylene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05
B[a]P TPE	mg/kg		0.023	0.023	0.025	0.023	0.023	0.023	0.023	0.023	0.023
IACR (Coarse Soil)			0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
IACR (Fine Soil)			0.11	0.11	0.12	0.11	0.11	0.11	0.11	0.11	<0.11
Surrogate	Unit	Acceptable Limits									
2-Fluorobiphenyl (PAH)	%	50-150		86	95	80	85	88	84	85	83
p-Terphenyl-d14 (PAH)	%	50-150		95	92	93	96	97	96	96	95

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbon Analysis in Soil

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

SAMPLE DESCRIPTION:				17BH18 0.3-0.5	17BH18 1.3-1.5	17BH18 2.2-2.5	17BH19 1.3-1.5	17BH20 1.3-1.5	17BH20 2.8-3.0
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-07	2017-02-07	2017-02-07	2017-02-07	2017-02-07	2017-02-07
Parameter	Unit	G / S	RDL	8181031	8181034	8181037	8181044	8181050	8181051
Naphthalene	mg/kg		0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005
2-Methylnaphthalene	mg/kg		0.005	<0.005	0.008	0.021	0.006	0.006	0.007
Quinoline	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluorene	mg/kg		0.02	<0.02	<0.02	0.05	<0.02	<0.02	<0.02
Phenanthrene	mg/kg		0.02	<0.02	<0.02	0.08	<0.02	<0.02	<0.02
Anthracene	mg/kg		0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Fluoranthene	mg/kg		0.01	<0.01	0.03	0.01	0.03	0.01	0.02
Pyrene	mg/kg		0.01	<0.01	<0.01	0.06	<0.01	<0.01	0.03
Acridine	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[a]anthracene	mg/kg		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chrysene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[b+j]fluoranthene	mg/kg		0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Benzo[k]fluoranthene	mg/kg		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo[a]pyrene	mg/kg		0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Indeno[1,2,3-cd]pyrene	mg/kg		0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Dibenzo[ah]anthracene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo[ghi]perylene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
B[a]P TPE	mg/kg		0.023	0.023	0.023	0.023	0.023	0.023	0.023
IACR (Coarse Soil)			0.05	0.05	0.05	0.05	0.05	0.05	0.05
IACR (Fine Soil)			0.11	0.11	0.11	0.11	0.11	0.11	0.11
Surrogate	Unit	Acceptable Limits							
2-Fluorobiphenyl (PAH)	%	50-150		84	87	85	88	83	87
p-Terphenyl-d14 (PAH)	%	50-150		102	94	96	96	95	92

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17N185998

PROJECT: O-35

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbon Analysis in Soil

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-03-03

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8180953-8181051 Results are based on the dry weight of the sample.
Based on GC/MS target ion analysis.
Isomers Benzo(b)fluoranthene and Benzo(j)fluoranthene have the same GC retention time and are reported as the sum of the two.
B[a]P TPE, IACR (Coarse) and IACR (Fine) are calculated parameters. They are calculated according to the Alberta Tier 1 Soil and Groundwater remediation Guidelines, May 23, 2014. Note that if the analysis returns non-detects for a parameter, ½ the detection limit is entered into the formulas.

Certified By:

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17N185998

PROJECT: O-35

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Mar 03, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)															
pH (CaCl2 Extraction)	42	8180540	7.43	7.47	0.5%	N/A	100%	90%	110%						
Electrical Conductivity (Sat. Paste)	42	8180540	0.63	0.65	3.1%	< 0.05	100%	90%	110%						
Saturation Percentage	42	8180962	51	47	8.2%	< 1	95%	80%	120%						
Chloride, Soluble	1801	8180962	4	5	NA	< 5	96%	80%	120%				94%	80%	120%
Calcium, Soluble	42	8181716	10	10	0.0%	< 1	92%	80%	120%				114%	80%	120%
Potassium, Soluble	42	8181716	<2	<2	NA	< 2	93%	80%	120%				97%	80%	120%
Magnesium, Soluble	42	8181716	4	4	NA	< 1	92%	80%	120%				99%	80%	120%
Sodium, Soluble	42	8181716	457	455	0.4%	< 2	91%	80%	120%				95%	80%	120%
Sulfate, Soluble	42	8181716	599	566	5.7%	< 2	87%	80%	120%				90%	80%	120%
CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)															
Antimony	42	8180953	0.6	0.6	NA	< 0.5	91%	80%	120%				94%	80%	120%
Arsenic	42	8180953	11.4	10.3	10.1%	< 0.5	90%	80%	120%				99%	80%	120%
Barium	42	8180953	874	853	2.4%	< 0.5	97%	80%	120%				106%	80%	120%
Beryllium	42	8180953	0.7	0.7	NA	< 0.5	101%	80%	120%				113%	80%	120%
Boron (Saturated Paste)	42	8181716	<0.5	<0.5	NA	< 0.5	102%	80%	120%				97%	80%	120%
Cadmium	42	8180953	<0.5	<0.5	NA	< 0.5	89%	80%	120%				93%	80%	120%
Chromium	42	8180953	18.5	17.3	6.7%	< 0.5	88%	80%	120%				92%	80%	120%
Chromium, Hexavalent	42	8182868	<0.3	<0.3	NA	< 0.3	96%	80%	120%				80%	80%	120%
Cobalt	42	8180953	9.3	8.9	4.4%	< 0.5	88%	80%	120%				87%	80%	120%
Copper	42	8180953	20.2	19.7	2.5%	< 0.5	85%	80%	120%				91%	80%	120%
Lead	42	8180953	11.1	10.6	4.6%	< 0.5	90%	80%	120%				94%	80%	120%
Mercury	42	8180953	<0.5	<0.5	NA	< 0.5	108%	80%	120%				97%	80%	120%
Molybdenum	42	8180953	2.2	2.0	NA	< 0.5	93%	80%	120%				99%	80%	120%
Nickel	42	8180953	25.5	24.6	3.6%	< 0.5	91%	80%	120%				92%	80%	120%
Selenium	42	8180953	0.7	0.5	NA	< 0.5	92%	80%	120%				98%	80%	120%
Silver	42	8180953	<0.5	<0.5	NA	< 0.5	86%	80%	120%				94%	80%	120%
Thallium	42	8180953	<0.5	<0.5	NA	< 0.5	89%	80%	120%				90%	80%	120%
Tin	42	8180953	0.8	0.6	NA	< 0.5	90%	80%	120%				85%	80%	120%
Uranium	42	8180953	1.2	1.1	NA	< 0.5	94%	80%	120%				89%	80%	120%
Vanadium	42	8180953	32.0	30.3	5.5%	< 0.5	91%	80%	120%				93%	80%	120%
Zinc	42	8180953	89	85	4.6%	< 1	95%	80%	120%				99%	80%	120%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated
If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD
AGAT WORK ORDER: 17N185998
PROJECT: O-35
ATTENTION TO: Larry Yoon
SAMPLING SITE:
SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Mar 03, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
pH (CaCl2 Extraction)	42	8180962	7.68	7.64	0.5%	N/A	108%	90%	110%						
Electrical Conductivity (Sat. Paste)	42	8180962	0.34	0.36	5.7%	< 0.05	98%	90%	110%						
Saturation Percentage	42	8180540	55	54	1.8%	< 1	112%	80%	120%						
Chloride, Soluble	1801	8181716	127	118	7.3%	< 5	96%	80%	120%				92%	80%	120%
Calcium, Soluble	42	8180962	39	39	0.0%	< 1	91%	80%	120%				90%	80%	120%
Potassium, Soluble	42	8180962	<2	<2	NA	< 2	94%	80%	120%				92%	80%	120%
Magnesium, Soluble	42	8180962	8	7	13.3%	< 1	91%	80%	120%				89%	80%	120%
Sodium, Soluble	42	8180962	11	11	0.0%	< 2	93%	80%	120%				85%	80%	120%
Sulfate, Soluble	42	8180962	60	61	1.7%	< 2	89%	80%	120%				92%	80%	120%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated
If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.

Particle Size by Sieve															
Sieve Analysis - 75 microns	42	8174697	46	45	1.1%	< 1	104%	80%	120%						
Soil Analysis - Barium Guidelines															
Barium, Extractable	49	8199697	19	18	5.4%	< 2	82%	80%	120%				94%	80%	120%
Barium by Fusion ICP-OES	52	8181134	2690	3050	12.5%	< 40	96%	80%	120%				104%	80%	120%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

CCME/ Tier 1 Metals - As and Se															
Arsenic	49	8189596	4.3	4.9	13.0%	< 0.5	96%	80%	120%				101%	80%	120%
Selenium	49	8189596	0.6	<0.5	NA	< 0.5	97%	80%	120%				97%	80%	120%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Soil Analysis - Total Barium															
Barium	49	8189596	254	259	1.9%	< 0.5	98%	80%	120%				101%	80%	120%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

CCME/ Tier 1 Metals															
Arsenic	61	8191355	14.6	16.4	11.6%	< 0.5	88%	80%	120%				92%	80%	120%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17N185998

PROJECT: O-35

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Mar 03, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

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SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Mar 03, 2017

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)															
Benzene	1280	8180978	<0.005	<0.005	NA	< 0.005	90%	80%	120%	81%	80%	120%	122%	60%	140%
Toluene	1280	8180978	<0.05	<0.05	NA	< 0.05	98%	80%	120%	89%	80%	120%	132%	60%	140%
Ethylbenzene	1280	8180978	<0.01	0.02	NA	< 0.01	90%	80%	120%	81%	80%	120%	111%	60%	140%
Xylenes	1280	8180978	<0.05	0.05	NA	< 0.05	104%	80%	120%	87%	80%	120%	126%	60%	140%
C6 - C10 (F1)	1280	8180978	20	<10	NA	< 10	90%	80%	120%	85%	80%	120%	114%	60%	140%
C10 - C16 (F2)	1023	8180978	<10	<10	NA	< 10	102%	80%	120%	114%	80%	120%	81%	60%	140%
C16 - C34 (F3)	1023	8180978	17	20	NA	< 10	107%	80%	120%	110%	80%	120%	78%	60%	140%
C34 - C50 (F4)	1023	8180978	<10	<10	NA	< 10	107%	80%	120%	93%	80%	120%	66%	60%	140%
Moisture Content	1023	8180978	12	12	0.0%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Polyaromatic Hydrocarbon Analysis in Soil															
Naphthalene	1067	8176514	<0.005	<0.005	NA	< 0.005	103%	70%	130%	88%	70%	130%	89%	70%	130%
2-Methylnaphthalene	1067	8176514	<0.005	<0.005	NA	< 0.005				87%	70%	130%	89%	70%	130%
Quinoline	1067	8176514	<0.05	<0.05	NA	< 0.05	100%	70%	130%	114%	70%	130%	115%	70%	130%
Acenaphthylene	1067	8176514	<0.005	<0.005	NA	< 0.005	88%	70%	130%	87%	70%	130%	90%	70%	130%
Acenaphthene	1067	8176514	<0.005	<0.005	NA	< 0.005	87%	70%	130%	75%	70%	130%	76%	70%	130%
Fluorene	1067	8176514	<0.02	<0.02	NA	< 0.02	96%	70%	130%	82%	70%	130%	84%	70%	130%
Phenanthrene	1067	8176514	<0.02	<0.02	NA	< 0.02	118%	70%	130%	96%	70%	130%	95%	70%	130%
Anthracene	1067	8176514	<0.004	<0.004	NA	< 0.004	117%	70%	130%	92%	70%	130%	100%	70%	130%
Fluoranthene	1067	8176514	<0.01	<0.01	NA	< 0.01	123%	70%	130%	116%	70%	130%	122%	70%	130%
Pyrene	1067	8176514	0.01	<0.01	NA	< 0.01	121%	70%	130%	107%	70%	130%	116%	70%	130%
Acridine	1067	8176514	<0.05	<0.05	NA	< 0.05	76%	70%	130%	127%	70%	130%	120%	70%	130%
Benzo[a]anthracene	1067	8176514	<0.02	<0.02	NA	< 0.02	93%	70%	130%	104%	70%	130%	106%	70%	130%
Chrysene	1067	8176514	<0.05	<0.05	NA	< 0.05	114%	70%	130%	97%	70%	130%	95%	70%	130%
Benzo[b+j]fluoranthene	1067	8176514	<0.03	<0.03	NA	< 0.03	91%	70%	130%	88%	70%	130%	90%	70%	130%
Benzo[k]fluoranthene	1067	8176514	<0.02	<0.02	NA	< 0.02	110%	70%	130%	81%	70%	130%	85%	70%	130%
Benzo[a]pyrene	1067	8176514	<0.03	<0.03	NA	< 0.03	86%	70%	130%	92%	70%	130%	93%	70%	130%
Indeno[1,2,3-cd]pyrene	1067	8176514	<0.02	<0.02	NA	< 0.02	103%	70%	130%	94%	70%	130%	95%	70%	130%
Dibenzo[ah]anthracene	1067	8176514	<0.005	<0.005	NA	< 0.005	109%	70%	130%	90%	70%	130%	92%	70%	130%
Benzo[ghi]perylene	1067	8176514	<0.05	<0.05	NA	< 0.05	108%	70%	130%	92%	70%	130%	92%	70%	130%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Glycols Analysis in Soil															
Propylene Glycol	21	8180983	<10	<10	NA	< 10	111%	70%	130%	107%	70%	130%	106%	60%	140%
Ethylene Glycol	21	8180983	<10	<10	NA	< 10	126%	70%	130%	124%	70%	130%	123%	60%	140%
Diethylene Glycol	21	8180983	<10	<10	NA	< 10	124%	70%	130%	120%	70%	130%	121%	60%	140%
Triethylene Glycol	21	8180983	<10	<10	NA	< 10	122%	70%	130%	118%	70%	130%	119%	60%	140%
Tetraethylene Glycol	21	8180983	<10	<10	NA	< 10	79%	70%	130%	84%	70%	130%	84%	60%	140%

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17N185998

PROJECT: O-35

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Mar 03, 2017

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)															
Benzene	1772	8154255	0.095	0.090	5.4%	< 0.005	95%	80%	120%	85%	80%	120%	108%	60%	140%
Toluene	1772	8154255	<0.05	<0.05	NA	< 0.05	92%	80%	120%	108%	80%	120%	128%	60%	140%
Ethylbenzene	1772	8154255	0.07	0.07	0.0%	< 0.01	85%	80%	120%	97%	80%	120%	117%	60%	140%
Xylenes	1772	8154255	0.18	0.20	NA	< 0.05	83%	80%	120%	104%	80%	120%	124%	60%	140%
C6 - C10 (F1)	1772	8154255	10	<10	NA	< 10	104%	80%	120%	90%	80%	120%	117%	60%	140%
C10 - C16 (F2)	6035	8177965	<10	<10	NA	< 10	113%	80%	120%	99%	80%	120%	119%	60%	140%
C16 - C34 (F3)	6035	8177965	76	77	1.3%	< 10	113%	80%	120%	100%	80%	120%	136%	60%	140%
C34 - C50 (F4)	6035	8177965	27	29	NA	< 10	113%	80%	120%	96%	80%	120%	93%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Alcohol Analysis in Soil - Methanol															
Methanol	5224	8180983	<0.5	<0.5	NA	< 0.5	114%	80%	120%	83%	70%	130%	100%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)															
Benzene	1535	8193367	<0.005	<0.005	NA	< 0.005	85%	80%	120%	83%	80%	120%	129%	60%	140%
Toluene	1535	8193367	<0.05	<0.05	NA	< 0.05	93%	80%	120%	83%	80%	120%	127%	60%	140%
Ethylbenzene	1535	8193367	<0.01	<0.01	NA	< 0.01	81%	80%	120%	82%	80%	120%	131%	60%	140%
Xylenes	1535	8193367	<0.05	<0.05	NA	< 0.05	93%	80%	120%	87%	80%	120%	140%	60%	140%
C6 - C10 (F1)	1535	8193367	<10	<10	NA	< 10	99%	80%	120%	89%	80%	120%	89%	60%	140%
C10 - C16 (F2)	1126	8191211	<10	<10	NA	< 10	102%	80%	120%	104%	80%	120%	129%	60%	140%
C16 - C34 (F3)	1126	8191211	14	20	NA	< 10	100%	80%	120%	106%	80%	120%	134%	60%	140%
C34 - C50 (F4)	1126	8191211	<10	<10	NA	< 10	95%	80%	120%	107%	80%	120%	139%	60%	140%
Moisture Content	1126	8191211	16	17	6.1%	< 1									
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Alcohol Analysis in Soil - Methanol															
Methanol	31	8181160	<0.5	<0.5	NA	< 0.5	90%	80%	120%	85%	70%	130%	110%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Polyaromatic Hydrocarbon Analysis in Soil															
Naphthalene	1075	8181050	<0.005	0.006	NA	< 0.005	103%	70%	130%	97%	70%	130%	87%	70%	130%
2-Methylnaphthalene	1075	8181050	0.006	0.011	NA	< 0.005				99%	70%	130%	89%	70%	130%
Quinoline	1075	8181050	<0.05	<0.05	NA	< 0.05	100%	70%	130%	114%	70%	130%	113%	70%	130%
Acenaphthylene	1075	8181050	<0.005	<0.005	NA	< 0.005	119%	70%	130%	111%	70%	130%	104%	70%	130%
Acenaphthene	1075	8181050	<0.005	<0.005	NA	< 0.005	93%	70%	130%	87%	70%	130%	82%	70%	130%
Fluorene	1075	8181050	<0.02	<0.02	NA	< 0.02	107%	70%	130%	99%	70%	130%	92%	70%	130%
Phenanthrene	1075	8181050	<0.02	<0.02	NA	< 0.02	108%	70%	130%	102%	70%	130%	88%	70%	130%
Anthracene	1075	8181050	<0.004	<0.004	NA	< 0.004	122%	70%	130%	111%	70%	130%	103%	70%	130%

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AGAT WORK ORDER: 17N185998

PROJECT: O-35

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SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Mar 03, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Fluoranthene	1075	8181050	0.01	0.01	NA	< 0.01	127%	70%	130%	120%	70%	130%	121%	70%	130%
Pyrene	1075	8181050	<0.01	<0.01	NA	< 0.01	123%	70%	130%	117%	70%	130%	107%	70%	130%
Acridine	1075	8181050	<0.05	<0.05	NA	< 0.05	103%	70%	130%	92%	70%	130%	104%	70%	130%
Benzo[a]anthracene	1075	8181050	<0.02	<0.02	NA	< 0.02	104%	70%	130%	104%	70%	130%	122%	70%	130%
Chrysene	1075	8181050	<0.05	<0.05	NA	< 0.05	123%	70%	130%	97%	70%	130%	97%	70%	130%
Benzo[b+j]fluoranthene	1075	8181050	<0.03	<0.03	NA	< 0.03	95%	70%	130%	79%	70%	130%	81%	70%	130%
Benzo[k]fluoranthene	1075	8181050	<0.02	<0.02	NA	< 0.02	98%	70%	130%	87%	70%	130%	81%	70%	130%
Benzo[a]pyrene	1075	8181050	<0.03	<0.03	NA	< 0.03	106%	70%	130%	107%	70%	130%	95%	70%	130%
Indeno[1,2,3-cd]pyrene	1075	8181050	<0.02	<0.02	NA	< 0.02	110%	70%	130%	99%	70%	130%	93%	70%	130%
Dibenzo[ah]anthracene	1075	8181050	<0.005	<0.005	NA	< 0.005	102%	70%	130%	95%	70%	130%	89%	70%	130%
Benzo[ghi]perylene	1075	8181050	<0.05	<0.05	NA	< 0.05	108%	70%	130%	92%	70%	130%	86%	70%	130%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Petroleum Hydrocarbons (BTEX/F1) in Soil															
Benzene	1539	8210273	<0.005	<0.005	NA	< 0.005	83%	80%	120%	81%	80%	120%	70%	60%	140%
Toluene	1539	8210273	<0.05	<0.05	NA	< 0.05	93%	80%	120%	80%	80%	120%	73%	60%	140%
Ethylbenzene	1539	8210273	<0.01	<0.01	NA	< 0.01	80%	80%	120%	80%	80%	120%	75%	60%	140%
Xylenes	1539	8210273	<0.05	<0.05	NA	< 0.05	97%	80%	120%	82%	80%	120%	69%	60%	140%
C6 - C10 (F1)	1539	8210273	<10	<10	NA	< 10	90%	80%	120%	82%	80%	120%	88%	60%	140%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

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Method Summary

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17N185998

PROJECT: O-35

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Arsenic	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Barium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Beryllium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Boron (Saturated Paste)	INOR-171-6002, 171-6201	CARTER & GREGORICH 2007	ICP/OES
Cadmium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Chromium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP/MS
Chromium, Hexavalent	INOR-171-6215	ASA 20-4.3; REISENAUER 1982	SPECTROPHOTOMETER
Cobalt	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Copper	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Lead	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Mercury	INOR-171-6006, -6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Molybdenum	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Nickel	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Selenium	INORG-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Silver	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Thallium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Tin	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Uranium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Vanadium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Zinc	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Sieve Analysis - 75 microns	INOR-171-6009	KROETSCH 2007; SHEPPARD 2007	SIEVE
Barium, Extractable	INOR-171-6007, INOR-171-6201	EPA SW - 846-3050/6010; SHEPPARD	ICP/OES
True Barium by Fusion ICP	INOR-171-60008	ASTM D4503.08	ICP/OES
pH (CaCl2 Extraction)	INOR-171-6207	SHEPPARD 2007; HENDERSHOT 2008	PH METER
Electrical Conductivity (Sat. Paste)	INO-171-6206	SHEPPARD 2007; MILLER 2007	CONDUCTIVITY METER
Sodium Adsorption Ratio	INOR-171-6201 & INOR-171-6002	McKeague 3.26	CALCULATION
Saturation Percentage	SOIL 0140; SOIL 0110; SOIL 0120	MILLER 2007; SHEPPARD 2007	GRAVIMETRIC
Chloride, Soluble			COLORIMETER
Calcium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES

Results relate only to the items tested and to all the items tested

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Method Summary

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17N185998

PROJECT: O-35

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Potassium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Magnesium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Sodium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Sulfate, Soluble	INOR-171-6201 & INOR-171-6002	SHEPPARD 2007; EATON 2005; MILLER 2007, SM 3120B	ICP/OES
Theoretical Gypsum Requirement	SOIL 0260	USDA HDBK 60, 22D	N/A

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Method Summary

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17N185998

PROJECT: O-35

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Methanol	TO 1420	EPA 8015	GC/FID
4-Methyl-2-pentanone	TO 1420	EPA 8015	GC/FID
Methanol	ORG-170-5442	EPA SW-846 8015	GC/FID
4-Methyl-2-pentanone	ORG-170-5442	EPA SW-846 8015	GC/FID
Propylene Glycol	TO-1410	EPA SW-846 8015	GC/FID
Ethylene Glycol	TO-1410	EPA SW-846 8015	GC/FID
Diethylene Glycol	TO-1410	EPA SW-846 8015	GC/FID
Triethylene Glycol	TO-1410	EPA SW-846 8015	GC/FID
Tetraethylene Glycol	TO-1410	EPA SW-846 8015	GC/FID
Heptanol	TO-1410	EPA SW-846 8015	GC/FID
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Benzene	TO 0570	EPA SW-846 8260-S	GC/MS
Toluene	TO 0570	EPA SW-846 8260-S	GC/MS
Ethylbenzene	TO 0570	EPA SW-846 8260-S	GC/MS
Xylenes	TO 0570	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	TO 0570	CCME Tier 1 Method-S L	GC/FID
C10 - C16 (F2)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C6 - C10 (F1 minus BTEX)	TO 0570	CCME Tier 1 Method-S L	GC/FID
C34 - C50 (F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C10 - C16 (F2)	TO-0560	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	TO-0560	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	TO-0560	CCME Tier 1 Method-S H	GC/FID
Moisture Content	LAB-175-4002	CCME Tier 1 Method-S %	GRAVIMETRIC
Gravimetric Heavy Hydrocarbons	TO-0560	CCME Tier 1 Method-S H	GC/FID
Moisture Content	TO-0560	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	TO 0570	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Ethylbenzene-d10 (BTEX)	TO 0570	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	TO 0560	CCME Tier 1 Method-S H	GC/FID
Naphthalene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
2-Methylnaphthalene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Quinoline	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Acenaphthylene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Acenaphthene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS

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Method Summary

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17N185998

PROJECT: O-35

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Fluorene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Phenanthrene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Anthracene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Fluoranthene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Pyrene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Acridine	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Benzo[a]anthracene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Chrysene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Benzo[b+j]fluoranthene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Benzo[k]fluoranthene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Benzo[a]pyrene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Indeno[1,2,3-cd]pyrene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Dibenzo[ah]anthracene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Benzo[ghi]perylene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
2-Fluorobiphenyl (PAH)	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
p-Terphenyl-d14 (PAH)	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
B[a]P TPE	ORG-170-5420	CCME	CALCULATION
IACR (Coarse Soil)		CCME	CALCULATION
IACR (Fine Soil)		CCME	CALCULATION

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Laboratory Use Only
Arrival Temperature: -2.1°C
AGAT Job Number: 17N185998
Date and Time: 17 FEB 09 1259

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report Information

Company: North Shore Environmental
Contact: Brent Walchuk
Address: #143, 201 Kaska Rd
Sherwood Park AB, T8A 2J6
Phone: 780-467-3354 Fax: 780-464-9622
LSD: 0-35
Client Project #:

Invoice To

Same ☐ Yes ☐ No

Company: Paramount Resources c/o North Shore
Contact: Larry Yoon
Address:
Phone: Fax:
PO/AFE#

Report Information

1. Name: Data Group
Email: data@northshoreenv.com
2. Name: Brent Walchuk
Email: bwalchuk@northshoreenv.com
3. Name: Derek Moore
Email: dmoore@northshoreenv.com

Report Format

☐ Single Sample per Page
☑ Multiple Samples per Page

Turnaround Time Required (TAT)

Regular TAT ☐ 5-7 Business Days
Rush TAT (Surcharge) ☐ Less than 24 Hours (200%) ☐ Less than 48 Hours (100%) ☑ Less than 72 Hours (50%)
Date Required: ASAP

Requirements (Selection may impact detection limits)

☑ CCME: ☐ Agricultural ☐ Industrial ☑ Residential/ Park ☐ Commercial ☐ Drinking Water ☐ FWAL
☐ AB Tier 1: ☐ Agricultural ☐ Industrial ☐ Residential/ Park ☐ Commercial ☐ Natural Area ☐ AB Surface Water
☐ BC CSR: ☐ AW ☐ IW ☐ LW ☐ DW
☐ Other: ☐ D50 (Drilling) ☐ SPIGEC ☐

LABORATORY USE (LAB ID#)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/ TIME SAMPLED	COMMENTS- SITE SAMPLE INFO, SAMPLE CONTAINMENT	# of CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/ F1-F4	Soil Metals: ☐ HWS-B ☐ Cr^{6+} ☐ Hg	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr^{6+}	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Salinity (As Received)	Microtox	☐ BTEXS/VPH/EPH ☐ LEPH/HEPH	Particle Size (75um Sieve)	HOLD FOR 60 DAYS	PRESERVED	CONTAMINATED/ HAZARDOUS
6180930	17C01 0-0.2	Soil	6-Feb-17		1												X		
931	17C01 0.3-0.5	Soil	6-Feb-17		1												X		
932	17C01 0.8-1.0	Soil	6-Feb-17		1	X										X			
933	17C01 1.3-1.5	Soil	6-Feb-17		1												X		
934	17C01 1.7-1.9	Soil	6-Feb-17		1												X		
935	17C01 2.2-2.5	Soil	6-Feb-17		1												X		
936	17C01 2.8-3.0	Soil	6-Feb-17		1												X		
937	17C01 3.2-3.4	Soil	6-Feb-17		1	X										X			
938	17C01 4.3-4.5	Soil	6-Feb-17		1												X		
939	17C01 4.7-4.9	Soil	6-Feb-17		1	X										X			
940	17C01 5.8-6.0	Soil	6-Feb-17		1												X		

Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:	
		Jason Trasmonte	9 Feb. 2017 1259H	Page 1 of 6

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Document ID: DIV-50-1507.003

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Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report to: 17N185998 @ -2.1°C

Company: _____ Same as COC#: _____

LABORATORY USE (LAB ID#)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/ TIME SAMPLED	COMMENTS- SITE SAMPLE INFO, SAMPLE CONTAINMENT	# of CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/ F1-F4	Soil Metals: ☐ HWS-B ☐ Cr6+ ☐ Hg	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr6+	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Salinity (As Received)	Microtox	☐ BTEXS/VPH/EPH ☐ LEPH/HEPH	Particle Size (75um Seive)	PAH					HOLD FOR 60 DAYS	PRESERVED	CONTAMINATED/ HAZARDOUS
8180941	17C02 0-0.2	Soil	6-Feb-17		1	X										X								
942	17C02 0.3-0.5	Soil	6-Feb-17		1																	X		
943	17C02 0.8-1.0	Soil	6-Feb-17		1																	X		
944	17C02 1.3-1.5	Soil	6-Feb-17		1																	X		
945	17C02 1.7-1.9	Soil	6-Feb-17		1	X										X								
946	17C02 2.2-2.5	Soil	6-Feb-17		1																	X		
947	17C02 2.8-3.0	Soil	6-Feb-17		1																	X		
948	17C02 3.2-3.4	Soil	6-Feb-17		1	X										X								
949	17C02 4.3-4.5	Soil	6-Feb-17		1																	X		
950	17BH01 0-0.2	Soil	6-Feb-17		1																	X		
951	17BH01 0.3-0.5	Soil	6-Feb-17		1																	X		
952	17BH01 0.8-1.0	Soil	6-Feb-17		1																	X		
953	17BH01 1.3-1.5	Soil	6-Feb-17		6	X	X	X									X							
954	17BH01 1.7-1.9	Soil	6-Feb-17		1																	X		
955	17BH01 2.2-2.5	Soil	6-Feb-17		1																	X		
956	17BH01 2.8-3.0	Soil	6-Feb-17		6	X	X	X									X							
957	17BH01 3.2-3.4	Soil	6-Feb-17		1																	X		
958	17BH01 4.3-4.5	Soil	6-Feb-17		6	X	X	X									X							

'17 FEB 09 12:59

Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign): J. Trasmonte	Date/ Time: 9 Feb. 2017 1289H
Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:
Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:

Document ID: DIV-50-1507.002

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Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report to: 17N185998 @ -2.1°C

Company: _____ Same as COC#: _____

LABORATORY USE (LAB ID#)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/ TIME SAMPLED	COMMENTS- SITE SAMPLE INFO, SAMPLE CONTAINMENT	# of CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/ F1-F4	Soil Metals: ☐ HWS-B ☐ Cr6+ ☐ Hg	Water Metals: ☐ Dissolved ☐ Total ☐ Cr6+ ☐ Hg	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Salinity (As Received)	Microtox	☐ BTEXS/VPH/EPH ☐ LEPH/HEPH	Methanol	Alcohol					HOLD FOR 60 DAYS	PRESERVED	CONTAMINATED/ HAZARDOUS
81809959	17BH02 0-0.2	Soil	6-Feb-17		1																	X		
960	17BH02 0.3-0.5	Soil	6-Feb-17		1																	X		
961	17BH02 0.8-1.0	Soil	6-Feb-17		1																	X		
962	17BH02 1.3-1.5	Soil	6-Feb-17		5	X	X	X																
963	17BH02 1.7-1.9	Soil	6-Feb-17		1																	X		
964	17BH02 2.2-2.5	Soil	6-Feb-17		5	X	X	X																
965	17BH02 2.8-3.0	Soil	6-Feb-17		1																	X		
966	17BH02 3.2-3.4	Soil	6-Feb-17		1																	X		
967	17BH02 4.3-4.5	Soil	6-Feb-17		1																	X		
968	17BH03 1.3-1.5	Soil	6-Feb-17		5																	X		
969	17BH03 2.2-2.5	Soil	6-Feb-17		5																	X		
970	17BH04 1.3-1.5	Soil	6-Feb-17		5																	X		
971	17BH04 2.2-2.5	Soil	6-Feb-17		5																	X		
972	17BH05 1.3-1.5	Soil	6-Feb-17		5																	X		
973	17BH05 2.2-2.5	Soil	6-Feb-17		5																	X		
974	17BH06 1.3-1.5	Soil	6-Feb-17		5																	X		
975	17BH06 2.2-2.5	Soil	6-Feb-17		5																	X		
976	17BH07 0-0.2	Soil	6-Feb-17		3											X								
977	17BH07 0.3-0.5	Soil	6-Feb-17		1																	X		
978	17BH07 0.8-1.0	Soil	6-Feb-17		5		X																	
979	17BH07 1.3-1.5	Soil	6-Feb-17		1	X		X																
980	17BH071.7-1.9	Soil	6-Feb-17		1																	X		
981	17BH07 2.2-2.5	Soil	6-Feb-17		5																	X		
982	17BH07 2.8-3.0	Soil	6-Feb-17		1																	X		
983	17HA01 0-0.1	Soil	6-Feb-17		2	X	X	X								X								

Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign): J. Trasmonte	Date/ Time: 9 Feb. 2017 [illegible]	Page 3 of 6
Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:	
Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:	

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Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report to: 17N185998 @ -2.1°C

Company: _____ Same as COC#: _____

LABORATORY USE (LAB ID#)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/ TIME SAMPLED	COMMENTS- SITE SAMPLE INFO, SAMPLE CONTAINMENT	# of CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/ F1-F4	Soil Metals: ☐HWS-B ☐Cr6+ ☐Hg	Water Metals: ☐Dissolved ☐Total ☐Hg ☐Cr6+	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Salinity (As Received)	Microtox	☐BTEXS/VPH/EPH ☐LEPH/HEPH	Methanol	Alcohol					HOLD FOR 60 DAYS	PRESERVED	CONTAMINATED/ HAZARDOUS
8180985	17BH08 0-0.2	Soil	6-Feb-17		3											X								
986	17BH08 0.3-0.5	Soil	6-Feb-17		1																	X		
987	17BH08 0.8-1.0	Soil	6-Feb-17		5		X																	
988	17BH08 1.3-1.5	Soil	6-Feb-17		1	X		X																
989	17BH08 1.7-1.9	Soil	6-Feb-17		1																	X		
990	17BH08 2.2-2.5	Soil	6-Feb-17		5																	X		
991	17BH08 2.8-3.0	Soil	6-Feb-17		1																	X		
992	17BH09 0-0.2	Soil	6-Feb-17		3											X								
993	17BH09 0.3-0.5	Soil	6-Feb-17		1																	X		
994	17BH09 0.8-1.0	Soil	6-Feb-17		5	X	X	X																
995	17BH09 1.3-1.5	Soil	6-Feb-17		1																	X		
996	17BH09 1.7-1.9	Soil	6-Feb-17		1																	X		
997	17BH09 2.2-2.5	Soil	6-Feb-17		5																	X		
998	17BH09 2.8-3.0	Soil	6-Feb-17		1																	X		
999	17BH10 0-0.2	Soil	6-Feb-17		3											X								
1000	17BH10 0.3-0.5	Soil	6-Feb-17		1																	X		
001	17BH10 0.8-1.0	Soil	6-Feb-17		5	X	X	X																
002	17BH10 1.3-1.5	Soil	6-Feb-17		1																	X		
003	17BH10 1.7-1.9	Soil	6-Feb-17		1																	X		
004	17BH10 2.2-2.5	Soil	6 Feb 17		5																	X		
005	17BH10 2.8-3.0	Soil	6-Feb-17		1																	X		

Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:
Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:
Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:

J. Trasmonte 9 Feb. 2017 1300H

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Document ID: DIV-50-1507.002

E 96992

AGAT Laboratories
2910 12 Street NE
Calgary, Alberta T2E 7P7
P: 403.735.2005 ▪ F: 403.735.2771
webearth.agatlabs.com

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report to: 17N185998 @ -2.1°C

Company: _____ Same as COC#: _____

LABORATORY USE (LAB ID#)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/ TIME SAMPLED	COMMENTS- SITE SAMPLE INFO, SAMPLE CONTAINMENT	# of CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/ F1-F4	Soil Metals: ☐ HWS-B ☐ Cr6+ ☐ Hg	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr6+	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Salinity (As Received)	Microtox	☐ BTEXS/VPH/EPH ☐ LEPH/HEPH	Methanol	Alcohol					HOLD FOR 60 DAYS	PRESERVED	CONTAMINATED/ HAZARDOUS
8181006	17BH11 0-0.2	Soil	6-Feb-17		3											X								
007	17BH11 0.3-0.5	Soil	6-Feb-17		1																	X		
008	17BH11 0.8-1.0	Soil	6-Feb-17		5		X																	
009	17BH11 1.3-1.5	Soil	6-Feb-17		1	X		X																
010	17BH11 1.7-1.9	Soil	6-Feb-17		1																	X		
011	17BH11 2.2-2.5	Soil	6-Feb-17		5																	X		
012	17BH11 2.8-3.0	Soil	6-Feb-17		1																	X		
013	17BH12 0-0.2	Soil	6-Feb-17		3											X								
014	17BH12 0.3-0.5	Soil	6-Feb-17		1																	X		
015	17BH12 0.8-1.0	Soil	6-Feb-17		5		X																	
016	17BH12 1.3-1.5	Soil	6-Feb-17		1	X		X																
017	17BH12 1.7-1.9	Soil	6-Feb-17		1																	X		
018	17BH12 2.2-2.5	Soil	6-Feb-17		5																	X		
019	17BH12 2.8-3.0	Soil	6-Feb-17		1																	X		
020	17BH13 0-0.2	Soil	6-Feb-17		1																	X		
021	17BH13 0.3-0.5	Soil	6-Feb-17		1	X		X																
022	17BH13 0.8-1.0	Soil	6-Feb-17		5		X																	
023	17BH13 1.3-1.5	Soil	6-Feb-17		1																	X		
024	17BH13 1.7-1.9	Soil	6-Feb-17		1																	X		
025	17BH13 2.2-2.5	Soil	6-Feb-17		5																	X		
026	17BH13 2.8-3.0	Soil	6-Feb-17		1																	X		
027	17BH14 2.8-3.0	Soil	7-Feb-17		6																	X		
028	17BH15 2.8-3.0	Soil	7-Feb-17		6																	X		
029	17BH16 2.8-3.0	Soil	7-Feb-17		6																	X		
—																								

Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:
		J. Trasmonte	9 Feb. 2017 1300H

Page 5 of 6

Document ID: DIV-50-1507.002

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Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report to: 17N185998 @ -2.1°C

Company: _____ Same as COC#: _____

LABORATORY USE (LAB ID#)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/ TIME SAMPLED	COMMENTS- SITE SAMPLE INFO, SAMPLE CONTAINMENT	# of CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/ F1-F4	Soil Metals: ☐ HWS-B ☐ Cr6+ ☐ Hg	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr6+	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Salinity (As Received)	Microtox	☐ BTEXS/VPH/EPH ☐ LEPH/HEPH	Methanol	Alcohol	PAH	Particle Size (75 um Sieve)			HOLD FOR 60 DAYS	PRESERVED	CONTAMINATED/ HAZARDOUS
8181030	17BH18 0-0.2	Soil	7-Feb-17		1																	X		
031	17BH18 0.3-0.5	Soil	7-Feb-17		6	X	X	X										X						
033	17BH18 0.8-1.0	Soil	7-Feb-17		1																	X		
034	17BH18 1.3-1.5	Soil	7-Feb-17		6	X	X	X										X						
036	17BH18 1.7-1.9	Soil	7-Feb-17		1																	X		
037	17BH18 2.2-2.5	Soil	7-Feb-17		6	X	X	X										X						
038	17BH18 2.8-3.0	Soil	7-Feb-17		1																	X		
039	17BH18 3.2-3.4	Soil	7-Feb-17		1																	X		
040	17BH18 4.3-4.5	Soil	7-Feb-17		1																	X		
041	17BH19 0-0.2	Soil	7-Feb-17		1																	X		
042	17BH19 0.3-0.5	Soil	7-Feb-17		1																	X		
043	17BH19 0.8-1.0	Soil	7-Feb-17		1																	X		
044	17BH19 1.3-1.5	Soil	7-Feb-17		6	X	X	X																
045	17BH19 1.7-1.9	Soil	7-Feb-17		1																	X		
046	17BH19 2.2-2.5	Soil	7-Feb-17		1																	X		
047	17BH19 2.8-3.0	Soil	7-Feb-17		6	X	X	X																
048	17BH19 3.2-3.4	Soil	7-Feb-17		1																	X		
049	17BH19 4.3-4.5	Soil	7-Feb-17		6																	X		
—																								
050	17BH20 1.3 1.5	Soil	7 Feb 17		6																	X		
051	17BH20 2.8-3.0	Soil	7-Feb-17		6																	X		
—																								
052	Dup A 2.8-3.0	Soil	6-Feb-17		1	X													X					
054	Dup B 1.3-1.5	Soil	6-Feb-17		5	X	X	X																
—																								

17 FEB 09 13:30

Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign): J. Tremonte	Date/ Time: 9 Feb. 2017 1300H	Page 6 of 6
Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:	
Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:	

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: North Shore

Courier: Rosenau (Prepaid) Collect

Waybill# 2500 24 392

Branch: EDM GP (FN) FM RD VAN LYD FSJ EST Other:____

If multiple sites were submitted at once: Yes No

Custody Seal Intact: Yes No (NA)

TAT: <24hr 24-48hr (48-72hr) Reg Other_____

Cooler Quantity: 14

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes No

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry:_____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken:_____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: (Icepack) (Bagged Ice) Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) -4 + -4 + -4 = -4 °C		2 (Bottle/Jar) -5 + -6 + -6 -6 °C	
3 (Bottle/Jar) -10 + -8 + -9 = -9 °C		4 (Bottle/Jar) -7 + -7 + -7 = -7 °C	
5 (Bottle/Jar) ___ + -3 + -5 = -3 °C		6 (Bottle/Jar) ___ + ___ + ___ = NA °C	
7 (Bottle/Jar) ___ + ___ + ___ = NA °C		8 (Bottle/Jar) ___ + ___ + ___ = NA °C	
9 (Bottle/Jar) ___ + ___ + ___ = NA °C		10 (Bottle/Jar) ___ + ___ + ___ = NA °C	

(If more than 10 coolers are received use another sheet of paper and attach) Continued Next page

LOGISTICS USE ONLY

Workorder No: 17N185998

Samples Damaged: Yes (No) If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial_____

General Comments: _____

* Subcontracted Analysis (See CPM)

Date issued: October 05, 2015

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: _____

Courier: _____ Prepaid Collect

Waybill#_____

Branch: EDM GP (FN) FM RD VAN LYD FSJ EST Other:_____

If multiple sites were submitted at once: Yes No

Custody Seal Intact: Yes No NA

TAT: <24hr 24-48hr 48-72hr Reg Other_____

Cooler Quantity: _____

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes No

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlprophyll* , Chloroamines*

Earliest Expiry:_____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES NO Precaution Taken:_____

Legal Samples: Yes No

International Samples: Yes No

Tape Sealed: Yes No

Coolant Used: Icepack Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar)___+___+___=NA °C 2(Bottle/Jar)___+___+___=NA °C

3 (Bottle/Jar)___+___+___=NA °C 4 (Bottle/Jar)___+___+___=NA °C

5 (Bottle/Jar)___+___+___=____ °C 6 (Bottle/Jar)___+___+___=____ °C

7 (Bottle/Jar)___+___+___=____ °C 8 (Bottle/Jar)___+___+___=____ °C

9 (Bottle/Jar)___+___+___=____ °C 10 (Bottle/Jar)___+___+___=____ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: 17N185998

Samples Damaged: Yes No If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial_____

General Comments: _____

_____

_____

_____

_____

* Subcontracted Analysis (See CPM)

Date issued: October 05, 2015

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: North Shore Env.

Courier: Rosenau Transport / Fort Nelson Prepaid Collect

Waybill# 2500 24 392

Branch [EDM] GP (FN) FM RD VAN LYD FSJ EST Other:____

If multiple sites were submitted at once: (Yes) No

Custody Seal Intact: Yes No (NA)

TAT: <24hr 24-48hr (48-72hr) Reg Other_____

Cooler Quantity: 6

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry: n/a

Hydrocarbons: Earliest Expiry Terra Core samples

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken:_____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: Icepack Bagged Ice (Free Ice) Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received -2.1°C

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) -1.9 + -2.6 + -2.4 = -2.3 °C	2 (Bottle/Jar) -1.2 + -1.4 + -1.7 = -1.4 °C
3 (Bottle/Jar) -1.4 + -1.2 + -1.4 = -2.7 °C	4 (Bottle/Jar) ___ + ___ + ___ = ___ °C
5 (Bottle/Jar) ___ + ___ + ___ = ___ °C	6 (Bottle/Jar) ___ + ___ + ___ = ___ °C
7 (Bottle/Jar) ___ + ___ + ___ = ___ °C	8 (Bottle/Jar) ___ + ___ + ___ = ___ °C
9 (Bottle/Jar) ___ + ___ + ___ = ___ °C	10 (Bottle/Jar) ___ + ___ + ___ = ___ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: 17N185998

Samples Damaged: Yes (No) If YES why?

- ALL samples with terracores submitted were NOT properly labeled. The vials & jars for BTEX/F1-F4 were not individually labeled. Terra core sets were submitted in a bag that was labeled with sample ID.

General Comments: Assign Glycols in place of Methanol - 6x 120mL jar sent to Calgary for Glycols & 1x 120mL jar sent for BTEX/F1-F4 & Glycols. sample 1008C - Duplicate vial for BTEX/F1 rec'd without sample in vial - only MeOH present. sample 1037B/C/D - COC ID is BH18 2.2-2.5, bag containing vials & jar reads BH17 2.2-2.5 - Logged following COC ID as 1037A/E/F match COC and there are no BH17 IDs listed on COC.

* Subcontracted Analysis (See CPM)

Date issued: October 05, 2015
Document ID: SR-9505.003

ROSENAU® TRANSPORT LTD.

HEAD OFFICE
PO Box 4244 STN South CRO
Edmonton, Alberta T6E 4T3
Toll Free: 1-800-371-6895 Bus: 780-431-2877
www.rosenau.ca

NOTE CAREFULLY CONDITIONS ON BACK WHICH ARE HEREBY ACCEPTED.
DAMAGE OR SHORTAGES MUST BE NOTED AT TIME OF DELIVERY.

QUOTE THIS PROBILL NUMBER WHEN REFERRING TO THIS SHIPMENT ▶ 250024392

DATE		REFERENCE NO.	TRAILER	INITIAL	PAGE	MASTER PRO
02/08/17			H 53545	PM25	1	

CONSIGNEE: EDM	SHIPPER: FNE	BILLED TO: 81255
AGAT LABS 6310 ROPER ROAD NW EDMONTON, AB	AGAT LABORATORIES LTD. 4904 48 AVENUE FORT NELSON, BC V0C 1R0	AGAT LABORATORIES LTD. 2905 12 STREET NE CALGARY, AB T2E 7J2

PCS.	DESCRIPTION	WEIGHT	RATE	PREPAID	CHARGE COLLECT	CASH COLLECT
1	Contact: SKID (14-YEL/BLK COOLERS) &C: 10 54 45 46 in CARBON LEVY SURCHARGE FUEL SURCHARGE AT % GST	Phone#: 725	780.3	95.2525		
ADVANCE			*N*			
BEYOND			DECLARED VALUE		C.O.D.	
					FEE	
REC'D BY:	DEL. BY:	DATE/TIME	TOTALS	PREPAID		

CUSTOMER COPY

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: PARAMOUNT RESOURCES LTD
4700, 888 3rd ST SW
CALGARY, AB T2P5C5
(403) 290-3600

ATTENTION TO: Larry Yoon

PROJECT: O-35 (Remote Sump)

AGAT WORK ORDER: 17F187337

SOIL ANALYSIS REVIEWED BY: Ngoc (Ruby) Vu, Lab Technician

TRACE ORGANICS REVIEWED BY: Laarni Hafso, Laboratory Manager

DATE REPORTED: Mar 06, 2017

PAGES (INCLUDING COVER): 21

VERSION*: 2

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*NOTES

VERSION 2:Added arsenic and barium to samples: 138, 141, 145, extractable barium and fusion barium to samples: 165, 174, 187, 198, 199 and BTEX/F1-F4 to samples: 180, 191, 203, 204, 205 and 206 - March 4th 2017 CS.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)
Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Results relate only to the items tested and to all the items tested
All reportable information as specified by ISO 17025:2005 is available from AGAT Laboratories upon request

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17F187337

PROJECT: O-35 (Remote Sump)

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-06

SAMPLE DESCRIPTION:				17BH52 1.5-2.0	17BH53 1.5-1.8	17BH55 1.6-2.0	17BH57 2.2-3.0	17BH57 3.0-3.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-08	2017-02-08	2017-02-08	2017-02-08	2017-02-08
Parameter	Unit	G / S	RDL	8191165	8191174	8191187	8191198	8191199
Antimony	mg/kg	20	0.5	0.5	0.6	0.5	0.5	0.5
Arsenic	mg/kg	17	0.5	10.7	11.6	11.8	10.8	12.2
Barium	mg/kg	750	0.5	1530	581	582	641	700
Beryllium	mg/kg	5	0.5	0.7	0.7	0.7	0.8	0.7
Boron (Saturated Paste)	mg/L	3.3	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	mg/kg	1.4	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	64	0.5	18.1	18.3	18.1	18.7	16.8
Chromium, Hexavalent	mg/kg	0.4	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Cobalt	mg/kg	20	0.5	8.6	9.8	9.6	9.1	9.1
Copper	mg/kg	63	0.5	19.9	20.5	20.8	18.8	19.5
Lead	mg/kg	70	0.5	10.9	11.3	11.4	11.1	10.8
Mercury	mg/kg	6.6	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg	4	0.5	2.3	2.3	2.3	2.2	2.4
Nickel	mg/kg	45	0.5	23.7	25.7	26.7	24.1	24.8
Selenium	mg/kg	1	0.5	0.6	0.7	0.6	0.6	0.6
Silver	mg/kg	20	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	mg/kg	1	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tin	mg/kg	5	0.5	0.5	<0.5	<0.5	<0.5	<0.5
Uranium	mg/kg	23	0.5	1.3	1.4	1.3	1.4	1.2
Vanadium	mg/kg	130	0.5	30.2	32.6	31.7	32.2	29.1
Zinc	mg/kg	200	1	82	84	84	78	85

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Alberta Tier 1 - Soil - Agricultural - Fine

8191165 Results are based on the dry weight of the sample.

8191174-8191199 Results are based on the dry weight of the sample.

Certified By:



Results relate only to the items tested and to all the items tested

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17F187337

PROJECT: O-35 (Remote Sump)

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME/ Tier 1 Metals

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-06

SAMPLE DESCRIPTION:				17C03 0.3-0.5	17C03 1.7-1.9	17C03 3.2-3.4
SAMPLE TYPE:				Soil	Soil	Soil
DATE SAMPLED:				2017-02-07	2017-02-07	2017-02-07
Parameter	Unit	G / S	RDL	8191138	8191141	8191145
Arsenic	mg/kg		0.5	11.1	8.7	9.0
Barium	mg/kg		0.5	185	209	168

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8191138-8191145 Results are based on the dry weight of the sample.

Certified By:

Results relate only to the items tested and to all the items tested

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17F187337

PROJECT: O-35 (Remote Sump)

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Particle Size by Sieve

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-06

SAMPLE DESCRIPTION:				17C03 0.3-0.5	17C03 2.2-2.5	17C03 4.3-4.5	Dup C 0.3-0.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-07	2017-02-07	2017-02-07	2017-02-07
Parameter	Unit	G / S	RDL	8191138	8191143	8191146	8191157
Sieve Analysis - 75 microns	%		1	33	27	26	36
Sieve Texture				Fine	Fine	Fine	Fine

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8191138-8191157 Value reported is amount of sample retained on a 75 micron sieve after wash with water and represents proportion by weight particles larger than indicated sieve size.

Certified By:

Results relate only to the items tested and to all the items tested

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 17F187337

PROJECT: O-35 (Remote Sump)

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Barium by Fusion ICP

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-06

		SAMPLE DESCRIPTION:		17BH52 1.5-2.0	17BH53 1.5-1.8	17BH55 1.6-2.0	17BH57 2.2-3.0	17BH57 3.0-3.5
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-02-08	2017-02-08	2017-02-08	2017-02-08	2017-02-08
Parameter	Unit	G / S	RDL	8191165	8191174	8191187	8191198	8191199
True Barium by Fusion ICP	mg/kg		50	1880	1330	1330	1320	1130

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8191165-8191199 Result is based on the dry weight of the sample.

Certified By:

Results relate only to the items tested and to all the items tested

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 17F187337

PROJECT: O-35 (Remote Sump)

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Extractable Barium

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-06

SAMPLE DESCRIPTION:				17BH52 1.5-2.0	17BH53 1.5-1.8	17BH55 1.6-2.0	17BH57 2.2-3.0	17BH57 3.0-3.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-08	2017-02-08	2017-02-08	2017-02-08	2017-02-08
Parameter	Unit	G / S	RDL	8191165	8191174	8191187	8191198	8191199
Barium, Extractable	mg/kg		2	38	19	26	49	72

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8191165-8191199 Result is based on the dry weight of the sample.

Certified By:

Results relate only to the items tested and to all the items tested

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17F187337

PROJECT: O-35 (Remote Sump)

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-06

SAMPLE DESCRIPTION:				17C03 0.3-0.5	17C03 2.2-2.5	17C03 4.3-4.5	17BH21 1.7-1.9	17BH25 1.7-1.9	17BH48 1.7-1.9	Dup C 0.3-0.5	17BH52 1.5-2.0
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-07	2017-02-07	2017-02-07	2017-02-07	2017-02-07	2017-02-08	2017-02-07	2017-02-08
Parameter	Unit	G / S	RDL	8191138	8191143	8191146	8191147	8191151	8191155	8191157	8191165
pH (CaCl2 Extraction)	pH Units		N/A	7.31	7.37	7.51	7.34	7.36	6.50	7.36	7.39
Electrical Conductivity (Sat. Paste)	dS/m		0.05	0.32	0.34	1.16	0.24	0.25	0.49	0.25	0.57
Sodium Adsorption Ratio	N/A			1.33	0.55	0.51	0.23	0.22	0.15	0.33	1.47
Saturation Percentage	%		1	39	44	49	46	48	59	40	57
Chloride, Soluble	mg/L		5	13	<5	22	<5	<5	6	5	92
Calcium, Soluble	mg/L		1	23	31	144	25	28	64	24	44
Potassium, Soluble	mg/L		2	<2	4	22	3	<2	6	2	3
Magnesium, Soluble	mg/L		1	5	7	31	6	7	15	6	11
Sodium, Soluble	mg/L		2	27	13	26	5	5	5	7	42
Sulfate, Soluble	mg/L		2	25	71	581	24	22	27	32	103
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	0	0	0	0	0	0	0
Calcium, Soluble (meq/L)	meq/L		0.05	1.15	1.55	7.19	1.25	1.40	3.19	1.20	2.20
Calcium, Soluble (mg/kg)	mg/kg		1	9	14	71	12	13	38	10	25
Chloride, Soluble (meq/L)	meq/L		0.06	0.37	<0.06	0.62	<0.06	<0.06	0.17	0.14	2.59
Chloride, Soluble (mg/kg)	mg/kg		2	5	<2	11	<2	<2	4	2	52
Magnesium, Soluble (meq/L)	meq/L		0.08	0.41	0.58	2.55	0.49	0.58	1.23	0.49	0.91
Magnesium, Soluble (mg/kg)	mg/kg		1	2	3	15	3	3	9	2	6
Potassium, Soluble (meq/L)	meq/L		0.05	<0.05	0.10	0.56	0.08	<0.05	0.15	0.05	0.08
Potassium, Soluble (mg/kg)	mg/kg		2	<2	<2	11	<2	<2	4	<2	<2
Sodium, Soluble (meq/L)	meq/L		0.09	1.17	0.57	1.13	0.22	0.22	0.22	0.30	1.83
Sodium, Soluble (mg/kg)	mg/kg		2	11	6	13	2	2	3	3	24
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	0.52	1.48	12.1	0.50	0.46	0.56	0.67	2.14
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	10	31	285	11	11	16	13	59

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17F187337

PROJECT: O-35 (Remote Sump)

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-06

SAMPLE DESCRIPTION:				17BH53 1.5-1.8	17BH55 1.6-2.0	17BH57 2.2-3.0	17BH57 3.0-3.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-08	2017-02-08	2017-02-08	2017-02-08
Parameter	Unit	G / S	RDL	8191174	8191187	8191198	8191199
pH (CaCl2 Extraction)	pH Units		N/A	7.29	7.40	7.37	7.41
Electrical Conductivity (Sat. Paste)	dS/m		0.05	0.56	0.54	1.20	0.97
Sodium Adsorption Ratio	N/A			0.54	0.70	5.05	3.94
Saturation Percentage	%		1	48	45	49	48
Chloride, Soluble	mg/L		5	14	25	306	241
Calcium, Soluble	mg/L		1	62	57	47	43
Potassium, Soluble	mg/L		2	3	2	<2	2
Magnesium, Soluble	mg/L		1	13	11	11	11
Sodium, Soluble	mg/L		2	18	22	148	112
Sulfate, Soluble	mg/L		2	187	164	73	68
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	0	0	0
Calcium, Soluble (meq/L)	meq/L		0.05	3.09	2.84	2.35	2.15
Calcium, Soluble (mg/kg)	mg/kg		1	30	26	23	21
Chloride, Soluble (meq/L)	meq/L		0.06	0.39	0.71	8.63	6.80
Chloride, Soluble (mg/kg)	mg/kg		2	7	11	150	116
Magnesium, Soluble (meq/L)	meq/L		0.08	1.07	0.91	0.91	0.91
Magnesium, Soluble (mg/kg)	mg/kg		1	6	5	5	5
Potassium, Soluble (meq/L)	meq/L		0.05	0.08	0.05	<0.05	0.05
Potassium, Soluble (mg/kg)	mg/kg		2	<2	<2	<2	<2
Sodium, Soluble (meq/L)	meq/L		0.09	0.78	0.96	6.44	4.87
Sodium, Soluble (mg/kg)	mg/kg		2	9	10	73	54
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	3.89	3.41	1.52	1.42
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	90	74	36	33

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8191138-8191199 If sodium results in mg/L are less than detection, SAR is non-calculable and is reported as 0.
Sodium Adsorption Ratio is a calculated parameter. The calculated value is the ratio of the sodium concentration in mmol/L over the square rooted sum of the calcium and magnesium concentrations in mmol/L.
Theoretical Gypsum Requirement is a calculated parameter. The calculation is from “A Comparison of Methods for Gypsum Requirement of Brine-Contaminated Soils”, Canadian Journal of Soil Science, 1998.

Certified By:

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AGAT WORK ORDER: 17F187337

PROJECT: O-35 (Remote Sump)

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1) in Soil (CWS)

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-06

SAMPLE DESCRIPTION:				17BH54 1.7-1.9	17BH56 1.7-1.9	17BH58 2.2-2.5	17BH58 3.2-3.4	17BH59 2.2-2.5	17BH59 3.2-3.4
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-08	2017-02-08	2017-02-08	2017-02-08	2017-02-08	2017-02-08
Parameter	Unit	G / S	RDL	8191180	8191191	8191203	8191204	8191205	8191206
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10
Moisture Content	%		1	11	12	13	12	12	12
Surrogate	Unit	Acceptable Limits							
Toluene-d8 (BTEX)	%	50-150		104	103	113	104	104	104
Ethylbenzene-d10 (BTEX)	%	50-150		84	88	97	99	111	105

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8191180-8191206 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:



Results relate only to the items tested and to all the items tested

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AGAT WORK ORDER: 17F187337

PROJECT: O-35 (Remote Sump)

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-06

SAMPLE DESCRIPTION:				17BH21 1.7-1.9	17BH25 1.7-1.9	17BH48 1.7-1.9	17BH52 1.5-2.0	17BH53 1.5-1.8	17BH55 1.6-2.0	17BH57 2.2-3.0	17BH57 3.0-3.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-07	2017-02-07	2017-02-08	2017-02-08	2017-02-08	2017-02-08	2017-02-08	2017-02-08
Parameter	Unit	G / S	RDL	8191147	8191151	8191155	8191165	8191174	8191187	8191198	8191199
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	0.12	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	0.23	<0.01	<0.01	0.24	0.25
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	1.15	<0.05	<0.05	<0.05	0.23
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	<10	<10	462	14	11	733	297
C16 - C34 (F3)	mg/kg		10	11	<10	49	437	13	30	305	254
C34 - C50 (F4)	mg/kg		10	<10	<10	<10	38	<10	<10	20	25
Gravimetric Heavy Hydrocarbons	mg/kg		1000	NA	NA	NA	NA	NA	NA	NA	NA
Moisture Content	%		1	12	13	29	15	14	15	16	18
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		101	101	80	89	103	89	78	104
Ethylbenzene-d10 (BTEX)	%	50-150		59	70	88	66	67	68	74	66
o-Terphenyl (F2-F4)	%	50-150		98	95	96	94	99	101	90	94

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8191147-8191199 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

Certified By:

Results relate only to the items tested and to all the items tested

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Certificate of Analysis

AGAT WORK ORDER: 17F187337

PROJECT: O-35 (Remote Sump)

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (F2-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-06

SAMPLE DESCRIPTION:				17BH54 1.7-1.9	17BH56 1.7-1.9	17BH58 2.2-2.5	17BH58 3.2-3.4	17BH59 2.2-2.5	17BH59 3.2-3.4
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-08	2017-02-08	2017-02-08	2017-02-08	2017-02-08	2017-02-08
Parameter	Unit	G / S	RDL	8191180	8191191	8191203	8191204	8191205	8191206
C10 - C16 (F2)	mg/kg		10	<10	<10	<10	<10	<10	<10
C16 - C34 (F3)	mg/kg		10	<10	<10	<10	46	21	<10
C34 - C50 (F4)	mg/kg		10	<10	<10	<10	<10	<10	<10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	11	12	13	12	12	12
Surrogate	Unit	Acceptable Limits							
o-Terphenyl (F2-F4)	%	50-150		90	89	106	109	93	90

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8191180-8191206 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram has returned to baseline by the retention time of nC50.
Sample holding time exceeded.

Certified By:

Results relate only to the items tested and to all the items tested

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17F187337

PROJECT: O-35 (Remote Sump)

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Mar 06, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)															
pH (CaCl2 Extraction)	47	8191174	7.29	7.31	0.3%	N/A	100%	90%	110%						
Electrical Conductivity (Sat. Paste)	47	8191174	0.56	0.58	3.5%	< 0.05	101%	90%	110%						
Saturation Percentage	47	8191174	48	48	0.0%	< 1	104%	80%	120%						
Chloride, Soluble	1806	8191174	14	16	NA	< 5	103%	80%	120%				104%	80%	120%
Calcium, Soluble	47	8191174	62	63	1.6%	< 1	91%	80%	120%				94%	80%	120%
Potassium, Soluble	47	8191174	3	3	NA	< 2	92%	80%	120%				93%	80%	120%
Magnesium, Soluble	47	8191174	13	13	0.0%	< 1	91%	80%	120%				88%	80%	120%
Sodium, Soluble	47	8191174	18	18	0.0%	< 2	91%	80%	120%				89%	80%	120%
Sulfate, Soluble	47	8191174	187	191	2.1%	< 2	104%	80%	120%				92%	80%	120%
Particle Size by Sieve															
Sieve Analysis - 75 microns	47	8186779	83	82	0.5%	< 1	107%	80%	120%						
CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)															
Antimony	47	8191375	< 0.5	< 0.5	0.0%	< 0.5	96%	80%	120%				96%	80%	120%
Arsenic	47	8191375	14.0	14.2	1.4%	< 0.5	93%	80%	120%				109%	80%	120%
Barium	47	8191375	273	284	3.9%	< 0.5	95%	80%	120%				102%	80%	120%
Beryllium	47	8191375	0.7	0.8	NA	< 0.5	118%	80%	120%				120%	80%	120%
Boron (Saturated Paste)	47	8191174	< 0.5	< 0.5	0.0%	< 0.5	115%	80%	120%				96%	80%	120%
Cadmium	47	8191375	< 0.5	< 0.5	0.0%	< 0.5	100%	80%	120%				99%	80%	120%
Chromium	47	8191375	19.3	19.6	1.5%	< 0.5	99%	80%	120%				113%	80%	120%
Chromium, Hexavalent	48	8191375	< 0.3	< 0.3	0.0%	< 0.3	100%	80%	120%				104%	80%	120%
Cobalt	47	8191375	10.6	10.6	0.0%	< 0.5	99%	80%	120%				102%	80%	120%
Copper	47	8191375	19.3	18.7	3.2%	< 0.5	97%	80%	120%				103%	80%	120%
Lead	47	8191375	11.9	12.2	2.5%	< 0.5	100%	80%	120%				105%	80%	120%
Mercury	47	8191375	< 0.5	< 0.5	0.0%	< 0.5	104%	80%	120%				102%	80%	120%
Molybdenum	47	8191375	1.6	1.6	NA	< 0.5	102%	80%	120%				107%	80%	120%
Nickel	47	8191375	26.5	26.3	0.8%	< 0.5	97%	80%	120%				101%	80%	120%
Selenium	47	8191375	0.6	0.6	NA	< 0.5	104%	80%	120%				102%	80%	120%
Silver	47	8191375	< 0.5	< 0.5	0.0%	< 0.5	100%	80%	120%				98%	80%	120%
Thallium	47	8191375	< 0.5	< 0.5	0.0%	< 0.5	97%	80%	120%				96%	80%	120%
Tin	47	8191375	0.6	<0.5	NA	< 0.5	101%	80%	120%				100%	80%	120%
Uranium	47	8191375	1.0	1.0	NA	< 0.5	105%	80%	120%				110%	80%	120%
Vanadium	47	8191375	34.2	35.6	4.0%	< 0.5	100%	80%	120%				110%	80%	120%
Zinc	47	8191375	96	90	6.5%	< 1	97%	80%	120%				101%	80%	120%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated
If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

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AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17F187337

PROJECT: O-35 (Remote Sump)

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Mar 06, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
CCME/ Tier 1 Metals															
Arsenic	61	8191355	14.6	16.4	11.6%	< 0.5	88%	80%	120%				92%	80%	120%
Barium	61	8191355	253	271	7.1%	< 0.5	95%	80%	120%				82%	80%	120%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Soil Analysis - Barium by Fusion ICP															
Barium by Fusion ICP-OES	63	8186872	19300	20100	4.1%	< 40	87%	80%	120%				97%	80%	120%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Soil Analysis - Extractable Barium															
Barium, Extractable	60	8211893	16	16	0.0%	< 2	86%	80%	120%				95%	80%	120%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By:

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17F187337

PROJECT: O-35 (Remote Sump)

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Mar 06, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)															
Benzene	1176	8191147	<0.005	<0.005	NA	< 0.005	114%	80%	120%	93%	80%	120%	114%	60%	140%
Toluene	1176	8191147	<0.05	<0.05	NA	< 0.05	90%	80%	120%	89%	80%	120%	109%	60%	140%
Ethylbenzene	1176	8191147	<0.01	<0.01	NA	< 0.01	94%	80%	120%	100%	80%	120%	120%	60%	140%
Xylenes	1176	8191147	<0.05	<0.05	NA	< 0.05	93%	80%	120%	81%	80%	120%	91%	60%	140%
C6 - C10 (F1)	1176	8191147	<10	<10	NA	< 10	88%	80%	120%	89%	80%	120%	91%	60%	140%
C10 - C16 (F2)	1030	8191147	< 10	< 10	NA	< 10	96%	80%	120%	102%	80%	120%	103%	60%	140%
C16 - C34 (F3)	1030	8191147	11	< 10	NA	< 10	100%	80%	120%	98%	80%	120%	98%	60%	140%
C34 - C50 (F4)	1030	8191147	< 10	< 10	NA	< 10	100%	80%	120%	80%	80%	120%	76%	60%	140%
Moisture Content	1030	8191147	12	13	8.0%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Petroleum Hydrocarbons (BTEX/F1) in Soil (CWS)															
Benzene	1189	8206334	0.129	0.135	4.5%	< 0.005	87%	80%	120%	92%	80%	120%	82%	60%	140%
Toluene	1189	8206334	0.22	0.21	NA	< 0.05	90%	80%	120%	87%	80%	120%	79%	60%	140%
Ethylbenzene	1189	8206334	< 0.01	< 0.01	NA	< 0.01	91%	80%	120%	100%	80%	120%	89%	60%	140%
Xylenes	1189	8206334	< 0.05	< 0.05	NA	< 0.05	95%	80%	120%	81%	80%	120%	71%	60%	140%
C6 - C10 (F1)	1189	8206334	< 10	< 10	NA	< 10	87%	80%	120%	109%	80%	120%	99%	60%	140%
Moisture Content	898	8206334	83	84	1.2%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Petroleum Hydrocarbons (F2-F4) in Soil (CWS)															
C10 - C16 (F2)	898	8206334	< 10	< 10	NA	< 10	93%	80%	120%	84%	80%	120%	72%	60%	140%
C16 - C34 (F3)	898	8206334	266	217	20.3%	< 10	96%	80%	120%	82%	80%	120%	71%	60%	140%
C34 - C50 (F4)	898	8206334	97	76	24.3%	< 10	92%	80%	120%	95%	80%	120%	86%	60%	140%
Moisture Content	898	8206334	83	84	1.2%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

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Method Summary

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17F187337

PROJECT: O-35 (Remote Sump)

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Arsenic	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Barium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Beryllium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Boron (Saturated Paste)	INOR-171-6002, 171-6201	CARTER & GREGORICH 2007	ICP/OES
Cadmium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Chromium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP/MS
Chromium, Hexavalent	INOR-171-6215	ASA 20-4.3; REISENAUER 1982	SPECTROPHOTOMETER
Cobalt	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Copper	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Lead	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Mercury	INOR-171-6006, -6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Molybdenum	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Nickel	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Selenium	INORG-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Silver	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Thallium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Tin	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Uranium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Vanadium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Zinc	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Sieve Analysis - 75 microns	INOR-171-6009	KROETSCH 2007; SHEPPARD 2007	SIEVE
True Barium by Fusion ICP	INOR-171-60008	ASTM D4503.08	ICP/OES
Barium, Extractable	INOR-171-6007, INOR-171-6201	EPA SW - 846-3050/6010; SHEPPARD	ICP/OES
pH (CaCl2 Extraction)	INOR-171-6207	SHEPPARD 2007; HENDERSHOT 2008	PH METER
Electrical Conductivity (Sat. Paste)	INO-171-6206	SHEPPARD 2007; MILLER 2007	CONDUCTIVITY METER
Sodium Adsorption Ratio	INOR-171-6201 & INOR-171-6002	McKeague 3.26	CALCULATION
Saturation Percentage	SOIL 0140; SOIL 0110; SOIL 0120	MILLER 2007; SHEPPARD 2007	GRAVIMETRIC
Chloride, Soluble			COLORIMETER
Calcium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES

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Method Summary

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17F187337

PROJECT: O-35 (Remote Sump)

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Potassium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Magnesium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Sodium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Sulfate, Soluble	INOR-171-6201 & INOR-171-6002	SHEPPARD 2007; EATON 2005; MILLER 2007, SM 3120B	ICP/OES
Theoretical Gypsum Requirement	SOIL 0260	USDA HDBK 60, 22D	N/A
Trace Organics Analysis			
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
Moisture Content	LAB-175-4002	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C10 - C16 (F2)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
o-Terphenyl (F2-F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5300, 170-5120	CCME Tier 1 Method	GRAVIMETRIC
Moisture Content	ORG-170-5120/5300	CCME Tier 1 Method-S %	GRAVIMETRIC

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AGAT Laboratories

2910 12 Street NE
Calgary, Alberta T2E 7P7
P: 403.735.2005 • F: 403.735.2771
webearth.agatlabs.com

Laboratory Use Only
Arrival Temperature: 1.7 °C
AGAT Job Number: 17F187337
Date and Time: 17FEB15 07:55

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report Information

Company: North Shore Environmental
Contact: Brent Walchuk
Address: #143, 201 Kaska Rd
Sherwood Park AB, T8A 2J6
Phone: 780-467-3354 Fax: 780-464-9622
LSD: 0-35 (Remote Sump)
Client Project #:

Invoice To

Same ☐ Yes ☐ No

Company: Paramount Resources c/o North Shore
Contact: Larry Yoon
Address:
Phone: Fax:
PO/AFE#

Report Information

1. Name: Data Group
Email: data@northshoreenv.com
2. Name: Brent Walchuk
Email: bwalchuk@northshoreenv.com
3. Name: Derek Moore
Email: dmoore@northshoreenv.com

Report Format

☐ Single Sample per Page
☑ Multiple Samples per Page

Turnaround Time Required (TAT)

Regular TAT ☐ 5-7 Business Days
Rush TAT (Surcharge) ☐ Less than 24 Hours (200%) ☐ Less than 48 Hours (100%) ☑ Less than 72 Hours (50%)
Date Required: ASAP

Requirements (Selection may impact detection limits)

☑ CCME: ☐ Agricultural ☐ Industrial ☑ Residential/ Park ☐ Commercial ☐ Drinking Water ☐ FWAL
☐ AB Tier 1: ☐ Agricultural ☐ Industrial ☐ Residential/ Park ☐ Commercial ☐ Natural Area ☐ AB Surface Water
☐ BC CSR: ☐ AW ☐ IW ☐ LW ☐ DW
☐ Other:
☑ D50 (Drilling) ☐ SPIGEC ☐

LABORATORY USE (LAB ID#)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/ TIME SAMPLED	COMMENTS- SITE SAMPLE INFO, SAMPLE CONTAINMENT	# of CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/ F1-F4	Soil Metals: ☐ HWS-B ☐ Cr^{6+} ☐ Hg	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr^{6+}	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Salinity (As Received)	Microtox	☐ BTEXS/VPH/EPH ☐ LEPH/HEPH	Particle Size (75um Sieve)	HOLD FOR 60 DAYS	PRESERVED	CONTAMINATED/ HAZARDOUS
819 1128	17C03 0-0.2	Soil	8-Feb-17		1														
138	17C03 0.3-0.5	Soil	8-Feb-17		1	X										X			
139	17C03 0.8-1.0	Soil	8-Feb-17		1														
140	17C03 1.3-1.5	Soil	8-Feb-17		1														
141	17C03 1.7-1.9	Soil	8-Feb-17		1														
143	17C03 2.2-2.5	Soil	8-Feb-17		1	X										X			
144	17C03 2.8-3.0	Soil	8-Feb-17		1														
145	17C03 3.2-3.4	Soil	8-Feb-17		1														
146	17C03 4.3-4.5	Soil	8-Feb-17		1	X										X			

Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:
		A. Benjamin	15FEB17 @ 7:55
Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:
Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:

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Document ID: DIV-50-1507.003

AGAT Laboratories
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Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report to: 17F187337 @ 1.7°C

Company: _____ Same as COC#: _____

LABORATORY USE (LAB ID#)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/ TIME SAMPLED	COMMENTS- SITE SAMPLE INFO, SAMPLE CONTAINMENT	# of CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/ F1-F4	Soil Metals: ☐ HWS-B ☐ Cr6+ ☐ Hg	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr6+	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Salinity (As Received)	Microtox	☐ BTEXS/VPH/EPH ☐ LEPH/HEPH	Particle Size (75um Seive)	PAH					HOLD FOR 60 DAYS	PRESERVED	CONTAMINATED/ HAZARDOUS
8191147	17BH21 1.7-1.9	Soil	7-Feb-16		5	X	X																	
151	17BH25 1.7-1.9	Soil	7-Feb-16		5	X	X																	
153	17BH40 1.7-1.9	Soil	8-Feb-16	Please Dispose																				
155	17BH48 1.7-1.9	Soil	8-Feb-16		5	X	X																	
157	Dup C 0.3-0.5	Soil	7-Feb-17		1	X										X								
—																								
160	17BH52 0-0.2	Soil	8-Feb-16		1																			
163	17BH52 0.3-0.5	Soil	8-Feb-16		5																	X		
164	17BH52 0.8-1.0	Soil	8-Feb-16		1																	X		
165	17BH52 1.5-2.0	Soil	8-Feb-16		5	X	X	X																
166	17BH52 2.8-3.0	Soil	8-Feb-16		1																	X		
167	17BH52 3.2-3.4	Soil	8-Feb-16		5																	X		
168	17BH52 4.3-4.5	Soil	8-Feb-16		1																	X		
169	17BH53 0-0.2	Soil	8-Feb-16		1																	X		
171	17BH53 0.3-0.5	Soil	8-Feb-16		1																	X		
173	17BH53 0.8-1.0	Soil	8-Feb-16		1																	X		
174	17BH53 1.4-1.8	Soil	8-Feb-16		5	X	X	X																
175	17BH53 2.2-2.5	Soil	8-Feb-16		1																	X		
176	17BH53 2.8-3.0	Soil	8-Feb-16		1																	X		
—																								

Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:	Page	of
Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:		
Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:		

Document ID: DIV-50-1507.002

E 97143

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Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report to: 17F187337 @ 1.7°C

Company: _____ Same as COC#: _____

LABORATORY USE (LAB ID#)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/ TIME SAMPLED	COMMENTS- SITE SAMPLE INFO, SAMPLE CONTAINMENT	# of CONTAINERS	Detailed Soil Salinity (Saturated Paste)	CCME BTEX/ F1-F4	Soil Metals: ☐ HWS-B ☐ Cr6+ ☐ Hg	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr6+	Routine Water Potability	AB Class 2 Landfill	BC Landfill	D50 Detailed Salinity (As Received)	Microtox	☐ BTEXS/VPH/EPH ☐ LEPH/HEPH	Methanol						HOLD FOR 60 DAYS	PRESERVED	CONTAMINATED/ HAZARDOUS
8191180	17BH54 1.7-1.9	Soil	8-Feb-17		5																	X		
181	17BH55 0-0.2	Soil	8-Feb-17		1																	X		
182	17BH55 0.3-0.5	Soil	8-Feb-17		1																	X		
183	17BH55 0.8-1.0	Soil	8-Feb-17		1																	X		
185	17BH55 1.3-1.5	Soil	8-Feb-17		1																	X		
187	17BH55 1.6-2.0	Soil	8-Feb-17		5	X	X	X																
189	17BH55 2.2-2.5	Soil	8-Feb-17		1																	X		
190	17BH55 2.8-3.0	Soil	8-Feb-17		1																	X		
191	17BH56 1.7-1.9	Soil	8-Feb-17		5																	X		
193	17BH57 0-0.2	Soil	8-Feb-17		1																	X		
194	17BH57 0.3-0.5	Soil	8-Feb-17		1																	X		
195	17BH57 0.8-1.0	Soil	8-Feb-17		1																	X		
196	17BH57 1.3-1.5	Soil	8-Feb-17		1																	X		
197	17BH57 1.7-1.9	Soil	8-Feb-17		1																	X		
198	17BH57 2.2-3.0	Soil	8-Feb-17		5	X	X	X																
199	17BH57 3.0-3.5	Soil	8-Feb-17		5	X	X	X																
201	17BH57 4.3-4.5	Soil	8-Feb-17		5																	X		
203	17BH58 2.2-2.5	Soil	8-Feb-17		5																	X		
204	17BH58 3.2-3.4	Soil	8-Feb-17		5																	X		
205	17BH59 2.2-2.5	Soil	8-Feb-17		5																	X		
206	17BH59 3.2-3.4	Soil	8-Feb-17		5																	X		

Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:	Page	of
Samples Relinquished By (Print Name and Sign):	Date/ Time:	Samples Relinquished By (Print Name and Sign):	Date/ Time:		
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A Bontamino 15 FEB 17 @ 7:56

E 97144

Document ID: DIV-50-1507.002

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: North Shore

Courier: Jazz - FSJ Prepaid (Collect)

Waybill# N/A

Branch [EDM] GP FN FM RD VAN LYD FSJ EST Other:____

If multiple sites were submitted at once: (Yes) No

Custody Seal Intact: Yes No (NA)

TAT: <24hr 24-48hr (48-72hr) Reg Other_____

Cooler Quantity: _____

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes No

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry:_____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken:_____

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: (Icepack) Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 2.3+2.3+0.6 = 1.7 °C 2(Bottle/Jar)___+___+___=____°C

3 (Bottle/Jar)___+___+___=____°C 4 (Bottle/Jar)___+___+___=____°C

5 (Bottle/Jar)___+___+___=____°C 6 (Bottle/Jar)___+___+___=____°C

7 (Bottle/Jar)___+___+___=____°C 8 (Bottle/Jar)___+___+___=____°C

9 (Bottle/Jar)___+___+___=____°C 10 (Bottle/Jar)___+___+___=____°C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: 17F187337

Samples Damaged: Yes (No) If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

General Comments: -ALL samples with terracores submitted were NOT properly labeled. The vials & jars for BTEX/F1-F4 were not individually labeled. Terra core sets were submitted in a bag labeled with IDs.

sample 963 (17BH52 2.2-2.5)- EXTRA REC'D - sample placed on HOLD

samples 128-146 - COC sampling date reads 08Feb17, bags read 07Feb17 - logged following COC. smpls 174A-E & 204A - mislabels → 174-COC reads 17BH53 1.4-1.8 - bag/jars read 17BH53 1.5-1.8 →204A-COC reads 17BH58 3.2-3.4 - bag reads 17BH58 3.2-3.5. Logged following COC IDs.

* Subcontracted Analysis (See CPM)

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CONTACT NAME	DATE	BILLED TO
Ryley Nielsen	FEB 14/17	AGAT LABS

CONTACT LOCATION	DELIVERY FROM
FSJ	10331 ALASKA ROAD, V1J 1B1
	DELIVERY TO: AGAT LABS 6310 Roper Rd NW, Edmonton, AB T6B 3P9

ITEM DESCRIPTION	TOTAL NUMBER OF ITEMS
8-COOLERS	8
	AUTHORIZED SHIPPER SIGNATURE

DRIVER USE ONLY

P/U DRIVER NAME:	Vanessa	P/U TIME:	AM	D/O TIME:	12:21 AM
# ITEMS P/U:	8		3:10 PM		PM

Additional Stop Details

	LOCATION	WAIT TIME	# PACKAGES P/U OR D/O
1			
2			
3			

TOTAL # ITEMS DROPPED OFF	8	D/O DRIVER NAME	
AUTHORIZED RECEIVER SIGNATURE			

HOTSHOT DETAILS

TOTAL Km		OR TOTAL CHARGE ($)	

OFFICE USE ONLY

VERIFIED BY		INVOICED BY	

Contacts: Ft.M (587)645-6364 CGY (403)660-5504 EDM (780)903-3628

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Desktop Remediation Report

PARA ET AL FORT LIARD
O-35 60-10-123-15
South Liard Field
WID# 1868

Prepared for:
Paramount Resources Ltd

SYNERGYASPEN PROJECT No. PAR6211

June 3, 2021



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II. Historical Borehole Logs
III. Water Well and Water Body Search Results

1. INTRODUCTION

At the request of Paramount Resources Limited (Paramount), SynergyAspen completed a Desktop Remediation™ (DTR) review of historical environmental site assessment information and data for the Paramount former wellsite *PARA ET AL* O-35 - 60-10-123-15, with Well Identification number 1868 (the Site). The Site is in the South Liard field of the Northwest Territories.

The scope of work for the DTR involved reviewing and assessing available analytical data to determine the applicability of various guidelines based on land uses and receptors at the Site. Recommendations for remediation at the Site will be provided based on regulatory requirements.

The areas of potential environmental concern (APECs) identified in the 2017 Phase 1 ESA for the Site by North Shore Environmental Limited (North Shore) were the Well centre; production facility areas and flare stack areas; former spill areas at Well centre and storage tank areas; the remote drilling waste disposal area (DWDA) in O-35; and the potential drilling flare pit area (North Shore, 2017a). The areas of environmental concern (AECs) identified in North Shore's 2017 Phase 2 ESA for the Site were the Production Facilities area and Flare Knockout area for marginally elevated arsenic; the Flare Pit area and Remote DWDA for hydrocarbons; and the Flare Pit area for polycyclic aromatic hydrocarbons (PAHs) (North Shore, 2017b).

2. CURRENT SITE DESCRIPTION

The well was drilled to a depth of 2121 meters between November 2 and December 4, 1999, with the rig release on December 29, 1999. The well produced natural gas from 2000 to 2005 and was abandoned in April 2008. The Site was winter-access, in the South Liard field, approximately 18 kilometres (km) southwest of Fort Liard, Northwest Territories (NT). The Site location is presented on Drawing PAR6211-001.

The Site was approximately 150m x 150m, with a proposed borrow pit/remote sump adjacent east of the Site, and a 30m x 60m campsite east of the borrow pit/remote sump. Site details and surrounding land uses are shown on Drawing PAR6211-002 and PAR6211-003. Table A below summarizes general information regarding the Site's location, topography, hydrogeology, and surrounding land uses.

TABLE A: Summary of General Information

Item	Description
Site Latitude & Longitude	60° 04' 47.73" N, 123° 21' 29.33" W
NTS Map	O-35 - 60°-10'-123°-15'
Well ID #	1868
Land Owner(s)	Crown
Drilling Dates	November 2 to December 4, 1999; RR December 29, 1999
Total Depth	2121m
Site Description & Size	Site dimensions are approximately 150 m x 150 m square, with access from the west.
Site Facilities	Wellhead was located at the centre of the Site; remote sump/borrow pit adjacent east; 30x60m campsite east of the remote sump area along seismic line
Topography:	
Regional Surface Grade	The regional grade is gently sloping northeast (0-1%) towards a tributary of the Liard River
On Site Drainage	The lease slopes northeast (0-1%) based on the survey details
Surface Cover	In 2017 vegetation included willow, spruce, pine, aspen, and alder, consistent with off-site
Geology	Bedrock geology consists of Fort Saint John Group, which is comprised of mudstone, siltstone, Shale and fine clastic sedimentary rocks, sandstone, coal and conglomerates [BCGS online map resource].
Hydrology & Hydrogeology:	
Nearest Surface Water	Government of NWT ATLAS website shows no water bodies within 500m of the Site. A borrow pit with standing water is visible ~800m east at the M-25 site.
Water Wells	Government of NWT ATLAS website shows no water wells within 500m of the Site (Appendix III).

Item	Description
Depth to Groundwater	Unknown
Groundwater Flow	Unknown but likely to the northeast towards the unnamed tributary of the Liard River
Surrounding Land Use (Site)	
North	Mixed wood Boreal forest
East	Mixed wood Boreal Forest
South	Mixed wood Boreal Forest
West	Mixed wood Boreal Forest

3. HISTORICAL REVIEW

The scope of this report included a review of available historical environmental site assessment (ESA) information for the Site. Findings from the review of the available reports are summarized below.

3.1 Phase 1 ESA - 2017

North Shore completed a Phase 1 ESA on the Site, published in March of 2017. The Phase 1 ESA indicated the well was a producing well from 2000 to 2005. Infrastructure at the Site included the wellhead, flare knockout drum with vent; pipeline; flowline; meter run; separator and methane pump building; pig launcher, and methanol tank within a containment berm. A remote sump/borrow pit was located east of the Site, with a campsite east of the remote sump area. Based on Compliance Option #2 checklist, the Remote DWDA failed for salt and barite loading calculations for the drilling waste disposal, and the Remote DWDA requires assessment (North Shore, 2017a).

Three spills were associated with the Site: 1000L of diesel fuel from a storage tank; a small amount of staining around the wellhead; and 800L of waste along the access road during the rig move (North Shore, 2017a). Areas of Potential Environmental Concern noted in the Phase 1 ESA were the well centre; production facility/flare stack area; former spill areas at well centre and tank areas; Remote DWDA at O-35; and a potential drilling flare pit area (North Shore, 2017a).

3.2 Phase 2 ESA - 2017

North Shore completed a Phase 2 ESA on the Site, published in May of 2017. The Phase 2 ESA investigated the APECs identified in the Phase 1 ESA for the Site and consisted of 63 boreholes and one hand-auger advanced at the Site and remote DWDA. Analytical results from the Phase 2 ESA were compared to the following guidelines: Canadian Council of Ministers of the Environment (CCME) 2017 Tier 1 Soil Remediation Guidelines; the 2003 Northwest Territories Environmental Guidelines for Contaminated Site Remediation; and the Alberta Tier 1 Soil and Groundwater Remediation Guidelines (North Shore, 2017b). Results showed impacts withing the subsurface (>1.5mbgs) at the Site: elevated arsenic in two samples from the Production Facilities area, and the Flare Knockout area; hydrocarbons and PAHs noted in the flare pit area; and hydrocarbons noted in the Remote DWDA (North Shore, 2017b).

4. SUMMARY OF SITE SOIL CONDITIONS

Based on a review of historical reports, SynergyAspen developed a list of areas of environmental concern (AECs) for the Site. The AECs, along with contaminants of concern (COCs) and associated regulated parameters, are shown on Table B below. The AEC is shown in Drawing PAR6211-002.

TABLE B: AECs and Associated COCs in Soil

AEC Label	AECs	Impacted Borehole(s)	COCs (depth)
A	Flare Pit Area	17BH01, 17BH14, 17BH18	Benzene and Ethylbenzene (2.8-3.0mbg) Naphthalene and Fluorene (2.8-3.0mbg), Phenanthrene (1.3-3.0mbg)
B	Remote DWDA	17BH48, 17BH52, 17BH57	Toluene (1.7-1.9mbg) Ethylbenzene and F2 PHC (1.5-3.5mbg)
C	Production Facilities	17BH08	Arsenic (1.3-1.5mbg)
D	Flare Knockout	17BH13	Arsenic (0.3-0.5mbg)

Soil Stratigraphy

Three background boreholes assessed at the Site in the North Shore 2017 Phase 2 ESA. Soil stratigraphy at background boreholes was consistent with firm clay layer from surface to between 1.0 and 3.0mbg, overlying hard clay to 6.0mbg, the total depth of assessment (North Shore, 2017b).

The stratigraphy at the Flare Pit area APEC was shown in boreholes 17BH01 and 17BH14 through 17BH20. Stratigraphy was described similar to the controls with firm clay to around 2.5mbg, overlying hard clay to 4.5mbg. Organic material was noted mixed in 17BH18 at 2.6-3.2mbg leading to an increase in volatile organic compounds measured at that depth.

The stratigraphy at the remote DWDA APEC was shown in boreholes 17BH48 through 17BH60. Stratigraphy in 17BH48 was similar to the controls with undisturbed firm clay to around 2.2mbg, overlying hard clay to 4.5mbg; the soil profile was noted as “wet due to low area” (North Shore, 2017b). Stratigraphy in 17BH52 was described similar to the controls with undisturbed firm clay to around 1.5mbg, overlying hard clay to 4.5mbg; a layer of wet “potential drilling waste” was noted from 1.5 to 2.0mbg in the borehole. Stratigraphy in 17BH57 was described similar to 17BH52 with undisturbed firm clay to around 2.2mbg, overlying hard clay to 4.5mbg; a layer of wet “potential drilling waste” was noted from 2.2 to 3.5mbg in the borehole (North Shore, 2017b).

The stratigraphy at the Production Facilities and Flare Knockout AECs was shown in boreholes 17BH08 and 17BH13 and was like the controls with firm clay to 2.2 or 3.0mbg, overlying hard clay to 4.5mbg.

Hydrogeology

There were 9 soil samples collected at varying depths from the background boreholes for grain size analysis by sieve pan. The sieve method provides the percentage split between coarse and fine-grained material based on retention on a 75µm mesh screen sieve. The grain size analysis results ranged from 3% to 33% retention on the sieve, indicating fine-grained material was dominant throughout the soil profile at the Site (North Shore, 2017b).

The shallow subsurface regional geology of the area north of Maxhamish Lake was reviewed through borehole logs from Phase 2 ESAs completed at four sites in the region. The borehole logs from the following sites were reviewed:

- PARA ET AL MAXHAMISH B- 21-K/094-O-14 (WA#03717) (North shore, 2017c)
- PARA ET AL MAXHAMISH B- 043-K/094-O-14 (WA#12563) (North shore, 2017d)
- PARA ET AL MAXHAMISH B- 083-K/094-O-14 (WA#13773) (North shore, 2017e)
- PARA ET AL MAXHAMISH A-96-J/094-O-14 (WA#13772) (North shore, 2017f)

The sites were located respectively approximately 17 kilometres (km) south-southeast, 15km south-southeast, 11.5km south-southeast, and 13.5km southeast of the O-35 Site. Soil stratigraphy at the b-21-K/94-O-14 site was topsoil and silty-clay overlying clay subsurface. Delineation boreholes around the site showed clay overlying hard clay, with minor occurrences of sandy loam. Hydraulic conductivity testing was completed at the site from 3 groundwater monitoring wells installed during the Phase 2 ESA: hydraulic conductivity values ranged from $1.0x10^{-9}$ meters per second (m/s) to $2.0x10^{-10}$ m/s, as expected from the soil type at the site (2017c).

The soil profile at background locations at the b-043-K site showed loam surface soil to 0.2m, overlying clay-loam soil to approximately 3.0mbg, followed by silty-clay-loam to 4.5mbg, and silty-loam to 6.0mbg. All samples from various depths submitted for grain-size analysis through sieve analysis showed fine-grained soils dominant in the soil profile at the site (North Shore, 2017d).

The borehole logs from background locations at the b-083-K and A-96-J sites showed consistent profiles with loam surface soil to 0.2mbg, followed by clay to approximately 3.0 mbg, overlying “hard clay” to 6.0mbg, the maximum depth of investigation; a layer of silty-clay was noted in one borehole from the a-069-J site. A sand layer was noted in one borehole from 2.4-2.8 mbg at the b-083-K site. All samples submitted for grain-size analysis through sieve analysis from both sites showed fine-grained soils dominant in the soil profile at the sites (North Shore, 2017e,f). Copies of the reviewed borehole logs and figures are provided in Appendix I and II.

From the Phase 2 ESA for the Site and hydraulic conductivity information the region, there was a sufficient minimum confining layer present between the Site and a deeper regional aquifer. Hydraulic conductivity values of the deeper soils at the Site would be expected to be low due to the hard clay soil at the Site. Therefore, drinking water (DW) standards would not apply at the Site within the shallow soils, but would apply in the deeper aquifer unit, if present. At the time of the assessments there were no water wells, water bodies, or residences within 500m of the Site.

5. ENVIRONMENTAL REGULATORY FRAMEWORK

Numerical soil standards for evaluating the results of the Phase 2 ESA were based on the CCME 2018 Canadian Environmental Soil Quality Guidelines (the CESQ), and the Northwest Territories Environmental Guidelines for Contaminated Site Remediation (the Environmental Guidelines) (Minister of the Environment and Natural Resources [ENR], 2003). The selection of applicable guideline limits in both documents are dependent upon site conditions, applicable receptors at a site, and relevant exposure pathways. From the land use definitions and soil depth considerations in the guideline documents, the Residential/Parkland land use was used to evaluate the 2017 Phase 2 ESA results for the Site.

For assessment of the available data for the O-35 Site, the *Tier 1 – Criteria-based Approach* described in the Environmental Guidelines and the CESQ guidelines were used to determine the applicable hydrocarbon and PAH concentration limits for the Site.

For the evaluation of receptors and pathways related to groundwater protection, water use considered proximity to potable water and aquatic receptors, current and potential future use of groundwater aquifers as water sources, and the potential for groundwater extraction based on the hydraulic conductivity of the shallow regional soils.

From the Site information in Section 2, there were no groundwater wells, water bodies, or residences within 500m of the Site. Based on the rationale in Section 4 regarding low hydraulic conductivity due to fine-grained soil in the region, and the lack of water bodies, water wells or residences in proximity to the Site, the Protection of Potable Groundwater, Protection of Freshwater Aquatic Life, and Protection of Livestock Watering pathways would not be operative at the Site.

The following receptor pathways were determined to be applicable at the Site:

For analytical results from soil samples <1.5mbg:	For analytical results from soil samples >1.5mbg:
• Direct Contact; and • Ecological Soil Contact.	• Ecological Soil Contact; • Nutrient and Energy Cycling.

5.1 Guideline Derivation

From the evaluation of receptor pathways at the Site, as described in the ENR *Tier 1 Criteria-based Approach,* the Protection of Potable Groundwater pathway was not applicable at the Site. Therefore, the guideline limit for F2 PHC in fine-grained sub-surface soil for Residential land use was determined to be 2200 milligrams per kilogram (mg/kg), based on the Ecological Soil Contact pathway (ENR, 2003). The guideline limit in the Environmental Guidelines for benzene was 0.5mg/kg; for toluene was 0.8mg/kg; and for ethylbenzene was 1.2mg/kg.

Guideline limits for PAHs at the Site were based on the ENR 2003 guidelines for Residential land use, and the CCME 1997 *Recommended Canadian Soil Quality Guidelines* (CCME, 1997). The guideline limits were based on the elimination the Protection of Freshwater Life pathway at the Site, and the CCME recommendation in cases where PAH guidelines were not provided, to revert to the 1997 provisional Soil Quality Guidelines. Therefore, the applicable guideline for naphthalene at the Site was determined to be 0.6mg/kg based on soil contact, for fluorene was determined to be 0.25mg/kg, and for phenanthrene was determined to be 5.0mg/kg.

6. COMPARISON OF DATA

Based on the 2017 Phase 2 ESA, soil analytical results were compared to the applicable guideline limits with respect to the operative receptor pathways at the Site. Table C below shows the historic Site soil data compared to applicable soil guidelines at the Site:

TABLE C: Soil Quality Guidelines applicable at the Site (mg/kg)

Parameter	2017 Analytical Results (North Shore, 2017b)	ENR 2003 Residential/ Parkland	ENR 2003 Residential/ Parkland*
Arsenic	12.6 - 13.0	12	-
F2	297 - 733	250	2200
Benzene	0.01	0.5	-
Ethylbenzene	0.23 – 0.83	1.2	-
Toluene	0.12	0.8	-
Naphthalene	0.032 - 0.823	0.6	-
Fluorene	0.41	0.25	-
Phenanthrene	0.07 – 0.48	5.0	-

*Guideline for Ecological Soil Contact, subsurface samples >1.5mbg

As well, further discussion regarding the applicability of various guidelines with respect to expected land uses, available receptors, and site-specific conditions is included in the next section.

7. RESULTS AND CONCLUSIONS

Analytical soil data from the 2017 North Shore Phase 2 ESA were compared to current ENR and CCME guidelines applicable to the Site. A discussion of the results is presented below.

7.1 Soil Results

7.1.1 Arsenic

Two samples at the Site, from the Production Facilities area and Flare Knockout area had concentrations of arsenic marginally above the guideline level. The CCME Residential/Parkland guideline for Arsenic in soils was based on protection of human health from soil ingestion with a limit of 12 mg/kg, and the protection of environmental health, with a soil contact limit of 19 mg/kg (CCME, 1997). The 1991 CCME interim guideline for arsenic was 50 mg/kg.

Referring to CCME fact sheets, *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health*, the fate and behaviour for arsenic according to the site-specific conditions and application of standards is as follows:

- If a spill or release led to the exceedances for arsenic, contamination from other chemicals, including hydrocarbons, salinity, and metals would be expected. As no residual hydrocarbon, salinity, or metals parameters were indicated in the analytical results for the two samples, it was unlikely that the elevated arsenic concentrations were the result of a spill or release.
- The Site is not currently occupied by humans and the Site is unlikely to be occupied by humans in the future. While the arsenic concentrations in the two soil samples were above the guideline limit for soil ingestion and soil contact, the depth of the impacts at >0.3mbg was below the depth that would require mechanical excavation to expose impacted soil. Therefore, soil ingestion and soil contact pathways would not be operative at the Site.
- If removal of the two elevated arsenic exceedances was undertaken, the heavy equipment used to excavate the soil would likely cause significant impacts to the reclaimed condition at the Site compared to the minimal risk to humans and the environment that may be imposed by the arsenic remaining *in-situ*.

- ENR Guidelines for soil in and around the Yellowknife area noted natural occurrences of arsenic up to 300mg/kg, with the average in and around the Yellowknife area of 150mg/kg (ENR, 2003). The ENR determined a remediation objective of 160mg/kg for Residential land use in Yellowknife area soils, based on accessibility (soil ingestion and soil contact) to the yard for 2 hours per day, 5 months of the year (ENR, 2003). Access to the Site by the public is currently less than 5 months of the year for a maximum concentration of 13.0mg/kg in soil. The Site is in a remote setting where access is limited to helicopter transport or winter roads, and toddlers or the public are not expected on a regular basis at the Site. The Site aligns with Industrial land uses, in contrast to the models for residential/parkland areas.

In addition, arsenic concentrations in the background/control boreholes show increasing arsenic with increasing depth. Based on the above rationale, the arsenic exceedances detected at the Site did not pose a risk to human and ecological receptors at the Site.

7.1.2 F2 Petroleum Hydrocarbons

Exceedances for F2 PHC were noted in three soil samples from the subsurface of the Remote DWDA, at depths of 1.5 to 3.5mbg. Concentrations ranged from 297 to 733 mg/kg in the three samples. Based on the summary of site conditions in Section 4, the result was compared with the ENR guideline for PHC in subsurface soils (>1.5mbg) with the Protection of Groundwater pathway removed, resulting in a guideline limit for subsurface soil of 2200 mg/kg. All samples with elevated F2 PHC results were below the applicable ENR guideline, therefore the results do not present a risk to human or ecological receptors at the Site.

7.1.3 Benzene and Toluene

Single exceedances for benzene and toluene were noted in the subsurface of the Flare Pit area and Remote DWDA respectively. The concentration of benzene, at 0.01 mg/kg in the Flare Pit area at 2.8-3.0mbg, and the toluene concentration of 0.12 mg/kg in the Remote DWDA at 1.5-2.0 mbg were compared to the ENR 2003 guideline limits in fine-grained subsurface (>1.5mbg) soil; the limit for benzene was 0.5 mg/kg, and for toluene was 0.8 mg/kg (ENR, 2003). The results for the benzene and toluene concentrations were below the applicable ENR guideline. Therefore, the single benzene and toluene exceedances noted in the subsurface do not pose a risk to human or ecological receptors at the Site.

7.1.4 Ethylbenzene

Exceedances for ethylbenzene were noted in the subsurface at the Flare Pit area and Remote DWDA. The concentration in the Flare Pit area sample was 0.83 mg/kg at 2.8-3.0 mg/kg, and in the Remote DWDA ranged from 0.23 to 0.25 mg/kg in three samples, at depths from 1.5 to 3.5mbg. The results compared to the ENR 2003 guideline limit for ethylbenzene in fine-grained subsurface (>1.5mbg) soil, with a limit of 1.2 mg/kg. The results from all samples were below the ENR guideline applicable to the Site. Therefore, the ethylbenzene exceedances noted in the subsurface at the Site do not pose a risk to human or ecological receptors.

7.1.5 Polycyclic Aromatic Hydrocarbons

Four subsurface soil samples from the Flare Pit area had concentrations of naphthalene, fluorene, and phenanthrene above the guideline limits. One sample, from 17BH01 at 2.8-3.0 mbg, had exceedances for the three PAHs; one sample from 17BH14 at 2.8-3.0mbg had an exceedance for naphthalene; and single samples from 17BH01 at 1.3-1.5mbg, and 17BH18 at 2.2-2.5mbg, had exceedances for phenanthrene only. The results were compared to guideline limits with Protection of Freshwater Life pathway removed at the Site, based on the rationale provided in Section 4.

Following revision of the guidelines, one of the two exceedances for naphthalene at 2.8-3.0m was above the revised guideline limit of 0.60mg/kg: the sample from 17BH01 at 2.8-3.0mbg with a result of 0.823mg/kg. However, the exceedance was >2.8mbg, below the depth at which mechanical excavation would be required to expose receptors to the soil.

The single exceedance for fluorene, at 0.41 mg/kg was above the applicable guideline limit of 0.25 mg/kg; however, the exceedance was at >2.8mbg, below the depth at which mechanical excavation would be required to expose receptors to the soil.

The exceedances of Phenanthrene in the 3 samples: 0.07 mg/kg at a depth of 1.3-1.5 mbg; 0.48 mg/kg at a depth of 2.2-2.5 mbg; and 0.08 mg/kg at a depth of 2.8-3.0 mbg, were in 3 different boreholes, with no other boreholes showing evidence of elevated PAHs. The results were compared to the guideline limit for phenanthrene with the Protection of Freshwater Life pathway eliminated based on information on Section 4. The results were all below the guideline limit of 5.0mg/kg for phenanthrene, therefore the exceedances did not pose a risk to receptors at the Site.

7.2 Conclusions

Based on a review of results from the 2017 Stage 2 PSI at the Site, SynergyAspen determined that the hydrocarbon and PAH exceedances at the Site were reasonably expected to pose no risk to receptors at the Site. Rationale for the determination was based on the applicable guideline limits with receptor pathways removed; the lack of associated contaminant impacts; low regional soil infiltration rates; naturally occurring metals in the soil profile; and the depth of the samples. The rationale regarding exceedances at the Site were considered to meet the ENR and CCME requirements for determining the risk to receptors at the Site.

8. CLOSURE

Based on the evaluation of the available historic data, no further environmental work is required at the Site prior to submission of the report to the ENR.

Thank you for the opportunity to conduct the work presented herein. If you have any questions or comments, please do not hesitate to contact the undersigned at 250-785-1030.

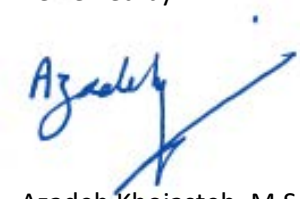
Respectfully Submitted,

SYNERGYASPEN ENVIRONMENTAL INC.

Written By:

Jason Richl, B.Sc.
Environmental Client Manager

Reviewed by:



Azadeh Khojasteh, M.Sc. M.Eng.
Environmental Project Manager



Adrian Renneberg, M.Sc.
Environmental Client Manager

9. REFERENCES

Canadian Council of Ministers of the Environment (CCME). 2018. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health: Zinc. In: Canadian Environmental Quality Guidelines. 8pp. Online: Accessed February 15, 2021.

Minister of the Environment and Natural Resources (ENR). 2003 Environmental Guidelines for Contaminated Site Remediation. Government of the Northwest Territories. November, 2003. 39pp.

North Shore Environmental Consultants Limited (North Shore). 2017a. Paramount Resources Ltd. Para et al Fort Liard O-35 60˚10' 123˚ 15'. Phase 1 Environmental Site Assessment – March 2017. March [], 2017. 46pp.

North Shore. 2017b. Paramount Resources Ltd. Para et al Fort Liard O-35 60˚10' 123˚ 15'. Phase 2 Environmental Site Assessment – May 2017. May 10, 2017. 174pp.

North Shore. 2017c. Paramount Resources Limited. 200/B-21-K/94-O-14 Stage II Preliminary Site Investigation – November 2017. November 28, 2017. 237pp.

North Shore. 2017d. Paramount Resources Limited. 200/B-43-K/94-O-14 Stage II Preliminary Site Investigation – May 2017. May 24, 2017. 114pp.

North Shore. 2017e. Paramount Resources Limited. 200/B-83-K/94-O-14 Stage II Preliminary Site Investigation – May 2017. May 30, 2017. 115pp.

North Shore. 2017f. Paramount Resources Limited. 200/A-69-J/94-O-14 Stage II Preliminary Site Investigation – March 2017. March 31, 2017. 93pp.

10. USER RELIANCE AND GENERAL LIMITATIONS

10.1 User Reliance

SynergyAspen Environmental Inc. (SynergyAspen) prepared this report for the sole use of Paramount Resources Limited (the Client). The Client was privy to the establishment of this project's scope and is aware of its terms and conditions.

Should the Client submit this report to a regulatory authority, the regulatory authority may rely on the results within the context of the document's General Limitations for the purpose of determining whether the Client is meeting (has met) its requirements concerning applicable environmental regulations.

Third party reliance is subject to the scope of work agreed upon by SynergyAspen and the Client and is only suitable within the limitations of the project/document. The activities detailed herein were performed for the Client and this document may not be appropriate for the purposes of a relying party. Application of this document for aims beyond those practically intended by the Client and SynergyAspen is at the exclusive risk of the user. SynergyAspen does not accept legal responsibility for any damages toward any third party as a result of the application, use of, or any conclusion drawn based on this report.

As far as the nature of these investigative activities involves professional opinion, SynergyAspen offers no assurance that the results contained herein support a particular course of action. The investigative activities may have included the application of judgment to scientific principles; hence certain results of this work may be based on subjective interpretation. Professional opinions expressed herein are derived from the specifics currently available within the confines of the existing information, scope of work, budget, and schedule.

10.2 General Limitations

The results and conclusions herein were developed according to the degree of care and skill generally exercised by contemporary environmental professionals within similar conditions and localities. The findings herein are somewhat reliant upon information provided by others. If any of the information is erroneous, amendments to the results, conclusions, and recommendations may be required.

The results, conclusions and recommendations SynergyAspen presents herein represent SynergyAspen's best professional judgement according to the site conditions and on available information during preparation of this report. They were determined explicitly for this site and are somewhat reliant upon visual observation of the site, subsurface investigation at specific locations and depths, and select analysis of specific materials (as detailed herein).

While this assessment has attempted to identify all areas of potential environmental concern at the Site, it is possible that other areas of potential environmental concern may have escaped detection due to imprecise government records, undocumented historical environmental accidents, or other undocumented activities that resulted in contamination.

DRAWINGS

- PAR6211-001 – Site Location Plan
- PAR6211-002 – Site Plan and Areas of Potential Environmental Concern
- PAR6211-003 – Areas of Potential Environmental Concern
- Wellsite Survey



CHK	BY	REVISION DESCRIPTION	DATE	REV.
JR	GA	ISSUED TO CLIENT	–	–
–	–	–	–	–

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
–	–	–	–
–	IMAGE BY MAXAR	2017-09-07	–

LEGEND

- DRAINAGE LINE
- ROADS
- WETLAND/MUSKEG
- OIL AND GAS WELLS
- LIARD 0-35 60-10-123-15

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. DATA COMPILED BY SYNGIS: SYNERGYASPEN GEOGRAPHIC INFORMATION SYSTEM.
3. VALTUS IMAGERY SERVICES – SEPTEMBER-OCTOBER 2011.
4. ORIGINAL DRAWING PAPER SIZE 8.5x11 INCHES.

SynergyAspen ENVIRONMENTAL

TITLE:

SITE LOCATION PLAN
(60° 04' 48.08" N, 123° 21' 22.79" W)

CLIENT NAME: PARAMOUNT RESOURCES LTD.			
SITE LOCATION:	DATE: 2021-05-17		PAR6211
0-35 60-10-123-15 LIARD	SCALE: 1:20,000	DWG No:	001
	DWN: TW CHK'D: JR		

PLOT: 20210517.0823



CHK	BY	REVISION DESCRIPTION	DATE	REV.
JR	TW	ISSUED TO CLIENT	–	0

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
07257WS	SURVEY PLAN OF WELLSITE	1999-07-02	1
–	IMAE BY MAXAR	2017-09-07	–

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM MEASUREMENTS TAKEN IN THE FIELD. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
3. ORIGINAL DRAWING PAPER SIZE 17x11 INCHES

LEGEND

- WELLBORE
- APPROXIMATE LEASE BOUNDARY
- APPROXIMATE REMOTE SUMP BOUNDARY
- ROAD CENTRELINE
- PIPELINE

SynergyAspen ENVIRONMENTAL

TITLE:

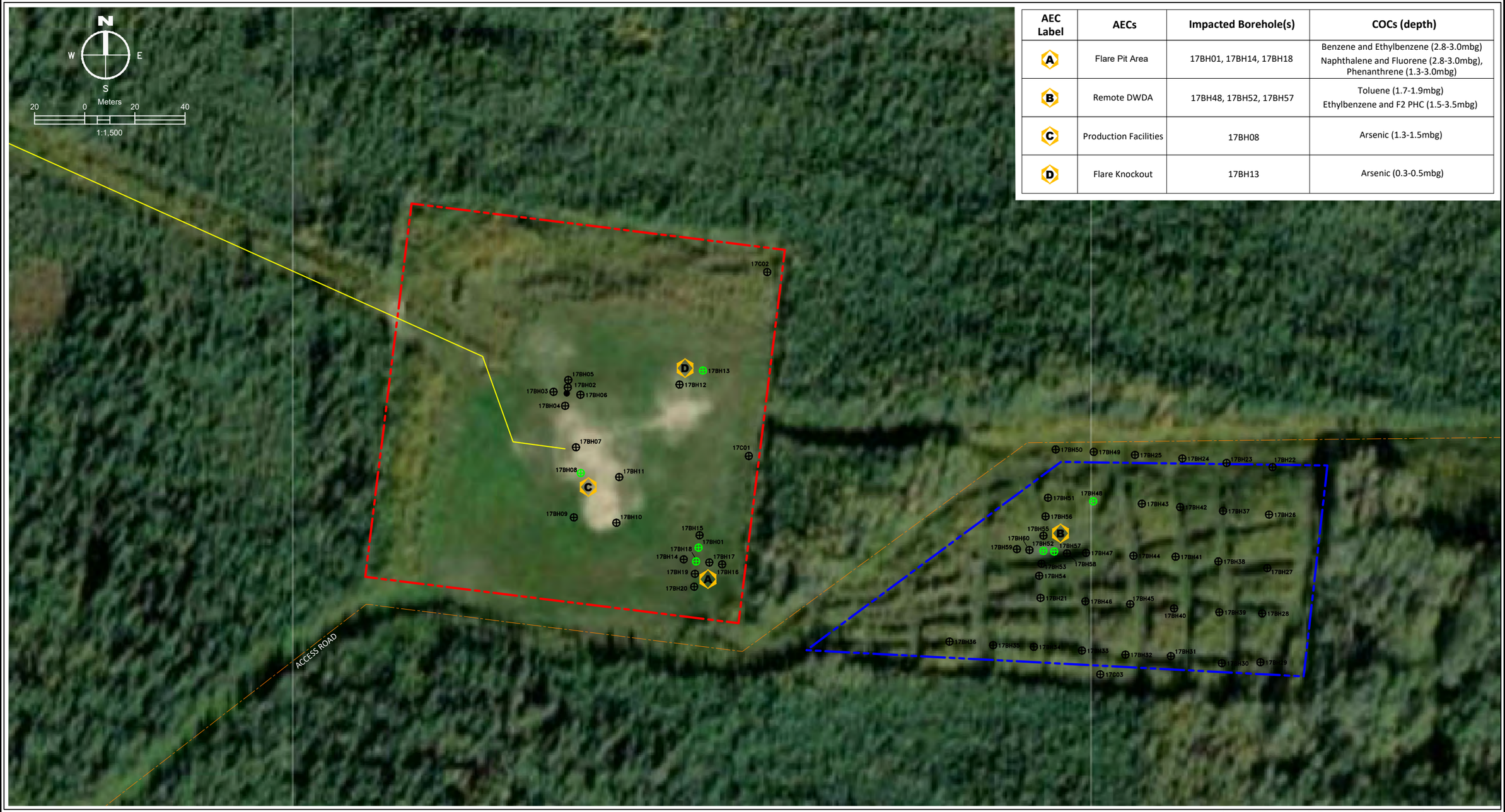
SITE PLAN

CLIENT NAME: PARAMOUNT RESOURCES LTD.

SITE LOCATION:	DATE: 2021-05-17		PAR6211
0-35 60-10-123-15 LIARD	SCALE: 1:1,500		DWG No: 002
	DWN: TW	CHK'D: JR	

FILE: P:\PARAMOUNT RESOURCES\PAR6211 - 0-35\DRAWINGS\2021\PAR6211

PLOT: 20210517.0859



AEC Label	AECs	Impacted Borehole(s)	COCs (depth)
A	Flare Pit Area	17BH01, 17BH14, 17BH18	Benzene and Ethylbenzene (2.8-3.0mbg) Naphthalene and Fluorene (2.8-3.0mbg), Phenanthrene (1.3-3.0mbg)
B	Remote DWDA	17BH48, 17BH52, 17BH57	Toluene (1.7-1.9mbg) Ethylbenzene and F2 PHC (1.5-3.5mbg)
C	Production Facilities	17BH08	Arsenic (1.3-1.5mbg)
D	Flare Knockout	17BH13	Arsenic (0.3-0.5mbg)

CHK	BY	REVISION DESCRIPTION	DATE	REV.
JR	TW	ISSUED TO CLIENT	–	0

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
07257WS	SURVEY PLAN OF WELLSITE	1999-07-02	1
–	IMAE BY MAXAR	2017-09-07	–

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM SURVEY PLAN. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
3. ORIGINAL DRAWING PAPER SIZE 17x11 INCHES

LEGEND

- WELLBORE
- APPROXIMATE BOREHOLE LOCATION (NORTH SHORE)
- APPROXIMATE BOREHOLE LOCATION (NORTH SHORE– PASS)
- APPROXIMATE LEASE BOUNDARY
- APPROXIMATE REMOTE SUMP BOUNDARY
- ROAD CENTRELINE
- PIPELINE

SynergyAspen ENVIRONMENTAL

TITLE:

AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

CLIENT NAME: PARAMOUNT RESOURCES LTD.

SITE LOCATION: 0-35 60-10-123-15 LIARD

DATE: 2021-05-17

SCALE: 1:1,500

DWN: TW CHK'D: JR

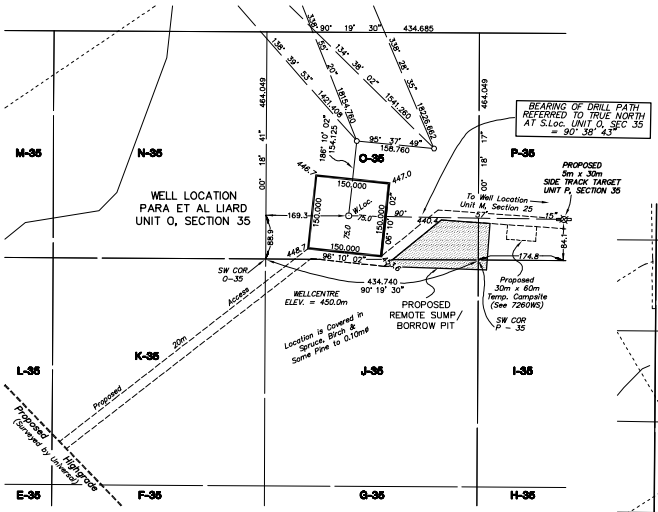
PAR6211

DWG No: 003

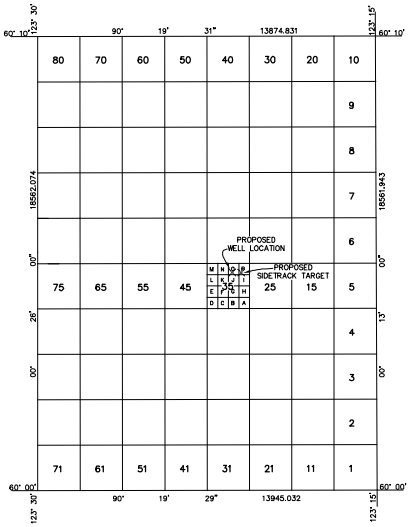
FILE: P:\PARAMOUNT RESOURCES\PAR6211 - 0-35\DRAWINGS\2021\PAR6211

AREAS REQUIRED:

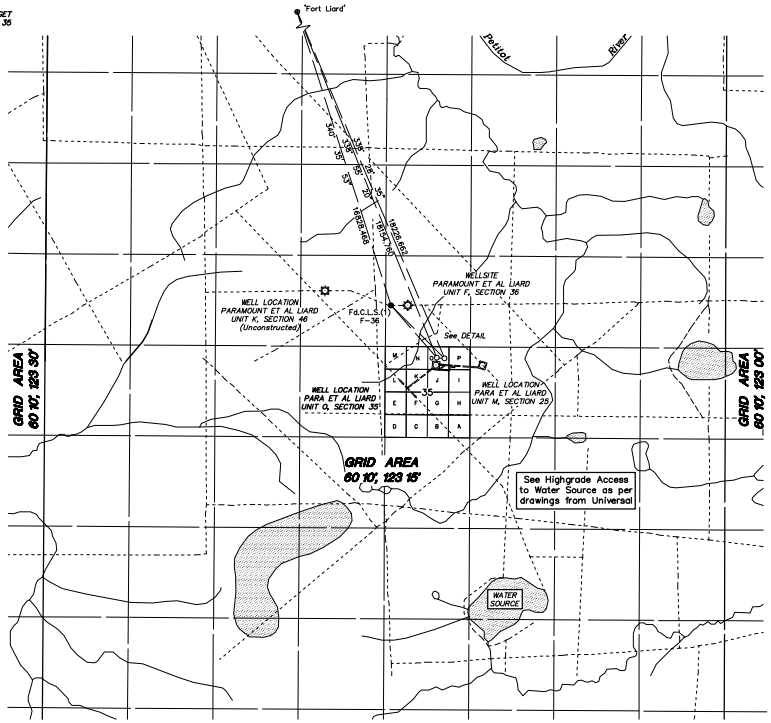
WELLSITE: 150mx150m = 2.25 ha.
REMOTE SUMP & BORROW PIT: VARIABLE = 1.51 ha.
TOTAL: 3.76 ha.



DETAIL
UNIT O, SECTION 35
SCALE 1:5,000



GRID AREA 60'10', 123'15'
SCALE 1:100,000



All coordinates shown are on 1927 North American Datum.
Wellsite control established using differentially corrected GPS observations.
Final coordinate values for control were transformed from NAD83 datum to NAD27 datum using National Transformation Version 2 program.
Geodetic Survey of Canada published coordinate values for monument 'Fort Liard' were held fixed. Adjusted values for Fd.CLS(1) F-36 Grid Area 60'10', 123'15' and comparison to published coordinates are shown below.

GEOGRAPHIC AND UTM COORDINATES, (1927 NAD)				
Station	Latitude	Longitude(W)	Northings	Eastings
CONTROL MONUMENTS				
Fort Liard (Pub. & Fixed)	60°13'59.011"	123°28'31.881"	6677255.686	473662.363
Fd.CLS(1) F-36 (Adj.)	60°14'15.436"	123°27'39.795"	6661390.271	479250.101
CLS(1) F-36 (Pub.)	60°05'27.349"	123°22'22.878"	6661390.164	479250.101
GRID AREA				
NE	60° 10' 00"	123° 15' 00"	6669792.783	486125.259
NW	60° 10' 00"	123° 30' 00"	6669871.559	472250.651
SE	60° 00' 00"	123° 15' 00"	6651230.973	486055.060
SW	60° 00' 00"	123° 30' 00"	6651310.016	472110.252
O-35, NE	60°05'00.207"	123°21'05.624"	6660543.935	480439.341
O-35, NW	60°05'00.211"	123°21'33.749"	6660546.401	480004.663
O-35, SE	60°04'45.207"	123°21'05.624"	6660079.893	480436.873
O-35, SW	60°04'45.211"	123°21'33.749"	6660082.359	480002.140
TRAVERSE STATIONS				
O-35-1	60°04'52.562"	123°21'11.558"	6660307.924	480346.367
O-35-2	60°04'53.038"	123°21'21.780"	6660323.492	480188.454
PROPOSED WELL				
O-35	60°04'48.084"	123°21'22.797"	6660170.331	480171.904
PROPOSED SIDETRACK TARGET				
P-35	60°04'47.923"	123°20'54.323"	6661063.000	480612.000

PLAN AND FIELD NOTES
OF SURVEY OF
PROPOSED EXPLORATORY WELL
PARA ET AL LIARD
IN UNIT O, SECTION 35
GRID AREA 60° 10' , 123° 15'
(DIRECTIONALLY DRILLED TO SIDETRACK TARGET IN UNIT P, SECTION 35)
NORTHWEST TERRITORIES
CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50,000
0m 500m 1000m 2000m 3000m 4000m 5000m

SURVEYED FOR
PARAMOUNT RESOURCES LTD.

BY : R.O. BLACKALL, CLS
JUNE, 1999.

LEGEND
UTM coordinates are computed for Zone 10, central meridian 123° W.
Bearings were derived from differentially corrected GPS Observations and are referred to Meridian 123° W.
Distances are expressed in metres and decimals thereof.
Distances shown in traverse are measured distances reduced to the horizontal at general ground level.
For the computation of coordinates measured distances have been reduced to the UTM plane by multiplying them by an average combined scale factor of 0.9995353. Coordinates were then adjusted to fit the control.
Distances shown on grid area subdivisions are UTM plane.
Authorized control monuments found ..... ●
Monuments placed ..... ○
Mar. denotes metal marker post 2.0m long placed 0.30m N.
Elevations were derived from Geodetic of Canada Monument 'Fort Liard' Elev. = 216.299m

Survey was completed prior to drilling; therefore well as drilled may not necessarily agree with proposed location.

I, R.O. Blackall, of the City of Fort St. John, British Columbia, Canada Lands Surveyor, make oath and say that I have in my own proper person, according to law and the instructions of the Surveyor General of Canada Lands, faithfully and correctly executed the survey shown by this plan and field notes, and that the said plan and field notes are correct and true to the best of my knowledge and belief.
SO HELP ME GOD

R.O. Blackall, CLS

Sworn before me at Fort St. John, this 06th day of July, 1999.

THIS SURVEY WAS EXECUTED DURING THE PERIOD
JUNE 25th TO JUNE 27th, 1999. BY R.O. BLACKALL, CLS

PARAMOUNT RESOURCES LIMITED

WITNESS

DATE

REV.No.	DESCRIPTION	DATE
1	ADDED SIDETRACK TARGET	05/01/28

McELHANNEY LAND SURVEYS LTD.
8808 - 72nd Street
Fort St. John, British Columbia
Phone (250)787-0356, Fax:(250)787-0310

DATE : 99/07/02 JOB No.: 3111-07257WS BY: RBC

APPENDIX I

Borehole Logs, Tables and Drawings from North Shore Preliminary Stage 2 Report
(See Stage 2 report)

APPENDIX II

Historical Borehole Logs

- 200/B-43-K/94-O-14 Stage II Preliminary Site Investigation (North Shore. 2017b)
- 200/B-83-K/94-O-14 Stage II Preliminary Site Investigation (North Shore. 2017c)
- 200/A-69-J/94-O-14 Stage II Preliminary Site Investigation (North Shore. 2017d)

Borehole Log: 17C01

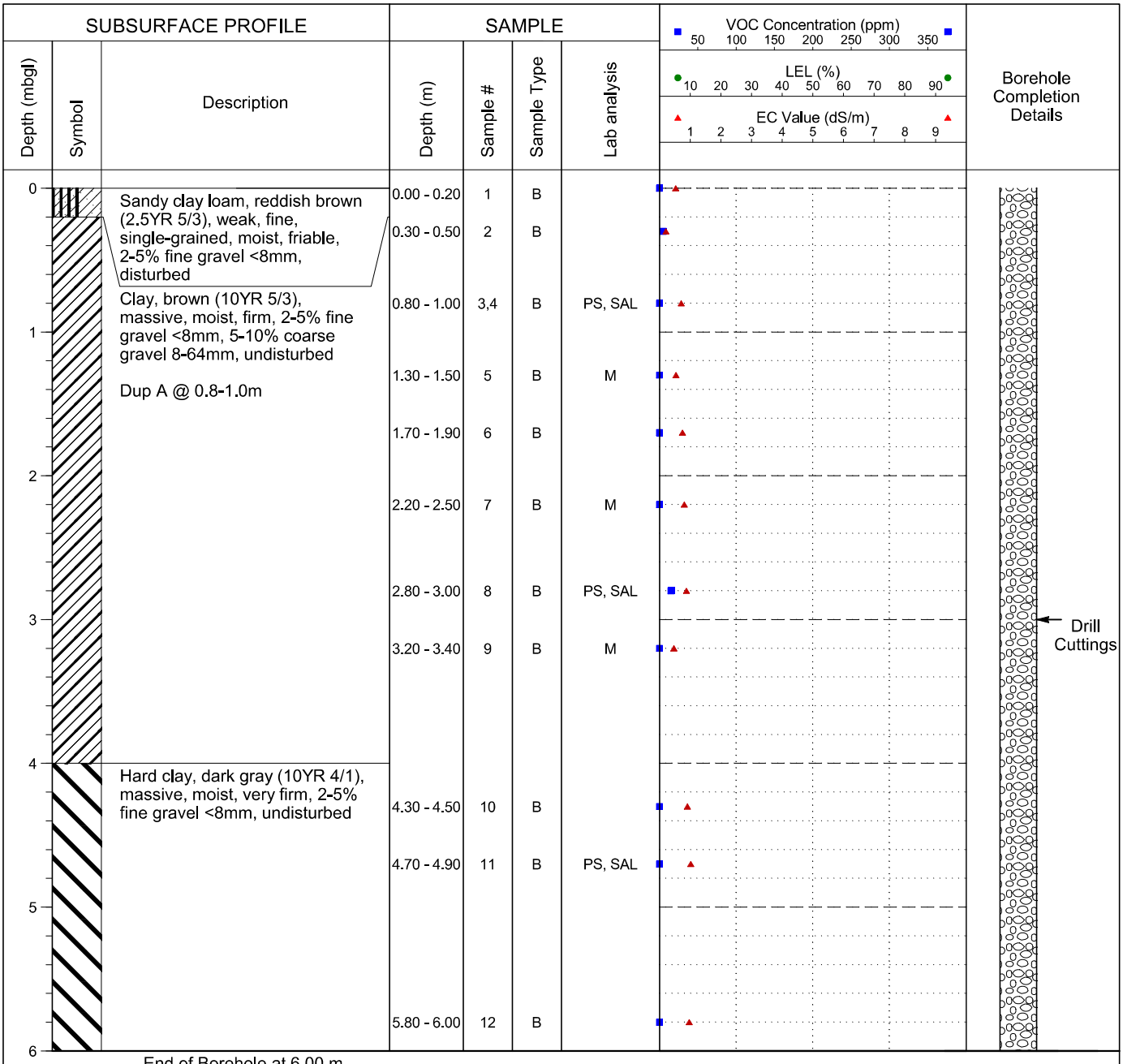
Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-021-K/094-O-14

Area of Concern: Background Control

NORTH SHORE Environmental Consultants



Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6643957 E: 485277

Drill Date: 2/15/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

NORTH SHORE
Environmental Consultants

Borehole Log: 17C02

Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-021-K/094-O-14

Area of Concern: Background Control

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0		Topsoil, Silty loam, black (10YR 2/1), weak, fine, granular, moist, friable, undisturbed, roots, silt inclusions	0.00 - 0.20	13	B			
			0.30 - 0.50	14	B	PS, SAL		
		Sandy clay, brown (10YR 4/3), massive, moist, firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, sand inclusions	0.80 - 1.00	15	B			
1			1.30 - 1.50	16	B			
			1.70 - 1.90	17	B	PS, SAL		
2			2.20 - 2.50	18	B			Drill Cuttings
		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, 5-10% cobbles 64-256mm, undisturbed, sand inclusions	2.80 - 3.00	19	B	M		
3			3.20 - 3.40	20	B	PS, SAL		
4		Large rock at 4.0m	4.30 - 4.50	21	B	M		
		End of Borehole at 4.50 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6644100 E: 485324

Drill Date: 2/15/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

NORTH SHORE
Environmental Consultants

Borehole Log: 17C03

Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-021-K/094-O-14

Area of Concern: Background Control

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Subsoil, Silty loam, light brown (10YR 6/3), weak, fine, single-grained, dry, 2% fine gravel <8mm, silt inclusions	0.00 - 0.10	22	B+J	M		
0.5		Subsoil, Silty clay loam, brown (10YR 4/3), moderate, fine, massive, moist, friable, 2% fine gravel <8mm, iron and silt inclusions	0.50 - 0.60	23	B+J	M		
1.0			0.90 - 1.00	24	B+J	M		
1.5			1.50 - 2.00	25	B+J	M		Drill Cuttings
2.0								
2.5								
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: TCL Drilling

GPS Coordinates: UTM: 10 N: 6643964 E: 485244

Drill Date: 2/17/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

Borehole Log: 17C04

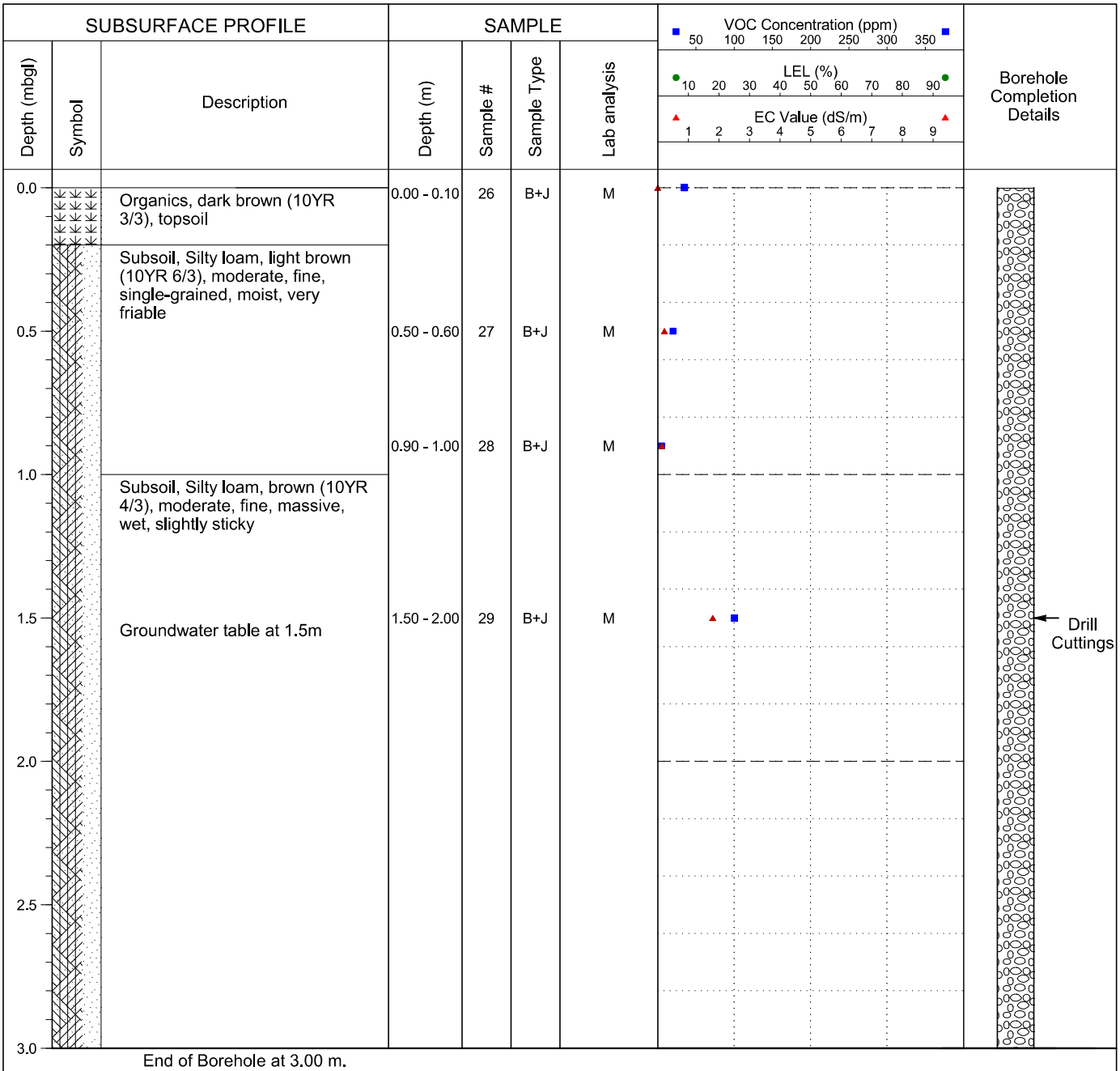
Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-021-K/094-O-14

Area of Concern: Background Control

NORTH SHORE Environmental Consultants



Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: TCL Drilling

GPS Coordinates: UTM: 10 N: 6644113 E: 485254

Drill Date: 2/17/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

Borehole Log: 17C05

Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-021-K/094-O-14

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Subsoil, Silty loam, brown (10YR 4/3), moderate, fine, massive, moist, friable, 2% fine gravel <8mm	0.00 - 0.10	30	B+J	M		
0.5			0.50 - 0.60	31	B+J	M		
1.0		Subsoil, Silty clay, brown (10YR 4/3), weak, fine, single-grained, moist, friable, 5% fine gravel <8mm, iron and sand inclusions	0.90 - 1.00	32	B+J	M		
1.5		Subsoil, Clay, brown (10YR 4/3), moderate, fine, massive, moist, very friable, 5% fine gravel <8mm, iron and silt inclusions	1.50 - 2.00	33	B+J	M		Drill Cuttings
2.0								
2.5								
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: TCL Drilling

GPS Coordinates: UTM: 10 N: 6644017 E: 485368

Drill Date: 2/17/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

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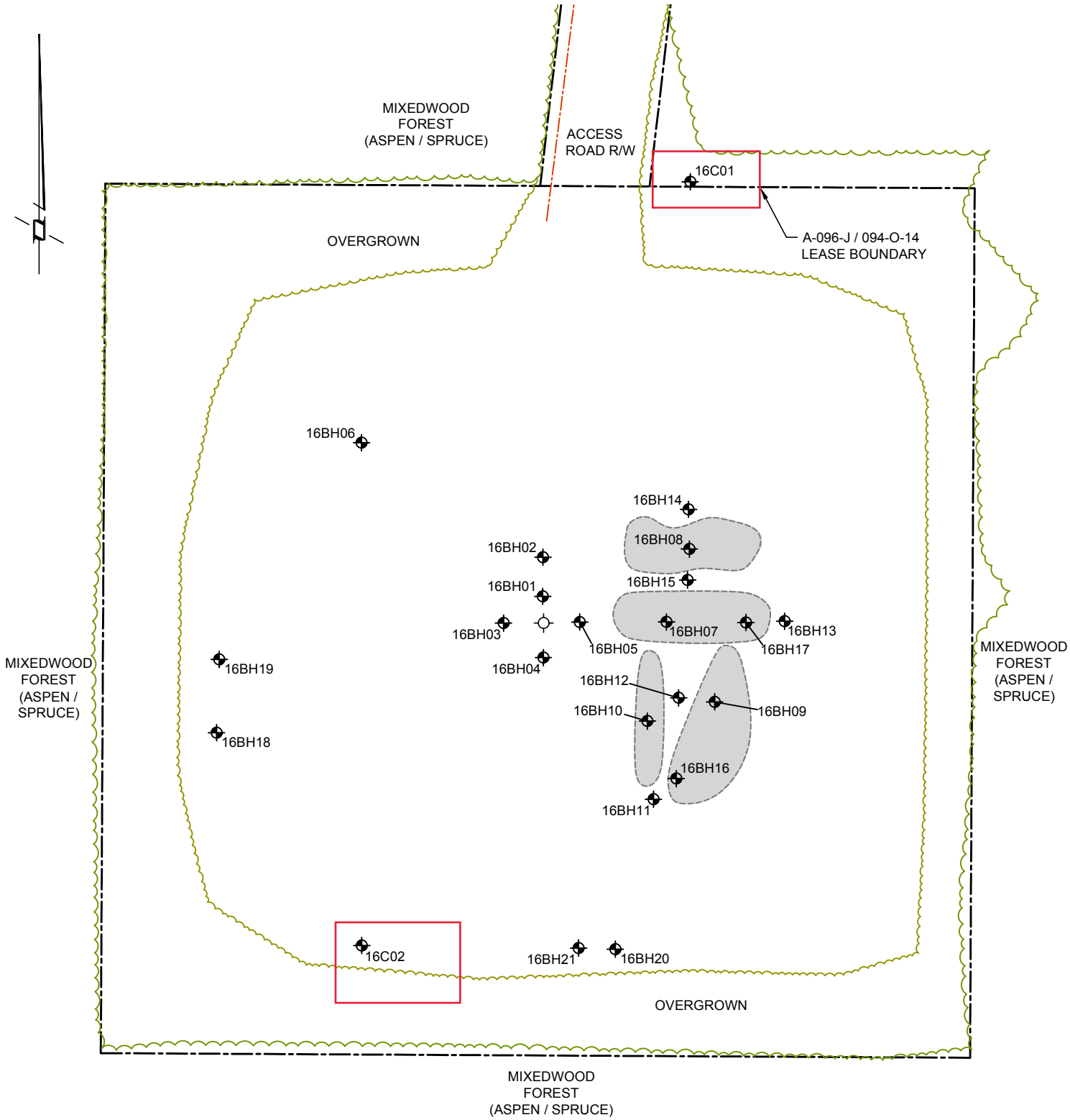


NOTES:

LOCATIONS ARE APPROXIMATE.

0 5 10 20 30m

Scale 1 : 750

LEGEND

- A-096-J / 094-O-14 WELL CENTRE
- SAMPLE LOCATION
- SUBSIDED AREA
- UNDERGROUND PIPELINE

SITE DIAGRAM

NORTH SHORE Environmental Consultants

Date: 28-FEB-17	Drawn by: DT	PARAMOUNT RESOURCES LTD. A-096-J / 094-O-14	Figure: 3
File name: A-096-J_094-O-14_16PH2-A.dwg	Requested by: DM		

Borehole Log: 17C01

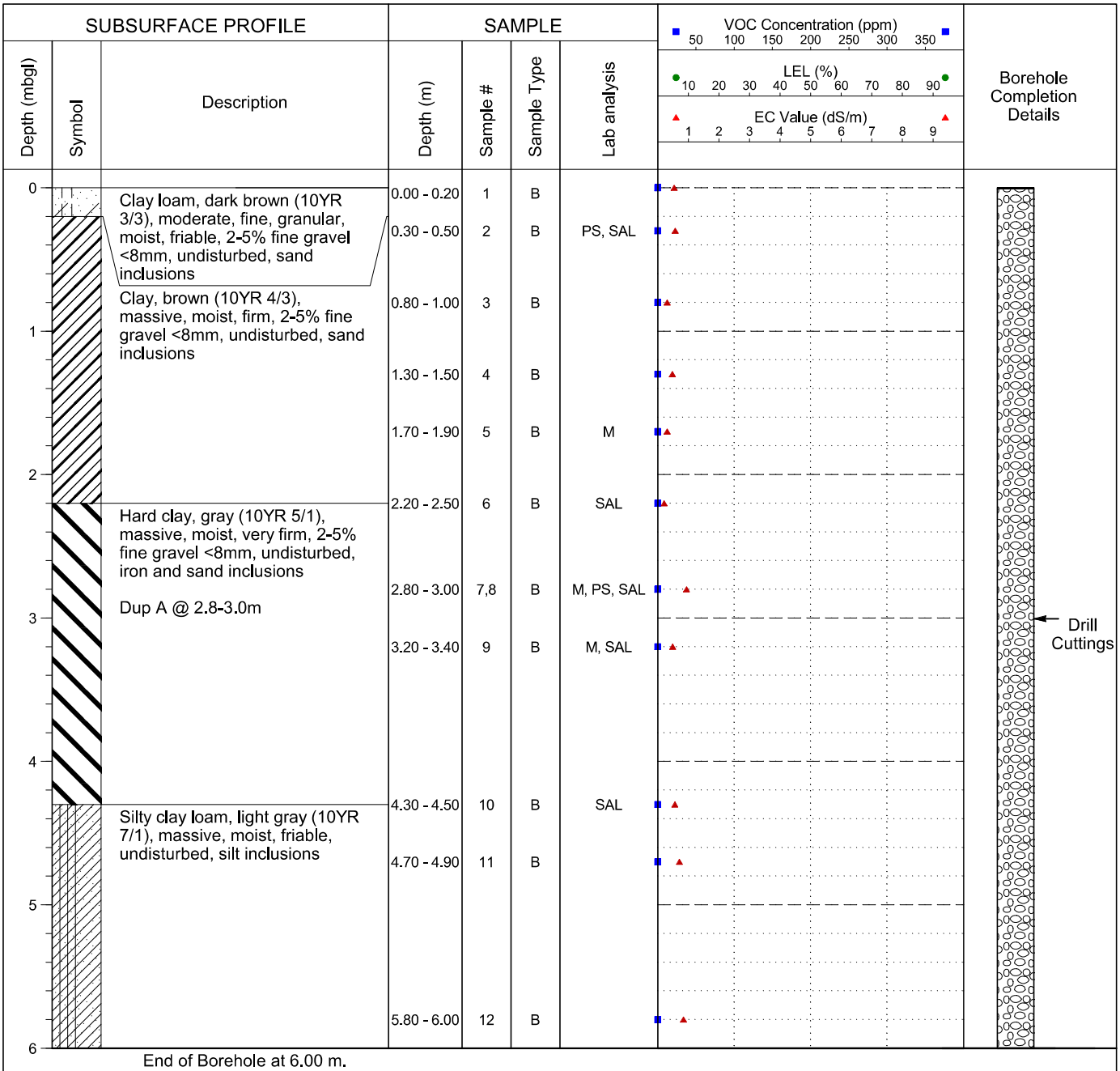
Client: Paramount Resources Ltd.

Project: Stage II Preliminary Site Investigation

Legal Location: A-096-J/094-O-14

Area of Concern: Background Control

NORTH SHORE Environmental Consultants



Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6650652 E: 489155

Drill Date: 2/11/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

Borehole Log: 17C02

Client: Paramount Resources Ltd.

Project: Stage II Preliminary Site Investigation

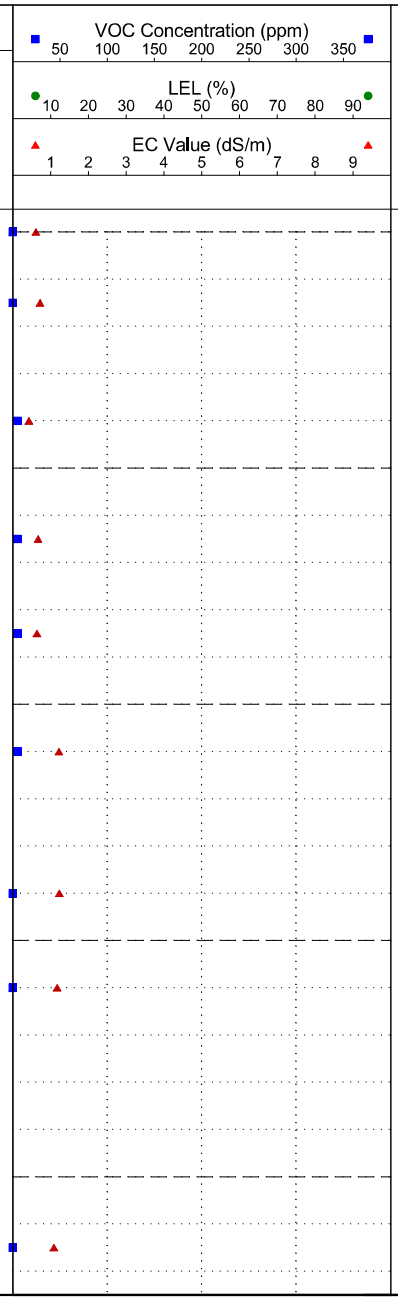
Legal Location: A-096-J/094-O-14

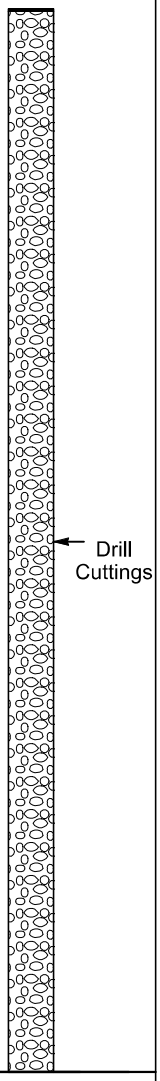
Area of Concern: Background Control

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0		Clay loam, reddish brown (2.5YR 4/3), moderate, fine, granular, moist, friable, 2-5% fine gravel <8mm, disturbed, sand inclusions	0.00 - 0.20	13	B	
			0.30 - 0.50	14	B	
		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, iron and sand inclusions	0.80 - 1.00	15	B	PS, SAL
1			1.30 - 1.50	16	B	
			1.70 - 1.90	17	B	
2		Hard clay, gray (10YR 5/1), massive, moist, very firm, 2-5% fine gravel <8mm, undisturbed, iron and sand inclusions	2.20 - 2.50	18	B	PS, SAL
			2.80 - 3.00	19	B	SAL
3			3.20 - 3.40	20	B	SAL
4			4.30 - 4.50	21	B	PS, SAL

End of Borehole at 4.50 m.





Borehole Completion Details

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6650550 E: 489104

Drill Date: 2/11/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

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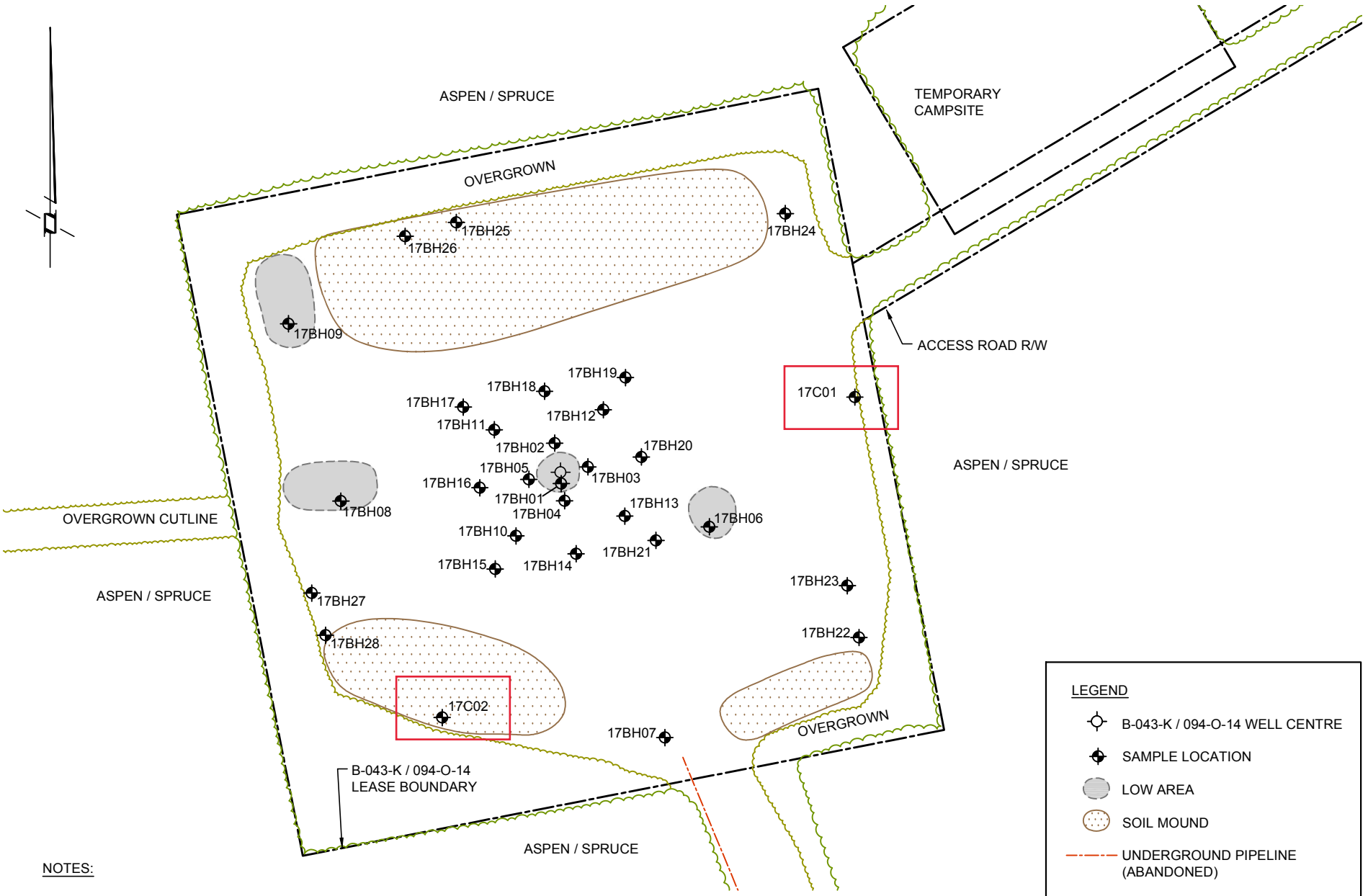

NOTES:

LOCATIONS ARE APPROXIMATE.

0 10 20 40m

Scale 1 : 1000

SITE DIAGRAM

NORTH SHORE Environmental Consultants

Date: 01-MAR-17	Drawn by: DT	PARAMOUNT RESOURCES LTD. B-043-K / 094-O-14	Figure: 3
File name: B-043-K_094-O-14_16PH2-A.dwg	Requested by: DM		

NORTH SHORE
Environmental Consultants

Borehole Log: 17C01

Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-043-K/094-O-14

Area of Concern: Background Control

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Loam, yellowish brown (10YR 5/6), weak, fine, granular, moist, friable, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed	0.00 - 0.20	1	B			
			0.30 - 0.50	2	B			
		Clay loam, brown (10YR 4/3), massive, moist, firm, undisturbed, sand inclusions	0.80 - 1.00	3	B	M, PS, SAL		
1		Clay loam, grayish brown (10YR 5/2), massive, moist, firm, undisturbed, sand inclusions	1.30 - 1.50	4	B			
			1.70 - 1.90	5	B	M		
2		Dup A @ 2.2-2.5m	2.20 - 2.50	6,7	B	PS, SAL		
		Silty clay loam, gray (10YR 5/1), massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, iron and sand inclusions	2.80 - 3.00	8	B			
3			3.20 - 3.40	9	B	M		Drill Cuttings
4			4.30 - 4.50	10	B			
		Silty loam, light gray (10YR 7/1), massive, dry, hard, undisturbed, silt inclusions	4.70 - 4.90	11	B	PS, SAL		
5								
			5.80 - 6.00	12	B			
6		End of Borehole at 6.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6645903 E: 483912

Drill Date: 2/13/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

Borehole Log: 17C02

Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-043-K/094-O-14

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Clay loam, yellowish brown (10YR 5/6), weak, fine, granular, moist, friable, undisturbed	0.00 - 0.20	13	B			
			0.30 - 0.50	14	B	M, PS, SAL		
		*1.5-0 horizon: clay loam, brown (10YR 5/3), disturbed, mounded topsoil, no samples obtained, EC 0.47 dS/m						
		Clay loam, grayish brown (10YR 5/2), massive, moist, friable, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, sand inclusions	0.80 - 1.00	15	B			
1			1.30 - 1.50	16	B			
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	1.70 - 1.90	17	B	PS, SAL		
2			2.20 - 2.50	18	B			Drill Cuttings
			2.80 - 3.00	19	B			
3		Silty clay loam, gray (10YR 5/1), massive, moist, very friable, 2-5% fine gravel <8mm, undisturbed, silt inclusions	3.20 - 3.40	20	B	PS, SAL		
4			4.30 - 4.50	21	B	M		

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6645829 E: 483833

Drill Date: 2/13/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

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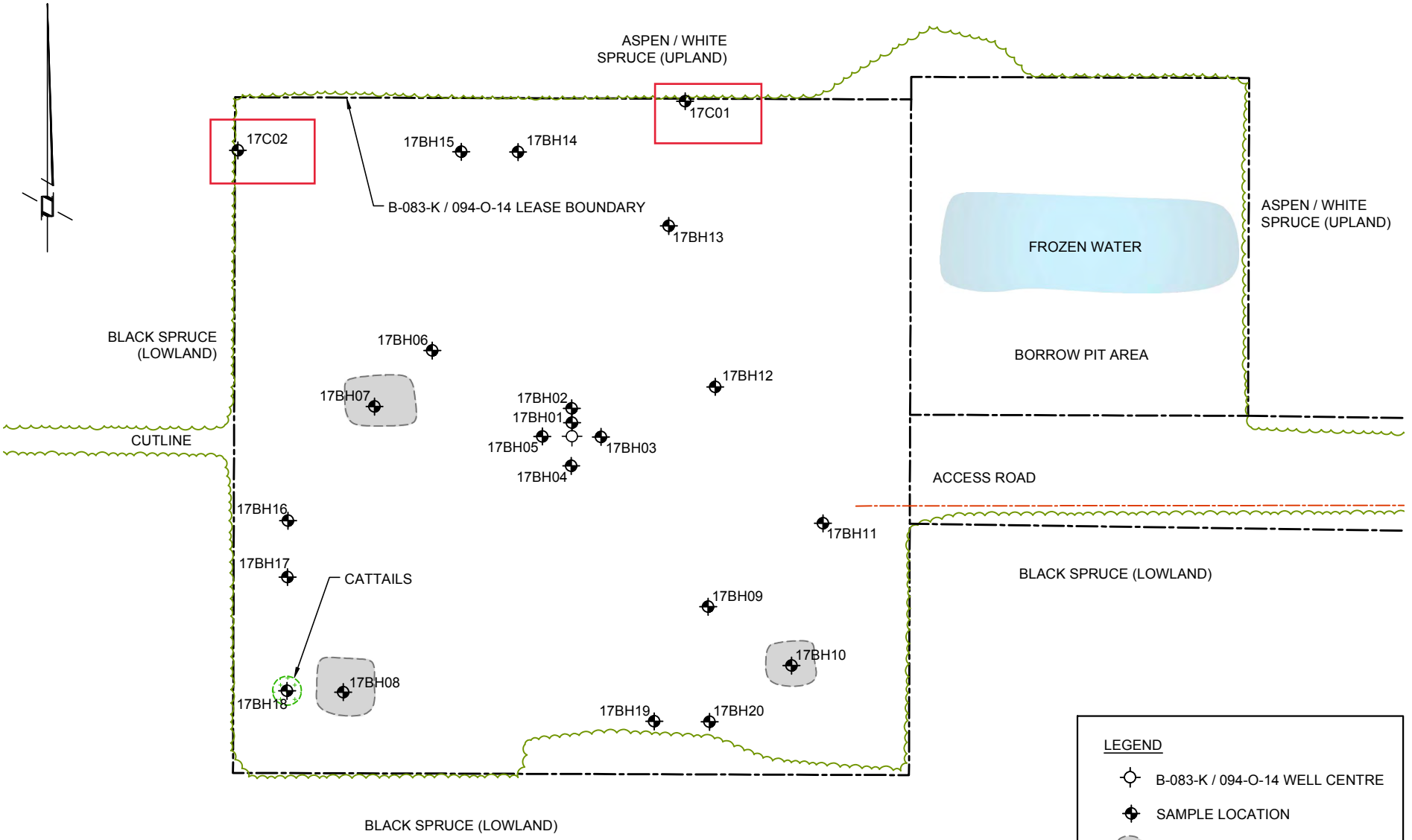

LEGEND

- B-083-K / 094-O-14 WELL CENTRE
- SAMPLE LOCATION
- LOW AREA
- UNDERGROUND PIPELINE

NOTES:

LOCATIONS ARE APPROXIMATE.

0 10 20 40m

Scale 1 : 1000

SITE DIAGRAM

NORTH SHORE Environmental Consultants

Date: 23-MAR-17	Drawn by: DT/LH	PARAMOUNT RESOURCES LTD. B-083-K / 094-O-14	Figure: 3
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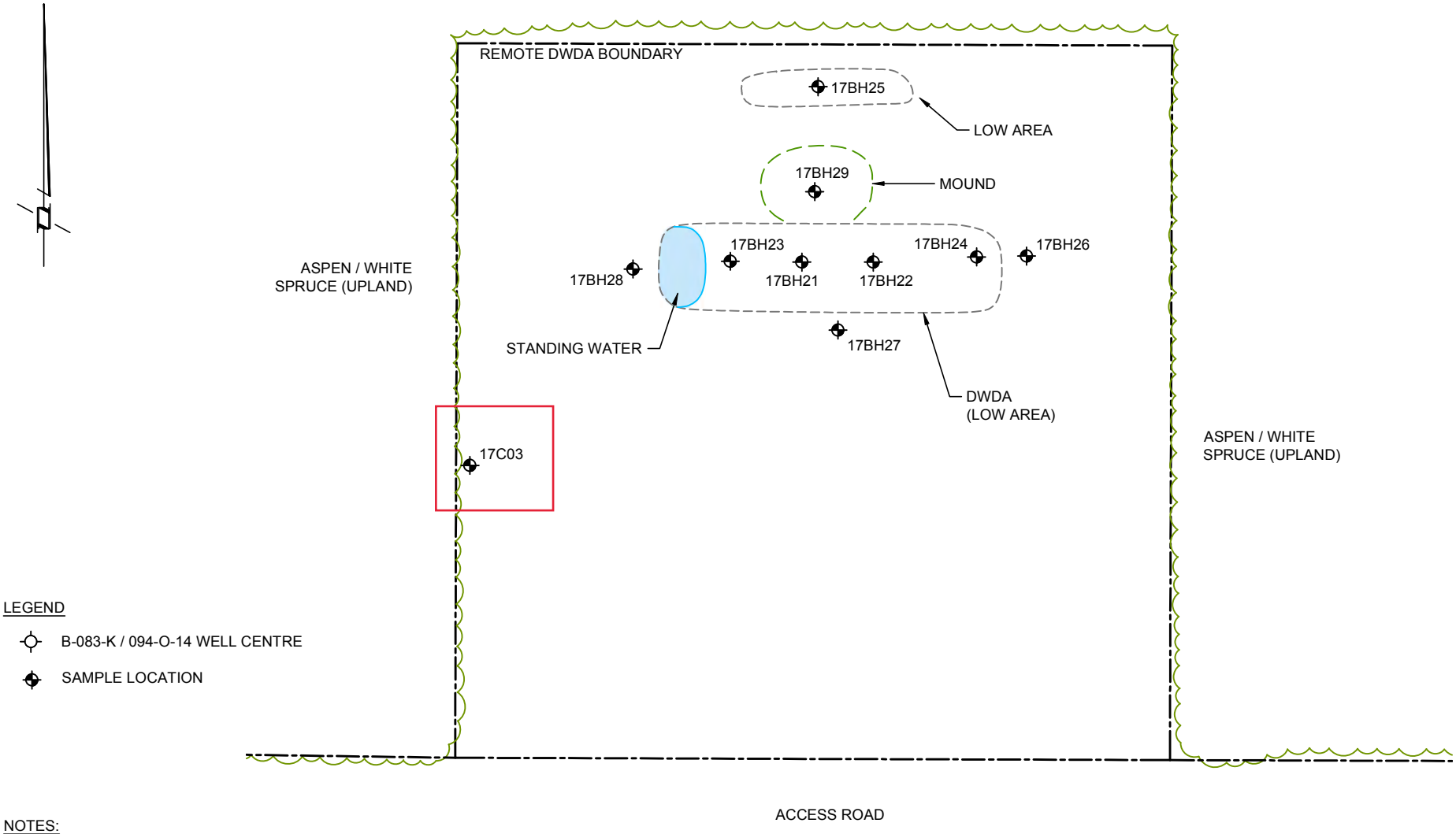


LEGEND

- B-083-K / 094-O-14 WELL CENTRE
- SAMPLE LOCATION

NOTES:

LOCATIONS ARE APPROXIMATE.

0 5 10 20m

Scale 1 : 500

REMOTE DWDA DIAGRAM

NORTH SHORE Environmental Consultants

Date: 23-MAY-17	Drawn by: DT/LH	PARAMOUNT RESOURCES LTD. B-083-K / 094-O-14	Figure: 6
File name: B-083-K_094-O-14_16PH2-D.dwg	Requested by: DM		

Borehole Log: 17C01

Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-083-K/094-O-14

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0		Sandy clay loam, reddish brown (2.5YR 5/3), weak, fine, single-grained, moist, friable, 5-10% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, roots, sand inclusions	0.00 - 0.20	1	B	
			0.30 - 0.50	2	B	
			0.80 - 1.00	3,4	B	M, PS, SAL
1		Clay, gray (10YR 6/1), massive, moist, firm, 2-5% fine gravel <8mm, undisturbed	1.30 - 1.50	5	B	
		Dup A @ 0.8-1.0m	1.70 - 1.90	6	B	M
2			2.20 - 2.50	7	B	
			2.80 - 3.00	8	B	M, PS, SAL
3		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, undisturbed, silt inclusions	3.20 - 3.40	9	B	
4			4.30 - 4.50	10	B	
			4.70 - 4.90	11	B	PS, SAL
5						
			5.80 - 6.00	12	B	
6		End of Borehole at 6.00 m.				

VOC Concentration (ppm): 50 100 150 200 250 300 350

LEL (%): 10 20 30 40 50 60 70 80 90

EC Value (dS/m): 1 2 3 4 5 6 7 8 9

Borehole Completion Details: Drill Cuttings

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6649705 E: 483910

Drill Date: 2/12/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

Borehole Log: 17C02

Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-083-K/094-O-14

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0		Organics, black (10YR 2/1), undisturbed	0.00 - 0.20	13	B			
		Clay, brown (10YR 5/3), massive, moist, firm, 2-5% fine gravel <8mm, 1-2% coarse gravel 8-64mm, undisturbed, silt inclusions	0.30 - 0.50	14	B	PS, SAL		
			0.80 - 1.00	15	B			
1			1.30 - 1.50	16	B	M		
			1.70 - 1.90	17	B	M, PS, SAL		
2			2.20 - 2.50	18	B			Drill Cuttings
		Sand (medium), reddish brown (2.5YR 5/3), single-grained, wet, non-sticky, 15-20% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, saturated soils	2.80 - 3.00	19	B			
3		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, silt inclusions	3.20 - 3.40	20	B	PS, SAL		
4			4.30 - 4.50	21	B			

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6649698 E: 483828

Drill Date: 2/12/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

Borehole Log: 17C03

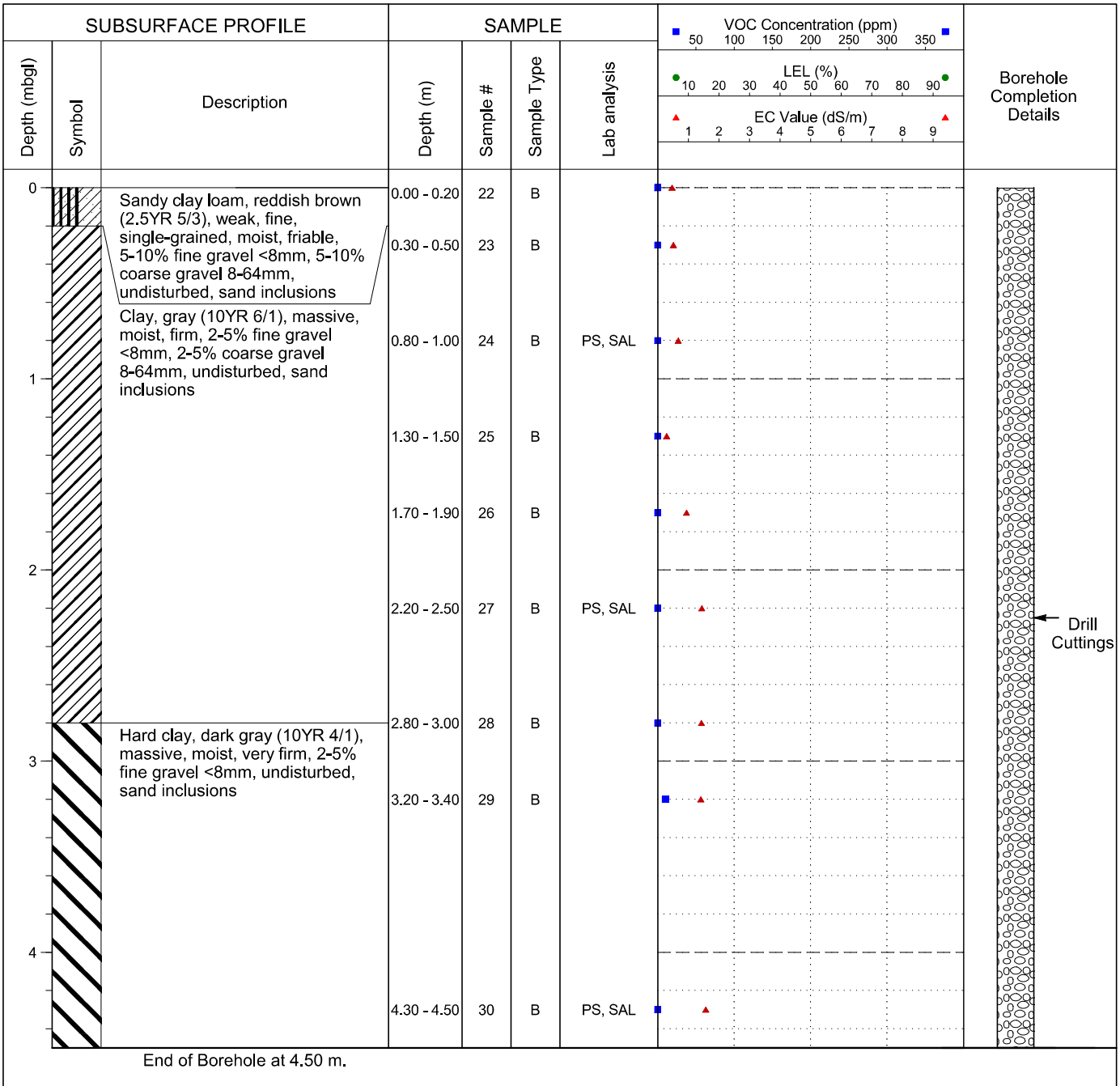
Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-083-K/094-O-14

Area of Concern: Background Control

NORTH SHORE Environmental Consultants



Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6649665 E: 484163

Drill Date: 2/13/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

APPENDIX III

Water Well and Water Body Search Results

ATLAS
Government of Northwest Territories

Paramount O-35
Water body Search



April 6, 2021

Legend

- Block Land Transfer Boundaries
- Development Areas
- Surveyed Parcels
- Line Approximately 31m from O.H.W.M.
- Municipal Boundaries
- Condominium Units
- Building Footprints

Scale 1: 10,000

250 metres

UTM Zone: 10

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N-01

NORTH SHORE
Environmental Consultants

Paramount Resources Ltd.
Para et al Fort Liard N-01 60°10' 123°15'
Phase 1 Environmental Site Assessment
March 2017



Paramount Resources Ltd.
4700 Bankers Hall West
888 3rd Street SW
Calgary, Alberta T2P 5C5

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INTRODUCTION

Paramount Resources Ltd. (Paramount) retained North Shore Environmental Consultants Inc. (North Shore) to conduct a Phase 1 Environmental Site Assessment (ESA) for the Para et al Fort Liard N-01 gas well located in the Northwest Territories (NWT) at Unit N, Section 01 Grid Area 60° 10', 123° 15' (Site).

The purpose of the Phase 1 ESA was to assess and qualify potential environmental concerns associated with the Site through a historic records review and site visit. The Phase 1 ESA was conducted in general accordance with the Canadian Standards Association (CSA) *Standard Z678-01: Phase I Environmental Site Assessment* (CSA, 2001). The Alberta Energy Regulator (AER) *Assessing Drilling Waste Disposal Areas: Compliance Option for Reclamation Certification* (AER, 2014) guidelines were used to assess the drilling waste associated with the Site.

FINDINGS

The Para et al Fort Liard N-01 well was spud on December 12, 2000 and the rig was released on January 16, 2001. The well was drilled to a final depth of 1940 metres. The well produced sweet natural gas, condensate and produced water from 2001 to 2005. The well was deactivated in April 2008. The wellsite is accessible by helicopter and winter road.

Infrastructure identified in association with the site includes the following: wellhead, flare knockout tank with dual vent stacks, bermed methanol tanks, separator building, line heater, aboveground piping, pipeline riser, pig launcher, triethylene glycol (TEG) unit, meter skids, and a fuel tank. A 30 m x 60 m campsite and a 40 m x 60 m borrow pit were surveyed in association with the wellsite.

Aerial photograph imagery of the wellsite from 2011 and 2013 was reviewed and show production facilities located at the well centre and northwest and northeast of well centre. The subsided sump was also evident on the east side of well centre.

Drilling Waste Information

The well was drilled using a gel-chem drilling mud. According to the Alpine Environmental Ltd. Drilling Waste Sampling Report, 1999 m^3 of drilling waste was disposed of on site by mix-bury-cover. The sump was located on the east side of well centre. A Compliance Option 1 checklist and associated calculations were completed as per the *Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification* document (AER, 2014). The drilling waste meets the requirements of the checklist and associated calculations and no further assessment of the drilling waste disposal area is required.

Spills & Complaints

A review of the NWT Resource Wildlife and Economic Development's Hazardous Material Spill Database identified the following spills associated with the N-01 wellsite:

Spill No.	Date	Spill Location	Product Released	Volume	Source
2007318	July 3, 2007	N-01 Wellsite	Methanol	135 L	Drum
2006322	August 16, 2006	N-01 Wellsite	Produced Water	150 L	Pipeline

Previous Assessments/Reports

The Alpine Environmental (Alpine) Annual 2005 Environmental Site Assessment Report indicated that an area of hydrocarbon impact was noted on the northeast area of the site and at well centre. A subsided area northeast of the vent stacks and at the former DWDA were holding water. Two trenches in the northwest area of the site were open and holding water, and wooden planks were noted south of the wellhead. According to previous sampling reports, hydrocarbon impacts were reported northeast of well centre as a result of a condensate spill; impacts were delineated vertically and extended off the site boundaries to the northeast.

A 2007 Inspection report indicated that the fuel drum on site had ruptured, and as a result, vegetation growth west of well centre was reduced. Housekeeping issues such as debris on site were also noted.

A limited Phase 2 ESA was conducted to delineate the methanol spills from 2007. An estimated 4 m^3 of impacted soil was present on site. A copy of the limited Phase 2 ESA report was not available for review.

A Paramount Remediation Summary document indicated that a biopile was constructed in March 2007 to remediate soil impacted from 150 L of produced water that was carried over from the vent stacks in August 2006. The biopile was sampled on August 14, 2007 and reported benzene, ethylbenzene, toluene and petroleum hydrocarbon F3 values that exceeded applicable guidelines.

From January 8 through 11, 2008, the soil in the biopile was mixed and soil from two areas, one located on the southwest corner and the other on the northeast portion of the berm, were excavated and added to the biopile. Composite samples were taken and benzene and ethylbenzene exceedences were reported. In March 2009, the biopile was turned and separated into two windrows. The document also noted that two samples were collected from the 2007 methanol spill area to further delineate the impacts. Further information regarding the biopile and the methanol spill area sampling was not available for review.

A 2008 Groundwater Monitoring Report noted that annual assessments and/or monitoring had been completed at the site from 2002 to 2008. In 2004, Alpine installed three groundwater monitoring wells, and in 2005, an additional two monitoring wells were installed. Seven groundwater monitoring and sampling events were completed between March 2004 and August 2007. Historically, salinity, metals and hydrocarbon values exceeding applicable guidelines have been reported in soil samples collected from the site. In August 2008, the concentrations of petroleum hydrocarbons in all groundwater samples were below the drinking water criteria. Total dissolved solids criterion was exceeded in all monitoring wells. All wells had dissolved manganese concentrations above the drinking water criterion. Monitoring well BH106 had dissolved zinc concentrations exceeding the freshwater aquatic life criterion. Copies of assessment and monitoring reports prior to 2008 were not

available for review. Based on 2007 and 2008 groundwater sampling results, Paramount recommended to the National Energy Board that the frequency of the monitoring and sampling events be decreased to bi-annual or tri-annual.

Interviews

There were no Paramount operations personnel with historic knowledge of drilling or production activities at the Site available for an interview.

Site Visit

During the February 2017 site visit, North Shore noted subsided areas southeast and northeast of well centre. An excavated remedial area was noted on the northeast portion of the wellsite, and a drainage ditch was noted on the northwest area of the site. The centre of the site was padded and the organics appeared to have been stripped. Dogwood, willow, fescue, moss, spruce, tamarack and sweet clover were noted on site. Two 400 barrel aboveground storage tanks (AST) in containment were noted on the northwest area of the site and one AST was noted south of the separator. Two flare lines extending from well centre to the northeast portion of the site were noted, as well as aboveground pipelines extending from well centre to various facilities. Two flare stacks were noted o the northeast area of the site, and a group separator, a separator, an incinerator, and three meter buildings were noted. The site was under snow cover at the time of the assessment.

CONCLUSIONS AND RECOMMENDATIONS

Based on the information gathered for this Phase 1 ESA from the historic records review and the site inspection, North Shore concludes that there is a potential for environmental impact in connection with the site. A Phase 2 ESA is recommended to assess the following areas of potential concern:

- Well centre;
- Production facility areas;
- Flare stack/flare knockout drum areas;
- Area of reported soil impacts on the northeast area of the site; and
- Reported spill areas.

DISCLOSURE

North Shore Environmental Consultants Inc. (North Shore) has prepared this report taking into account government regulations available at the time of the assessment. North Shore has not made an independent verification of historical or analytical results provided by third parties and therefore makes no assurances regarding the accuracy of such information. It has assumed such information is correct. Where indicated or implied the conclusions are based on visual observation and/or analytical testing conducted at the time of the assessment. The conclusions do not apply to any areas of the site not investigated.

This report is intended for the exclusive use of the company, organization, or individual to whom it is addressed and may not be relied upon by any third party without the express written permission of North Shore. The investigation and reporting has been conducted with a reasonable level of attention and skill, in accordance with standards prevailing in the environmental consulting profession at the time of report date in the location in which the report was prepared.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. North Shore accepts no responsibility for damages, if any, suffered by any third party as a result of the use of this report or any decisions made or actions based on this report.

In the preparation of this report, selected Alberta Energy Regulator (AER) reference material has been gathered from AbaData™ (property of Abacus Datagraphics Ltd.), which is an online information source. The information provided by AbaData is received directly from the AER, electronically updated on a monthly basis and is assumed to be correct.

CLOSURE

North Shore appreciated the opportunity to work on this project. If we can provide clarification of any part of this report, please contact the undersigned at (780) 467-3354.

This report was prepared by:



_____
Angela Bricker, B.Sc., P.Ag.
Environmental Consultant

Reviewed By:



_____
Ann Tuson, R.T.(Ag.)
Environmental Consultant

REFERENCES

Alberta Energy Regulator (AER). 2015. *Directive 050: Drilling Waste Management*. Retrieved from: https://www.aer.ca/rules-and-regulations/directives/directive-050

Alberta Energy Regulator (AER). 2014. *Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification*. Edmonton, Alberta. March 2014.

Alpine Environmental (Alpine). 2005. *Annual 2005 Environmental Site Assessment Report F-36 Wellsite, Northwest Territories Calgary, Alberta.* October 2005

Petroleum Services Association of Canada. 2016. *Drilling Fluid Product Listing for Potential Toxicity Information*. Retrieved from: www.psac.ca/mudlist/pdf/mud_list.pdf

Mackenzie Valley Land and Water Board. 2017. *Mackenzie Valley Land and Water Board – Public Registry – Online Review System*. Accessed January 2017. Retrieved from: https://mvlwb.com/

NWT Environment and Natural Resources. 2017. *Hazardous Materials Spills Database.* Accessed January 2017. Retrieved from: http://apps.enr.gov.nt.ca/app/spills/epd_spills/asp/login.asp

Government of NWT. 2017. *Office of the Regulator of Oil and Gas Operations – Public Registry.* Accessed January 2017. Retrieved from: http://www.orogo.gov.nt.ca/registry

Government of NWT. 2017. *Northwest Territories Geological Survey* Accessed January 2017. Retrieved from: http://www.nwtgeoscience.ca/

List of Appendices

Appendix A Survey Plan
Site Diagram

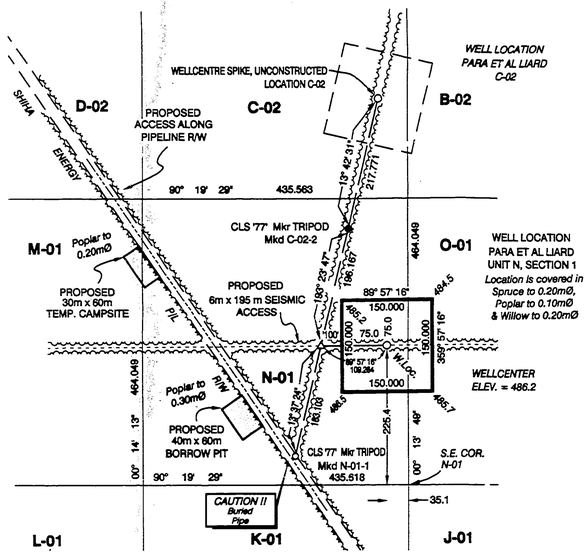
Appendix B Spill Report
Aerial Photographs
Correspondence

Appendix C Drilling Waste Documentation

Appendix D Site Visit Photos

APPENDIX A

Survey Plan
Site Diagram



DETAIL
UNIT N, SECTION 01
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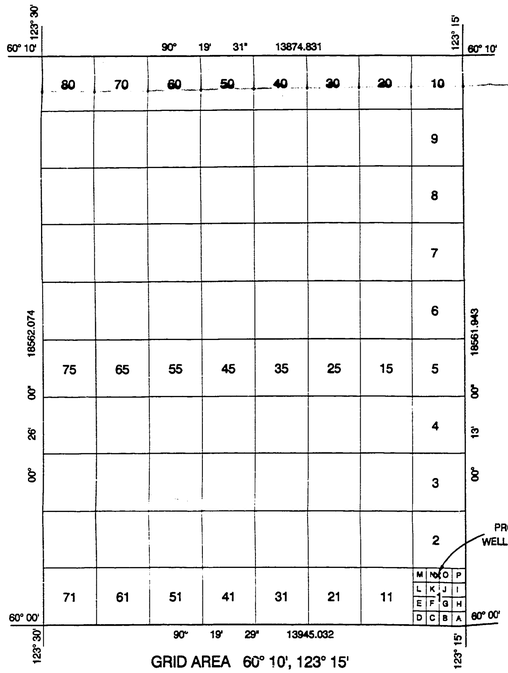
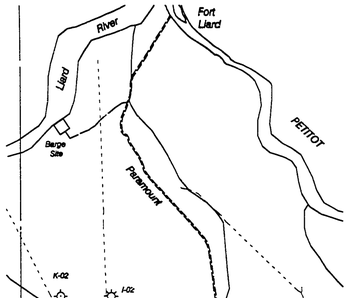
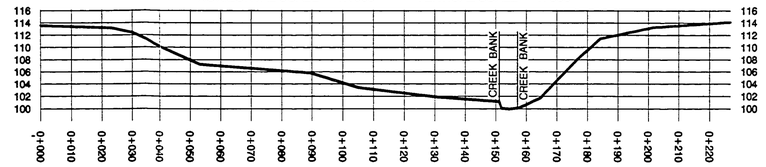
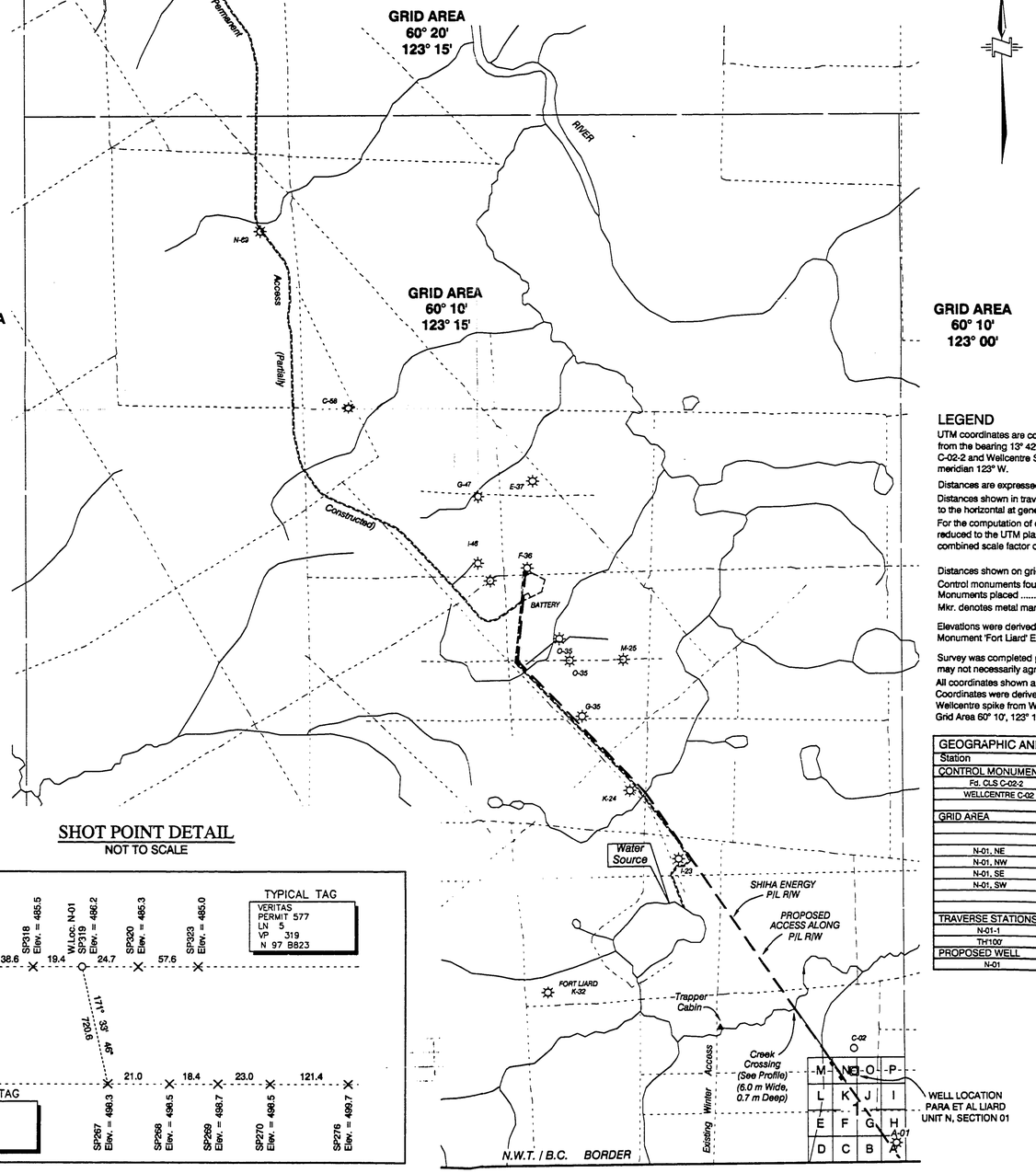


GRID AREA 60° 10', 123° 15'
SCALE 1:100,000





ELEVATIONS ARE BASED UPON ASSUMED DATUM



SHOT POINT DETAIL
NOT TO SCALE

AREAS REQUIRED:

WELLSITE:	150m x 150m =	2.25 ha.
TEMP. CAMPSITE:	30m x 60m =	0.18 ha.
BORROW PIT:	40m x 60m =	0.24 ha.
ACCESS:	6m x 195m =	0.12 ha.
TOTAL:		2.79 ha.

REV No	DESCRIPTION	DATE

McElhanney
McELHANNEY ASSOCIATES
PROFESSIONAL LAND SURVEYORS
10012 - 97th Ave.
Fort St. John, British Columbia
Phone:(250)787-0366, Fax:(250)787-0310

DATE 00/07/13 JOB No.: 3111-08117WS AW DBO

PLAN AND FIELD NOTES

OF SURVEY OF

PROPOSED EXPLORATORY WELL

PARA ET AL LIARD

IN UNIT N, SECTION 01

GRID AREA 60° 10', 123° 15'

NORTHWEST TERRITORIES
CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50,000
0m 500m 1000m 2000m 3000m 4000m 5000m

SURVEYED FOR
PARAMOUNT RESOURCES LTD.

BY: W.V. JOHNSON, CLS
JUNE, 2000

LEGEND

UTM coordinates are computed for Zone 10 Bearings were derived from the bearing 13° 42' 31" computed between Fd. CLS 77, Post C-02-2 and Wellcentre Spike for Wellsite C-02, and are referred to meridian 123° W.

Distances are expressed in metres and decimals thereof.

Distances shown in traverse are measured distances reduced to the horizontal at general ground level..

For the computation of coordinates measured distances have been reduced to the UTM plane by multiplying them by an average combined scale factor of 0.9995227.

Distances shown on grid area subdivisions are UTM plane.

Control monuments found ..... ●
Monuments placed ..... ○

Mkr. denotes metal marker post 2.0m long placed 0.30m away from Post.

Elevations were derived from Geodetic Survey of Canada Monument 'Fort Liard' Elev. = 216.299 m.

Survey was completed prior to drilling; therefore well as drilled may not necessarily agree with proposed location.

All coordinates shown are on 1927 North American Datum. Coordinates were derived from Fd. CLS Post C-02-2 and Fd. Wellcentre spike from Wellsite Plan Para et al Liard Unit C, Sec. 02, Grid Area 60° 10', 123° 15'.

Certified Correct and completed on the 14th day of June, 2000.

Canada Lands Surveyor

Date: June 14, 2000

ASSOCIATION OF CANADA LANDS SURVEYORS
ASSOCIATION DES ARPENTEURS DES TERRES DU CANADA
W.V. Johnson
Comm. No. 1393

GEOGRAPHIC AND UTM COORDINATES, (1927 NAD)				
Station	Latitude	Longitude(W)	Northings	Eastings
CONTROL MONUMENTS				
Fd. CLS C-02-2	60° 00' 58.493"	123° 16' 02.685"	6653044.322	485091.105
WELLCENTRE C-02	60° 01' 05.336"	123° 15' 59.410"	6653255.782	485142.689
GRID AREA				
N-01, NE	60° 01' 00.051"	123° 15' 56.250"	6653092.092	485190.968
N-01, NW	60° 01' 00.073"	123° 16' 24.374"	6653094.561	484755.412
N-01, SE	60° 00' 45.060"	123° 15' 56.250"	6652628.047	485189.103
N-01, SW	60° 00' 45.073"	123° 16' 24.375"	6652630.517	484753.493
TRAVERSE STATIONS				
N-01-1	60° 00' 46.567"	123° 16' 08.305"	6652675.717	485002.570
TH'100'	60° 00' 52.322"	123° 16' 05.569"	6652853.584	485045.677
PROPOSED WELL				
N-01	60° 00' 52.339"	123° 15' 58.517"	6652853.670	485154.889

PARAMOUNT RESOURCES LTD

WITNESS

July 18 2000
DATE

MOUNT COTY

MCKAY LAKES

123°30'

60°20',123°15'

60°20',123°00'

STAGING AREA

CAMP

MAINTENANCE YARD

RESIDENCE

BARGE SITE

CAMP SITE

I-02 DECKING SITE

CAMP

BRIDGE 5X15m

FORT LIARD HIGHWAY

Betalamea Lake

Petitot River

FORT LIARD

A-47 (NOT DRILLED)

I-46

CAMP

F-36

DECKING SITE BORROW PIT

123°30'

60°10',123°00'

O-35

CAMP

M-25 (NOT DRILLED)

BORROW PIT & SUMP

60°10',123°15'

BORROW PIT

BRIDGE 18.4X5m

Water Source #3 (Mea Goh Cho Lake)

STANLEY BERTRAND TRAPPER CABIN

BRIDGE

CAMP

N-01

BORROW PIT

CAMP

A-01

NORTHWEST TERRITORIES

BRITISH COLUMBIA

94O13I

94O14L

94O14K

94O14J

94O14I

MAXHAMISH COMPRESSOR

LEGEND

- SEISMIC
- AIRSTRIP - (FOREIGN)
- AIRSTRIP
- PIPELINE R/W
- PIPELINE R/W FOREIGN
- ACCESS ROAD - (FOREIGN)
- WINTER ACCESS ROAD
- ALL SEASON ACCESS ROAD
- CONTOUR
- LEASE - (TIED-IN)
- LEASE - (NOT TIED-IN)
- LEASE - (FOREIGN)
- LEASE - RECLAIMED
- BORROW PIT
- CAMP SITE
- SUMP / PIT
- DECKING SITE
- BATTERY SITE
- OTHER CLEARING
- BRIDGE
- TOWER

SCALE 1:50,000

1250 0 1250 2500 3750 5000 METERS

2500 0 5000 10000 15000 FEET

N

DISCLAIMER: The information contained herein is compiled from various government and industry sources. The Universal Group of Companies and its data suppliers provide no warranty regarding the accuracy or completeness of this information. No liability can be assumed by The Universal Group of Companies or its data suppliers resulting from the use or interpretation of this information, or from any decisions made based on this information.

Paramount resources ltd.

FORT LIARD SOUTH

As-Built June 2009

94O14I (BC P&NG GRID) to

SE1/4 60°20',123°30' (NWT GRID)

REV.	DESCRIPTION	INI.	DATE
3	Updated map title	BPV	03-JUN-09
2	Removed I-03 W/S & updated map title	BPV	12-SEP-07
1	Added Bridge in Sec.12 and Road in Sec.1 & 11.	BPV	05-DEC-06
0	Original construction (from 2005 map)	WGT	13-JUN-06

SPECIFICATIONS	
Datum:	NAD 83
Projection:	UTM
NTS Ref:	95B
Zone:	10
Scale:	1:50 000
C.I.:	100m
Filename:	050399G01_2009
Model:	50K Ft Liard South
Job No:	05-0399G

IMAGERY (Air Photo / Satellite)	
Date:	2000
Type:	1m Orthophoto

PREPARED BY:

UNIVERSAL GEOSYSTEMS U.G.S. SPATIAL INFORMATION SERVICES

Ph:. 262-1336
Fax: 262-1308
www.universalsurveys.com

REV. 3

File: N-01_17PH1.dwg Date: March-20-17 10:23:36 AM

CONIFEROUS FOREST

FORMER METHANE TANK

FORMER SPILL AREA

COLLAR

METHANE TANK

METHANE TANK

HEATER

FLARE KNOCKOUT DRUM

CONIFEROUS FOREST

SEPARATOR BUILDING

METER SKIDS

ELECTRICAL BOX

SKIDS

BURIED PPE

PIG RUN

ACCESS ROAD

CONIFEROUS FOREST

N-01 LEASE BOUNDARY

CONIFEROUS FOREST

LEGEND

- N-01 WELL CENTRE
- FLARE STACK
- UNDERGROUND PIPE
- ABO□EGROUND PIPELINE

NOTES:

DATE OF SITE □ISIT: FEBRUARY 4□2017.

LOCATIONS ARE APPROXIMATE.

DRAWING SHOULD BE PRINTED ON 11x17 PAPER FOR ACCURATE SCALING.

0 5 10 20 30m

Scale 1 : 800

SITE □ISIT DIAGRAM

NORTH SHORE Environmental Consultants

Date: 18-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. N-01 (NORTHWEST TERRITORIES)	Figure: 1
File name: N-01_17PH1-B.dwg	Requested by: DM		

APPENDIX B

Spill Report
Aerial Photographs
Correspondence

Hazardous Materials Spill Database

Environment Division of ENR

Scotia 6, 5102-50th Avenue; Yellowknife, NT X1A 3S8

Phone: (867) 873-7654 Fax: (867) 873-0221

Sorted By: Location for the year (s): 2017

Spill No.	Date	Ter	Region	Location	Site Description	Commodity	Quantity	Source	Agency
2007318	2007-07-03	NT	DEH	-	SE Fort Liard Well N-01 60:07:52N 123:16:2W	Methanol	135 L	DRUM	INAC
2006322	2006-08-16	NT	DEH	-	N-01 Well Site 60:00:86N 123:16:08W	Produced Water	150 L	PL	NEB

Total Spills on this Report: 2

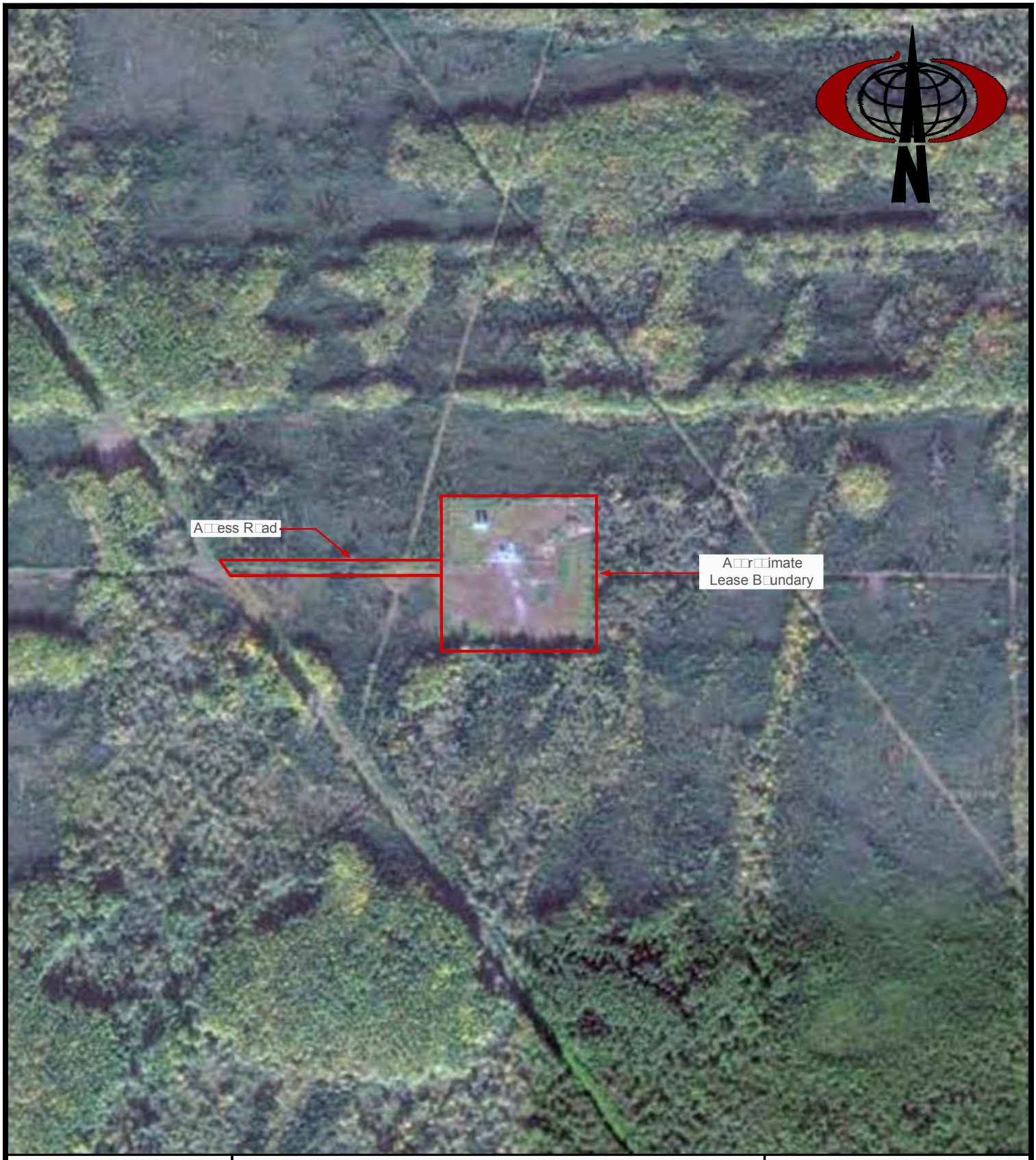
This report contains information regarding spills that were reported to the NWT 24-Hour Spill Line. The absence of information on any particular location in no way guarantees that contamination has not occurred at that location.

LEGEND

Region:
BAF - Baffin
DEH - Deh Cho
INU - Inuvik
KEE - Keewatin
KIT - Kitikmeot
NSL - North Slave
SAH - Sahtu
SSL - South Slave

Source:
AIR - Aircraft
DRUM - Drum or Barrel
MV - Marine Vessel
NS - Natural Seepage
OTH - Other Transportation
PL - Pipe or Line
RT - Rail Train
SL - Sewage Lagoon
ST< - Storage Tank <4000 litres
ST> - Storage Tank >4000 litres
TP - Tailings Pond
TRU - Truck
UK - Unkown
WELL - Wet Wells, Flaring
Boom

Agency:
CCG - Canadian Coast Guard
EP - Environment Canada
GN - Government of Nunavut
GNWT - Government of Northwest Territories
ILA - Inuvialiut Land Administration
INAC - Indian and Northern Affairs Canada
NEB - National Energy Board



NORTH SHORE
Environmental Consultants

□143□201 Kas□a R□ad
S□erw□□d Par□□AB
T8A 2□6

□aramount Resour□es □td□

Param□unt et al Liard N-01

G□□gle Eart□ Imagery - 2011

0 50 100 200

SCALE IN METERS

S□ale: 1:5000

NOTE: SCALE IS APPROXIMATE ± 1m



NORTH SHORE
Environmental Consultants
□143□201 Kas□a R□ad
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T8A 2□6

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T8A 2□6

□aramount Resour□es □td□

Param□unt et al Liard N-01

G□□gle Eart□ Imagery - 2013

0 50 100 200

SCALE IN METERS

S□ale: 1:5000

NOTE: SCALE IS APPROXIMATE ± 1m



NORTH SHORE
Environmental Consultants

□143□201 Kas□a R□ad
S□erw□□d Par□□AB
T8A 2□6

□aramount Resour□es □td□

Param□unt et al Liard N-01

G□□gle Eart□ Imagery - 2013

S□ale: N□t t□ S□ale

From: Ann Tuson
To: Ann Tuson
Subject: FW: Looking for Production Information
Date: Thursday, January 26, 2017 12:11:13 PM
Attachments: image001.jpg

From: Kristen Cameron [mailto:Kristen_Cameron@gov.nt.ca]
Sent: Thursday, January 26, 2017 10:42 AM
To: Brent Walchuk
Cc: DST_ITI_OROGO
Subject: RE: Looking for Production Information

Brent,

I have included a table below that shows the annual production statistics gathered by the NEB for the Fort Liard fields.

There are four fields:

- Liard Wells: Liard F-25A, K-29, M-25, 2K29, 3K-29, 2M-25, K29A
- Liard North Wells: North Liard P-66A
- Fort Liard SE Wells: SE Fort Liard N-01
- Fort Liard Wells: Fort Liard F-36, O-35

There is monthly data by well, but it would take me a while to compile the historical records for release. Please let me know if this information suits your purpose, and feel free to call if you have any questions.

Field Name	Year	Annual Wellhd Gas Prod (10^3m^3)	Annual Oil Prod (m^3)	Annual Cond Prod (m^3)	Annual Wtr Prod (m^3)
Liard Wells:	Liard F-25A, K-29, M-25, 2K29, 3K-29, 2M-25, K29A				
Liard	2000	490,079.2	-	-	21,530.9
Liard	2001	1,213,623.8	-	-	75,896.1
Liard	2002	834,139.7	-	-	144,375.2
Liard	2003	680,340.6	-	-	215,589.5
Liard	2004	465,409.7	-	4,002.3	-
Liard	2005	203,286.2	-	-	114,509.2
Liard	2006				
Liard	2007				
Liard	2008				
Liard	2009				
Liard	2010				
Liard North Wells:	North Liard P-66A				
Liard North	2000	60,113.4			23,386.8
Liard North	2001	1,824.0			5,488.5
Liard North	2002				

Fort Liard SE Wells:		SE Fort Liard N-01			
Fort Liard SE	2001	33,153.6	-	-	259.4
Fort Liard SE	2002	61,898.6	-	422.3	778.4
Fort Liard SE	2003	51,128.2	-	566.2	1,666.5
Fort Liard SE	2004	48,152.9	-	44.6	421.2
Fort Liard SE	2005	38,799.0	-	-	46.0
Fort Liard SE	2006	-	-	-	-
Fort Liard SE	2007	-	-	-	-
Fort Liard SE	2008	-	-	-	-
Fort Liard SE	2009	-	-	-	-
Fort Liard SE	2010	-	-	-	-
Fort Liard Wells:		Fort Liard F-36, O-35			
Fort Liard	2000	81,792.3	-	-	-
Fort Liard	2001	57,173.5	-	-	-
Fort Liard	2002	35,705.4	-	-	-
Fort Liard	2003	15,721.4	-	-	-
Fort Liard	2004	10,422.3	-	-	-
Fort Liard	2005	50,737.9	-	-	-
Fort Liard	2006				
Fort Liard	2007				
Fort Liard	2008				
Fort Liard	2009				
Fort Liard	2010				

- Kristen

From: Brent Walchuk [mailto:bwalchuk@northshoreenv.com]
Sent: Monday, January 23, 2017 07:50
To: Kristen Cameron
Cc: Ann Tuson
Subject: RE: Looking for Production Information

Thanks Kristen. If there are any issues sending the information via email let me know and we could send it through North Shore's FTP site.

Thanks,

Brent

From: Kristen Cameron [mailto:Kristen_Cameron@gov.nt.ca]
Sent: Friday, January 20, 2017 3:29 PM
To: Brent Walchuk
Cc: Ann Tuson
Subject: RE: Looking for Production Information

Brent,

Thanks for sending the specifics. If the information is readily available, we may have it in a few days, but it can sometimes take a couple of weeks if it has been archived.

In the meantime, I have found production reports for 2005 and 2006. I will see what information I can send you from those reports.

- Kristen

From: Brent Walchuk [mailto:bwalchuk@northshoreenv.com]
Sent: Friday, January 20, 2017 10:15
To: Kristen Cameron
Cc: Ann Tuson
Subject: RE: Looking for Production Information

Hi Kristen,

Thank you for the quick response. The production records that we are looking for are from the early 2000's. Specifically, we are looking for information for the Paramount Resources wells O-35, N-01, I-46, F-36, and A-01. From the information we currently have it looks like these wells produced between 2002 and 2007. I believe there will only be production information for F-36, O-35, and N-01. The other two wells were drilled and abandoned.

Would you be able to see if there are production records for these wells?

Thanks,

Brent

From: Kristen Cameron [mailto:Kristen_Cameron@gov.nt.ca]
Sent: Friday, January 20, 2017 10:09 AM
To: Brent Walchuk
Cc: Ann Tuson
Subject: RE: Looking for Production Information

Hello, Brent,

Thank you for contacting OROGO. As of April 2014, the Regulator has jurisdiction for the regulation of oil and gas works and activities in the onshore Northwest Territories (NWT), with the exception of the Inuvialuit Settlement Region and lands that were not transferred from the Government of Canada to the Government of the Northwest Territories.

Production statistics by field for 2014, 2015, and 2016 are available on our website at www.orogo.gov.nt.ca on the 'Documents' page. The files are listed alphabetically. *Production Statistic Reports* are on page 3, and there is one document for each year. However, all production since 2014 has been from the Cameron Hills field. There has been no recent production in the Fort Liard area. If you need historical production data, let me know and I will see if we can obtain it.

Please feel free to call me if you have any questions.

Kristen Cameron
Manager, Information Office | Gestionnaire, bureau d'information
Office of the Regulator of Oil and Gas Operations | Bureau de l'organisme de réglementation des opérations pétrolières et gazières
Government of the Northwest Territories | Gouvernement des Territoires du Nord-Ouest
PO Box 1320
Yellowknife NT X1A 2L9
Tel | Tél : 867-767-9097 x78004
Fax | Téléc : 867-920-0798
Web | Site Web : www.orogo.gov.nt.ca
NWT-NU Spill Line: 867-920-8130
OROGO Incident Reporting Line | Pour signaler un incident: 867-445-8551

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From: Brent Walchuk [mailto:bwalchuk@northshoreenv.com]
Sent: Thursday, January 19, 2017 16:48
To: Kristen Cameron
Cc: Ann Tuson
Subject: Looking for Production Information

Hi Kristen,

North Shore is currently completing Phase 1 ESAs for some wellsites in the Fort Liard area. We are relatively new to working in the Northwest Territories and we are trying to track down production information for the wells. Would this information be available in the OROGO Public Registry? Any help or information that you can provide would be greatly appreciated.

Thanks,

Brent

Brent Walchuk, B.Sc., P.Ag.
Remediation/Reclamation Supervisor
North Shore Environmental Consultants Inc.
#143, 201 Kaska Road
Sherwood Park, AB T8A 1K5
Office: (780) 467-3354 ext. 120

Cell: (780) 271-0870

Brent Walchuk
Environmental Consultant
#143, 201 Kaska Road
Sherwood Park, Alberta T8A 2J6
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bwalchuk@northshoreenv.com **http://www.northshoreenv.com**

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APPENDIX C

Drilling Waste Documentation

DRILLING WASTE SAMPLING REPORT

Prepared for
Nahendeh Land & Environmental Service, LLP

Re: Paramount Resources Ltd.
"LIARD" N-01

Project No. N0009

January 19, 2001

ALPINE ENVIRONMENTAL LTD.

Your Natural Resource for Environmental Services

DRILLING WASTE SAMPLING REPORT

PROJECT NO: N0009 **TICKET NO:** 1010 **DATE:** January 19, 2001

COMPANY NAME: Paramount Resources Ltd.
LEGAL DESCRIPTION: "LIARD" N-01
LOCATION OF SUMP: On-site
CONDITION OF ACCESS: Winter access
SAMPLED BY (Individuals): D. Sahara & R. Hennessey

	PIT A		
OIL COVER (%)	100% light sheen		
FREEBOARD (m)	1.4		
TOTAL VOLUME OF SUMP (m^3)	1999		
TREATABLE FLUID VOLUME (m^3)	266		
SOLIDS VOLUME (m^3)	1236		
CUTTINGS VOLUME (m^3)	N/A		
ICE VOLUME (m^3)	497		

DESCRIPTION OF FLUID

At the time of sampling, the fluid was yellow in colour, non-turbid, and emitted no apparent odour.
A fluid sample was not procured, as the proposal disposal method is mix/bury/cover of the total waste component of Pit A.

PROJECT NO: N0009 **TICKET NO:** 1010 **DATE:** January 19, 2001

COMMENTS

The on-site soil texture consists of sandy clay. Pit A was excavated with a hoe. The northeast corner of Pit A is located 6 m west of the well centre. The south, east and west sides of the site are surrounded by muskeg.

SAMPLES OBTAINED

Pit A Total Waste (1-1L AW Jar, 1-2L HDPE Pail)

On-site Soil (1- bag)

Legend	AW: Acid Wash PE: Polyethylene HDPE: High Density Polyethylene

DIRECTIONS

From Fort Nelson travel 23 km west to the Liard Hwy. Turn right onto the Liard Hwy. and travel 122 km. Turn left and travel 8 km to the Paramount "Maxhamish" compressor station at d-36-I/94-0-14. Turn right and travel 12.2 km. Turn right and travel 7.2 km. Turn right and travel 0.3 km to the site.

PHOTOGRAPHS TAKEN

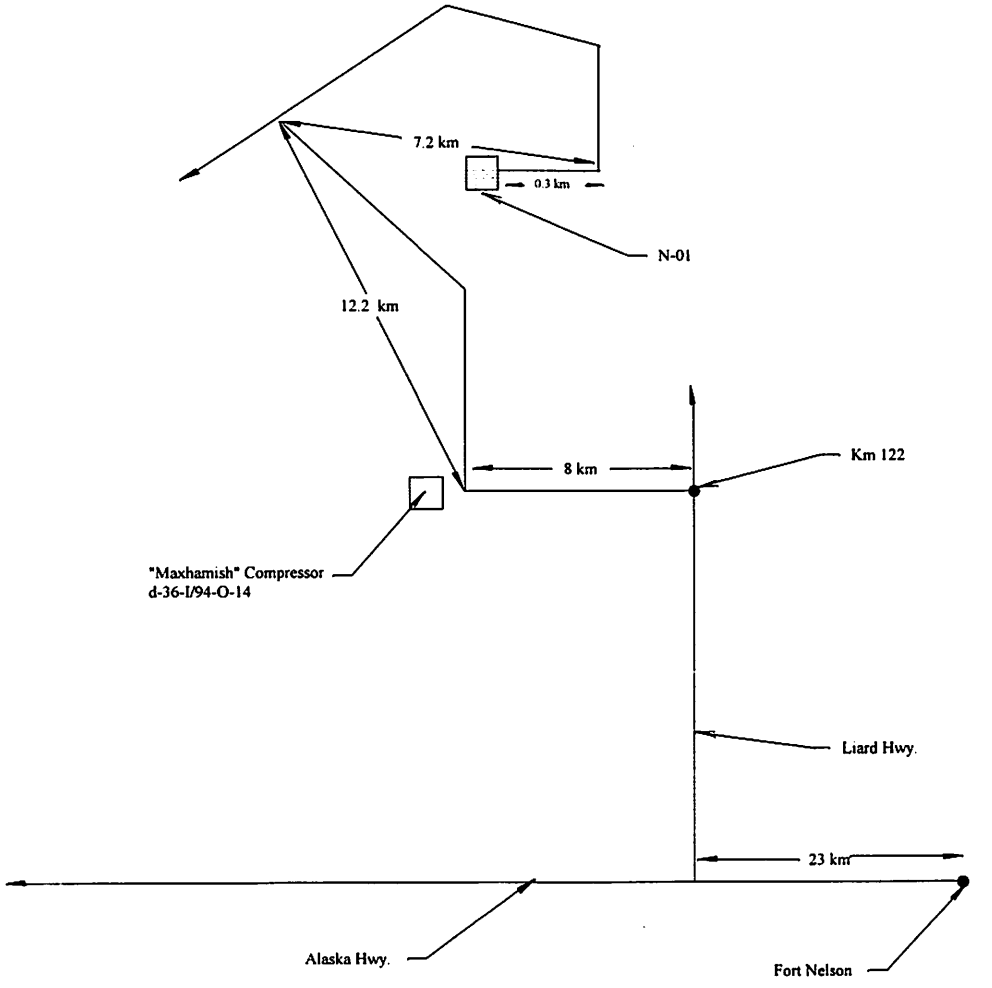
No photographs were taken.

LOCATION ACCESS MAP

PROJECT NO: N0009 **TICKET NO:** 1010 **DATE:** January 19, 2001

COMPANY NAME: Paramount Resources Ltd.
LEGAL DESCRIPTION: "LIARD" N-01

Note: Drawing not to scale

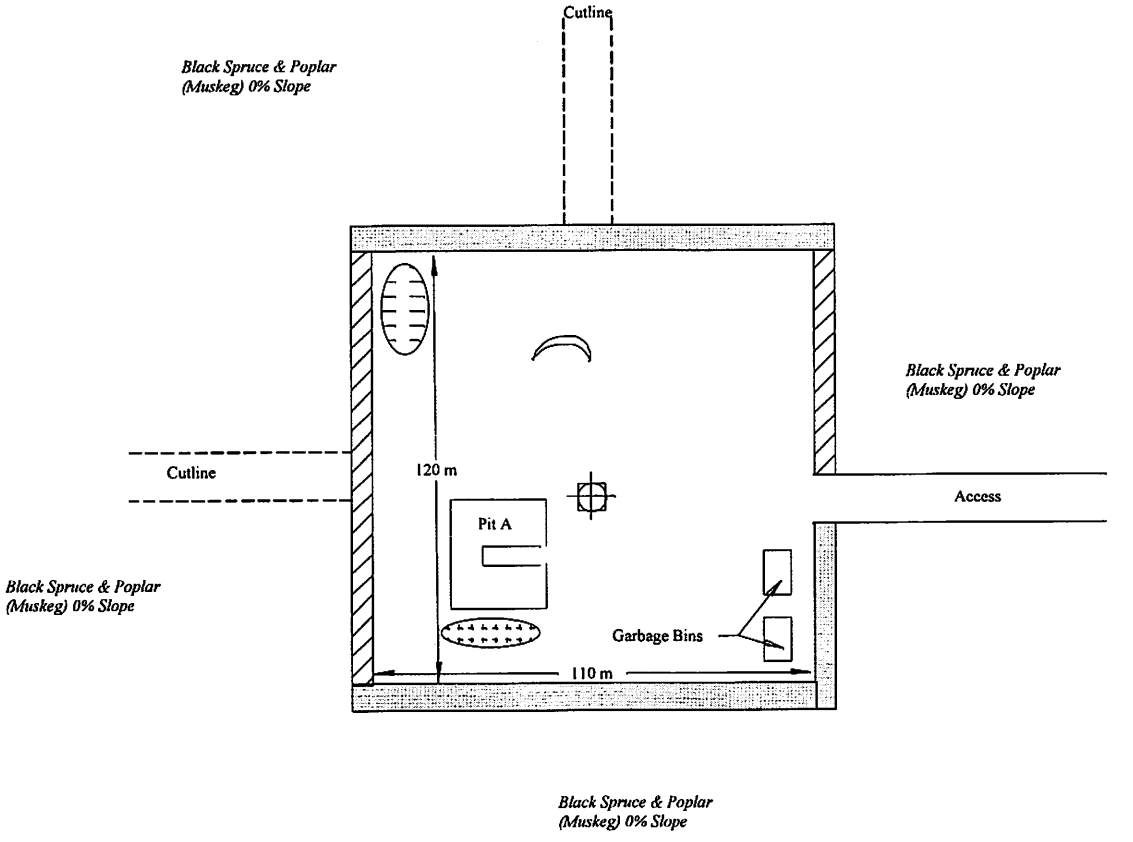


SITE PLAN

PROJECT NO: N0009 **TICKET NO:** 1010 **DATE:** January 19, 2001

COMPANY NAME: Paramount Resources Ltd.
LEGAL DESCRIPTION: "LIARD" N-01

Note: Drawing not to scale



LEGEND

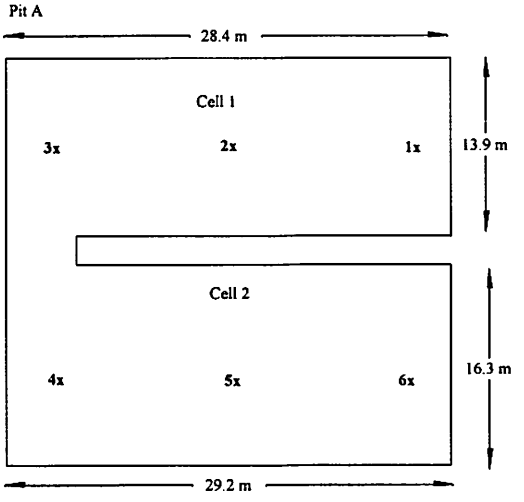
Berm		Spoil Pile		Flarepit	
Strippings		Brush Pile		Well Centre	

SUMP DIAGRAM
LAYOUT AND DIMENSION

PROJECT NO: N0009 **TICKET NO:** 1010 **DATE:** January 19, 2001

COMPANY NAME: Paramount Resources Ltd.
LEGAL DESCRIPTION: "LIARD" N-01

Note: Drawing not to scale



Pit A	Fluid	Solids	Ice	Total
Cell 1				
1	0.20	1.35	0.05	1.60
2	0.00	2.10	0.30	2.40
3	0.00	1.70	0.80	2.50
Average	0.07	1.72	0.38	2.17
Cell 2				
4	0.30	1.10	1.00	2.40
5	0.60	1.20	0.60	2.40
6	0.60	1.20	0.60	2.40
Average	0.50	1.17	0.73	2.40

* measurements reported in metres

NOTIFICATION OF DRILLING WASTE DISPOSAL

The licensee certifies that the information on this form is correct and is submitted to the appropriate regulatory agency 48 hours prior to drilling waste disposal.

DAY MONTH YEAR: 29 01 2001

YOUR FILE NUMBER: N0009 (1010) Pit A Total Waste

1. REGULATORY OFFICE

Appropriate regulatory office: Department of Indian and Northern Development — Fax: (867) 695-2615

Second regulatory office *(if applicable)*: — Fax: ( ) -

2. WELL INFORMATION

Well licensee: Paramount Resources Ltd.

Surface location: A-001-B/094-H-03 — Well authorization/licence number: 0000000

Unique well identifier: 00/A-001-B/094-H-03/0 — MSL number *(if applicable)* 000000

Sump location or storage location — 1. Same as surface location /or: - -/ --

2. Same as surface location /or: - -/ --

Mud type: Gel chem

Date of Sampling: DAY MONTH YEAR 19 01 2001 — Proposed Date of disposal: *(48 hours notice is required)* DAY MONTH YEAR 31 01 2001

Lab Name: EnviroTest Labs — Lab Work Order: G101144

Operator/company contact	Name:	Mr. Bob Raduenz	Phone:	(780) 963-7604	
	Company Name:	Paramount Resources Ltd.	Mobile:	(780) 915-6630	Fax: (867) 770-3119
Sampling company contact	Name:	Mr. Don Antoine	Phone:	(867) 770-4700	
	Company Name:	Nahendeh Land and Environmental Services	Mobile:	( ) -	Fax: (867) 770-4701

If drilling sump wastes are to be disposed by landtreatment or alternate disposal methods, attach the required documentation and provide a summary in the comments section on page 2 of this form.

3. ON-SITE DISPOSAL

Fluids: ____ m³ Solids: ____ m³ Total Waste: 1999 m³

Soil texture: Sandy clay

LANDSPREADING ☐

Application thickness: ____ cm Incorporation depth: ____ cm

Receiving Soil EC: ____ dS/m Receiving Soil SAR: ____

	Minimum area ha	Max. application rate m³/ha	Max. amount added kg/ha
Chloride			
Sodium			
Nitrogen			
TDS			

Toxicity pass: ____ Predicted oil content after mix: ____ %

Proposed application rate: ____ m³/ha

Proposed area used for disposal ____ ha

MIX-BURY-COVER ☒

Est. water table depth: 4.9 m Intended mix ratio: 3:1

Volume to be disposed 1999 m³

Has site been used before? No Toxicity pass: Yes

Post disposal values:

Chloride 16.12 mg/kg Oil ____ %

Total mass chloride: 167.40 kg Total mass nitrogen: ____ kg

4. OFF-SITE DISPOSAL

Fluids: ____ m³ Solids: ____ m³ Total Waste: ____ m³

Soil texture: ____ Horizon thickness: ____ cm

LANDSPRAYING ☐ **PUMPOFF** ☐ **LWD** ☐

Application thickness: ____ cm Incorporation depth: ____ cm *(if applicable)*

Receiving soil EC: ____ dS/m Receiving soil SAR: ____

	Minimum area ha	Max. application rate m³/ha	Max. amount added kg/ha
Chloride			
Sodium			
Nitrogen			
TDS			

Solids Loading Rate: ____ t/ha

Toxicity pass: ____

Predicted oil content after mix: ____ %

Proposed application rate: ____ ³/ha

Proposed area used for disposal: ____ ha

Land owner: ____

Phone: ____

Date of consent: ____

Landowner consent is required if the disposal is off site.

Horizontal Oil Well? No **Hydrocarbons Added** No **Salt Zone Encountered?** No **Nitrogen > 400 kg added?** No

If you answered YES to any one of the above questions, please give details in the comments section on page 2.

WELL LICENCE No. 0000000
YOUR FILE NUMBE N0009 (1010) Pit A Total Waste

NOTIFICATION OF DRILLING WASTE DISPOSAL

Unique well ID 00/A-001-B/094-H-03/0

5. DETAILED INFORMATION

Over-saturated solids, fluids or total waste

As received sample

SG	1.06	
Mud density	1060	kg/m³
DBD	96	kg/m³
Oil content	0.10	% dry wt
Phi	0.96	

As received filtrate

pH	11.20	
EC	4.85	dS/m
TDS	3395	mg/L
Chloride	87	mg/L
Sodium		mg/L
Nitrogen		mg/L
Calcium		mg/L
Magnesium		mg/L
SAR		

Under-saturated solids

As received sample

SG		
Mud density		kg/m³
DBD		kg/m³
Oil content		% dry wt

Saturated paste

SG		
Phi		

Saturated paste extract

pH		
EC		dS/m
TDS		mg/L
Chloride		mg/L
Sodium		mg/L
Nitrogen		mg/L
Calcium		mg/L
Magnesium		mg/L
SAR		

Clear liquids

As received sample

pH		
EC		dS/m
TDS		mg/L
Chloride		mg/L
Sodium		mg/L
Nitrogen		mg/L
Calcium		mg/L
Magnesium		mg/L
SAR		
Hydrocarbon diss		mg/L

Receiving soil

As received sample

Soil density		kg/m³
Oil content		% dry wt

Saturated paste extract

pH		
EC		dS/m
Chloride		mg/L
Sodium		mg/L
Nitrogen		mg/L
Calcium		mg/L
Magnesium		mg/L
SAR		

Mud products used	Bioassay required? (Y/N)

Microtox bioassay	Reading at 15 minutes
EC50 (15) original	41.00 %
EC50 (15) charcoal	82.00 %

Notes The sample passed the charcoal microtox.

Trace element analysis		Landspreading/Landspraying/LWD			Mix-Bury-Cover		
Analysis threshold kg	Conc of analyte mg/kg	Minimum area ha	Application rate m³/ha	Loading rate kg/ha	Max. load rate kg/ha	Total mass kg	Max. appl. quantity kg
B 2.5					5		10
Cd 0.75					1.5		3
Cr 50					100		200
Cu 100					200		400
Pb 50					100		200
Ni 12.5					25		50
V 50					100		200
Zn 150					300		600

Trace element analysis is only required if the amount of trace elements added to the mud exceeds the threshold.

Saline/Sodic soil test results	Mix ratio:	Mix ratio:	Mix ratio:
Electrical Conductivity (dS/m)			
Sodium Adsorption Ratio			

Off-site disposal location (referenced from the north east corner of the section)

			Section	Township	Range	Meridian
North-east corner	0 m South	0 m West				
South-west corner	0 m South	0 m West				

COMMENTS

Approximately 1999 m3 of Pit A Total Waste is satisfactory for disposal under mix/bury/cover criteria in the G-50 guidelines. A minimum mixing ratio of 1 part waste to 3 parts soil will ensure all parameters are within G-50 guidelines.

As a mud list was not available at the time of sampling, a microtox was completed to ensure no toxicity problems with the sampled waste.

Additional comments, disposal/treatment plan details, or site maps may be added on a separate page.

Edmonton (Main)
9936 - 67 Avenue
Edmonton, AB
T6E 0P5
Phone: (780) 413-5227
Fax: (780) 437-2311

Edmonton (Downtown) Industrial Hygiene
2nd Flr., 10158 - 103 Street
Edmonton, AB
T5J 0X6
Phone: (780) 413-5265
Fax: (780) 424-4602

Calgary
Bay 2, 1313 - 44th Ave. N.E.
Calgary, AB
T2E 6L5
Phone: (403) 291-9897
Fax: (403) 291-0298

Grande Prairie
9505 - 111 Street
Grande Prairie, AB
T8V 5W1
Phone: (780) 539-5196
Fax: (780) 513-2191

Saskatoon
124 Veterinary Road
Saskatoon, SK
S7N 5E3
Phone: (306) 668-8370
Fax: (306) 668-8383
1-800-667-7645

Winnipeg
745 Logan Avenue
Winnipeg, MB
R3E 3L5
Phone: (204) 945-3705
Fax: (204) 945-0763

Thunder Bay
1081 Barton Street
Thunder Bay, ON
P7B 5N3
Phone: (807) 623-6463
Fax: (807) 623-7598

Ottawa
Xenos Laboratories Inc.
2319 St. Laurent Blvd.
Unit 100
Ottawa, ON
K1G 4J8
Phone: (613) 731-1005
Fax: (613) 736-1107

Wyoming
420 West First Street
Casper, Wyoming 82601
Phone: (307) 235-5741
Fax: (307) 266-1676
1-800-666-0306

Canada Wide Phone:
1-800-668-9878

Western Canada Fax:
1-800-286-7319

www.envirotest.com

ETL Enviro-Test LABORATORIES
A DIVISION OF ETL CHEMSPEC ANALYTICAL LIMITED

CHEMICAL ANALYSIS REPORT

ALPINE ENVIRONMENTAL
BOX 1471
GRANDE PRAIRIE, AB T8V 4Z2

DATE: January 22, 2001

ATTN: MICHELLE LATRACE

Lab Work Order # :	G101144	**Sampled By:**	RH
Project Reference:	N0009/N1010	**Date Received:**	22-JAN-01
Project P.O.#:			

Comments:

Dahendeh Land & Environmental Services "PARAMOUNT - LIARD" N-01

APPROVED BY:

Bill Durnford
Project Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY. ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

ACCREDITATIONS: **STANDARDS COUNCIL OF CANADA (SCC),** IN COOPERATION WITH **THE CANADIAN ASSOCIATION FOR ENVIRONMENTAL ANALYTICAL LABORATORIES (CAEAL):** FOR SPECIFIC TESTS AS REGISTERED BY THE COUNCIL (EDMONTON, CALGARY)
AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA): FOR INDUSTRIAL HYGIENE ANALYSIS (EDMONTON)
AGRICULTURE CANADA: UNDER THE CANADIAN FERTILIZER QUALITY ASSURANCE PROGRAM (SASKATOON)

ENVIRO-TEST CHEMICAL ANALYSIS REPORT

LAB ID	SAMPLE ID	TEST DESCRIPTION	RESULT	D.L.	UNITS	TEST METHOD	ANALYZED	BY
G101144-01	PIT A TOTAL WASTE N0009							
Sample Type:SOLIDS								
Collected:01/19/01								
		Microtox Waste						
		Clarification	CENTRIFUG	3	C.U.		01/22/01	VEW
		Color Correction Microtox	NO	3	C.U.		01/22/01	VEW
		Color Microtox	TAN	3	C.U.		01/22/01	VEW
		EC20(05Min) Charcoal	>82		%		01/22/01	VEW
		EC20(05Min) Treated	N/A		%		01/22/01	VEW
		EC20(05Min) Original	11.9		%		01/22/01	VEW
		EC20(15Min) Charcoal	>82		%		01/22/01	VEW
		EC20(15Min) Treated	N/A		%		01/22/01	VEW
		EC20(15Min) Original	13.8		%		01/22/01	VEW
		EC50(05Min) Charcoal	>82		%		01/22/01	VEW
		EC50(05Min) Treated	N/A		%		01/22/01	VEW
		EC50(05Min) Original	40.2		%		01/22/01	VEW
		EC50(15Min) Charcoal	>82		%		01/22/01	VEW
		EC50(15Min) Treated	N/A		%		01/22/01	VEW
		EC50(15Min) Original	40.5		%		01/22/01	VEW
		Final pH for microtox	8.72		pH		01/22/01	VEW
		Initial pH for microtox	11.2		pH		01/22/01	VEW
		Interpetation Charcoal	PASS		%		01/22/01	VEW
		Interpetation Original	FAIL		%		01/22/01	VEW
		Interpetation Treated	N/A		%		01/22/01	VEW
		Lab Treatment Microtox	CHARCOAL		none		01/22/01	VEW
		Turbidity Microtox	LOW	0.1	NTU		01/22/01	VEW
		Mix/Bury/Cover						
		Chloride	86.9	0.5	mg/L		01/22/01	NHH
		Conductivity(EC)	4.85	0.2	dS/m		01/22/01	NHH
		Specific Gravity on Waste	1.06		g/cm3		01/22/01	JAB
		Oil&Grease (Soxhlet Extr.)						
		%Solids	11.7	0.1	%		01/23/01	VEW
		Oil Content	<0.1	0.1	%		01/23/01	VEW
		Water Content	88.3	0.1	%		01/23/01	VEW

N.D. - NOT DETECTED, LESS THAN THE DETECTION LIMIT

THIS IS THE FINAL PAGE OF THE REPORT
NOT INCLUDING APPENDICES

Enviro-Test Laboratories

MICROTOX ANALYSIS REPORT - DRILLING WASTE

Client:
ALPINE ENVIRONMENTAL
BOX 1471
GRANDE PRAIRIE, AB T8V 4Z2

Date: **January 24, 2001**

Attn: MICHELLE LATRACE

SAMPLE INFORMATION

Lab #: **G101144-01**
Sample ID: **PIT A TOTAL WASTE N0009**
Date Sampled: **January 19, 2001**
Date Received: **January 22, 2001**
Date Analyzed: **January 22, 2001**

Sample Type:
Liquid _____ Soil _____
Solid __x__ Other _____

Turbidity: **LOW**

Color: **TAN**
Color Correction: **NO**

Clarification: **CENTRIFUG**

Initial pH: **11.2**
Final pH: **8.72**

Lab Treatment: **CHARCOAL**

MICROTOX RESULTS

Microtox Original %	
EC50(15Min)	**40.5**
EC20(15Min)	**13.8**
EC50(5Min)	**40.2**
EC20(5Min)	**11.9**
Interpetation*	**FAIL**
Microtox Charcoal	
EC50(15Min)	**>82**
EC20(15Min)	**>82**
EC50(5Min)	**>82**
EC20(5Min)	**>82**
Interpetation*	**PASS**
Microtox Other	
EC50(15Min)	**N/A**
EC20(15Min)	**N/A**
EC50(5Min)	**N/A**
EC20(5Min)	**N/A**
Interpetation*	**N/A**

AEUB 1996 Guide 50 Interpetation*

PASS: EC50(15) ≥ 75%
FAIL: EC50(15) < 75%

Remarks: _____

ETL Enviro-Test LABORATORIES
A DIVISION OF ETL CHEMSPEC ANALYTICAL LIMITED

9505 – 111 Street, Grande Prairie AB T8V 5W1
Telephone: (780) 539-5196 Fax: (780) 513-2191

CHAIN OF CUSTODY ANALYTICAL REQUEST FORM

ALPINE ENVIRONMENTAL

Regular ☒ Priority ☐ (50% surcharge) Emergency ☐ (100% surcharge)

Client Job #: N0009/N1010 PO #: _____

Sample ID	Sampled By	Date/Time Sampled	Sample Type	LDSPS (SAR3S9)	LDSPF (SAR3W9, SPW1R9)	LDSPYS (SAR3S9)	LDSPYF (SAR3W9, SPW1R9)	LDTRS (SAL5S9, OGG1R9, NPK1S2)	LEASF (PHW1W9, ECW1W9, CLD1W9, TSS1W9, BTL3W1)	ALRS (SDG1S9, PHS1S9, PSQ1S9, LOI1S9)	SAR6S9	SAL4S9	MBCS	NIC3X9	OGG1R1	Hold	Lab ID
PIT A - TOTAL WASTE	RH	19 JAN/01	SOLIDS										X	X	X		6101144
ON-SITE SOILS	"	"	SOIL													X	

NO. SAMPLES:	RELINQUISHED BY:	DATE: 20 JAN/01	RECEIVED BY:	DATE: 22 Jan-01
2	K. HENNESSY	TIME: 1430	JM	TIME: 9:00
NO. COOLERS/BOXES	RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
		TIME:		TIME:

CLIENT INFORMATION:

Report to: Sharlene Yadlowsky / Joanna Hibbs

Alpine Environmental Ltd.
RR 2
1/2 Mile South of Airport
Grande Prairie AB T8V 2Z9

Phone: (780) 538-0050 Fax: (780) 532-2899

Invoice to: Alpine Environmental Ltd. (GP)

Attention: Mr. Dave Kliewer

FOR LABORATORY USE ONLY

SAMPLE CONDITION UPON RECEIPT: FROZEN _____ COLD _____ AMBIENT _____

OTHER (BREAKAGE, LEAKAGE, ETC.): _____

Compliance Option 1
Drilling Waste Disposal Assessment Checklist

If any response to the checklist questions leads to a Phase 2 ESA requirement, an environmental site assessment must be conducted in accordance with Compliance Option Three. **If insufficient information is available to allow completion of the Compliance Option One checklist, Compliance Option Two or Three (Phase 2 ESA) must be completed.**

1. General Disposal and Drilling Fluid Information:
If some or all of the drilling waste was managed on-site (the wellsite) or at a land treatment area or a remote sump, then the checklist must be completed. In some cases, the drilling waste may have been managed at a remote sump/site that is not linked to the wellsite and as such a separate reclamation certificate is required for that separate location. If the remote sump or land treatment area is linked to the wellsite, proceed with the checklist for the remote sump or land treatment area. Where remote sumps are associated with multiple disposals managed in separate cells complete one checklist per disposal. Otherwise, complete one checklist by combining the information from all notification forms.

Section 1.0 to 1.3 must be completed for all disposals. The remaining sections do not need to be completed for wastes disposed of by the following methods:

a) If drilling waste was managed at an AER or ESRD approved waste management facility, indicate this using the appropriate checkbox below and list the supporting documentation (e.g. waste manifests, truck tickets, invoices, Alberta Oilfield Waste Management Form) under Reference Documents.

b) If the waste was disposed at an off-site location by pump-off, landspraying or landspray-while-drilling (LWD), or disposal onto forested public lands and the *Notification of Drilling Waste Disposal Form*, *Drilling Waste Management Disposal Form*, *Drilling Waste Pipeline Disposal Form,* or equivalent indicates the disposal method and location.

The notification form will indicate the type of drilling fluid system used. Water-based drilling fluids can be described in numerous ways for example; gel chem, floc water, fresh water gel, gypsum water, nitrate gypsum water, etc.

1.0 Well Information:	Unique Identifier (UI)	Para et al Fort Liard N-01
	Spud Date	December 12, 2000
	Well Depth	1940 m

1.1 Disposal Method (Check all that apply):

On-site
- ☒ Mix-bury-cover
- ☐ Landspread
- ☐ Biodegradation, including land treatment
- ☐ Landspray-while-drilling
- ☐ Landspray
- ☐ Pump-off
- ☐ Disposal onto Forested Public Lands

Off-site
- ☐ Landspray-while-drilling
- ☐ Landspray
- ☐ Pump-off
- ☐ Disposal onto Forested Public Lands

- ☐ Land Fill/Waste Management Facility

Remote Sump/Site
- ☐ Mix-bury-cover
- ☐ Landspread
- ☐ Biodegradation, including land treatment
- ☐ Landspray-while-drilling
- ☐ Pump-off
- ☐ Landspray
- ☐ Disposal onto Forested Public Lands

☐ Other, specify: _____

	Yes	No
1.2 Were there other drilling waste disposal events on the site (e.g. wellbore re-entry or another well drilled, using fluids containing drilling fluid additives)?	☐	☒
If yes, were the disposal areas separate from one another?	☐ Drilling waste information must be evaluated for each disposal	☐
If the disposal areas were not separate, is documentation available to show that a disposal plan was followed that was agreed to by the licensee and the regulator?	☐ Disposal plan and confirmatory information must be retained on file and provided to the AER upon request.	☐ Compliance Option Two or Three required
1.3 Were cuttings or solids disposed of on-site that were associated with off-site waste disposal?	☐	☒
If Yes, is separate analytical information or unique notification available?	☐	☐
If separate information or notification is not available, is the known volume (include references in Reference Documents) or estimated volume of waste disposed of on-site less than 50 m^3?	☐	☐ Phase 2 required
If the volume of cuttings or solids disposed of on-site is unknown, estimate the volume using following calculation and enter the data and results at right*: $V_C = V_T - V_{OFF}$ Where: V_C = Volume of cuttings or solids on-site (m^3) V_{OFF} = Volume of cuttings or solids disposed of off-site (m^3) V_T = Total volume of cuttings or solids (m^3) and: $V_T = \left(\frac{WDm}{2000}\right)^2 \times 3.14 \times WDp \times 1.2$ Where: WDm = Well diameter (mm) WDp = Well Depth (m) * If different hole sections have different diameters, V_C may be calculated for each section separately. Provide the data and result for each section at right or as an attachment.	Enter data below: V_C = ____(m) V_T = ____(m) V_{OFF}= ____(m^3) WDm = ____(mm) WDp = ____(m)	

	Yes	No
1.4 Were water-based drilling fluids used (gel chemical drilling fluid system)?	☒	☐
If Yes, were all or part of the wastes disposed of on-site?	☒	☐
1.5 Was the drilling fluid described as an advanced gel chemical system?	☐	☒
If Yes, were all or part of the wastes disposed of on-site before November 1, 2012?	☐	☐
If wastes were disposed of on-site before November 1, 2012, was the disposal done in compliance with an approval from the AER?	☐ Approval and post-disposal sampling results must be retained on file and provided to the AER upon request.	☐ Compliance Option Two or Three Required
1.6 Is a mud list available and can all the additives on the mud list be identified and described? Record the additives and their description (e.g., chrome-free lignosulfonate, aldehyde-based bactericide, etc.) on the attached form.	☒	☐ Phase 2 required
1.7 For mix-bury-cover disposal, was the disposal completed before November 1, 2012?	☒	☐
If Yes, was calculated or measured post-disposal chloride concentration 800 mg/kg or less?	☒	☐ Phase 2 required
1.8 For mix-bury-cover or landspread disposal, was the disposal completed on or after November 1, 2012?	☐	☒
If yes, did electrical conductivity, nitrogen concentration or sodium loading rate trigger a requirement for post-disposal sampling?	☐	☐
If post-disposal sampling was required, did all post-disposal samples meet the soil endpoints specified in Section 3 of *Directive 50* (2012 version).	☐	☐ Phase 2 required

	Yes	No
1.9 Was a remote site used?	☐	☒
If Yes, is the remote site included in this reclamation application?	☐	☐
If not included, is the remote site a multi-well disposal location?	☐ In Comments section, indicate which well the remote site will be linked with for the purposes of reclamation	☐ Single well remote disposal site must be included with reclamation certificate application, unless it already has received a Reclamation Certificate.
1.10 Were cement returns buried on-site or at a remote site linked to the well?	☐	☒

2. Hydrocarbon & Toxicity Management

If hydrocarbon based drilling fluids were used (i.e. diesel inverts, synthetic or mineral oil systems) or hydrocarbons were added to the drilling fluid or the well is a horizontal oil well then it must be demonstrated that the resulting drilling waste was handled appropriately as per *Directive 50* or *Directive 58*. In most cases, if hydrocarbons were added to the system or if the well was a horizontal oil well it is still possible to dispose of the resulting drilling waste on the location and remain within allowable disposal limits but hydrocarbon testing and toxicity testing must have been conducted and documented.

	Yes	No
2.1 Were hydrocarbon-based drilling fluids used or were hydrocarbons added to the drilling fluid or was the well a horizontal oil well?	☐	☒
If Yes, is documentation available showing that the wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58*?	☐	☐ Phase 2 required

	Yes	No
2.2 For mix-bury-cover or landspread disposal, was the disposal completed before November 1, 2012 and was hydrocarbon present?	☐	☒
If yes to both, is the predicted post-disposal hydrocarbon concentration at or below the appropriate guideline? (subsoil: 0.1%, topsoil: 0.5%)?	☐	☐ Phase 2 required
2.3 For mix-bury-cover or landspread disposal, was the disposal completed on or after November 1, 2012?	☐	☒
If yes, did hydrocarbon concentrations in the waste trigger a requirement for post-disposal sampling?	☐	☐
If post-disposal sampling was required, did all post-disposal samples meet the soil endpoints specified in Section 3 of *Directive 50* (2012 version).	☐	☐ Phase 2 required
2.4 Was a luminescent bacteria toxicity (Microtox) test required?	☒	☐
If Yes, did the waste pass the toxicity test requirements as outlined in *Directive 50* (waste must pass either the original or charcoal toxicity test)?	☒	☐
If the waste failed the toxicity test (i.e., EC50 (15) original and EC50 (15) charcoal treated, reading at 15 minutes < 75%) is there evidence that demonstrates the waste was treated to remove toxicity and retested or disposed of as per *Directive 58* (i.e., appropriately approved waste management facility)?	☐	☐ Phase 2 required

3. Metals (Trace Elements) Management

Some drilling fluids contain trace metals and other toxic compounds. Metal-containing additives that have been or are being used include barite ($BaSO_4$), zinc carbonate ($ZnCO_3$), and chrome-based thinners. If these additives were used, the attached calculation tables must be completed and the results used to determine if a Phase 2 ESA is required.

	Yes	No
3.1 Was the disposal completed before November 1, 2012?	☒ Complete questions 3.2 to 3.5	☐ Go to question 3.6
3.2 Was barite added to the drilling fluid?	☒	☐
If Yes, did it meet the requirements specified in the attached metal calculation table?	☒ Show calculation on attached form	☐ Phase 2 required
3.3 Was zinc carbonate added to the drilling fluid?	☐	☒
If Yes, did it meet the requirements specified in the attached metal calculation table?	☐ Show calculation on attached form	☐ Phase 2 required (Cadmium analysis will also be required.)
3.4 Were chrome-based thinners added to the drilling fluid?	☒	☐
If Yes, did it meet the requirements specified in the attached metal calculation table?	☒ Show calculation on attached form	☐ Phase 2 required
3.5 Were any other metals added that triggered testing required by Section 3 or 5 of *Directive 50* (1996 version)?	☐	☒
If Yes, are waste analytical data and application rates (land treatment, landspreading) or maximum application (mix-bury-cover) available?	☐	☐ Phase 2 required
If above data are available, did the application rate or maximum application meet *Directive 50* (1996 version) requirements?	☐	☐ Phase 2 required
3.6 Did metal concentrations in the waste trigger a requirement for post-disposal sampling?	☐	☐
If yes, did all post-disposal samples meet the soil metal endpoints specified in Section 3 of *Directive 50* (2012 version)?	☐	☐ Phase 2 required

Mud Additives (Attach additional pages if necessary.)

Product Name	Amount Used	Brief Description of Product
Gel	449 sacks	Viscosifier
Caustic	24 sacks	Alkalinity pH control
Detergent	20 L	Surface Active Agent
Sawdust	36 sacks	Lost Circulation Material
Floc	24 sacks	Flocculant
Gypsum	46 sacks	Shale Control Inhibitor
Alcomer	1 pail	Thinner, Dispersant
Barite	273 sacks	Weighting Material
Soda Ash	6 sacks	Calcium remover
Ligco	10 sacks	Thinner, Dispersant
Staflo	5 sacks	Filtrate Reducer
Desco	1 sack	Thinner, Dispersant (contains chrome)

Reference Documents (List all source documents used in the completion of this checklist. Attach additional pages if necessary. Documents must be supplied to the AER if requested.)

Daily Drilling Reports
Paramount Well File
Alpine Environmental Drilling Waste Sampling Report

Comments (Please provide any additional comments relevant to the decision process within the checklist. Attach additional pages if necessary.)

A Notification of Drilling Waste Disposal document was available for review and indicated that 1999 m^3 of gel-chem drilling waste was disposed of in an onsite drilling waste disposal area (DWDA) by mix-bury-cover. The DWDA was located on the east side of well centre.

The drilling waste meets the requirements of the Compliance Option 1 checklist and barite and chrome-based thinner calculation criteria. Further assessment of the DWDA is not required.

Location: Para et al Fort Liard N-01 **Spud:** December 12, 2000

Metal Calculations for Compliance Options One and Two

Note: Different default mix ratios are provided depending on whether the well was drilled before or after October 22, 1996. The 1996 version of *Guide 50* , *Drilling Waste Management,* which was issued by the Energy Resources Conservation Board on this date, increased the minimum mix ratio requirement from 1:1 to 3:1.

Barite:

Directions: Fill in the number of sacks and adjust for sack weight if different than 40 kg. Enter the Well Depth in metres. The spreadsheet will calculate the number of sacks per metre. This value must be less than or equal to **0.22** If the value exceeds the objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Total Number of Sacks (40 kg/sack*)		Well Depth (m)		Mix Ratio**		Sacks per Metre
273	÷	1940	÷	3	=	0.05

Result
PASS

* Sack weight may be adjusted by dividing the number of sacks by 40 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter “3”. If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

Location: Para et al Fort Liard N-01 **Spud:** December 12, 2000

Chromium-based Thinner:

Alternative 1:

If waste chromium, mix ratio and waste bulk density data are available use the following calculator to estimate post-disposal chromium concentration.

Directions: Enter the Total Chromium Concentration in mg/kg measured in the waste, the Waste Dry Bulk Density in kg/m3, and Mix Ratio in the appropriate cells. The spreadsheet will calculate the Post-Disposal Chromium Concentration. If this value is greater than 64 mg/kg, a Phase 2 ESA (Compliance Option 3) is required.

Waste Chromium Concentration (mg/kg)		Waste Dry Bulk Density* (kg/m^3)		Mix Ratio						Post-Disposal Cr Concentration (mg/kg)
	x		÷		÷	1500	+	30	=	#DIV/0!

* Waste Dry Bulk Density = (Waste Specific Gravity – 1) x 1600

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

Alternative 2:

If the above data is not available use the following equation to calculate the number of sacks of chrome thinner added per meter drilled. If the number of sacks exceeds the limits below, a Phase 2 is required.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Well Depth in metres. The spreadsheet will calculate the number of sacks per metre. This value must be less than or equal to **0.020.** If the value exceeds the objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Total Number of Sacks (25 kg/sack*)		Well Depth (m)		Mix Ratio**		Sacks per Metre
1	÷	1940	÷	3	=	0.0002

Result
PASS

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

= Required Field

APPENDIX D

Site Visit Photos



Photograph 1: View of the base of the wellhead.



Photograph 2: View of the well centre, facing north.



Photograph 3: View of lease from well centre, facing north.



Photograph 4: View of lease from well centre, facing east.



Photograph 5: View of lease from well centre, facing south.



Photograph 6: View of lease from well centre, facing west.



Photograph 7: View of the flare stack and knockout drum, facing northeast.



Photograph 8: View of flare stacks, facing northeast.



Photograph 9: View of knockout tank, facing northeast.



Photograph 10: View of cut-off pipe ends near well centre, facing northeast.



Photograph 11: View of unidentified pipe east of the well centre, facing east.



Photograph 12: View of methanol tank farm, facing northwest.



Photograph 13: View of methanol tank farm, facing northwest.



Photograph 14: View of methanol tank farm, facing northeast.



Photograph 15: View of incinerator shack, facing south.



Photograph 16: View of incinerator tank, facing north.



Photograph 17: View of incinerator shack, facing south.



Photograph 18: View of meter run located east of incinerator shack, facing south.

May 11, 2017

Paramount Resources Ltd.
4700 Bankers Hall West
888 3rd Street SW
Calgary, Alberta T2P 5C5

Attention: **Larry Yoon, B.Sc., P. Biol.**
Environmental Specialist

Reference: **N-01 (60°10', 123°15') NWT**
Phase 2 Environmental Site Assessment

North Shore Environmental Consultants Inc. is pleased to submit our Phase 2 Environmental Site Assessment report for the N-01 (60°10', 123°15') wellsite to Paramount Resources Ltd.

North Shore appreciated the opportunity to work on this project and if we can provide clarification of any part of this report, please call the undersigned at (780) 467-3354.

Yours truly,

North Shore Environmental Consultants Inc.



Brent Walchuk B.Sc., P. Ag.
Remediation/Reclamation Supervisor

NORTH SHORE
Environmental Consultants

Paramount Resources Ltd.
Para et al Fort Liard N-01 60°10' 123°15'
Phase 2 Environmental Site Assessment
May 2017



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North Shore Environmental Consultants Inc. (North Shore) was retained by Paramount Resources Ltd. (Paramount) to conduct a Phase 2 Environmental Site Assessment (ESA) at the N-01 (60°10', 123°15') wellsite (Site) located near Fort Liard, NWT. The objective of the Phase 2 ESA was to assess areas of potential environmental concern identified during the Phase 1 ESA conducted by North Shore in March 2017. Assessment activities included collecting soil samples to determine if select compounds used or produced on the Site exceed the federal and provincial remediation guidelines. The areas of potential environmental concern included the following:

- Well centre;
- Former methanol spill area;
- Production facility area;
- Flare area; and
- Potential flare pit area.

Between February 4, 2017 and February 5, 2017, 29 drilling (solid-stem) boreholes and one hand auger borehole were advanced at the Site. Based on a review of the analytical data, field observations, and field screening information from the Phase 2 ESA, several analyzed soil parameters did not meet the applicable remediation guidelines. Additionally, soil impacts that were identified during the Phase 2 ESA were not fully delineated.

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1 INTRODUCTION

North Shore Environmental Consultants Inc. (North Shore) was retained by Paramount Resources Ltd. (Paramount) to conduct a Phase 2 Environmental Site Assessment (ESA) at the N-01 (60°10', 123°15') wellsite (Site) located near Fort Liard, Northwest Territories (NWT).

1.1 Objective

The objective of the Phase 2 ESA was to assess areas of potential environmental concern identified during the Phase 1 ESA conducted by North Shore in March 2017 (North Shore, 2017). Assessment activities included collecting soil samples to determine if select compounds used or produced on the Site exceed the applicable remediation guidelines.

1.2 Scope of Work

The scope of work for the Phase 2 ESA included the following:

- Review background information to assist with establishing site specific protocols.
- Obtain the necessary written agreements from third-party licensees in the area.
- Hire a private utility locating surrounding the proposed ground disturbance locations in the proposed work area and control area (30 meter (m) buffer around the work area).
- Conduct a tailgate safety meeting prior to initiating work each day at the Site. This includes North Shore personnel and any other contractors' onsite.
- Advance 30 borehole locations to investigate background soil conditions and areas of potential environmental concern identified in the Phase 1 ESA (North Shore, 2017).
- Collect samples from each borehole, field screen, and log according to Canadian System of Soil Classification.
- Submit selected soil samples for laboratory analysis to confirm the absence or identify the presence of oil and gas related impacts.
- Prepare a report documenting the findings of the Phase 2 ESA and compare laboratory results with applicable soil remediation guidelines.

2 BACKGROUND

2.1 Site Description

The Site is located at Unit N, Section 1 Grid Area 60°10', 123°15' approximately 80 kilometres (km) south east of Fort Liard, NWT. The Site is located approximately 4 km north of the NWT/British Columbia (BC) border. A location map of the Site is included as Figure 1 and a survey plan is included in Appendix A.

2.2 Land Use and Receptors

The lease is situated on Crown land in a mixed-wood forested area. The Site has not been reclaimed, but natural encroachment from the surrounding forest is evident throughout the lease. Site photographs are included as Appendix B.

2.3 Site History and Infrastructure

The Para et al Liard N-01 well was spud on December 12, 2000 and drilled until January 16, 2001 to a depth of 1940 metres (m). The well produced sweet natural gas, condensate and produced water between 2001 and 2005 before the site was deactivated by Paramount in April 2008. Fluids were transported from the site via pipeline to the Paramount Maxhamish d-36-I compressor station in BC.

Infrastructure identified in association with the site includes the following: wellhead, flare knockout tank with dual vent stacks, bermed methanol tanks, separator building, line heater, aboveground piping, pipeline riser, pig launcher, triethylene glycol (TEG) unit, meter skids, and a fuel tank. Infrastructure was still in place at the time of this assessment.

2.4 Previous Environmental Work

A Phase 1 ESA was completed by North Shore in March 2017 (North Shore, 2017). Facilities remained onsite at the time of the Phase I ESA site visit. Areas of potential of environmental concern that were recommended for investigation included:

- Well centre;
- Production facility areas;
- Flare stack area/flare knockout drum area;
- Area of reported soil impacts on the northeast area of the Site; and
- Reported spill areas.

3 METHODOLOGY

3.1 Safe Work Procedures

North Shore personnel adhered to Paramount's policies and procedures to complete the assessment and investigation program. Standard oilfield personal-protective equipment (hard hat, steel-toed boots, safety glasses, and fire retardant coveralls) were worn by all personnel on-site. A calibrated four way gas monitor for H2S, O2, CO, and organic vapours was also carried by each person participating in the field work. Nitrile gloves were worn when handling soil samples. All personnel onsite were required to possess copies of the applicable safety certification (Ground Disturbance Level 2, H2S Alive, Transportation of Dangerous Goods, Workplace Hazardous Material Information System, and Standard Level First Aid). North Shore personnel acquired a Paramount Safe Work Permit prior to commencing fieldwork and a tailgate safety meeting was conducted at the beginning of each work day.

Prior to initiating any ground disturbance, a file review was completed and the proposed assessment area was swept by a third party company for the presence of buried facilities.

All ground disturbance documentation was peer reviewed prior to commencing the fieldwork. A hydrovac was not used prior to drilling, all above ground infrastructure was still in place and boreholes were advanced 5 m from any underground facilities.

3.2 Drilling Program

3.2.1 Borehole Drilling

Between February 4 and 5, 2017, 30 boreholes (17C01 to 17C02, 17HA01 and 17BH01 to 17BH27) were advanced as part of the drilling program (Figures 3). Boreholes were completed using a tracked-mounted drilling rig equipped with 15 cm solid-stem. One borehole was advanced using a hand auger. Boreholes were completed to a maximum depth of 6.0 metres below ground level (mbgl), depending on the assessment location and subsurface conditions. Delineation of potentially impacted areas was based on field screening, visual cues, and professional judgment. Vertical and horizontal delineations were completed to determine the spatial extent of the potentially impacted material. If potentially impacted material was identified during borehole logging, vertical delineation was completed by sampling parameters above the suspected impact zone and to a depth of 1.0 m below the suspected lowest point of contamination. Horizontal delineation was completed by advancing boreholes in 5.0 m horizontal increments in each direction (north, south, east, and west) until clean material, as determined by field screening and professional judgment, was identified. Select delineation samples were collected for laboratory analyses.

The GPS location, reference from a fixed point, and rationale of each borehole is included in the borehole logs in Appendix C. Borehole locations are shown in Figure 2.

3.3 Soil Sampling

Throughout the sample collection process, North Shore adhered to sampling procedures described in the Canadian Council of Ministers of Environment (CCME) Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites (CCME, 1993). Samples of the recovered soil were visually inspected for evidence of impact such as free product, staining, or discoloration. The outermost layer of the samples was trimmed using a soil tool to avoid cross-contamination. North Shore personnel wore a pair of clean, chemical resistant nitrile gloves for each soil sample collected as an added preventative cross-contamination measure.

Soil vapor concentrations were field screened for volatile hydrocarbon constituents using an RKI Eagle gas detector (RKI Eagle), calibrated with a 400 parts per million (ppm) concentration of hexane gas with the methane elimination switch turned on. Samples selected for vapor screening were placed into plastic bags, sealed, agitated, and allowed to volatilize. Volatile organic compounds (VOCs) that accumulated within the headspace were then measured in ppm or percent of the lower explosive limit (LEL) and recorded on the borehole logs.

Soil samples were also field screened for salinity related parameters by measuring electrical conductivity (EC) using a Spectrum Technologies Inc. Field Scout Soil and Water EC Metre (EC Probe).

Prior to sampling, the EC probe was calibrated with a 2.76 dS/m calibration solution. Once the soil on the auger had been trimmed, the EC probe was inserted directly into the soil media in order to obtain an insitu EC reading. The EC reading was allowed to stabilize for three seconds before being recorded in the field documents.

All soil samples were placed in sealable plastic bags for field screening organic vapors and inorganic analyses. Soil samples for volatile organic analyses included field preservation with methanol and glass jars with Teflon-lined lids for all other organic analyses. Jarred samples were packed tightly to minimize headspace, help prevent the loss of VOCs, and minimize biodegradation. All samples collected were labeled and placed in a cooler with ice or ice packs to maintain a temperature as close to 4°C as possible. Soil samples were transported to an accredited laboratory for analysis. Standard chain of custody protocols were followed during the transport of the samples.

Soil characteristics at each borehole location were described using classification procedures and terminology from The Canadian System of Soil Classification (Soil Classification Working Group, 1998). Borehole logs containing the soil profile descriptions are included in Appendix C.

3.4 Quality Assurance and Quality Control

3.4.1 Laboratory QA/QC

Soil samples collected during the February 3 to February 4, 2017, sampling event were submitted to AGAT Laboratory (AGAT) in Calgary, Alberta for analysis. The analytical suite was selected based on regulated compounds that are typically found on oil and gas sites.

AGAT is a Standards Council of Canada (SCC), ISO 9000 Series and ISO/IEC 17025 accredited laboratory and Canadian Association of Environmental Analytical Laboratories (CAEAL) accredited laboratory that uses ESRD recognized methods to conduct laboratory analyses. Method blanks, control standards samples, Certified Reference Material (CRM) standards, method spikes, replicates, duplicates, and instrument blanks are routinely analyzed as part of the QA/QC program at the laboratory. AGAT has indicated that analytical data is only released if it passes the laboratory QA/QC procedures. A summary of the QA/QC procedures adopted by AGAT during the analyses of samples for petroleum hydrocarbon concentrations, salinity parameters, and metals concentrations is included in Appendix D.

4 COMPARISON GUIDELINES

4.1 Assessment Guidelines

Selection of the appropriate set of guidelines is based on the texture of the dominant soil type along with current and potential future land use as determined in the assessment. Where both fine and coarse grain strata are present, grain size is determined by the stratum governing horizontal and vertical migration to a receptor. Four soil samples collected from depths ranging from 1.3 to 4.5 mbgl were analyzed for particle size (75 micron sieve). All of the samples were reported to be fine-grained and the guidelines for fine-grained soils were applied.

As per the direction of Paramount, the guidelines for residential/parkland land use were applied to the Site and laboratory values were compared to the following:

- Soil regulated metals, glycol, benzene, toluene, ethylbenzene, and xylenes (BTEX), PHC fractions F1-F4 and polycyclic aromatic hydrocarbons (PAH) results were compared to the Canadian Council of Ministers of the Environment (CCME) - Tier 1 Soil Remediation Guidelines (CCME, 2017).
- Saturated paste boron and methanol results were compared to the AEP Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Tier 1 Guidelines; AEP, 2016a).
- Soil EC, Sodium Adsorption Ration (SAR) and pH values were compared to Environmental Guidelines for Contaminated Site Remediation (EGCSR, 2003) Environment Division. Government of the Northwest Territories (EGCSR, 2003).

4.2 Background Control Characterization and Salinity Guidelines

All control EC and SAR results complied with the EGCSR Guidelines with the exception of one EC value of 2.29 dS/m (primarily naturally occurring calcium sulphate). The onsite values were compared to the same general EC and SAR range. One control sample reported a pH value of 5.73 that did not meet the EGCSR Guidelines. This is an indication that the soils in the area may have EC values above the guideline range, and naturally low pH values. All other samples met the applicable remediation guidelines.

All of the control samples reported arsenic values ranging from 10.7 mg/kg to 16.8 mg/kg, which exceed the applicable remediation guideline. One nickle value of 49 mg/kg was reported in the control soil samples. This is an indication that naturally elevated arsenic, and nickel values may occur in the area. All other control samples reported metals values that met the applicable guidelines (Tables 2 and 3).

5 RESULTS OF FIELD INVESTIGATION

5.1 Stratigraphy

Based on the boreholes advanced during the drilling program, soil conditions generally consisted of organics to clay over clay loam to heavy clay.

5.2 Soil Results

Soil results for areas of concern are summarized in Sections 5.2.1 through 5.2.5. The laboratory analyses for soil samples are presented in Tables 1 through 5 along with the applicable comparison guidelines. A summary of the analytical testing procedures of the laboratory is presented on the laboratory certificates enclosed in Appendix D.

5.2.1 Well Centre Area

One borehole (17BH01) was drilled within the well centre area to a maximum depth of 6.0 mbgl. Disturbed soil was encountered to a depth of 1.5 mbgl. The Phase 2 ESA was completed prior to

abandonment, therefore the wellhead was still in place. Ground cover in the area was uniform and similar to the surrounding lease. VOC field screening results from the well centre samples were all less than 140 ppm. EC field screening results from well centre samples ranged from 0.54 to 1.71 dS/m.

Four samples were submitted for hydrocarbons, five samples for detailed salinity and metal analyses. One sample (17BH01 3.2-3.4 mbgl) exceeded applicable hydrocarbon guidelines for PHC F2 (382 mg/kg) and SAR (7.94). Two samples (17BH01 0.3-0.5 mbgl and 17BH01 0.8-1.0 mbgl) exceeded applicable pH and EC guidelines. One sample (17BH01 2.2-2.5) reported an EC value of 2.17 dS/m, which exceeds the applicable guideline, but is comparable to the reported control EC value. Sample 17BH01 (3.2-3.4 mbgl) exceeded total barium criteria, therefore extractable and fusion barium analyses were completed which indicated the barium meets the applicable true total fusion barium guideline. One sample (17BH01 0.8-1.0) reported a selenium value of 1.1 mg/kg, however when the appropriate significant digits are applied, the value meets the applicable guideline. The same sample reported a nickel value of 46.3 mg/kg, which exceeds the CCME Guideline, but is comparable to reported control Nickel values. All other analyzed parameters complied with the applicable guidelines.

Four delineation boreholes (17BH02 to 17BH05) were advanced around the periphery of the well centre area to a maximum depth of 4.5 mbgl. Four samples collected from the boreholes were analyzed for hydrocarbon, nickel, and detailed salinity parameters. Two of the samples reported EC values of 2.94 dS/m and 2.56 dS/m, which exceed the applicable guideline, but are comparable to reported control EC values. All other delineation samples reported values that met applicable guidelines, indicating both vertical and lateral delineation were achieved.

5.2.2 Former Methanol Spill Area

One borehole (17BH07) was drilled within former methanol spill area. The borehole was advanced to a depth of 3.0 mbgl. VOC measurements from the area were all less than 5 ppm. EC field screening results from soil-waste mixture samples ranged from 0.43 to 0.64 dS/m.

One sample (17BH07 0.8-1.0 mbgl) was submitted for petroleum hydrocarbon analysis, two samples (17BH07 0.0-0.2 mbgl and 17BH07 2.2-2.5 mbgl) were submitted for detailed salinity and metal analyses, and one sample (17BH7 0.0-0.2 mbgl) was submitted for glycols and methanol analysis. Both samples reported arsenic values of 16 mg/kg and 15.1 mg/kg, which exceed CCME Guidelines, but are comparable to reported control values. All other samples submitted for analysis met the applicable remediation guidelines.

5.2.3 Production Facilities Area

Twelve boreholes (17BH06, and 17BH08 to 17BH18) and one hand auger borehole (17HA01) were advanced within production facilities areas on the wellsite. Boreholes were advanced to a maximum depth of 3.0 mbgl. VOC measurements from the soil-waste mixture were all less than 110 ppm. EC field screening results from the area ranged from 0.11 to 0.99 dS/m.

Eleven samples were submitted for hydrocarbon analysis, fourteen samples were submitted for detailed salinity, ten samples were submitted for metal analyses, one sample was submitted for PAH

analysis, and nine samples were submitted for glycols and methanol analysis. Seven samples reported arsenic values ranging from 14.0 mg/kg to 25.4 mg/kg, which exceed CCME Guidelines but are comparable to reported control arsenic values. All other samples submitted for analysis met the applicable guidelines.

5.2.4 Flare Area

Five boreholes (17BH19 to17BH23) were advanced in the northeast corner of the wellsite in the flare area. Boreholes were advanced to a maximum depth of 3.0 mbgl to assess the flare stack/knockout drum area, areas of soil impacts were previously reported in the area, and a historical condensate spill and produced water spill. VOC measurements were all less than 20 ppm. EC field screening results from soil samples ranged from 0.12 to 0.57 dS/m.

Nine samples were submitted for hydrocarbon analysis, metals and detailed salinity analysis, and two samples were submitted for PAH analysis. One sample (17BH21 0.8-1.0 mbgl) exceeded the applicable guidelines for ethylbenzene (0.64 mg/kg). The identified exceedance was delineated vertically, but not laterally. Eight samples reported arsenic values ranging from 13.4 mg/kg to 16.6 mg/kg, which exceed CCME Guidelines but are comparable to reported control arsenic values. All other samples submitted for analysis met the applicable guidelines.

5.2.5 Potential Flare Pit Area

Four boreholes (17BH24 to 17BH27) were advanced as exploratory boreholes in search of a potential flare pit. There was no indication of a potential flare pit in any of the boreholes advanced, and as such, samples were not collected for analysis.

5.3 Quality Assurance/Quality Control

Quality assurance and quality control for analytical data was also assessed by comparing analytical results from select samples to duplicate samples obtained from the same sample location. Primary and duplicate samples were compared and the relative percent differences (RPD) were calculated.

RPD criteria has been applied to field duplicates in order to evaluate the precision of the results. If both the original and duplicate sample concentrations are greater than or equal to five times the laboratory detection limit for a given parameter, the RPD must be less than or equal to 40% (water) and 60% (soils) (CCME, 2016). If the results lie outside of the range, they should be considered estimates only. The results of North Shore's QA/QC program are discussed in Section 5.3.1.

5.3.1 North Shore Environmental's QA/QC Program

Three soil sampling QA/QC measurements were conducted by duplicating soil samples 17C01 1.7 – 1.9 mbgl, 17BH01 2.2-2.5 mbgl and 17BH20 1.3 – 1.5 mbgl (referred to as Dup A 1.7-14.9 mbgl, Dup B 2.2-2.5 mbgl and Dup D 17BH20 1.3-1.5 mbgl). Laboratory comparisons reported good reproducibility for all benzene, toluene, ethylbenzene and total xylene (BTEX), petroleum hydrocarbon (PHC) (F1 – F4), particle size, metals, soluble ions, pH, EC and SAR values, with the exception of Duplicate B. Duplicate B exceeded the RPD comparison for total barium which reported poor reproducibility RPD value calculations. Results for the QA/QC measurements are included in Tables 6 through 8.

6 SUMMARY AND CONCLUSIONS

Between February 4, 2017 and February 5, 2017, 30 boreholes were advanced at the Site. Based upon the results of the Phase 2 ESA, the following conclusions were made:

- Well Centre - One sample (17BH01 3.2-3.4 mbgl) exceeded applicable hydrocarbon criteria for F2 (382 mg/kg) and SAR (7.94). Two samples (17BH01 0.3-0.5 mbgl and 17BH01 0.8-1.0 mbgl) exceeded applicable pH and EC criteria. All other analyzed parameters complied with the applicable guidelines or were deemed comparable to background controls.
- Former Methanol Spill Area - All of the samples submitted for analysis met the applicable remediation guidelines or were comparable to background soil conditions.
- Production Facilities Area - All samples submitted for analysis met the applicable guidelines or were comparable to background soil conditions.
- Flare Area - One sample (17BH21 0.8-1.0 mbgl) exceeded applicable criteria for ethylbenzene (0.64 mg/kg). All other samples submitted for analysis met the applicable guidelines or were comparable to background soil conditions.

Based on a review of the analytical data, field observations, and field screening information from the Phase 2 ESA, several analyzed soil parameters did not meet the applicable remediation guidelines. Additionally, soil impacts that were identified during the Phase 2 ESA were not fully delineated.

7 DISCLOSURE

North Shore Environmental Consultants Inc. (North Shore) has prepared this report taking into account government regulations available at the time of the assessment. North Shore has not made an independent verification of historical or analytical results provided by third parties and therefore makes no assurances regarding the accuracy of such information. It has assumed such information is correct. Where indicated or implied the conclusions are based on visual observation and/or analytical testing conducted at the time of the assessment. The conclusions do not apply to any areas of the site not investigated.

This report is intended for the exclusive use of the company, organization, or individual to whom it is addressed and may not be relied upon by any third party without the express written permission of North Shore. The investigation and reporting has been conducted with a reasonable level of attention and skill, in accordance with standards prevailing in the environmental consulting profession at the time of report date in the location in which the report was prepared.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. North Shore accepts no responsibility for damages, if any, suffered by any third party as a result of the use of this report or any decisions made or actions based on this report.

8 CLOSURE

North Shore appreciated the opportunity to work on this project. If we can provide clarification of any part of this report, please contact the undersigned at (780) 467-3354.

This report was prepared by:



_____
Kayle Watson, B.Sc., P.Ag.
Environmental Consultant

Reviewed By:



_____
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9 REFERENCES

Alberta Environment (AENV). 2012. *Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification*. ISBN: 978-1-4601-0442-2. July 2012.

Alberta Environment (AENV). 2001. Soil Quality Guidelines for Unrestricted Land Use from "Salt Contamination Assessment and Remediation Guidelines. Environmental Sciences Division. Edmonton, Alberta. Publication No. T/606. May 2001.

Alberta Environment and Parks (AEP). 2016a. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 197 pp. February 2, 2016. ISBN:978-1-4601-2695-0. (On-line Edition) Website http://aep.alberta.ca

Canadian Council of Ministers of Environment (CCME) 1993. Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites (CCME 1993).

Canadian Council of Ministers of the Environment (CCME). 2016. Volume 1 Guidance Manual: Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment. PN 1551. ISBN 978-1-77202-026-7 PDF. 2016.

Canadian Council of Ministers of Environment (CCME) 2017. Canadian Environmental Quality Guidelines Summary Table. Accessed On-line March, 2017. (CCME 2017).

Environmental Guidelines for Contaminated Site Remediation (EGCSR). 2003. Department of Environment and Natural Resources – Government of the Northwest Territories. (On-line Edition) Website http://www.enr.gov.nt.ca/sites/default/files/guidelines/siteremediation.pdf

North Shore Environmental Consultants. 2017. *Phase 1 Environmental Site Assessment Para et al Fort Liard N-01* Fort Liard, Northwest Territories. March 2017.

Soil Classification Working Group. 1998. *The Canadian System of Soil Classification*. 3rd edition. Agriculture and Agri-Food Canada. Publication 1646 (revised). 187pp.

TABLES

Paramount Resources Ltd.
Table 1. Soil - BTEX, Petroleum Hydrocarbons (F1-F4) and Grain Size
Phase 2 Environmental Site Assessment Report N-01
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	BTEX and PHC (F1-F4)										
			Benzene	Toluene	Ethylbenzene	Total Xylenes	Fraction 1[2]	Fraction 2	Fraction 3	Fraction 4[3]	Chrom. returned to baseline	% Moisture	Grain Size 75 µm Sieve
CCME Surface Soil Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**150**	**1300**	**5600**	**NC**	**NC**	**NC**
CCME Subsurface Soils Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**230**	**3500**	**10000**	**NC**	**NC**	**NC**
BACKGROUND CONTROLS													
17C01	1.7-1.9	04-Feb-17											Fine (10)
17C01	4.3-4.5	04-Feb-17											Fine (26)
17C02	1.3-1.5	04-Feb-17											Fine (23)
17C02	3.2-3.4	04-Feb-17											Fine (18)
WELL CENTRE AREA													
17BH01	0.8-1.0	04-Feb-17	<0.005	<0.05	0.01	<0.05	<10	<10	58	26	Yes	15	
17BH01	2.2-2.5	04-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	14	
17BH01	3.2-3.4	04-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	**382**	1920	530	Yes	36	
17BH01	5.8-6.0	04-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	90	<10	Yes	15	
17BH02	3.2-3.4	04-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	63	<10	Yes	12	
17BH03	3.2-3.4	04-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	38	<10	Yes	15	
17BH04	3.2-3.4	04-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	55	<10	Yes	11	
17BH05	3.2-3.4	04-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	48	<10	Yes	12	
FORMER METHANOL SPILL AREA													
17BH07	0.8-1.0	04-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	11	<10	Yes	15	
PRODUCTION FACILITIES AREA													
17BH06	0.3-0.5	04-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	22	12	Yes	15	
17BH06	2.2-2.5	04-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	11	<10	Yes	16	
17BH08	0.8-1.0	04-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	15	
17BH09	0.8-1.0	04-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	12	<10	Yes	16	
17BH12	2.2-2.5	04-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	14	
17BH13	0.8-1.0	05-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	11	<10	Yes	14	
17BH14	0.8-1.0	05-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	18	<10	Yes	14	
17BH15	0.8-1.0	05-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	14	
17BH16	0.8-1.0	05-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	14	
17BH17	0.8-1.0	05-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	15	
17BH18	0.8-1.0	05-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	15	<10	Yes	17	
FLARE AREA													
17BH19	0.8-1.0	05-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	29	<10	Yes	17	
17BH19	2.8-3.0	05-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	17	
17BH20	0.8-1.0	05-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	19	
17BH21	0.8-1.0	05-Feb-17	<0.005	<0.05	**0.64**	0.32	34	64	<10	<10	Yes	14	
17BH21	2.2-2.5	05-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	19	
17BH22	0.3-0.5	05-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	19	
17BH22	0.8-1.0	05-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	16	
17BH22	1.7-1.9	05-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	17	
17BH23	0.8-1.0	05-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	16	

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Fraction 1 petroleum hydrocarbons (C6-C10) minus benzene, toluene, ethylbenzene and xylene concentrations

[3] - Fraction 4 petroleum hydrocarbons (C34-C50 or >C34) as determined by high temperature gas chromatography

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 2. Soil - Regulated Metals
Phase 2 Environmental Site Assessment Report N-01
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Antimony (Sb)	Arsenic (As)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Fusion Barium (Ba) - True Total	Beryllium (Be)	Boron (B) Sat Paste (mg/L)	Cadmium (Cd)	Chromium (Cr) - Total	Hexavalent Chromium (Cr+6)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
CCME Guidelines[1] (mg/kg)			**20**	**12**	**500**	**0**	**0**	**4**	**NC**	**10**	**64**	**0.4**	**50**	**63**	**140**	**6.6**	**10**	**45**	**1**	**20**	**1**	**50**	**23**	**130**	**200**
AEP Tier 1 2016 Guidelines[2] (mg/kg)						**250**	**10000**																		
BACKGROUND CONTROLS																									
17C01	0.8-1.0	04-Feb-17		**13.4**														27.6	0.5						
17C01	1.3-1.5	04-Feb-17		**15.1**														22.9	<0.5						
17C01	2.2-2.5	04-Feb-17		**16.8**														23.3	0.6						
17C01	2.8-3.0	04-Feb-17		**15.8**														26.5	1.0						
17C02	1.7-1.9	04-Feb-17		**13.4**														26.7	<0.5						
17C02	3.2-3.4	04-Feb-17		**16.8**														24.7	0.9						
17C02	4.3-4.5	04-Feb-17		**10.7**														**49.0**	0.8						
WELL CENTRE AREA																									
17BH01	0.3-0.5	04-Feb-17																23.2							
17BH01	0.8-1.0	04-Feb-17	0.6	**16.7**	300			1.1	<0.5	<0.5	22.6	<0.3	15.2	25.7	17.5	<0.5	1.1	**46.3**	**1.1**	<0.5	<0.5	0.7	1.3	40.3	169
17BH01	1.3-1.5	04-Feb-17																31.5							
17BH01	2.2-2.5	04-Feb-17	0.5	**16.8**	312			0.7	<0.5	<0.5	20.2	<0.3	11.3	17.8	12.1	<0.5	1.5	29.9	<0.5	<0.5	<0.5	0.8	1.1	37.1	99
17BH01	3.2-3.4	04-Feb-17	0.8	**16.3**	**1090**	25	2560	1.1	<0.5	<0.5	32.3	<0.3	9.9	30.0	24.8	<0.5	3.6	31.7	1.0	<0.5	<0.5	0.9	1.8	44.5	133
17BH02	0.8-1.0	04-Feb-17																27.3							
17BH03	0.8-1.0	04-Feb-17																22.9							
17BH04	0.8-1.0	04-Feb-17																23.2							
17BH05	0.8-1.0	04-Feb-17																20.4							
FORMER METHANOL SPILL AREA																									
17BH07	0.0-0.2	04-Feb-17	0.6	**16.0**	316			0.7	<0.5	<0.5	25.5	<0.3	8.9	18.8	12.2	<0.5	2.3	26.3	0.8	<0.5	<0.5	<0.5	1.3	37.4	87
17BH07	2.2-2.5	04-Feb-17	<0.5	**15.1**	282			0.6	<0.5	<0.5	17.1	<0.3	9.1	16.8	11.4	<0.5	1.5	23.3	0.5	<0.5	<0.5	<0.5	1.2	33.4	98
PRODUCTION FACILITIES AREA																									
17BH06	0.3-0.5	04-Feb-17	0.5	11.3	255			0.7	<0.5	<0.5	19.3	<0.3	10.0	18.3	11.8	<0.5	2.3	25.5	0.8	<0.5	<0.5	0.5	1.5	33.1	85
17BH06	2.2-2.5	04-Feb-17	<0.5	**14.0**	315			0.6	<0.5	<0.5	17.8	<0.3	10.0	16.3	11.3	<0.5	1.4	23.4	0.5	<0.5	<0.5	<0.5	1.0	34.1	94
17BH08	0.8-1.0	04-Feb-17	0.6	**18.2**	307			0.9	<0.5	<0.5	18.8	<0.3	11.2	17.4	12.9	<0.5	2.1	28.6	<0.5	<0.5	<0.5	<0.5	1.1	40.6	100
17BH09	0.8-1.0	04-Feb-17	0.6	**25.4**	308			0.8	<0.5	<0.5	18.4	<0.3	9.8	16.0	12.3	<0.5	2.0	25.0	<0.5	<0.5	<0.5	<0.5	1.0	36.5	86
17BH10	1.3-1.5	04-Feb-17	0.6	**18.7**	448			1.0	<0.5	<0.5	21.4	<0.3	11.4	16.2	12.0	<0.5	3.2	30.6	0.8	<0.5	<0.5	<0.5	2.2	45.9	99
17BH11	0.8-1.0	04-Feb-17	<0.5	**16.4**	341			0.7	<0.5	<0.5	18.8	<0.3	9.8	17.2	11.8	<0.5	1.4	25.1	<0.5	<0.5	<0.5	<0.5	0.9	34.7	97
17HA01	0.0-0.1	04-Feb-17	<0.5	3.5	93.4			<0.5	<0.5	<0.5	7.3	<0.3	3.6	7.2	3.6	<0.5	1.2	7.5	<0.5	<0.5	<0.5	<0.5	0.7	15.5	29
17BH12	1.3-1.5	04-Feb-17	0.6	**16.0**	375			0.8	<0.5	<0.5	21.1	<0.3	9.5	18.3	12.9	<0.5	1.9	26.3	0.6	<0.5	<0.5	<0.5	1.1	39.6	88
17BH16	0.8-1.0	05-Feb-17	<0.5	10.9	282			0.7	<0.5	<0.5	21.6	<0.3	8.1	9.5	12.2	<0.5	1.0	19.2	<0.5	<0.5	<0.5	<0.5	0.6	33.6	71
17BH17	0.8-1.0	05-Feb-17	0.9	**15.3**	443			0.8	<0.5	<0.5	23.7	<0.3	9.3	19.6	15.9	<0.5	2.2	27.4	<0.5	<0.5	<0.5	<0.5	1.0	40.6	78
FLARE AREA																									
17BH19	0.3-0.5	05-Feb-17	0.6	**13.4**	311			0.6	<0.5	<0.5	21.5	<0.3	9.0	18.4	14.9	<0.5	1.5	26.1	0.6	<0.5	<0.5	0.7	1.3	34.8	85
17BH19	0.8-1.0	05-Feb-17	0.5	**16.5**	287			0.7	<0.5	<0.5	17.0	<0.3	10.3	17.1	13.0	<0.5	1.6	27.7	0.8	<0.5	<0.5	<0.5	1.2	31.4	100
17BH19	2.8-3.0	05-Feb-17	<0.5	**14.5**	273			<0.5	<0.5	<0.5	14.3	<0.3	8.9	15.7	11.0	<0.5	1.2	21.0	<0.5	<0.5	<0.5	<0.5	1.0	26.2	92
17BH20	0.0-0.2	05-Feb-17	<0.5	**13.6**	239			0.6	<0.5	<0.5	18.1	<0.3	7.1	8.3	12.2	<0.5	1.7	16.7	0.6	<0.5	<0.5	0.5	1.1	31.5	63
17BH20	1.3-1.5	05-Feb-17	<0.5	**16.2**	350			0.6	<0.5	<0.5	16.9	<0.3	9.4	16.3	11.5	<0.5	1.4	23.6	<0.5	<0.5	<0.5	<0.5	0.9	31.9	98
17BH21	0.3-0.5	05-Feb-17	<0.5	**15.7**	283			0.6	<0.5	<0.5	18.9	<0.3	9.9	18.9	14.0	<0.5	1.5	26.5	<0.5	<0.5	<0.5	<0.5	1.2	33.8	90
17BH22	0.3-0.5	05-Feb-17	0.5	**15.0**	310			0.7	<0.5	<0.5	18.2	<0.3	9.5	18.5	13.7	<0.5	1.6	26.2	<0.5	<0.5	<0.5	<0.5	1.1	34.2	95
17BH22	1.3-1.5	05-Feb-17	<0.5	**16.6**	307			0.5	<0.5	<0.5	16.5	<0.3	9.3	16.4	12.3	<0.5	1.3	23.7	<0.5	<0.5	<0.5	<0.5	1.0	30.2	93
17BH23	0.0-0.2	05-Feb-17	0.8	10.6	347			0.7	<0.5	<0.5	19.3	<0.3	7.9	17.8	16.1	<0.5	1.6	24.6	<0.5	<0.5	<0.5	<0.5	1.0	33.1	80

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Alberta Environment and Parks (AEP). 2016. Alberta Tier 1 Soil and Groundwater Remediation Guidelines

Bold - When the equivalent number of significant digits are applied, the value meets the applicable guideline

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 3. Soil - Detailed Salinity
Phase 2 Environmental Site Assessment Report N-01
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Lab pH (6.0-8.5)[1]	Lab EC (dS/m)	SAR	Saturation %	Soluble Ions						Guidelines
							Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg	
CCME Guidelines[1]					<5								1
EGCSR Guidelines[2]			6-8	<2	<5								2
BACKGROUND CONTROLS													
17C01	0.3-0.5	04-Feb-17	**5.73**	0.18	0.13	221	7	69	11	<2	15	64	1,2
17C01	0.8-1.0	04-Feb-17	7.26	0.30	0.18	44	2	18	4	<2	<2	18	1,2
17C01	1.3-1.5	04-Feb-17	7.57	0.34	0.24	45	3	22	4	<2	<2	24	1,2
17C01	1.7-1.9	04-Feb-17	7.05	0.35	0.22	43	3	18	3	<2	<2	21	1,2
17C01	4.3-4.5	04-Feb-17	7.47	0.58	0.49	52	8	31	7	9	4	69	1,2
17C01	4.7-4.9	04-Feb-17	7.75	**2.29**	0.39	58	19	233	46	21	37	1020	1,2
17C02	0.0-0.2	04-Feb-17	6.69	0.45	0.15	89	4	62	10	4	6	36	1,2
17C02	0.8-1.0	04-Feb-17	7.33	0.26	0.24	53	3	19	4	<2	<2	12	1,2
17C02	1.3-1.5	04-Feb-17	7.07	0.29	0.24	49	3	18	3	<2	<2	10	1,2
17C02	1.7-1.9	04-Feb-17	7.65	0.29	0.39	51	5	20	4	<2	<2	17	1,2
17C02	2.2-2.5	04-Feb-17	7.56	0.34	0.40	45	5	19	4	<2	<2	18	1,2
17C02	3.2-3.4	04-Feb-17	7.36	0.49	0.36	72	8	40	7	8	4	76	1,2
WELL CENTRE AREA													
17BH01	0.3-0.5	04-Feb-17	**3.42**	**4.59**	0.12	89	12	361	372	16	8	3080	1,2
17BH01	0.8-1.0	04-Feb-17	**4.46**	**4.64**	0.36	73	32	318	322	13	<2	2230	1,2
17BH01	1.3-1.5	04-Feb-17	6.63	**2.17**	1.21	82	74	250	57	33	34	1050	1,2
17BH01	2.2-2.5	04-Feb-17	7.14	0.56	1.22	50	18	25	5	3	25	35	1,2
17BH01	3.2-3.4	04-Feb-17	7.74	1.55	**7.94**	64	157	35	7	10	97	377	1,2
17BH02	0.8-1.0	04-Feb-17	6.68	**2.94**	0.81	72	57	386	77	8	6	1310	1,2
17BH03	0.8-1.0	04-Feb-17	6.92	0.28	0.28	46	3	17	3	<2	<2	18	1,2
17BH04	0.8-1.0	04-Feb-17	7.02	0.64	0.31	51	6	43	8	2	7	112	1,2
17BH05	0.8-1.0	04-Feb-17	7.10	**2.56**	1.27	43	48	189	37	3	5	679	1,2
FORMER METHANOL SPILL AREA													
17BH07	0.0-0.2	04-Feb-17	7.22	0.53	0.38	52	7	40	4	<2	3	53	1,2
17BH07	2.2-2.5	04-Feb-17	7.21	0.29	0.21	50	3	17	3	<2	<2	16	1,2
PRODUCTION FACILITIES AREA													
17BH06	0.3-0.5	04-Feb-17	7.24	0.39	0.21	53	3	28	4	3	<2	34	1,2
17BH06	2.2-2.5	04-Feb-17	7.22	0.58	0.26	39	4	28	5	<2	<2	64	1,2
17BH08	0.0-0.2	04-Feb-17	6.13	0.41	0.15	177	9	113	23	5	<2	138	1,2
17BH08	0.8-1.0	04-Feb-17	6.90	0.28	0.20	49	2	19	3	<2	<2	12	1,2
17BH09	0.0-0.2	04-Feb-17	6.00	0.26	0.19	237	12	97	19	7	12	81	1,2
17BH09	0.8-1.0	04-Feb-17	6.83	0.26	0.17	41	<2	14	2	<2	<2	7	1,2
17BH10	0.0-0.2	04-Feb-17	6.04	0.18	0.13	165	5	53	10	<2	12	43	1,2
17BH10	1.3-1.5	04-Feb-17	7.21	0.29	0.15	44	<2	18	3	<2	<2	7	1,2
17BH11	0.0-0.2	04-Feb-17	**5.82**	0.19	0.12	134	4	48	9	<2	9	50	1,2
17BH11	0.8-1.0	04-Feb-17	6.58	0.17	0.21	44	<2	9	2	<2	<2	7	1,2
17HA01	0.0-0.1	04-Feb-17	7.99	**2.31**	0.37	32	9	95	29	45	19	277	1,2
17BH12	1.3-1.5	04-Feb-17	7.00	0.26	0.26	49	3	15	3	<2	<2	16	1,2
17BH16	0.8-1.0	05-Feb-17	6.56	0.46	0.29	55	5	30	7	<2	<2	87	1,2
17BH17	0.8-1.0	05-Feb-17	6.84	0.50	0.31	53	5	33	6	<2	<2	84	1,2
FLARE AREA													
17BH19	0.3-0.5	05-Feb-17	7.01	0.72	0.53	57	13	58	9	<2	5	170	1,2
17BH19	0.8-1.0	05-Feb-17	7.01	0.78	0.60	60	15	61	10	<2	8	137	1,2
17BH19	2.8-3.0	05-Feb-17	7.06	0.38	0.40	47	5	20	4	<2	<2	36	1,2
17BH20	0.0-0.2	05-Feb-17	6.58	0.55	0.33	49	6	38	7	<2	<2	78	1,2
17BH20	1.3-1.5	05-Feb-17	7.21	0.30	0.23	54	3	21	4	<2	<2	17	1,2
17BH21	0.3-0.5	05-Feb-17	7.02	0.38	0.27	48	4	24	4	<2	3	42	1,2
17BH22	0.3-0.5	05-Feb-17	6.84	0.56	0.30	52	6	42	7	3	<2	102	1,2
17BH22	1.3-1.5	05-Feb-17	7.30	0.31	0.28	45	3	16	3	<2	<2	17	1,2
17BH23	0.0-0.2	05-Feb-17	7.11	0.59	0.38	51	7	42	7	<2	<2	115	1,2

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Environmental Guidelines for Contaminated Site Remediation (EGCSR). 2003

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NA - Not Applicable

NS - Not Specified

Paramount Resources Ltd.
Table 4. Soil - Polycyclic Aromatic Hydrocarbons
Phase 2 Environmental Site Assessment Report N-01
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b+j+k)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	B[a]P TPE	IACR (Fine/Coarse)
CCME Guidelines[1] (mg/kg)			**0.013**	**NC**	**0.28**	**0.25**	**0.046**	**2.5**	**20**	**10.000**	**1**	**6.2**	**1**	**6.2**	**20.00**	**1**	**1**	**NC**	**5.3**	**≤1**
PRODUCTION FACILITIES AREA																				
17BH16	0.8-1.0	05-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
FLARE AREA																				
17BH19	0.8-1.0	05-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11
17BH19	2.8-3.0	05-Feb-17	<0.005	<0.005	<0.005	<0.02	<0.02	<0.004	<0.01	<0.01	<0.02	<0.05	<0.03	<0.02	<0.03	<0.02	<0.005	<0.05	0.023	0.11

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guideline

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 5. Soil - Glycols and Methanol
Phase 2 Environmental Site Assessment Report N-01
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Ethylene Glycol	Diethylene Glycol	Triethylene Glycol	Tetraethylene Glycol	Propylene Glycol	Methanol	% Moisture
CCME Guidelines[1] (mg/kg)			**960**					**NC**	**NC**
AEP Tier 1 2016 Soil Guidelines[2] (mg/kg)			**62**					**37**	
FORMER METHANOL SPILL AREA									
17BH07	0.0-0.2	04-Feb-17	<10	<10	<10	<10	<10	<0.5	
PRODUCTION FACILITIES AREA									
17BH06	0.0-0.2	04-Feb-17	<10	<10	<10	<10	<10	<0.5	
17BH08	0.0-0.2	04-Feb-17	<10	<10	<10	<10	<10	<0.5	
17BH09	0.0-0.2	04-Feb-17	<10	<10	<10	<10	<10	<0.5	
17BH10	0.0-0.2	04-Feb-17	<10	<10	<10	<10	<10	<0.5	
17BH11	0.0-0.2	04-Feb-17	<10	<10	<10	<10	<10	<0.5	
17BH12	0.0-0.2	04-Feb-17	<10	<10	<10	<10	<10	36.0	
17HA01	0.0-0.2	04-Feb-17	<10	<10	<10	<10	<10	<0.5	
17BH16	0.0-0.2	05-Feb-17	<10	<10	<10	<10	<10	8.3	
17BH17	0.0-0.2	05-Feb-17	<10	<10	<10	<10	<10	<0.5	

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Alberta Environment and Parks (AEP). 2016. Alberta Tier 1 Soil and Groundwater Remediation Guidelines

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.

Table 6. Soil - Quality Control - BTEX and Petroleum Hydrocarbons (F1-F4)

Phase 2 Environmental Site Assessment Report N-01

May 2017

Sample ID	Sample Date (dd-mm-yy)	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	Fraction 1 mg/kg	Fraction 2 mg/kg	Fraction 3 mg/kg	Fraction 4 mg/kg	Grain Size 75 µm Sieve
17C01 1.7-1.9	04-Feb-17									10
Dup A 1.7-1.9	04-Feb-17									16
Detection Limit		---	---	---	---	---	---	---	---	1
Difference		---	---	---	---	---	---	---	---	-6
Relative Percent Difference		---	---	---	---	---	---	---	---	-46.15
Duplicate Sample Results		---	---	---	---	---	---	---	---	Good

Sample ID	Sample Date (dd-mm-yy)	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	F1 (C6-C10) mg/kg	F2 (C10-C16) mg/kg	Fraction 3 mg/kg	Fraction 4 mg/kg	Grain Size 75 µm Sieve
17BH01 2.2-2.5	04-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	
Dup B 2.2-2.5	04-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	13	
Detection Limit		0.005	0.05	0.01	0.05	10	10	10	10	---
Difference		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	---
Relative Percent Difference		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	---
Duplicate Sample Results		---	---	---	---	---	---	---	---	---

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility

Poor - Evaluation indicates poor reproducibility

Blank - Not analyzed

--- - Not applicable

NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 7. Soil - Quality Control - Regulated Metals
Phase 2 Environmental Site Assessment Report N-01
May 2017

Sample ID	Sample Date (dd-mm-yy)	Antimony (An) mg/kg	Arsenic (As) mg/kg	Barium (Ba) mg/kg	Extractable Barium (Ex Ba) mg/kg	Beryllium (Be) mg/kg	Berylium (Be) mg/kg	Boron (B) mg/kg	Cadmium (Cd) mg/kg	Chromium (Cr) - Total mg/kg	Chromium (Cr) - Hex. mg/kg	Cobalt (Co) mg/kg	Copper (Cu) mg/kg	Lead (Pb) mg/kg	Mercury (Hg) mg/kg	Molybdenum (Mo) mg/kg	Nickel (Ni) mg/kg	Selenium (Se) mg/kg	Silver (Ag) mg/kg	Thalium (Tl) mg/kg	Tin (Sn) mg/kg	Uranium (U) mg/kg	Vanadium (V) mg/kg	Zinc (Zn) mg/kg
17BH01 2.2-2.5	04-Feb-17	0.5	16.8	312			0.7	<0.5	<0.5	20.2	<0.3	11.3	17.8	12.1	<0.5	1.5	29.9	<0.5	<0.5	<0.5	0.8	1.1	37.1	99
Dup B 2.2-2.5	04-Feb-17	<0.5	13.4	133			0.5	<0.5	<0.5	15.8	<0.3	9.7	16.8	10.9	<0.5	2.0	22.0	0.9	<0.5	<0.5	<0.5	1.3	27.8	87
Detection Limit		0.5	0.5	0.5	---	---	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Difference		######	-3.4	-179	---	---	-0.2	######	######	-4.4	######	-1.6	-1	-1.2	######	0.5	-7.9	######	######	######	######	0.2	-9.3	12
Relative Percent Difference		######	-22.52	-80.45	---	---	-33.33	######	######	-24.44	######	-15.24	-5.78	-10.43	######	28.57	-30.44	######	######	######	######	16.67	-28.66	12.90
Duplicate Sample Results		---	Good	Poor	---	---	Good	---	---	Good	---	Good	Good	Good	---	Good	Good	---	---	---	---	Good	Good	Good

Sample ID	Sample Date (dd-mm-yy)	Antimony (An) mg/kg	Arsenic (As) mg/kg	Barium (Ba) mg/kg	Extractable Barium (Ex Ba) mg/kg	Beryllium (Be) mg/kg	Berylium (Be) mg/kg	Boron (B) mg/kg	Cadmium (Cd) mg/kg	Chromium (Cr) - Total mg/kg	Chromium (Cr) - Hex. mg/kg	Cobalt (Co) mg/kg	Copper (Cu) mg/kg	Lead (Pb) mg/kg	Mercury (Hg) mg/kg	Molybdenum (Mo) mg/kg	Nickel (Ni) mg/kg	Selenium (Se) mg/kg	Silver (Ag) mg/kg	Thalium (Tl) mg/kg	Tin (Sn) mg/kg	Uranium (U) mg/kg	Vanadium (V) mg/kg	Zinc (Zn) mg/kg
17BH20 1.3-1.5	05-Feb-17	<0.5	16.2	350			0.6	<0.5	<0.5	16.9	<0.3	9.4	16.3	11.5	<0.5	1.4	23.6	<0.5	<0.5	<0.5	<0.5	0.9	31.9	98
Dup D 1.3-1.5	05-Feb-17	<0.5	21.5	332			0.8	<0.5	<0.5	21.3	<0.3	13.6	21.5	14.3	<0.5	1.5	32.3	0.5	<0.5	<0.5	<0.5	1.1	39.8	119
Detection Limit		0.5	0.5	0.5	---	---	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Difference		######	5.3	-18	---	---	0.2	######	######	4.4	######	4.2	5.2	2.8	######	0.1	8.7	######	######	######	######	0.2	7.9	-21
Relative Percent Difference		######	28.12	-5.28	---	---	28.57	######	######	23.04	######	36.52	27.51	21.71	######	6.90	31.13	######	######	######	######	20.00	22.04	-19.35
Duplicate Sample Results		---	Good	Good	---	---	Good	---	---	Good	---	Good	Good	Good	---	Good	Good	---	---	---	---	Good	Good	Good

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 8. Soil - Quality Control - Detailed Salinity
Phase 2 Environmental Site Assessment Report N-01
May 2017

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17C01 1.7-1.9	04-Feb-17	7.05	0.35	0.22	3	18	3	<2	<2	21
Dup A 1.7-1.9	04-Feb-17	7.25	0.32	0.19	3	22	4	<2	<2	21
Detection Limit		---	0.05	---	2	1	1	2	2	2
Difference		-0.2	0.03	0.03	0	-4	-1	#VALUE!	#VALUE!	0
Relative Percent Difference		-2.80	8.96	14.63	0.00	-20.00	-28.57	#VALUE!	#VALUE!	0.00
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	---	---	Good

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17BH01 2.2-2.5	04-Feb-17	7.14	0.56	1.22	18	25	5	3	25	35
Dup B 2.2-2.5	04-Feb-17	7.41	0.71	1.19	21	34	7	4	20	86
Detection Limit		---	0.05	---	2	1	1	2	2	2
Difference		0	0	0.03	-3	9	-2	-1	5	-51
Relative Percent Difference		3.71	23.62	2.49	-15.38	30.51	-33.33	-28.57	22.22	-84.30
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	Good	Good	Poor

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17BH20 1.3-1.5	05-Feb-17	7.21	0.30	0.23	3	21	4	<2	<2	17
Dup D 1.3-1.5	05-Feb-17	7.09	0.26	0.26	3	17	3	<2	<2	17
Detection Limit		---	0.05	---	2	1	1	2	2	2
Difference		0	0	-0.03	0	-4	1	#VALUE!	#VALUE!	0
Relative Percent Difference		-1.68	-14.29	-12.24	0.00	-21.05	28.57	#VALUE!	#VALUE!	0.00
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	---	---	Good

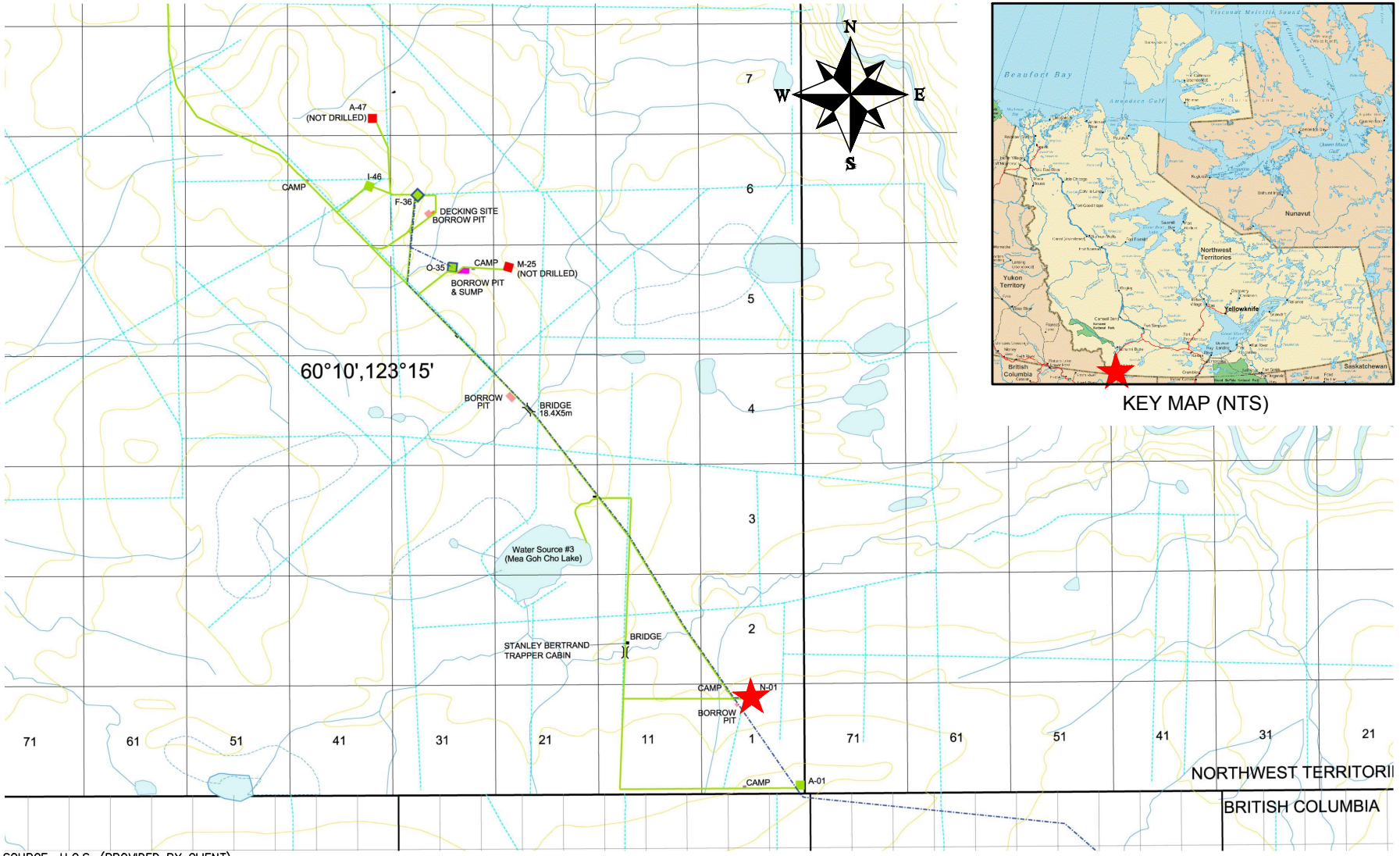
Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

FIGURES

File: N-01_SLM.dwg Date: March-20-17 7:09:53 AM



KEY MAP (NTS)

SOURCE: U.G.S. (PROVIDED BY CLIENT)

LEGEND

★ SITE LOCATION

0 1000 2000 4000m

Scale 1 : 100 000

NORTH SHORE
Environmental Consultants

Date: 19-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. N-01 (NORTHWEST TERRITORIES)	Figure: 1
File name: N-01_SLM-A.dwg	Requested by: DM		

SITE LOCATION MAP

File: N-01_17PH2.dwg Date: March-21-17 5:08:02 PM

CONIFEROUS FOREST

FORMER METHANOL TANK

17BH10

17BH11

COLLAR

17HA01

METHANOL TANK

17BH09

17BH08

METHANOL TANK

17BH24

17BH25

17BH16

17BH13

17BH15

HEATER

17BH12

17BH14

17BH17

17C02

SEPARATOR BUILDING

ELECTRICAL BOX

SKIDS

17BH06

17BH18

17BH07

PIG RUN

17BH05

17BH03

17BH04

17BH01

17BH02

FORMER SPILL AREA

17BH21

17BH22

17BH20

17BH23

17BH19

FLARE KNOCKOUT DRUM

BURIED PPE

CONIFEROUS FOREST

ACCESS ROAD

CONIFEROUS FOREST

17BH27

17BH26

17C01

N-01 LEASE BOUNDARY

CONIFEROUS FOREST

LEGEND

- N-01 WELL CENTRE
- BOREHOLE SAMPLE LOCATION
- HAND AUGER SAMPLE LOCATION
- UNDERGROUND PIPE
- ABOVEGROUND PIPELINE

NOTES:

LOCATIONS ARE APPROXIMATE.

DRAWING SHOULD BE PRINTED ON 11x17 PAPER FOR ACCURATE SCALING.

0 5 10 20 30m

Scale 1 : 800

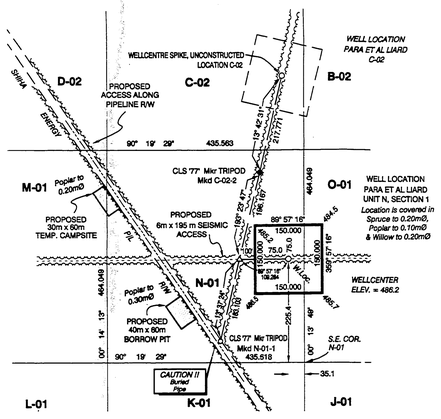
NORTH SHORE Environmental Consultants

SITE DIAGRAM SHOWING SAMPLING LOCATIONS

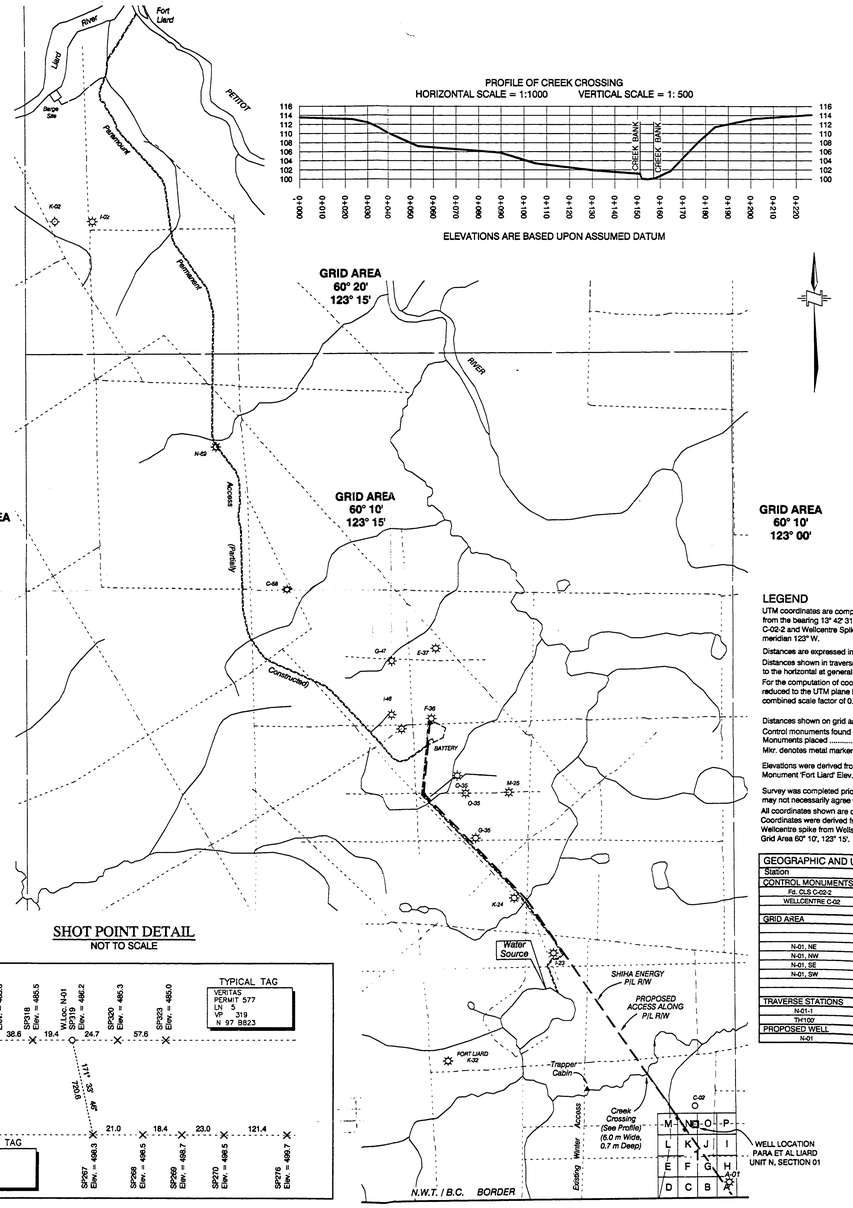
Date: 21-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. N-01 (NORTHWEST TERRITORIES)	Figure: 2
File name: N-01_17PH2-B.dwg	Requested by: DM		

APPENDIX A

Survey Plan

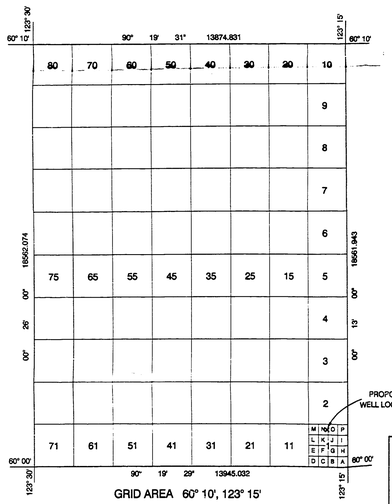


DETAIL
UNIT N, SECTION 01
SCALE 1:5,000



GRID AREA
60° 10'
123° 30'

GRID AREA
60° 10'
123° 00'



GRID AREA 60° 10', 123° 15'
SCALE 1:100,000

SHOT POINT DETAIL
NOT TO SCALE

PROFILE OF CREEK CROSSING
HORIZONTAL SCALE = 1:1000 VERTICAL SCALE = 1: 500

ELEVATIONS ARE BASED UPON ASSUMED DATUM

PLAN AND FIELD NOTES
OF SURVEY OF
PROPOSED EXPLORATORY WELL
PARA ET AL LIARD
IN UNIT N, SECTION 01
GRID AREA 60° 10', 123° 15'
NORTHWEST TERRITORIES
CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50,000
0m 500m 1000m 2000m 3000m 4000m 5000m

SURVEYED FOR
PARAMOUNT RESOURCES LTD.

BY: W.V. JOHNSON, CLS
JUNE, 2000

LEGEND

UTM coordinates are computed for Zone 10 Bearings were derived from the bearing 13° 42' 31" computed between Fd. CLS 77, Post C-02-2 and Wellcentre Spike for Wellsite C-02, and are referred to meridian 123° W.

Distances are expressed in metres and decimals thereof.
Distances shown in traverse are measured distances reduced to the horizontal at general ground level..
For the computation of coordinates measured distances have been reduced to the UTM plane by multiplying them by an average combined scale factor of 0.9995227.

Distances shown on grid area subdivisions are UTM plane.
Control monuments found ..... ●
Monuments placed ..... ○
Mkr. denotes metal marker post 2.0m long placed 0.30m away from Post.

Elevations were derived from Geodetic Survey of Canada Monument 'Fort Liard' Elev. = 216.299 m.

Survey was completed prior to drilling; therefore well as drilled may not necessarily agree with proposed location.
All coordinates shown are on 1927 North American Datum.
Coordinates were derived from Fd. CLS Post C-02-2 and Fd. Wellcentre spike from Wellsite Plan Para et al Liard Unit C, Sec. 02, Grid Area 60° 10', 123° 15'.

Certified Correct and completed on the 14th day of June, 2000.
W.V. Johnson Canada Lands Surveyor
Date: June 14, 2000

W.V. Johnson
Comm. No. 1393

GEOGRAPHIC AND UTM COORDINATES, (1927 NAD)				
Station	Latitude	Longitude(W)	Northings	Eastings
CONTROL MONUMENTS				
Fd. CLS C-02-2	60° 00' 58.489"	123° 16' 02.686"	6653044.322	485091.105
WELLCENTRE C-02	60° 01' 06.338"	123° 15' 59.417"	6653255.782	485142.689
GRID AREA				
N-01, NE	60° 01' 00.051"	123° 15' 56.250"	6653062.092	485190.968
N-01, NW	60° 01' 00.072"	123° 16' 24.374"	6653064.561	484755.412
N-01, SE	60° 00' 45.060"	123° 15' 56.252"	6652628.047	485189.103
N-01, SW	60° 00' 45.073"	123° 16' 24.375"	6652630.517	484753.493
TRAVERSE STATIONS				
N-01-1	60° 00' 46.587"	123° 16' 08.355"	6652675.717	485002.570
TH100	60° 00' 52.322"	123° 16' 05.569"	6652853.584	485045.677
PROPOSED WELL				
N-01	60° 00' 52.338"	123° 15' 58.517"	6652853.670	485154.589

PARAMOUNT RESOURCES LTD

WITNESS
July 15, 2000
DATE

AREAS REQUIRED:

WELLSITE:	150m x 150m =	2.25 ha.
TEMP. CAMPSITE:	30m x 60m =	0.18 ha.
BORROW PIT:	40m x 60m =	0.24 ha.
ACCESS:	6m x 195m =	0.12 ha.
TOTAL:		2.79 ha.

REV No.	DESCRIPTION	DATE

McElhanney
McELHANNEY ASSOCIATES
PROFESSIONAL LAND SURVEYORS
10012 - 97th Ave.
Fort St. John, British Columbia
Phone (250) 787-0394, Fax (250) 787-0310

DATE 00/07/13 JOB No. 3111-08117WS AW DWG

24X

MOUNT COTY

MCKAY LAKES

123°30'

60°20',123°15'

60°20',123°00'

STAGING AREA

CAMP

MAINTENANCE YARD

RESIDENCE

BARGE SITE

CAMP SITE

I-02 DECKING SITE

CAMP

BRIDGE 5X15m

FORT LIARD HIGHWAY

Betalamea Lake

Petitot River

FORT LIARD

A-47 (NOT DRILLED)

I-46

CAMP

F-36

DECKING SITE BORROW PIT

123°30'

60°10',123°00'

O-35

CAMP

M-25 (NOT DRILLED)

BORROW PIT & SUMP

60°10',123°15'

BORROW PIT

BRIDGE 18.4X5m

Water Source #3 (Mea Goh Cho Lake)

STANLEY BERTRAND TRAPPER CABIN

BRIDGE

CAMP

N-01

BORROW PIT

CAMP

A-01

NORTHWEST TERRITORIES

BRITISH COLUMBIA

94O13I

94O14L

94O14K

94O14J

94O14I

MAXHAMISH COMPRESSOR

LEGEND

- SEISMIC
- AIRSTRIP - (FOREIGN)
- AIRSTRIP
- PIPELINE R/W
- PIPELINE R/W FOREIGN
- ACCESS ROAD - (FOREIGN)
- WINTER ACCESS ROAD
- ALL SEASON ACCESS ROAD
- CONTOUR
- LEASE - (TIED-IN)
- LEASE - (NOT TIED-IN)
- LEASE - (FOREIGN)
- LEASE - RECLAIMED
- BORROW PIT
- CAMP SITE
- SUMP / PIT
- DECKING SITE
- BATTERY SITE
- OTHER CLEARING
- BRIDGE
- TOWER

SCALE 1:50,000

1250 0 1250 2500 3750 5000 METERS

2500 0 5000 10000 15000 FEET

N

DISCLAIMER: The information contained herein is compiled from various government and industry sources. The Universal Group of Companies and its data suppliers provide no warranty regarding the accuracy or completeness of this information. No liability can be assumed by The Universal Group of Companies or its data suppliers resulting from the use or interpretation of this information, or from any decisions made based on this information.

Paramount resources ltd.

FORT LIARD SOUTH

As-Built June 2009

94O14I (BC P&NG GRID) to

SE1/4 60°20',123°30' (NWT GRID)

REV.	DESCRIPTION	INI.	DATE
3	Updated map title	BPV	03-JUN-09
2	Removed I-03 W/S & updated map title	BPV	12-SEP-07
1	Added Bridge in Sec.12 and Road in Sec.1 & 11.	BPV	05-DEC-06
0	Original construction (from 2005 map)	WGT	13-JUN-06

SPECIFICATIONS	
Datum:	NAD 83
Projection:	UTM
NTS Ref:	95B
Zone:	10
Scale:	1:50 000
C.I.:	100m
Filename:	050399G01_2009
Model:	50K Ft Liard South
Job No:	05-0399G

IMAGERY (Air Photo / Satellite)	
Date:	2000
Type:	1m Orthophoto

PREPARED BY:

UNIVERSAL GEOSYSTEMS U.G.S. SPATIAL INFORMATION SERVICES

Ph:. 262-1336
Fax: 262-1308
www.universalsurveys.com

REV. 3

APPENDIX B

Site Photographs



Photograph 1: View of the well centre, facing north.



Photograph 2: View of the well centre, facing east.



Photograph 3: View of the well centre, facing south.



Photograph 4: View of the well centre, facing west.



Photograph 5: View of the well centre.



Photograph 6: View of the flare knockout area and flare stack, facing northeast.



Photograph 7: View of the incinerator shack, facing southeast.



Photograph 8: View of the incinerator, facing northeast.



Photograph 9: View of facilities north of well centre, facing west.



Photograph 10: View of the AST containment, facing northwest.



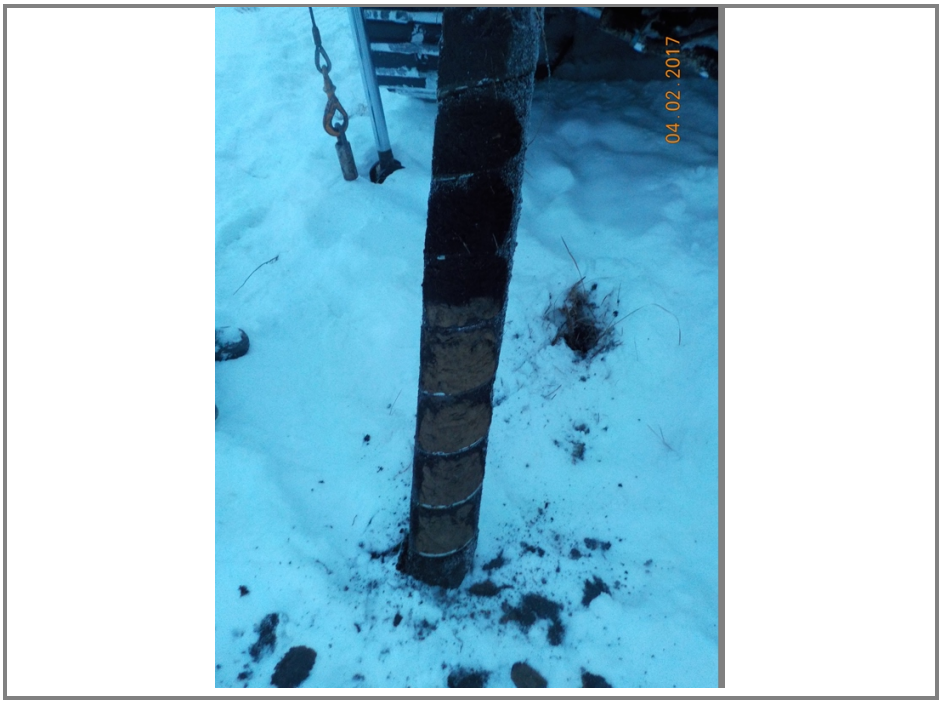
Photograph 11: View of the separator shack.



Photograph 12: View of the unidentified pipe, east of well centre.



Photograph 13: View of the unidentified pipe, east of the well centre.



Photograph 14: View of 17CO1.

APPENDIX C

Borehole Logs

NORTH SHORE
Environmental Consultants

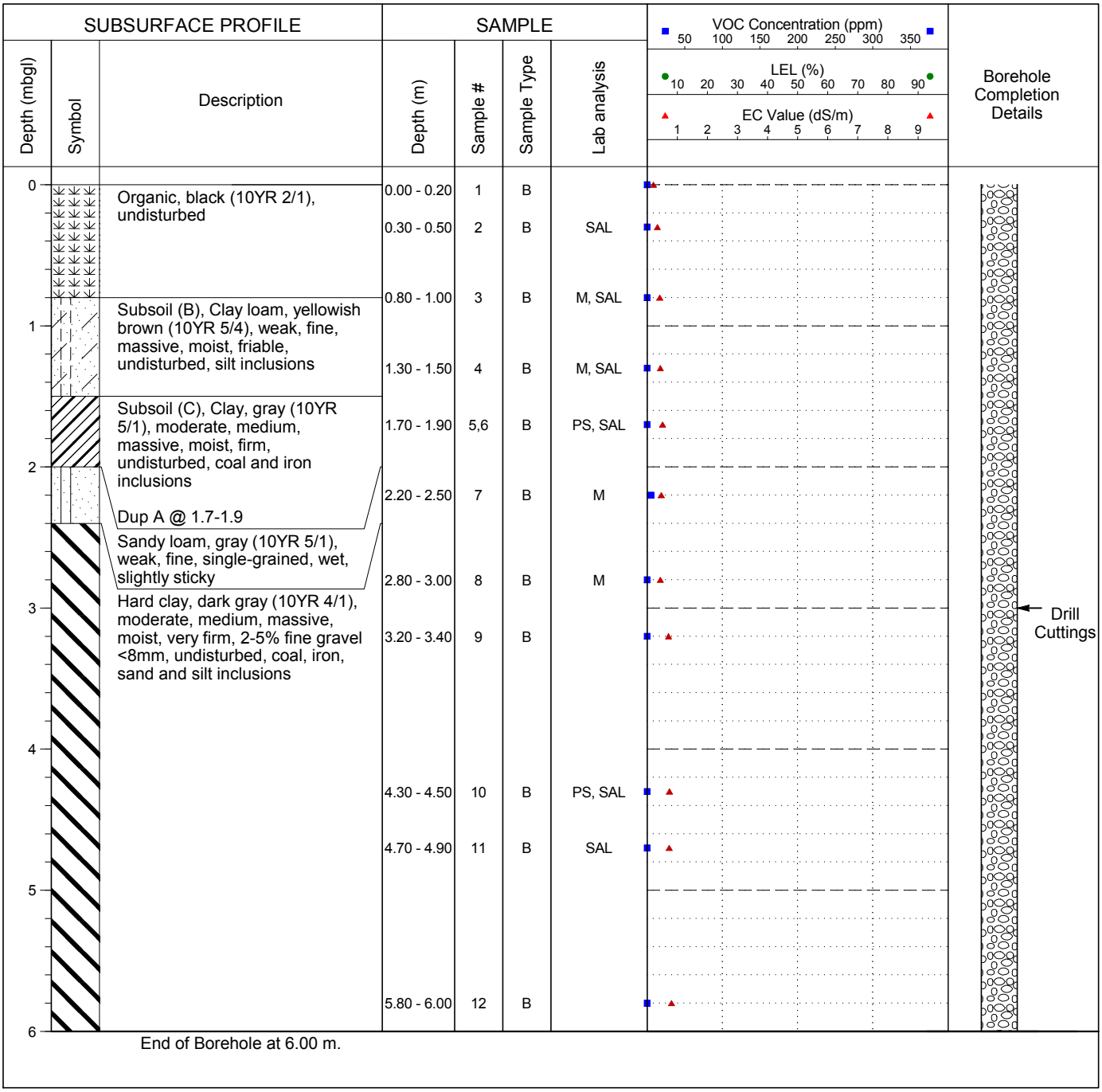
Borehole Log: 17C01

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Background Control



Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6652999 E: 485000

Drill Date: 2/4/2017 (mm/dd/yy)

From Benchmark: 65m South, 75m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

NORTH SHORE
Environmental Consultants

Borehole Log: 17C02

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Background Control

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Organic, black (10YR 2/1), undisturbed	0.00 - 0.20	13	B	SAL		
			0.30 - 0.50	14	B			
1		Subsoil (B), Clay loam, yellowish brown (10YR 5/4), weak, fine, massive, moist, friable, undisturbed, silt inclusions	0.80 - 1.00	15	B	SAL		
			1.30 - 1.50	16	B	PS, SAL		
2		Subsoil (C), Clay, gray (10YR 5/1), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, coal and sand inclusions	1.70 - 1.90	17	B	M, SAL		
		Small sand seam from 2.2-2.3m	2.20 - 2.50	18	B	SAL		Drill Cuttings
			2.80 - 3.00	19	B			
3			3.20 - 3.40	20	B	M, PS, SAL		
4			4.30 - 4.50	21	B	M		

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653076 E: 485004

Drill Date: 2/4/2017 (mm/dd/yy)

From Benchmark: 30m North, 75m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH01

Client: Paramount Resources Ltd.

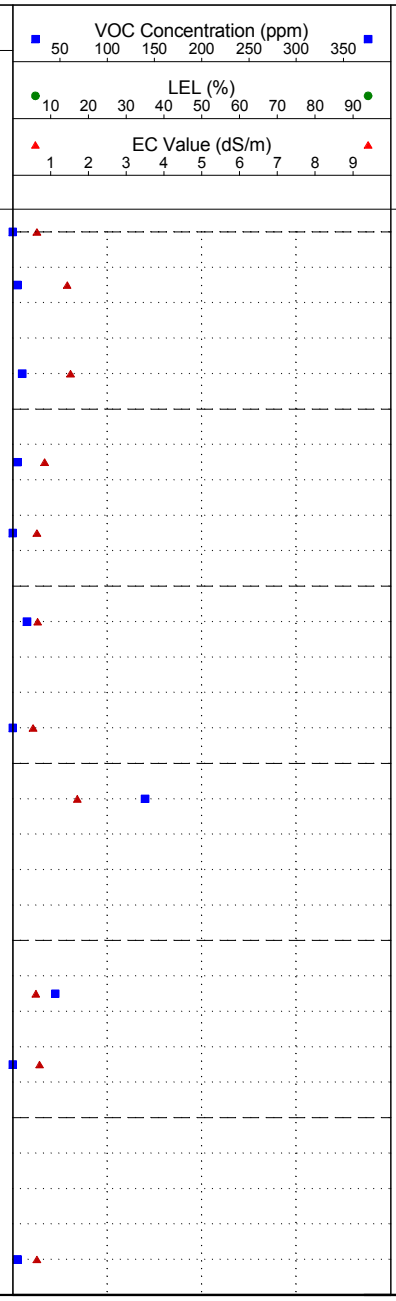
Project: Phase 2 Environmental Site Assessment

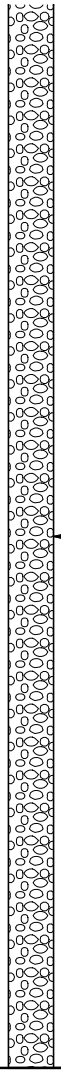
Legal Location: N-01

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0		Sandy clay loam, brown (10YR 4/3), weak, fine, massive, moist, friable, 20-30% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed, coal, iron and sand inclusions, lots of rocks	0.00 - 0.20	22	B	
			0.30 - 0.50	23	B	M, SAL
			0.80 - 1.00	24	B+J	HC, M, SAL
1		Hard clay, dark gray (10YR 4/1), moderate, medium, massive, moist, very firm, 15-20% fine gravel <8mm, 10-15% coarse gravel 8-64mm, disturbed, coal, iron and sand inclusions	1.30 - 1.50	25	B	M, SAL
			1.70 - 1.90	26	B	
2		Clay, yellowish brown (10YR 5/4), weak, fine, massive, moist, friable, 5-10% fine gravel <8mm, 10-15% coarse gravel 8-64mm, appears undisturbed, coal, iron and silt inclusions Dup B @ 2.2-2.5	2.20 - 2.50	27,28	B+J	HC, M, SAL
			2.80 - 3.00	29	B	
3		Potential drilling waste, gray (10YR 5/1), weak, fine, massive, wet, slightly sticky, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, gray discolouration	3.20 - 3.40	30	B+J	HC, M, SAL
4		Hard clay, gray (10YR 5/1), moderate, medium, massive, moist, firm, 1-2% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, coal and iron inclusions	4.30 - 4.50	31	B	
			4.70 - 4.90	32	B	
5						
			5.80 - 6.00	33	B+J	HC
6		End of Borehole at 6.00 m.				





Borehole Completion Details

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653043 E: 4855059

Drill Date: 2/4/2017 (mm/dd/yy)

From Benchmark: 3m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH02

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Sandy clay loam, brown (10YR 4/3), weak, fine, massive, moist, friable, 20-30% fine gravel <8mm, 15-20% coarse gravel 8-64mm, disturbed	0.00 - 0.20					
			0.30 - 0.50					
		Hard clay, dark gray (10YR 4/1), moderate, medium, massive, moist, very firm, 15-20% fine gravel <8mm, 10-15% coarse gravel 8-64mm, disturbed, coal, iron and sand inclusions	0.80 - 1.00	34	B+J	M, SAL		
1			1.30 - 1.50					
		Clay, yellowish brown (10YR 5/4), weak, fine, single-grained, moist, friable, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, coal, iron and sand inclusions	1.70 - 1.90					
2		*VOC field screening values not obtained at all sampling depths due to delineation sampling	2.20 - 2.50					Drill Cuttings
			2.80 - 3.00					
3		Hard clay, dark gray (10YR 4/1), moderate, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm	3.20 - 3.40	35	B+J	HC		
		Silty clay loam, light gray (10YR 7/1), weak, fine, massive, moist, friable						
4			4.30 - 4.50					

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653040 E: 485059

Drill Date: 2/4/2017 (mm/dd/yy)

From Benchmark: 5m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH03

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Clay, yellowish brown (10YR 5/4), weak, fine, massive, moist, friable, 2-5% fine gravel <8mm,	0.00 - 0.20					
			0.30 - 0.50					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00	36	B+J	M, SAL		
1			1.30 - 1.50					
			1.70 - 1.90					
2			2.20 - 2.50					Drill Cuttings
		Silty clay loam, brownish yellow (10YR 6/8), weak, fine, massive, moist, friable, 1-2% fine gravel <8mm, disturbed, coal and iron inclusions	2.80 - 3.00					
3			3.20 - 3.40	37	B+J	HC		
		Silty clay loam, light gray (10YR 7/1), weak, fine, massive, moist, friable, 1-2% fine gravel <8mm, undisturbed						
4			4.30 - 4.50					

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653048 E: 485053

Drill Date: 2/4/2017 (mm/dd/yy)

From Benchmark: 5m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH04

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 1-2% fine gravel <8mm, iron and sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00	38	B+J	M, SAL		
1			1.30 - 1.50					
			1.70 - 1.90					
2			2.20 - 2.50					Drill Cuttings
			2.80 - 3.00					
3		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, coal and iron inclusions	3.20 - 3.40	39	B+J	HC		
4			4.30 - 4.50					

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653052 E: 485058

Drill Date: 2/4/2017 (mm/dd/yy)

From Benchmark: 5m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH05

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Clay, brown (10YR 4/3), moderate, fine, massive, moist, firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron and sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.80 - 1.00	40	B+J	M, SAL		
1			1.30 - 1.50					
			1.70 - 1.90					
2			2.20 - 2.50					Drill Cuttings
			2.80 - 3.00					
3		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 10-15% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, iron and sand inclusions	3.20 - 3.40	41	B+J	HC		
4			4.30 - 4.50					

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653049 E: 485064

Drill Date: 2/4/2017 (mm/dd/yy)

From Benchmark: 5m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH06

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Organic, brown (10YR 4/3)	0.00 - 0.20	42	B+J	GLY, MTH		
			0.30 - 0.50	43	B+J	HC, M, SAL		
0.5								
		Organic, black (10YR 2/1), disturbed, compressed organics	0.80 - 1.00	44	B			
1.0		Clay, yellowish brown (10YR 5/4), weak, fine, massive, moist, friable, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, iron and silt inclusions						
			1.30 - 1.50	45	B			
1.5								Drill Cuttings
			1.70 - 1.90	46	B			
2.0		Sandy loam, yellow (10YR 7/8), weak, fine, single-grained, wet, non-sticky, 15-20% fine gravel <8mm, disturbed						
			2.20 - 2.50	47	B+J	HC, M, SAL		
2.5		Hard clay, brown (10YR 4/3), moderate, medium, massive, moist, very firm, 5-10% fine gravel <8mm, undisturbed						
			2.80 - 3.00	48	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653058 E: 485037

Drill Date: 2/4/2017 (mm/dd/yy)

From Benchmark: 14m North, 24m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH07

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Former Methanol Spill Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sandy clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 15-20% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed, iron and silt inclusions	0.00 - 0.20	49	B+J	GLY, M, MTH, SAL		
			0.30 - 0.50	50	B			
0.5								
		Clay, yellowish brown (10YR 5/4), moderate, fine, massive, moist, friable, 1-2% fine gravel <8mm, undisturbed	0.80 - 1.00	51	B+J	HC		
1.0								
			1.30 - 1.50	52	B			
1.5								Drill Cuttings
		Hard clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, coal, iron, and sand inclusions	1.70 - 1.90	53	B+J			
2.0								
			2.20 - 2.50	54	B	M, SAL		
2.5								
			2.80 - 3.00	55	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653051 E: 485033

Drill Date: 2/4/2017 (mm/dd/yy)

From Benchmark: 8m North, 32m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH08

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Organic, black (10YR 2/1), undisturbed	0.00 - 0.20	56	B+J	GLY, MTH, SAL		
			0.30 - 0.50	57	B			
0.5		Subsoil (B), Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, undisturbed	0.80 - 1.00	58	B+J	HC, M, SAL		
1.0								
			1.30 - 1.50	59	B			
1.5								Drill Cuttings
			1.70 - 1.90	60	B+J			
2.0								
			2.20 - 2.50	61	B			
2.5								
			2.80 - 3.00	62	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653092 E: 485028

Drill Date: 2/4/2017 (mm/dd/yy)

From Benchmark: 49m North, 25m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH09

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Organic, black (10YR 2/1), undisturbed	0.00 - 0.20	63	B+J	GLY, MTH, SAL		
			0.30 - 0.50	64	B			
0.5		Clay, brown (10YR 4/3), moderate, medium, massive, moist, friable, 2-5% fine gravel <8mm, undisturbed, sand and silt inclusions	0.80 - 1.00	65	B+J	HC, M, SAL		
1.0								
			1.30 - 1.50	66	B			
1.5								Drill Cuttings
			1.70 - 1.90	67	B			
2.0								
			2.20 - 2.50	68	B			
2.5								
			2.80 - 3.00	69	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653095 E: 485020

Drill Date: 2/4/2017 (mm/dd/yy)

From Benchmark: 49m North, 38m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH10

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Organic, black (10YR 2/1), undisturbed	0.00 - 0.20	70	B+J	GLY, MTH, SAL		
			0.30 - 0.50	71	B			
0.5		Clay, brown (10YR 4/3), moderate, fine, massive, moist, friable, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, iron and sand inclusions	0.80 - 1.00	72	B+J			
1.0		Sand (coarse), reddish brown (2.5YR 4/3), weak, fine, single-grained, wet, non-sticky, 20-30% fine gravel <8mm, 15-20% coarse gravel 8-64mm, sand inclusions, lots of gravel						
		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 5-10% fine gravel <8mm, undisturbed, coal and iron inclusions	1.30 - 1.50	73	B	M, SAL		
1.5								Drill Cuttings
			1.70 - 1.90	74	B+J			
2.0								
			2.20 - 2.50	75	B			
2.5								
			2.80 - 3.00	76	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653116 E: 485022

Drill Date: 2/4/2017 (mm/dd/yy)

From Benchmark: 64m North, 38m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH11

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0								
		Organic, black (10YR 2/1)	0.00 - 0.20	77	B+J	GLY, MTH, SAL		
			0.30 - 0.50	78	B			
0.5		Clay, brown (10YR 4/3), moderate, fine, massive, moist, friable, 5-10% fine gravel <8mm, 5-10-% coarse gravel 8-64mm, iron and sand inclusions	0.80 - 1.00	79	B+J	M, SAL		
1.0								
			1.30 - 1.50	80	B			
1.5								Drill Cuttings
		Sand (coarse), reddish brown (2.5YR 4/3), wet, non-sticky	1.70 - 1.90	81	B+J			
2.0		Clay, brown (10YR 4/3), moderate, fine, massive, moist, firm, 2-5% fine gravel <8mm, iron and sand inclusions						
			2.20 - 2.50	82	B			
2.5								
			2.80 - 3.00	83	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653107 E: 485033

Drill Date: 2/4/2017 (mm/dd/yy)

From Benchmark: 65m North, 24m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17HA01

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Production Facilities Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sand (coarse), brown (10YR 4/3), weak, fine, single-grained, moist, loose, 50-60% coarse gravel 8-64mm, gravel under tank *EC and VOC field screenings not obtained	0.00 - 0.10	84	B+J	M, SAL		Drill Cuttings

End of Borehole at 0.10 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653099 E: 485024

Drill Date: 2/4/2017 (mm/dd/yy)

From Benchmark: 30m North, 10m West

Drill Method: Dutch Auger

Benchmark: Well Centre

Borehole Log: 17BH12

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sandy clay, greenish gray (10G 5/1), moderate, medium, massive, moist, firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed	0.00 - 0.20	85	B+J	GLY, MTH		
			0.30 - 0.50	86	B			
0.5		Clay, yellowish brown (10YR 5/4), moderate, medium, massive						
			0.80 - 1.00	87	B+J			
1.0								
			1.30 - 1.50	88	B	M, SAL		
1.5		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 5-10% fine gravel <8mm, 2-5% coarse gravel 8-64mm, iron and sand inclusions						Drill Cuttings
			1.70 - 1.90	89	B			
2.0								
			2.20 - 2.50	90	B+J	HC		
2.5								
			2.80 - 3.00	91	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653074 E: 485049

Drill Date: 2/4/2017 (mm/dd/yy)

From Benchmark: 35m North, 10m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Sheet: 15 of 30

Borehole Log: 17BH13

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sandy clay, greenish gray (10G 5/1), strong, medium, massive, moist, firm, 20% fine gravel <8mm, disturbed *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20	92	B+J			
			0.30 - 0.50	93	B			
0.5		Clay, yellowish brown (10YR 5/6), moderate, medium, massive, moist, firm, 10% fine gravel <8mm, undisturbed						
			0.80 - 1.00	94	B+J	HC		Drill Cuttings
1.0								
			1.30 - 1.50					
1.5		End of Borehole at 1.50 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653078 E: 485047

Drill Date: 2/5/2017 (mm/dd/yy)

From Benchmark: 30m North, 15m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH14

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Production Facilities Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sandy clay, greenish gray (10G 5/1), moderate, medium, massive, moist, very firm, 15-20% fine gravel <8mm, disturbed, iron and silt inclusions	0.00 - 0.20	95	B+J			
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.30 - 0.50	96	B			
0.5								
			0.80 - 1.00	97	B+J	HC		Drill Cuttings
1.0								
		Clay, dark gray (10YR 4/1), moderate, medium, massive, moist, firm, 5-10% fine gravel <8mm, 2-5% coarse gravel 8-64mm	1.30 - 1.50					
1.5		End of Borehole at 1.50 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653075 E: 485043

Drill Date: 2/5/2017 (mm/dd/yy)

From Benchmark: 30m North, 5m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH15

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Sandy clay, greenish gray (10G 5/1), moderate, medium, massive, moist, very firm, 5-10% fine gravel <8mm, disturbed *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20	98	B+J			
			0.30 - 0.50	99	B			
0.5								
			0.80 - 1.00	100	B+J	HC		Drill Cuttings
1.0		Organic, black (10YR 2/1)						
		Clay, yellowish brown (10YR 5/6), moderate, medium, massive, moist, friable, 5-10% fine gravel <8mm, sand inclusions	1.30 - 1.50					
1.5		End of Borehole at 1.50 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653078 E: 485050

Drill Date: 2/5/2017 (mm/dd/yy)

From Benchmark: 43m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

NORTH SHORE
Environmental Consultants

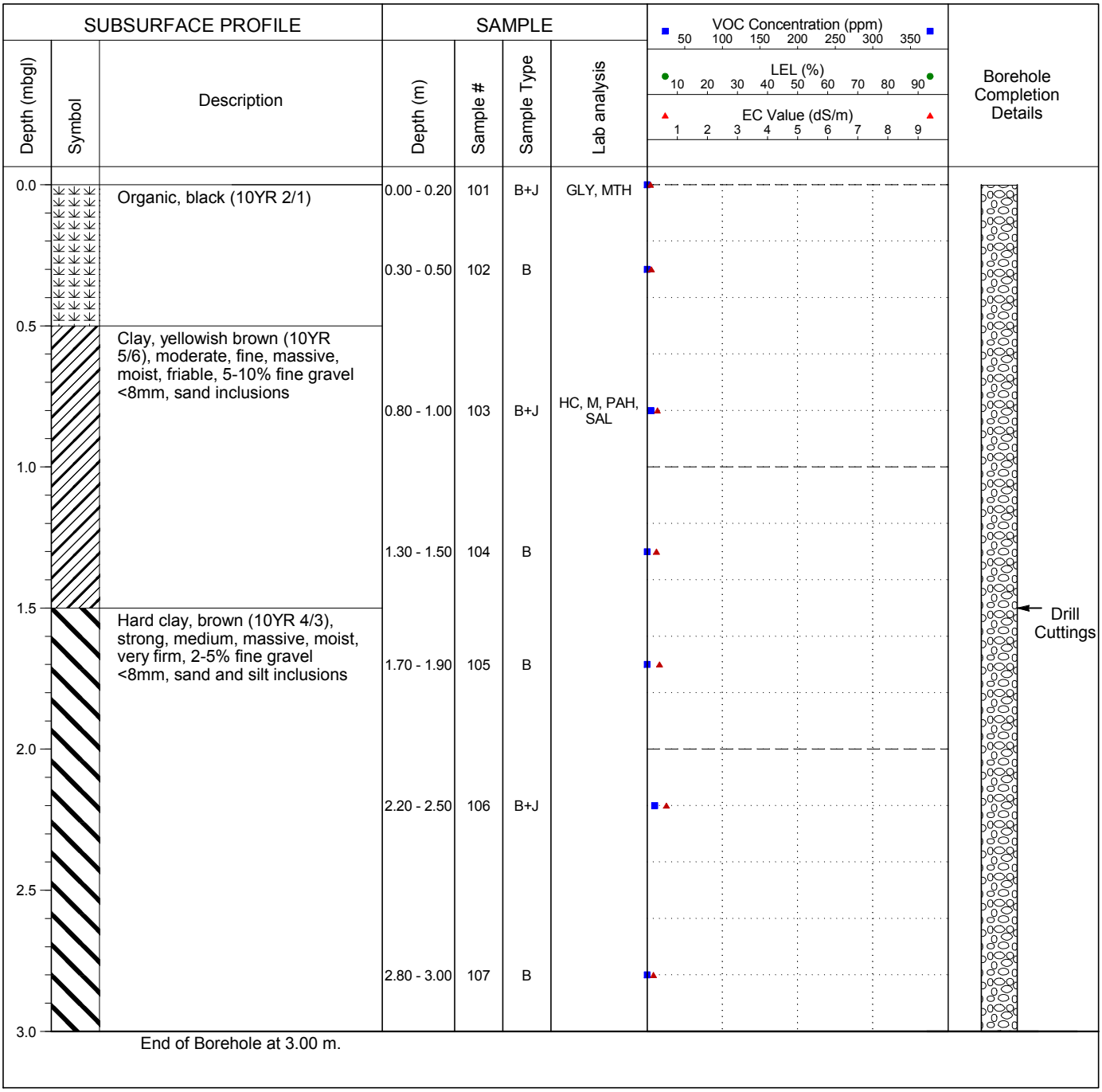
Borehole Log: 17BH16

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Production Facilities Area



Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653086 E: 485057

Drill Date: 2/5/2017 (mm/dd/yy)

From Benchmark: 32m North, 3m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH17

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sandy clay, greenish gray (10G 5/1), moderate, medium, massive, moist, very firm, 15-20% fine gravel <8mm, disturbed	0.00 - 0.20	108	B+J	GLY, MTH		
			0.30 - 0.50	109	B			
0.5		Organic, black (10YR 2/1), undisturbed						
			0.80 - 1.00	110	B+J	HC, M, SAL		
1.0		Clay, yellowish brown (10YR 5/6), weak, medium, massive, moist, friable, 5-10% fine gravel <8mm, undisturbed, sand inclusions						
			1.30 - 1.50	111	B			
1.5								Drill Cuttings
			1.70 - 1.90	112	B			
2.0								
			2.20 - 2.50	113	B+J			
2.5								
			2.80 - 3.00	114	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653071 E: 485060

Drill Date: 2/5/2017 (mm/dd/yy)

From Benchmark: 14m North, 10m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH18

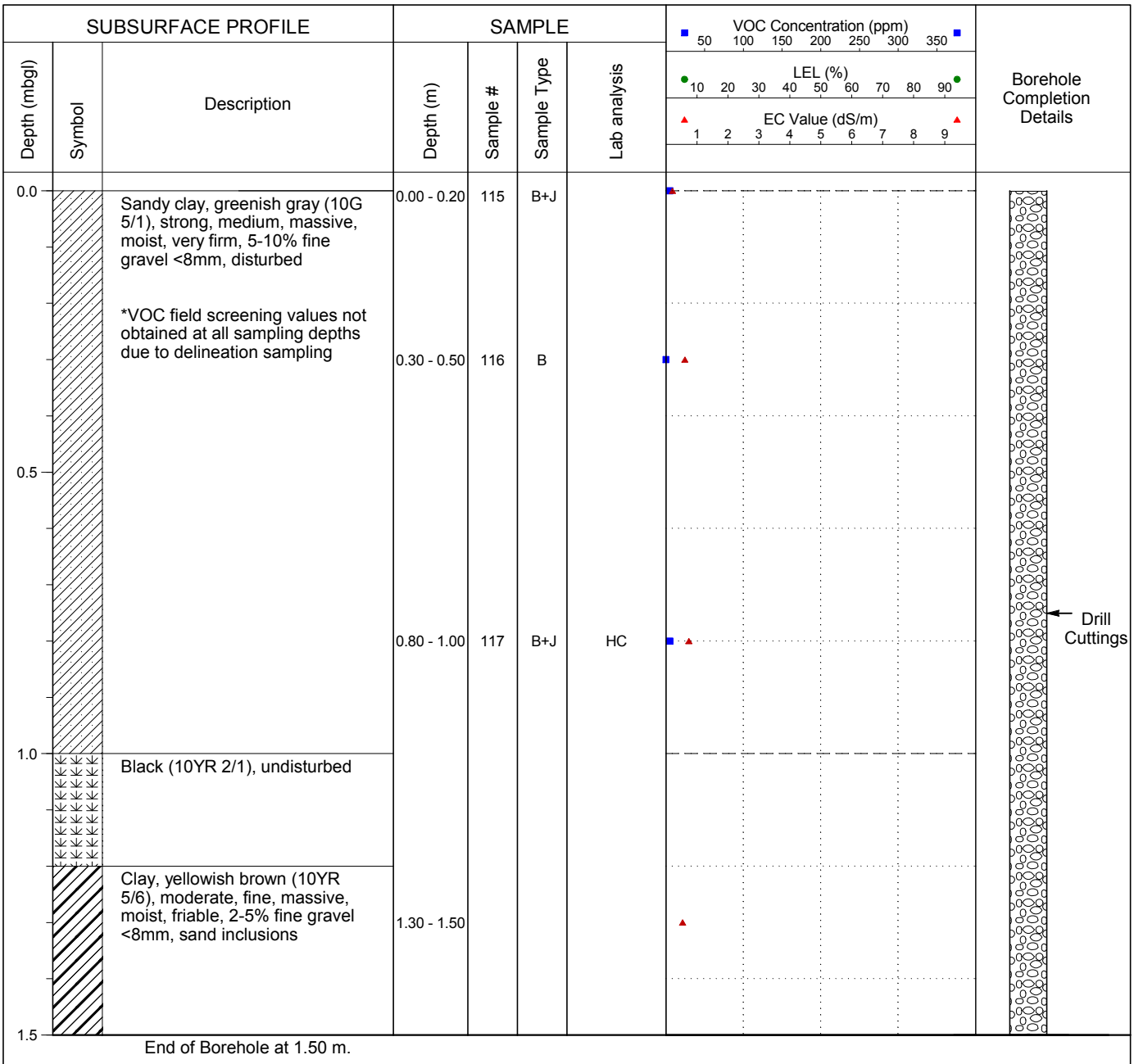
Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Production Facilities Area

NORTH SHORE Environmental Consultants



Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653067 E: 485048

Drill Date: 2/5/2017 (mm/dd/yy)

From Benchmark: 54m North, 42m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH19

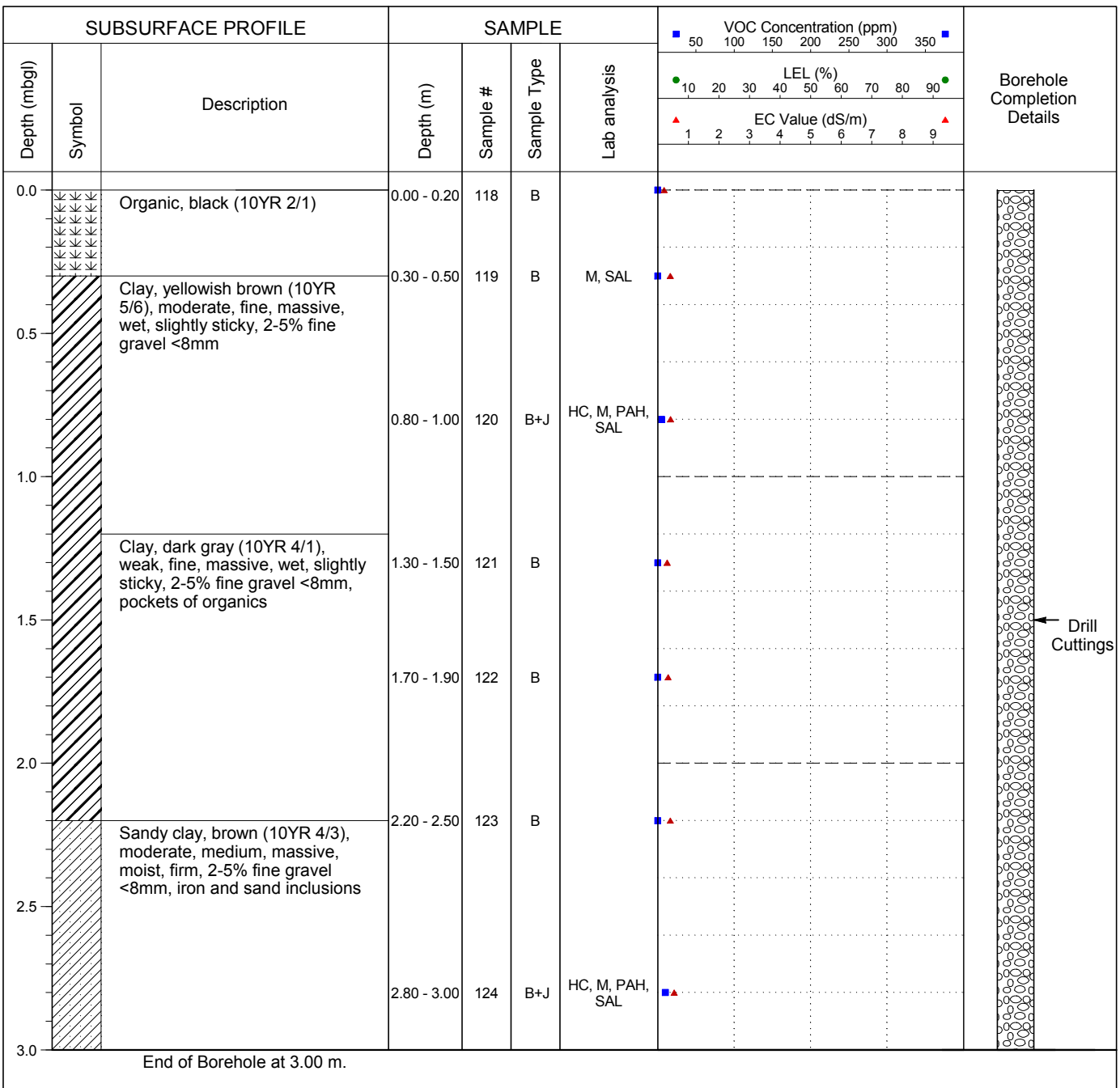
Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants



Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653087 E: 485093

Drill Date: 2/5/2017 (mm/dd/yy)

From Benchmark: 63m North, 50m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH20

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Organic, black (10YR 2/1)	0.00 - 0.20	125	B	M, SAL		
		Clay, yellowish brown (10YR 5/6), moderate, fine, massive, moist, friable, 2-5% fine gravel <8mm, sand inclusions	0.30 - 0.50	126	B			
0.5								
			0.80 - 1.00	127	B+J	HC		
1.0								
		Dup D @ 1.3-1.5	1.30 - 1.50	128,129	B	M, SAL		
1.5								Drill Cuttings
		Sandy loam, reddish brown (2.5YR 4/3), weak, fine, single-grained, wet, non-sticky, 15-20% fine gravel <8mm	1.70 - 1.90	130	B			
2.0								
			2.20 - 2.50	131	B			
2.5		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, sand and silt inclusions						
			2.80 - 3.00	132	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653102 E: 485107

Drill Date: 2/5/2017 (mm/dd/yy)

From Benchmark: 68m North, 55m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH21

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, grayish brown (10YR 5/2), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, disturbed	0.00 - 0.20	133	B			
			0.30 - 0.50	134	B	M, SAL		
0.5								
		Sandy clay loam, yellowish brown (10YR 5/6), weak, fine, massive, wet, slightly sticky	0.80 - 1.00	135	B+J	HC		
1.0								
			1.30 - 1.50	136	B			
1.5		Clay, grayish brown (10YR 5/2), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions						Drill Cuttings
			1.70 - 1.90	137	B			
2.0								
			2.20 - 2.50	138	B+J	HC		
2.5								
			2.80 - 3.00	139	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653105 E: 485115

Drill Date: 2/5/2017 (mm/dd/yy)

From Benchmark: 63m North, 58m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH22

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, grayish brown (10YR 5/2), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions	0.00 - 0.20	140	B			
			0.30 - 0.50	141	B+J	HC, M, SAL		
0.5								
			0.80 - 1.00	142	B+J	HC		
1.0								
			1.30 - 1.50	143	B	M, SAL		
1.5		Sandy loam, reddish brown (2.5YR 4/3), weak, fine, single-grained, wet, non-sticky, 2-5% fine gravel <8mm						Drill Cuttings
			1.70 - 1.90	144	B+J	HC		
2.0								
			2.20 - 2.50	145	B			
2.5		Hard clay, dark gray (10YR 4/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, iron and sand inclusions						
			2.80 - 3.00	146	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653046 E: 485116

Drill Date: 2/5/2017 (mm/dd/yy)

From Benchmark: 59m North, 54m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH23

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Flare Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, disturbed, iron and sand inclusions	0.00 - 0.20	147	B	M, SAL		
			0.30 - 0.50	148	B			
0.5								
			0.80 - 1.00	149	B+J	HC		
1.0								
			1.30 - 1.50	150	B			
1.5								Drill Cuttings
			1.70 - 1.90	151	B+J			
2.0								
			2.20 - 2.50	152	B			
2.5		Hard clay, dark gray (10YR 4/1), moderate, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, sand and iron inclusions						
			2.80 - 3.00	153	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653094 E: 485113

Drill Date: 2/5/2017 (mm/dd/yy)

From Benchmark: 55m North, 10m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH24

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Potential Flare Pit Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Black (10YR 2/1), disturbed	0.00 - 0.20					
		Clay, yellowish brown (10YR 5/4), moderate, fine, massive, moist, firm, 2-5% fine gravel <8mm, undisturbed, sand inclusions	0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
			0.80 - 1.00					
1.0		*VOC field screening values not obtained due to exploratory sampling						
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653096 E: 485052

Drill Date: 2/5/2017 (mm/dd/yy)

From Benchmark: 55m North, 5m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH25

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Potential Flare Pit Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Black (10YR 2/1), disturbed	0.00 - 0.20					
		Clay, brown (10YR 4/3), moderate, fine, massive, moist, firm, 2-5% fine gravel <8mm, undisturbed, sand inclusions	0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
		*VOC field screening values not obtained due to exploratory sampling	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653038 E: 485056

Drill Date: 2/5/2017 (mm/dd/yy)

From Benchmark: 50m South, 10m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH26

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Potential Flare Pit Area

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0.0		Sandy clay, yellowish brown (10YR 5/6), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed	0.00 - 0.20			
			0.30 - 0.50			
0.5		Sandy loam, brown (10YR 4/3), single-grained, wet, non-sticky, 2-5% fine gravel <8mm,				
		*Exploratory borehole; no samples obtained				
			0.80 - 1.00			
1.0		*VOC field screening values not obtained due to exploratory sampling				
			1.30 - 1.50			
1.5		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron, sand and silt inclusions				
			1.70 - 1.90			
2.0						
			2.20 - 2.50			
2.5						
			2.80 - 3.00			
3.0		End of Borehole at 3.00 m.				

VOC Concentration (ppm): 50 100 150 200 250 300 350

LEL (%): 10 20 30 40 50 60 70 80 90

EC Value (dS/m): 1 2 3 4 5 6 7 8 9

Borehole Completion Details: Drill Cuttings

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653001 E: 485071

Drill Date: 2/5/2017 (mm/dd/yy)

From Benchmark: 50m South, 20m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH27

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: N-01

Area of Concern: Potential Flare Pit Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Sandy clay, yellowish brown (10YR 5/6), moderate, medium, massive, moist, firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, disturbed	0.00 - 0.20					
			0.30 - 0.50					
0.5		Sandy loam, brown (10YR 4/3), single-grained, wet, non-sticky, 2-5% fine gravel <8mm, *Exploratory borehole; no samples obtained						
			0.80 - 1.00					
1.0		*VOC field screening values not obtained due to exploratory sampling						
			1.30 - 1.50					
1.5		Hard clay, gray (10YR 5/1), strong, medium, massive, moist, very firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, iron, sand and silt inclusions						Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6653000 E: 485066

Drill Date: 2/5/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

APPENDIX D

Laboratory Certificates of Analyses

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: PARAMOUNT RESOURCES LTD
4700, 888 3rd ST SW
CALGARY, AB T2P5C5
(403) 290-3600

ATTENTION TO: Larry Yoon

PROJECT: N-01

AGAT WORK ORDER: 17N186001

SOIL ANALYSIS REVIEWED BY: Qiuhong Dong, Lab Technician A

TRACE ORGANICS REVIEWED BY: Ngoc (Ruby) Vu, Lab Technician

DATE REPORTED: Apr 20, 2017

PAGES (INCLUDING COVER): 56

VERSION*: 6

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*NOTES

VERSION 6:Version 6 supersedes Version 4. Added detailed salinity and extended metals to 245, 253, 262, 288 and 300 - April 20th, 2017 RV.

Monoethylene glycol has been revised to say: ethylene glycol - February 13th 2017 CS.

Version 2 supersedes version 1 issued on February 13th 2017. Added add BTEX/F1-F4 to samples: 138, 148, 153, 156, 158, 213, 219, 222, 226, 243, detailed salinity to: 112, 129, 143, 152, 154, 157, 174, 182, 193, 200, nickel to samples: 112, 129, 143, 152, 154, 157, 092, 093, 096, 097, 095, 109, 110, arsenic and selenium to samples: 092, 093, 096, 097, 095, 109, 110, extractable barium and fusion barium to: 134, PAH to: 229, 246, 250 and methanol to samples: 160, 167, 174, 182, 193, 200, 208, 216, 227 and 234 - February 23rd 2017 CS.

Version 3 supersedes version 2 issued on February 23rd 2017. Added detailed salinity to samples: 092, 093, 100, 104, 106 and 107 - March 6th 2017 CS.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)
Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Results relate only to the items tested and to all the items tested
All reportable information as specified by ISO 17025:2005 is available from AGAT Laboratories upon request

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

SAMPLE DESCRIPTION:				17BH01 0.8-1.0	17BH01 2.2-2.5	17BH01 3.2-3.4	17BH06 0.3-0.5	17BH06 2.2-2.5	17BH07 0-0.2	17BH07 2.2-2.5	17BH08 0.8-1.0
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04
Parameter	Unit	G / S	RDL	8181128	8181131	8181134	8181161	8181165	8181167	8181172	8181176
Antimony	mg/kg		0.5	0.6	0.5	0.8	0.5	<0.5	0.6	<0.5	0.6
Arsenic	mg/kg		0.5	16.7	16.8	16.3	11.3	14.0	16.0	15.1	18.2
Barium	mg/kg		0.5	300	312	1090	255	315	316	282	307
Beryllium	mg/kg		0.5	1.1	0.7	1.1	0.7	0.6	0.7	0.6	0.9
Boron (Saturated Paste)	mg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	mg/kg		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg		0.5	22.6	20.2	32.3	19.3	17.8	25.5	17.1	18.8
Chromium, Hexavalent	mg/kg		0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Cobalt	mg/kg		0.5	15.2	11.3	9.9	10.0	10.0	8.9	9.1	11.2
Copper	mg/kg		0.5	25.7	17.8	30.0	18.3	16.3	18.8	16.8	17.4
Lead	mg/kg		0.5	17.5	12.1	24.8	11.8	11.3	12.2	11.4	12.9
Mercury	mg/kg		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg		0.5	1.1	1.5	3.6	2.3	1.4	2.3	1.5	2.1
Nickel	mg/kg		0.5	46.3	29.9	31.7	25.5	23.4	26.3	23.3	28.6
Selenium	mg/kg		0.5	1.1	<0.5	1.0	0.8	0.5	0.8	0.5	<0.5
Silver	mg/kg		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	mg/kg		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tin	mg/kg		0.5	0.7	0.8	0.9	0.5	<0.5	<0.5	<0.5	<0.5
Uranium	mg/kg		0.5	1.3	1.1	1.8	1.5	1.0	1.3	1.2	1.1
Vanadium	mg/kg		0.5	40.3	37.1	44.5	33.1	34.1	37.4	33.4	40.6
Zinc	mg/kg		1	169	99	133	85	94	87	98	100

Certified By: Qiuhong Dong

Results relate only to the items tested and to all the items tested

AGAT Laboratories

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EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

SAMPLE DESCRIPTION:				17BH09 0.8-1.0	17BH10 1.3-1.5	17BH11 0.8-1.0	17BH12 1.3-1.5	17HA01 0-0.1	17BH16 0.8-1.0	17BH17 0.8-1.0	17BH19 0.3-0.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-05	2017-02-05	2017-02-05
Parameter	Unit	G / S	RDL	8181185	8181196	8181202	8181211	8181216	8181229	8181236	8181245
Antimony	mg/kg	20	0.5	0.6	0.6	<0.5	0.6	<0.5	<0.5	0.9	0.6
Arsenic	mg/kg	17	0.5	25.4	18.7	16.4	16.0	3.5	10.9	15.3	13.4
Barium	mg/kg	750	0.5	308	448	341	375	93.4	282	443	311
Beryllium	mg/kg	5	0.5	0.8	1.0	0.7	0.8	<0.5	0.7	0.8	0.6
Boron (Saturated Paste)	mg/L	3.3	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	mg/kg	1.4	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	64	0.5	18.4	21.4	18.8	21.1	7.3	21.6	23.7	21.5
Chromium, Hexavalent	mg/kg	0.4	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Cobalt	mg/kg	20	0.5	9.8	11.4	9.8	9.5	3.6	8.1	9.3	9.0
Copper	mg/kg	63	0.5	16.0	16.2	17.2	18.3	7.2	9.5	19.6	18.4
Lead	mg/kg	70	0.5	12.3	12.0	11.8	12.9	3.6	12.2	15.9	14.9
Mercury	mg/kg	6.6	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg	4	0.5	2.0	3.2	1.4	1.9	1.2	1.0	2.2	1.5
Nickel	mg/kg	45	0.5	25.0	30.6	25.1	26.3	7.5	19.2	27.4	26.1
Selenium	mg/kg	1	0.5	<0.5	0.8	<0.5	0.6	<0.5	<0.5	<0.5	0.6
Silver	mg/kg	20	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	mg/kg	1	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tin	mg/kg	5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7
Uranium	mg/kg	23	0.5	1.0	2.2	0.9	1.1	0.7	0.6	1.0	1.3
Vanadium	mg/kg	130	0.5	36.5	45.9	34.7	39.6	15.5	33.6	40.6	34.8
Zinc	mg/kg	200	1	86	99	97	88	29	71	78	85

Certified By: Qiuhong Dong

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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

SAMPLE DESCRIPTION:				17BH19 0.8-1.0	17BH19 2.8-3.0	17BH20 0-0.2	17BH20 1.3-1.5	17BH21 0.3-0.5	17BH22 0.3-0.5	17BH23 0-0.2	17BH23 1.3-1.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-05	2017-02-05	2017-02-05	2017-02-05	2017-02-05	2017-02-05	2017-02-05	2017-02-05
Parameter	Unit	G / S	RDL	8181246	8181250	8181253	8181256	8181262	8181288	8181300	8181303
Antimony	mg/kg	20	0.5	0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.8	<0.5
Arsenic	mg/kg	17	0.5	16.5	14.5	13.6	16.2	15.7	15.0	10.6	16.6
Barium	mg/kg	750	0.5	287	273	239	350	283	310	347	307
Beryllium	mg/kg	5	0.5	0.7	<0.5	0.6	0.6	0.6	0.7	0.7	0.5
Boron (Saturated Paste)	mg/L	3.3	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium	mg/kg	1.4	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	mg/kg	64	0.5	17.0	14.3	18.1	16.9	18.9	18.2	19.3	16.5
Chromium, Hexavalent	mg/kg	0.4	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Cobalt	mg/kg	20	0.5	10.3	8.9	7.1	9.4	9.9	9.5	7.9	9.3
Copper	mg/kg	63	0.5	17.1	15.7	8.3	16.3	18.9	18.5	17.8	16.4
Lead	mg/kg	70	0.5	13.0	11.0	12.2	11.5	14.0	13.7	16.1	12.3
Mercury	mg/kg	6.6	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg	4	0.5	1.6	1.2	1.7	1.4	1.5	1.6	1.6	1.3
Nickel	mg/kg	45	0.5	27.7	21.0	16.7	23.6	26.5	26.2	24.6	23.7
Selenium	mg/kg	1	0.5	0.8	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5
Silver	mg/kg	20	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	mg/kg	1	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tin	mg/kg	5	0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Uranium	mg/kg	23	0.5	1.2	1.0	1.1	0.9	1.2	1.1	1.0	1.0
Vanadium	mg/kg	130	0.5	31.4	26.2	31.5	31.9	33.8	34.2	33.1	30.2
Zinc	mg/kg	200	1	100	92	63	98	90	95	80	93

Certified By: Qiuhong Dong

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FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

		SAMPLE DESCRIPTION:		Dup B 2.2-2.5	Dup D 1.3-1.5
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2017-02-04	2017-02-05
Parameter	Unit	G / S	RDL	8181309	8181311
Antimony	mg/kg		0.5	<0.5	<0.5
Arsenic	mg/kg		0.5	13.4	21.5
Barium	mg/kg		0.5	133	332
Beryllium	mg/kg		0.5	0.5	0.8
Boron (Saturated Paste)	mg/L		0.5	<0.5	<0.5
Cadmium	mg/kg		0.5	<0.5	<0.5
Chromium	mg/kg		0.5	15.8	21.3
Chromium, Hexavalent	mg/kg		0.3	<0.3	<0.3
Cobalt	mg/kg		0.5	9.7	13.6
Copper	mg/kg		0.5	16.8	21.5
Lead	mg/kg		0.5	10.9	14.3
Mercury	mg/kg		0.5	<0.5	<0.5
Molybdenum	mg/kg		0.5	2.0	1.5
Nickel	mg/kg		0.5	22.0	32.3
Selenium	mg/kg		0.5	0.9	0.5
Silver	mg/kg		0.5	<0.5	<0.5
Thallium	mg/kg		0.5	<0.5	<0.5
Tin	mg/kg		0.5	<0.5	<0.5
Uranium	mg/kg		0.5	1.3	1.1
Vanadium	mg/kg		0.5	27.8	39.8
Zinc	mg/kg		1	87	119

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8181128-8181176 Results are based on the dry weight of the sample.

8181185 Results are based on the dry weight of the sample.

8181196-8181311 Results are based on the dry weight of the sample.

Certified By: Qiuhong Dong

Results relate only to the items tested and to all the items tested

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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME/ Tier 1 Metals - As and Se

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

SAMPLE DESCRIPTION:				17C01 0.8-1.0	17C01 1.3-1.5	17C01 2.2-2.5	17C01 2.8-3.0	17C02 1.7-1.9	17C02 3.2-3.4	17C02 4.3-4.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04
Parameter	Unit	G / S	RDL	8181092	8181093	8181096	8181097	8181106	8181109	8181110
Arsenic	mg/kg		0.5	13.4	15.1	16.8	15.8	13.4	16.8	10.7
Selenium	mg/kg		0.5	0.5	<0.5	0.6	1.0	<0.5	0.9	0.8

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8181092-8181110 Results are based on the dry weight of the sample.

Certified By: Qiuhong Dong

Results relate only to the items tested and to all the items tested

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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME/ Tier 1 Metals - Ni

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: 17C01 0.8-1.0	17C01 1.3-1.5	17C01 2.2-2.5	17C01 2.8-3.0	17C02 1.7-1.9	17C02 3.2-3.4	17C02 4.3-4.5	17BH01 0.3-0.5
				SAMPLE TYPE: Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
				DATE SAMPLED: 2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04
				8181092	8181093	8181096	8181097	8181106	8181109	8181110	8181112
Nickel	mg/kg		0.5	27.6	22.9	23.3	26.5	26.7	24.7	49.0	23.2

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: 17BH01 1.3-1.5	17BH02 0.8-1.0	17BH03 0.8-1.0	17BH04 0.8-1.0	17BH05 0.8-1.0
				SAMPLE TYPE: Soil	Soil	Soil	Soil	Soil
				DATE SAMPLED: 2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04
				8181129	8181143	8181152	8181154	8181157
Nickel	mg/kg		0.5	31.5	27.3	22.9	23.2	20.4

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8181092-8181157 Results are based on the dry weight of the sample.

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AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Particle Size by Sieve

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

		SAMPLE DESCRIPTION:		17C01 1.7-1.9	17C01 4.3-4.5	17C02 1.3-1.5	17C02 3.2-3.4	Dup A 1.7-1.9
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04
Parameter	Unit	G / S	RDL	8181095	8181099	8181105	8181109	8181308
Sieve Analysis - 75 microns	%		1	10	26	23	18	16
Sieve Texture				Fine	Fine	Fine	Fine	Fine

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8181095-8181308 Value reported is amount of sample retained on a 75 micron sieve after wash with water and represents proportion by weight particles larger than indicated sieve size.

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AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Barium Guidelines

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

		SAMPLE DESCRIPTION:		17BH01 3.2-3.4
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2017-02-04
Parameter	Unit	G / S	RDL	8181134
Barium, Extractable	mg/kg		2	25
True Barium by Fusion ICP	mg/kg		50	2560

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8181134 Result is based on the dry weight of the sample.

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AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

SAMPLE DESCRIPTION:				17C01 0.3-0.5	17C01 0.8-1.0	17C01 1.3-1.5	17C01 1.7-1.9	17C01 4.3-4.5		17C01 4.7-4.9
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil		Soil
DATE SAMPLED:				2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04		2017-02-04
Parameter	Unit	G / S	RDL	8181089	8181092	8181093	8181095	8181099	RDL	8181100
pH (CaCl2 Extraction)	pH Units		N/A	5.73	7.26	7.57	7.05	7.47	N/A	7.75
Electrical Conductivity (Sat. Paste)	dS/m		0.05	0.18	0.30	0.34	0.35	0.58	0.05	2.29
Sodium Adsorption Ratio	N/A			0.13	0.18	0.24	0.22	0.49		0.39
Saturation Percentage	%		1	221	44	45	43	52	1	58
Chloride, Soluble	mg/L		5	7	<5	<5	<5	8	8	63
Calcium, Soluble	mg/L		1	31	42	49	43	60	1	402
Potassium, Soluble	mg/L		2	<2	<2	<2	3	18	2	37
Magnesium, Soluble	mg/L		1	5	9	8	7	13	1	79
Sodium, Soluble	mg/L		2	3	5	7	6	16	2	33
Sulfate, Soluble	mg/L		2	29	42	53	48	132	2	1750
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	0	0	0	0	N/A	0
Calcium, Soluble (meq/L)	meq/L		0.05	1.55	2.10	2.45	2.15	2.99	0.05	20.1
Calcium, Soluble (mg/kg)	mg/kg		1	69	18	22	18	31	1	233
Chloride, Soluble (meq/L)	meq/L		0.06	0.20	<0.06	<0.06	<0.06	0.23	0.06	1.78
Chloride, Soluble (mg/kg)	mg/kg		2	15	<2	<2	<2	4	2	37
Magnesium, Soluble (meq/L)	meq/L		0.08	0.41	0.74	0.66	0.58	1.07	0.08	6.50
Magnesium, Soluble (mg/kg)	mg/kg		1	11	4	4	3	7	1	46
Potassium, Soluble (meq/L)	meq/L		0.05	<0.05	<0.05	<0.05	0.08	0.46	0.05	0.95
Potassium, Soluble (mg/kg)	mg/kg		2	<2	<2	<2	<2	9	2	21
Sodium, Soluble (meq/L)	meq/L		0.09	0.13	0.22	0.30	0.26	0.70	0.09	1.44
Sodium, Soluble (mg/kg)	mg/kg		2	7	2	3	3	8	2	19
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	0.60	0.87	1.10	1.00	2.75	0.04	36.4
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	64	18	24	21	69	2	1020

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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

SAMPLE DESCRIPTION:				17C02 0-0.2	17C02 0.8-1.0	17C02 1.3-1.5	17C02 1.7-1.9	17C02 2.2-2.5	17C02 3.2-3.4		17BH01 0.3-0.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil		Soil
DATE SAMPLED:				2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04		2017-02-04
Parameter	Unit	G / S	RDL	8181102	8181104	8181105	8181106	8181107	8181109	RDL	8181112
pH (CaCl2 Extraction)	pH Units		N/A	6.69	7.33	7.07	7.65	7.56	7.36	N/A	3.42
Electrical Conductivity (Sat. Paste)	dS/m		0.05	0.45	0.26	0.29	0.29	0.34	0.49	0.05	4.59
Sodium Adsorption Ratio	N/A			0.15	0.24	0.24	0.39	0.40	0.36		0.12
Saturation Percentage	%		1	89	53	49	51	45	72	1	89
Chloride, Soluble	mg/L		5	7	<5	<5	<5	<5	5	8	9
Calcium, Soluble	mg/L		1	70	35	36	39	43	56	1	406
Potassium, Soluble	mg/L		2	4	<2	<2	3	4	11	2	18
Magnesium, Soluble	mg/L		1	11	7	7	7	8	10	1	418
Sodium, Soluble	mg/L		2	5	6	6	10	11	11	2	14
Sulfate, Soluble	mg/L		2	40	22	21	34	40	106	6	3460
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	0	0	0	0	0	N/A	0
Calcium, Soluble (meq/L)	meq/L		0.05	3.49	1.75	1.80	1.95	2.15	2.79	0.05	20.3
Calcium, Soluble (mg/kg)	mg/kg		1	62	19	18	20	19	40	1	361
Chloride, Soluble (meq/L)	meq/L		0.06	0.20	<0.06	<0.06	<0.06	<0.06	0.14	0.06	0.25
Chloride, Soluble (mg/kg)	mg/kg		2	6	<2	<2	<2	<2	4	2	8
Magnesium, Soluble (meq/L)	meq/L		0.08	0.91	0.58	0.58	0.58	0.66	0.82	0.08	34.4
Magnesium, Soluble (mg/kg)	mg/kg		1	10	4	3	4	4	7	1	372
Potassium, Soluble (meq/L)	meq/L		0.05	0.10	<0.05	<0.05	0.08	0.10	0.28	0.05	0.46
Potassium, Soluble (mg/kg)	mg/kg		2	4	<2	<2	<2	<2	8	2	16
Sodium, Soluble (meq/L)	meq/L		0.09	0.22	0.26	0.26	0.43	0.48	0.48	0.09	0.61
Sodium, Soluble (mg/kg)	mg/kg		2	4	3	3	5	5	8	2	12
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	0.83	0.46	0.44	0.71	0.83	2.21	0.04	72.0
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	36	12	10	17	18	76	2	3080

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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

SAMPLE DESCRIPTION:				17BH01 0.8-1.0	17BH01 1.3-1.5		17BH01 2.2-2.5	17BH01 3.2-3.4		17BH02 0.8-1.0
SAMPLE TYPE:				Soil	Soil		Soil	Soil		Soil
DATE SAMPLED:				2017-02-04	2017-02-04		2017-02-04	2017-02-04		2017-02-04
Parameter	Unit	G / S	RDL	8181128	8181129	RDL	8181131	8181134	RDL	8181143
pH (CaCl2 Extraction)	pH Units		N/A	4.46	6.63	N/A	7.14	7.74	N/A	6.68
Electrical Conductivity (Sat. Paste)	dS/m		0.05	4.64	2.17	0.05	0.56	1.55	0.05	2.94
Sodium Adsorption Ratio	N/A			0.36	1.21		1.22	7.94		0.81
Saturation Percentage	%		1	73	82	1	50	64	1	72
Chloride, Soluble	mg/L		5	<5	42	5	50	152	5	8
Calcium, Soluble	mg/L		1	436	305	1	49	54	1	536
Potassium, Soluble	mg/L		2	18	40	2	5	15	2	11
Magnesium, Soluble	mg/L		1	441	70	1	10	11	1	107
Sodium, Soluble	mg/L		2	44	90	2	36	245	2	79
Sulfate, Soluble	mg/L		6	3050	1280	2	70	589	6	1820
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	0	N/A	0	0.110	N/A	0
Calcium, Soluble (meq/L)	meq/L		0.05	21.8	15.2	0.05	2.45	2.69	0.05	26.7
Calcium, Soluble (mg/kg)	mg/kg		1	318	250	1	25	35	1	386
Chloride, Soluble (meq/L)	meq/L		0.06	<0.06	1.18	0.06	1.41	4.29	0.06	0.23
Chloride, Soluble (mg/kg)	mg/kg		2	<2	34	2	25	97	2	6
Magnesium, Soluble (meq/L)	meq/L		0.08	36.3	5.76	0.08	0.82	0.91	0.08	8.80
Magnesium, Soluble (mg/kg)	mg/kg		1	322	57	1	5	7	1	77
Potassium, Soluble (meq/L)	meq/L		0.05	0.46	1.02	0.05	0.13	0.38	0.05	0.28
Potassium, Soluble (mg/kg)	mg/kg		2	13	33	2	3	10	2	8
Sodium, Soluble (meq/L)	meq/L		0.09	1.91	3.91	0.09	1.57	10.7	0.09	3.44
Sodium, Soluble (mg/kg)	mg/kg		2	32	74	2	18	157	2	57
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	63.5	26.7	0.04	1.46	12.3	0.04	37.9
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	2230	1050	2	35	377	2	1310

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AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

SAMPLE DESCRIPTION:				17BH03 0.8-1.0	17BH04 0.8-1.0	17BH05 0.8-1.0	17BH06 0.3-0.5	17BH06 2.2-2.5	17BH07 0-0.2	17BH07 2.2-2.5	17BH08 0-0.2
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04
Parameter	Unit	G / S	RDL	8181152	8181154	8181157	8181161	8181165	8181167	8181172	8181174
pH (CaCl2 Extraction)	pH Units		N/A	6.92	7.02	7.10	7.24	7.22	7.22	7.21	6.13
Electrical Conductivity (Sat. Paste)	dS/m		0.05	0.28	0.64	2.56	0.39	0.58	0.53	0.29	0.41
Sodium Adsorption Ratio	N/A			0.28	0.31	1.27	0.21	0.26	0.38	0.21	0.15
Saturation Percentage	%		1	46	51	43	53	39	52	50	177
Chloride, Soluble	mg/L		5	<5	14	11	<5	<5	6	<5	<5
Calcium, Soluble	mg/L		1	36	84	439	52	72	77	34	64
Potassium, Soluble	mg/L		2	3	4	7	5	4	3	3	3
Magnesium, Soluble	mg/L		1	7	16	85	7	12	8	6	13
Sodium, Soluble	mg/L		2	7	12	111	6	9	13	5	5
Sulfate, Soluble	mg/L		2	40	219	1580	65	164	102	31	78
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	0	0	0	0	0	0	0
Calcium, Soluble (meq/L)	meq/L		0.05	1.80	4.19	21.9	2.59	3.59	3.84	1.70	3.19
Calcium, Soluble (mg/kg)	mg/kg		1	17	43	189	28	28	40	17	113
Chloride, Soluble (meq/L)	meq/L		0.06	<0.06	0.39	0.31	<0.06	<0.06	0.17	<0.06	<0.06
Chloride, Soluble (mg/kg)	mg/kg		2	<2	7	5	<2	<2	3	<2	<2
Magnesium, Soluble (meq/L)	meq/L		0.08	0.58	1.32	6.99	0.58	0.99	0.66	0.49	1.07
Magnesium, Soluble (mg/kg)	mg/kg		1	3	8	37	4	5	4	3	23
Potassium, Soluble (meq/L)	meq/L		0.05	0.08	0.10	0.18	0.13	0.10	0.08	0.08	0.08
Potassium, Soluble (mg/kg)	mg/kg		2	<2	2	3	3	<2	<2	<2	5
Sodium, Soluble (meq/L)	meq/L		0.09	0.30	0.52	4.83	0.26	0.39	0.57	0.22	0.22
Sodium, Soluble (mg/kg)	mg/kg		2	3	6	48	3	4	7	3	9
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	0.83	4.56	32.9	1.35	3.41	2.12	0.65	1.62
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	18	112	679	34	64	53	16	138

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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

SAMPLE DESCRIPTION:				17BH08 0.8-1.0	17BH09 0-0.2	17BH09 0.8-1.0	17BH10 0-0.2	17BH10 1.3-1.5	17BH11 0-0.2	17BH11 0.8-1.0	17BH12 1.3-1.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04
Parameter	Unit	G / S	RDL	8181176	8181182	8181185	8181193	8181196	8181200	8181202	8181211
pH (CaCl2 Extraction)	pH Units		N/A	6.90	6.00	6.83	6.04	7.21	5.82	6.58	7.00
Electrical Conductivity (Sat. Paste)	dS/m		0.05	0.28	0.26	0.26	0.18	0.29	0.19	0.17	0.26
Sodium Adsorption Ratio	N/A			0.20	0.19	0.17	0.13	0.15	0.12	0.21	0.26
Saturation Percentage	%		1	49	237	41	165	44	134	44	49
Chloride, Soluble	mg/L		5	<5	5	<5	7	<5	7	<5	<5
Calcium, Soluble	mg/L		1	38	41	34	32	41	36	20	30
Potassium, Soluble	mg/L		2	<2	3	<2	<2	<2	<2	<2	<2
Magnesium, Soluble	mg/L		1	7	8	6	6	6	7	4	6
Sodium, Soluble	mg/L		2	5	5	4	3	4	3	4	6
Sulfate, Soluble	mg/L		2	25	34	16	26	15	37	15	32
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	0	0	0	0	0	0	0
Calcium, Soluble (meq/L)	meq/L		0.05	1.90	2.05	1.70	1.60	2.05	1.80	1.00	1.50
Calcium, Soluble (mg/kg)	mg/kg		1	19	97	14	53	18	48	9	15
Chloride, Soluble (meq/L)	meq/L		0.06	<0.06	0.14	<0.06	0.20	<0.06	0.20	<0.06	<0.06
Chloride, Soluble (mg/kg)	mg/kg		2	<2	12	<2	12	<2	9	<2	<2
Magnesium, Soluble (meq/L)	meq/L		0.08	0.58	0.66	0.49	0.49	0.49	0.58	0.33	0.49
Magnesium, Soluble (mg/kg)	mg/kg		1	3	19	2	10	3	9	2	3
Potassium, Soluble (meq/L)	meq/L		0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Potassium, Soluble (mg/kg)	mg/kg		2	<2	7	<2	<2	<2	<2	<2	<2
Sodium, Soluble (meq/L)	meq/L		0.09	0.22	0.22	0.17	0.13	0.17	0.13	0.17	0.26
Sodium, Soluble (mg/kg)	mg/kg		2	2	12	<2	5	<2	4	<2	3
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	0.52	0.71	0.33	0.54	0.31	0.77	0.31	0.67
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	12	81	7	43	7	50	7	16

Certified By: Qiuhong Dong

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AGAT Laboratories
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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

		SAMPLE DESCRIPTION:		17HA01 0-0.1	17BH16 0.8-1.0	17BH17 0.8-1.0	17BH19 0.3-0.5	17BH19 0.8-1.0	17BH19 2.8-3.0	17BH20 0-0.2	17BH20 1.3-1.5
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-02-04	2017-02-05	2017-02-05	2017-02-05	2017-02-05	2017-02-05	2017-02-05	2017-02-05
Parameter	Unit	G / S	RDL	8181216	8181229	8181236	8181245	8181246	8181250	8181253	8181256
pH (CaCl2 Extraction)	pH Units		N/A	7.99	6.56	6.84	7.01	7.01	7.06	6.58	7.21
Electrical Conductivity (Sat. Paste)	dS/m		0.05	2.31	0.46	0.50	0.72	0.78	0.38	0.55	0.30
Sodium Adsorption Ratio	N/A			0.37	0.29	0.31	0.53	0.60	0.40	0.33	0.23
Saturation Percentage	%		1	32	55	53	57	60	47	49	54
Chloride, Soluble	mg/L		5	60	<5	<5	9	13	<5	<5	<5
Calcium, Soluble	mg/L		1	296	55	62	102	102	43	77	38
Potassium, Soluble	mg/L		2	140	<2	<2	2	3	3	<2	<2
Magnesium, Soluble	mg/L		1	90	12	11	16	17	8	14	7
Sodium, Soluble	mg/L		2	28	9	10	22	25	11	12	6
Sulfate, Soluble	mg/L		2	865	159	159	298	228	76	160	32
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	0	0	0	0	0	0	0
Calcium, Soluble (meq/L)	meq/L		0.05	14.8	2.74	3.09	5.09	5.09	2.15	3.84	1.90
Calcium, Soluble (mg/kg)	mg/kg		1	95	30	33	58	61	20	38	21
Chloride, Soluble (meq/L)	meq/L		0.06	1.69	<0.06	<0.06	0.25	0.37	<0.06	<0.06	<0.06
Chloride, Soluble (mg/kg)	mg/kg		2	19	<2	<2	5	8	<2	<2	<2
Magnesium, Soluble (meq/L)	meq/L		0.08	7.41	0.99	0.91	1.32	1.40	0.66	1.15	0.58
Magnesium, Soluble (mg/kg)	mg/kg		1	29	7	6	9	10	4	7	4
Potassium, Soluble (meq/L)	meq/L		0.05	3.58	<0.05	<0.05	0.05	0.08	0.08	<0.05	<0.05
Potassium, Soluble (mg/kg)	mg/kg		2	45	<2	<2	<2	<2	<2	<2	<2
Sodium, Soluble (meq/L)	meq/L		0.09	1.22	0.39	0.43	0.96	1.09	0.48	0.52	0.26
Sodium, Soluble (mg/kg)	mg/kg		2	9	5	5	13	15	5	6	3
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	18.0	3.31	3.31	6.20	4.75	1.58	3.33	0.67
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	277	87	84	170	137	36	78	17

Certified By: Qiuhong Dong

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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

		SAMPLE DESCRIPTION:		17BH21 0.3-0.5	17BH22 0.3-0.5	17BH23 0-0.2	17BH23 1.3-1.5	Dup A 1.7-1.9	Dup B 2.2-2.5	Dup D 1.3-1.5
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-02-05	2017-02-05	2017-02-05	2017-02-05	2017-02-04	2017-02-04	2017-02-05
Parameter	Unit	G / S	RDL	8181262	8181288	8181300	8181303	8181308	8181309	8181311
pH (CaCl2 Extraction)	pH Units		N/A	7.02	6.84	7.11	7.30	7.25	7.41	7.09
Electrical Conductivity (Sat. Paste)	dS/m		0.05	0.38	0.56	0.59	0.31	0.32	0.71	0.26
Sodium Adsorption Ratio	N/A			0.27	0.30	0.38	0.28	0.19	1.19	0.26
Saturation Percentage	%		1	48	52	51	45	51	51	54
Chloride, Soluble	mg/L		5	7	<5	<5	<5	<5	39	<5
Calcium, Soluble	mg/L		1	51	81	83	36	43	67	31
Potassium, Soluble	mg/L		2	<2	5	<2	4	3	7	<2
Magnesium, Soluble	mg/L		1	9	13	13	7	7	14	6
Sodium, Soluble	mg/L		2	8	11	14	7	5	41	6
Sulfate, Soluble	mg/L		2	87	196	226	38	42	168	31
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	0	0	0	0	0	0
Calcium, Soluble (meq/L)	meq/L		0.05	2.54	4.04	4.14	1.80	2.15	3.34	1.55
Calcium, Soluble (mg/kg)	mg/kg		1	24	42	42	16	22	34	17
Chloride, Soluble (meq/L)	meq/L		0.06	0.20	<0.06	<0.06	<0.06	<0.06	1.10	<0.06
Chloride, Soluble (mg/kg)	mg/kg		2	3	<2	<2	<2	<2	20	<2
Magnesium, Soluble (meq/L)	meq/L		0.08	0.74	1.07	1.07	0.58	0.58	1.15	0.49
Magnesium, Soluble (mg/kg)	mg/kg		1	4	7	7	3	4	7	3
Potassium, Soluble (meq/L)	meq/L		0.05	<0.05	0.13	<0.05	0.10	0.08	0.18	<0.05
Potassium, Soluble (mg/kg)	mg/kg		2	<2	3	<2	<2	<2	4	<2
Sodium, Soluble (meq/L)	meq/L		0.09	0.35	0.48	0.61	0.30	0.22	1.78	0.26
Sodium, Soluble (mg/kg)	mg/kg		2	4	6	7	3	3	21	3
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	1.81	4.08	4.71	0.79	0.87	3.50	0.65
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	42	102	115	17	21	86	17

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8181089-8181311 If sodium results in mg/L are less than detection, SAR is non-calculable and is reported as 0.
Sodium Adsorption Ratio is a calculated parameter. The calculated value is the ratio of the sodium concentration in mmol/L over the square rooted sum of the calcium and magnesium concentrations in mmol/L.
Theoretical Gypsum Requirement is a calculated parameter. The calculation is from “A Comparison of Methods for Gypsum Requirement of Brine-Contaminated Soils”, Canadian Journal of Soil Science, 1998.

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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Alcohol Analysis in Soil - Methanol

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

		SAMPLE DESCRIPTION:		17BH06 0-0.2	17BH07 0-0.2	17BH08 0-0.2	17BH09 0-0.2	17BH10 0-0.2	17BH11 0-0.2	17BH12 0-0.2	17HA01 0-0.1
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04
Parameter	Unit	G / S	RDL	8181160	8181167	8181174	8181182	8181193	8181200	8181208	8181216
Methanol	mg/kg		0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	36.0	<0.5
Surrogate	Unit	Acceptable Limits									
4-Methyl-2-pentanone	%	50-150		97	97	99	99	99	99	97	67

		SAMPLE DESCRIPTION:		17BH16 0-0.2	17BH17 0-0.2
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2017-02-05	2017-02-05
Parameter	Unit	G / S	RDL	8181227	8181234
Methanol	mg/kg		0.5	8.3	<0.5
Surrogate	Unit	Acceptable Limits			
4-Methyl-2-pentanone	%	50-150		95	98

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8181160-8181234 Analysis by GC/FID. Results are based on the dry weight of the sample.

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Glycols Analysis in Soil

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

		SAMPLE DESCRIPTION:		17BH06 0-0.2	17BH07 0-0.2	17BH08 0-0.2	17BH09 0-0.2	17BH10 0-0.2	17BH11 0-0.2	17BH12 0-0.2	17HA01 0-0.1
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04
Parameter	Unit	G / S	RDL	8181160	8181167	8181174	8181182	8181193	8181200	8181208	8181216
Propylene Glycol	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
Ethylene Glycol	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
Diethylene Glycol	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
Triethylene Glycol	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
Tetraethylene Glycol	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
Surrogate	Unit	Acceptable Limits									
Heptanol	%	50-150		90	95	102	92	97	87	102	94

		SAMPLE DESCRIPTION:		17BH16 0-0.2	17BH17 0-0.2
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2017-02-05	2017-02-05
Parameter	Unit	G / S	RDL	8181227	8181234
Propylene Glycol	mg/kg		10	<10	<10
Ethylene Glycol	mg/kg		10	<10	<10
Diethylene Glycol	mg/kg		10	<10	<10
Triethylene Glycol	mg/kg		10	<10	<10
Tetraethylene Glycol	mg/kg		10	<10	<10
Surrogate	Unit	Acceptable Limits			
Heptanol	%	50-150		94	91

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8181160-8181234 Analysis by GC/FID.
Results are based on the dry weight of the sample.

Certified By:

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AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

		SAMPLE DESCRIPTION:		17BH01 0.8-1.0	17BH01 2.2-2.5	17BH01 3.2-3.4	17BH01 5.8-6.0	17BH02 3.2-3.4	17BH03 3.2-3.4	17BH04 3.2-3.4	17BH05 3.2-3.4
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04
Parameter	Unit	G / S	RDL	8181128	8181131	8181134	8181138	8181148	8181153	8181156	8181158
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	<10	382	<10	<10	<10	<10	<10
C16 - C34 (F3)	mg/kg		10	58	<10	1920	90	63	38	55	48
C34 - C50 (F4)	mg/kg		10	26	<10	530	<10	<10	<10	<10	<10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	15	14	36	15	12	15	11	12
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		80	79	78	105	104	104	104	104
Ethylbenzene-d10 (BTEX)	%	50-150		94	78	103	65	65	72	64	69
o-Terphenyl (F2-F4)	%	50-150		109	94	100	102	102	97	102	94

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

SAMPLE DESCRIPTION:				17BH06 0.3-0.5	17BH06 2.2-2.5	17BH07 0.8-1.0	17BH07 1.7-1.9	17BH08 0.8-1.0	17BH09 0.8-1.0	17BH10 0.8-1.0	17BH11 0.8-1.0
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04	2017-02-04
Parameter	Unit	G / S	RDL	8181161	8181165	8181169	8181171	8181176	8181185	8181195	8181202
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
C16 - C34 (F3)	mg/kg		10	22	11	11	10	<10	12	<10	<10
C34 - C50 (F4)	mg/kg		10	12	<10	<10	<10	<10	<10	<10	<10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	15	16	15	14	15	16	15	16
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		78	76	79	101	78	75	74	77
Ethylbenzene-d10 (BTEX)	%	50-150		95	79	109	65	70	58	95	85
o-Terphenyl (F2-F4)	%	50-150		106	94	100	100	96	101	98	101

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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

SAMPLE DESCRIPTION:				17BH12 0.8-1.0	17BH12 2.2-2.5	17BH13 0.8-1.0	17BH14 0.8-1.0	17BH15 0.8-1.0	17BH16 0.8-1.0	17BH17 0.8-1.0	17BH18 0.8-1.0
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-04	2017-02-04	2017-02-05	2017-02-05	2017-02-05	2017-02-05	2017-02-05	2017-02-05
Parameter	Unit	G / S	RDL	8181210	8181213	8181219	8181222	8181226	8181229	8181236	8181243
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	21	<10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	21	<10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	79	<10	<10	<10	<10	<10	<10	<10
C16 - C34 (F3)	mg/kg		10	<10	<10	11	18	<10	<10	<10	15
C34 - C50 (F4)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	13	14	14	14	14	14	15	17
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		108	103	104	105	97	105	105	103
Ethylbenzene-d10 (BTEX)	%	50-150		74	73	76	52	68	72	70	76
o-Terphenyl (F2-F4)	%	50-150		98	94	93	96	93	98	89	96

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

		SAMPLE DESCRIPTION:		17BH19 0.8-1.0	17BH19 2.8-3.0	17BH20 0.8-1.0	17BH21 0.8-1.0	17BH21 2.2-2.5	17BH22 0.3-0.5	17BH22 1.7-1.9	17BH23 0.8-1.0
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-02-05	2017-02-05	2017-02-05	2017-02-05	2017-02-05	2017-02-05	2017-02-05	2017-02-05
Parameter	Unit	G / S	RDL	8181246	8181250	8181255	8181266	8181277	8181288	8181296	8181302
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	0.64	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	0.32	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	35	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	34	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	<10	<10	<10	64	<10	<10	<10	<10
C16 - C34 (F3)	mg/kg		10	29	<10	<10	<10	<10	<10	<10	<10
C34 - C50 (F4)	mg/kg		10	<10	<10	<10	<10	<10	<10	<10	<10
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture Content	%		1	17	17	19	14	19	19	17	16
Surrogate	Unit	Acceptable Limits									
Toluene-d8 (BTEX)	%	50-150		105	104	106	110	105	105	103	105
Ethylbenzene-d10 (BTEX)	%	50-150		66	70	68	80	75	72	69	63
o-Terphenyl (F2-F4)	%	50-150		87	80	86	87	60	81	86	77

Certified By:

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AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

		SAMPLE DESCRIPTION:		Dup B 2.2-2.5
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2017-02-04
Parameter	Unit	G / S	RDL	8181309
Benzene	mg/kg		0.005	<0.005
Toluene	mg/kg		0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01
Xylenes	mg/kg		0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10
C10 - C16 (F2)	mg/kg		10	<10
C16 - C34 (F3)	mg/kg		10	<10
C34 - C50 (F4)	mg/kg		10	13
Gravimetric Heavy Hydrocarbons	mg/kg		1000	N/A
Moisture Content	%		1	13
Surrogate	Unit	Acceptable Limits		
Toluene-d8 (BTEX)	%	50-150		69
Ethylbenzene-d10 (BTEX)	%	50-150		63
o-Terphenyl (F2-F4)	%	50-150		74

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8181128-8181309 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbon Analysis in Soil

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

SAMPLE DESCRIPTION:				17BH16 0.8-1.0	17BH19 0.8-1.0	17BH19 2.8-3.0
SAMPLE TYPE:				Soil	Soil	Soil
DATE SAMPLED:				2017-02-05	2017-02-05	2017-02-05
Parameter	Unit	G / S	RDL	8181229	8181246	8181250
Naphthalene	mg/kg		0.005	<0.005	<0.005	<0.005
2-Methylnaphthalene	mg/kg		0.005	<0.005	<0.005	<0.005
Quinoline	mg/kg		0.05	<0.05	<0.05	<0.05
Acenaphthylene	mg/kg		0.005	<0.005	<0.005	<0.005
Acenaphthene	mg/kg		0.005	<0.005	<0.005	<0.005
Fluorene	mg/kg		0.02	<0.02	<0.02	<0.02
Phenanthrene	mg/kg		0.02	<0.02	<0.02	<0.02
Anthracene	mg/kg		0.004	<0.004	<0.004	<0.004
Fluoranthene	mg/kg		0.01	<0.01	<0.01	<0.01
Pyrene	mg/kg		0.01	<0.01	<0.01	<0.01
Acridine	mg/kg		0.05	<0.05	<0.05	<0.05
Benzo[a]anthracene	mg/kg		0.02	<0.02	<0.02	<0.02
Chrysene	mg/kg		0.05	<0.05	<0.05	<0.05
Benzo[b+j]fluoranthene	mg/kg		0.03	<0.03	<0.03	<0.03
Benzo[k]fluoranthene	mg/kg		0.02	<0.02	<0.02	<0.02
Benzo[a]pyrene	mg/kg		0.03	<0.03	<0.03	<0.03
Indeno[1,2,3-cd]pyrene	mg/kg		0.02	<0.02	<0.02	<0.02
Dibenzo[ah]anthracene	mg/kg		0.005	<0.005	<0.005	<0.005
Benzo[ghi]perylene	mg/kg		0.05	<0.05	<0.05	<0.05
B[a]P TPE	mg/kg		0.023	0.023	0.023	0.023
IACR (Coarse Soil)			0.05	0.05	0.05	0.05
IACR (Fine Soil)			0.11	0.11	0.11	0.11
Surrogate	Unit	Acceptable Limits				
2-Fluorobiphenyl (PAH)	%	50-150		80	76	81
p-Terphenyl-d14 (PAH)	%	50-150		85	84	87

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Certificate of Analysis

AGAT WORK ORDER: 17N186001

PROJECT: N-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Polyaromatic Hydrocarbon Analysis in Soil

DATE RECEIVED: 2017-02-09

DATE REPORTED: 2017-04-20

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8181229-8181250 Results are based on the dry weight of the sample.
Based on GC/MS target ion analysis.
Isomers Benzo(b)fluoranthene and Benzo(j)fluoranthene have the same GC retention time and are reported as the sum of the two.
B[a]P TPE, IACR (Coarse) and IACR (Fine) are calculated parameters. They are calculated according to the Alberta Tier 1 Soil and Groundwater remediation Guidelines, May 23, 2014. Note that if the analysis returns non-detects for a parameter, ½ the detection limit is entered into the formulas.

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17N186001

PROJECT: N-01

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Apr 20, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)															
pH (CaCl2 Extraction)	8181093	8181093	7.57	7.55	0.3%	N/A	NA	90%	110%	NA			NA		
Electrical Conductivity (Sat. Paste)	8181093	8181093	0.34	0.36	4.9%	< 0.05	102%	90%	110%	NA			NA		
Saturation Percentage	8181288	8181288	52	50	3.9%	< 1	NA	80%	120%	NA			NA		
Chloride, Soluble	8181093	8181093	<5	6	NA	< 5	112%	80%	120%	106%			111%	80%	120%
Calcium, Soluble	8181093	8181093	49	51	2.7%	< 1	89%	80%	120%	NA			NA	80%	120%
Potassium, Soluble	8181093	8181093	<2	<2	NA	< 2	93%	80%	120%	NA			93%	80%	120%
Magnesium, Soluble	8181093	8181093	8	9	6.5%	< 1	96%	80%	120%	NA			98%	80%	120%
Sodium, Soluble	8181093	8181093	7	8	NA	< 2	94%	80%	120%	NA			95%	80%	120%
Sulfate, Soluble	8181093	8181093	53	60	11.7%	< 2	89%	80%	120%	NA			NA	80%	120%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.															
Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)															
pH (CaCl2 Extraction)	42	8183823	7.48	7.43	0.7%	N/A	101%	90%	110%						
Electrical Conductivity (Sat. Paste)	42	8183823	0.67	0.62	7.8%	< 0.05	98%	90%	110%						
Saturation Percentage	42	8183823	42	37	12.7%	< 1	103%	80%	120%						
Chloride, Soluble	1801	8179995	8	8	NA	< 5	95%	80%	120%				97%	80%	120%
Calcium, Soluble	42	8183823	76	84	10.0%	< 1	92%	80%	120%				90%	80%	120%
Potassium, Soluble	42	8183823	9	9	NA	< 2	95%	80%	120%				98%	80%	120%
Magnesium, Soluble	42	8183823	12	14	15.4%	< 1	89%	80%	120%				92%	80%	120%
Sodium, Soluble	42	8183823	13	14	7.4%	< 2	93%	80%	120%				95%	80%	120%
Sulfate, Soluble	42	8183823	165	183	10.3%	< 2	88%	80%	120%				93%	80%	120%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.															
Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)															
Saturation Percentage	8181152	8181152	46	56	19.6%	< 1	NA	80%	120%	NA			NA		
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.															
Particle Size by Sieve															
Sieve Analysis - 75 microns	42	8174697	46	45	1.1%	< 1	104%	80%	120%						
CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)															
Antimony	42	8181131	0.5	0.5	NA	< 0.5	91%	80%	120%				91%	80%	120%
Arsenic	42	8181131	16.8	16.1	4.3%	< 0.5	90%	80%	120%				99%	80%	120%
Barium	42	8181131	312	317	1.6%	< 0.5	97%	80%	120%				99%	80%	120%
Beryllium	42	8181131	0.7	0.6	NA	< 0.5	101%	80%	120%				108%	80%	120%
Boron (Saturated Paste)	42	8150629	<0.5	<0.5	NA	< 0.5	102%	80%	120%				100%	80%	120%
Cadmium	42	8181131	<0.5	<0.5	NA	< 0.5	89%	80%	120%				94%	80%	120%
Chromium	42	8181131	20.2	18.1	11.0%	< 0.5	88%	80%	120%				94%	80%	120%
Chromium, Hexavalent	42	8181128	<0.3	<0.3	NA	< 0.3	83%	80%	120%				86%	80%	120%

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD
AGAT WORK ORDER: 17N186001
PROJECT: N-01
ATTENTION TO: Larry Yoon
SAMPLING SITE:
SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Apr 20, 2017

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Cobalt	42	8181131	11.3	12.2	7.7%	< 0.5	88%	80%	120%				91%	80%	120%
Copper	42	8181131	17.8	16.3	8.8%	< 0.5	85%	80%	120%				93%	80%	120%
Lead	42	8181131	12.1	11.9	1.7%	< 0.5	90%	80%	120%				99%	80%	120%
Mercury	42	8181131	<0.5	<0.5	NA	< 0.5	108%	80%	120%				108%	80%	120%
Molybdenum	42	8181131	1.5	1.5	NA	< 0.5	93%	80%	120%				100%	80%	120%
Nickel	42	8181131	29.9	29.2	2.4%	< 0.5	91%	80%	120%				93%	80%	120%
Selenium	42	8181131	<0.5	<0.5	NA	< 0.5	92%	80%	120%				97%	80%	120%
Silver	42	8181131	<0.5	<0.5	NA	< 0.5	86%	80%	120%				94%	80%	120%
Thallium	42	8181131	<0.5	<0.5	NA	< 0.5	89%	80%	120%				97%	80%	120%
Tin	42	8181131	0.8	0.6	NA	< 0.5	90%	80%	120%				86%	80%	120%
Uranium	42	8181131	1.1	1.1	NA	< 0.5	94%	80%	120%				95%	80%	120%
Vanadium	42	8181131	37.1	35.6	4.1%	< 0.5	91%	80%	120%				95%	80%	120%
Zinc	42	8181131	99	88	11.8%	< 1	95%	80%	120%				103%	80%	120%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)

Antimony	42	8180953	0.6	0.6	NA	< 0.5	91%	80%	120%				94%	80%	120%
Arsenic	42	8180953	11.4	10.3	10.1%	< 0.5	90%	80%	120%				99%	80%	120%
Barium	42	8180953	874	853	2.4%	< 0.5	97%	80%	120%				106%	80%	120%
Beryllium	42	8180953	0.7	0.7	NA	< 0.5	101%	80%	120%				113%	80%	120%
Boron (Saturated Paste)	42	8183823	<0.5	<0.5	NA	< 0.5	105%	80%	120%				94%	80%	120%
Cadmium	42	8180953	<0.5	<0.5	NA	< 0.5	89%	80%	120%				93%	80%	120%
Chromium	42	8180953	18.5	17.3	6.7%	< 0.5	88%	80%	120%				92%	80%	120%
Chromium, Hexavalent	42	8181311	< 0.3	< 0.3	NA	< 0.3	83%	80%	120%				84%	80%	120%
Cobalt	42	8180953	9.3	8.9	4.4%	< 0.5	88%	80%	120%				87%	80%	120%
Copper	42	8180953	20.2	19.7	2.5%	< 0.5	85%	80%	120%				91%	80%	120%
Lead	42	8180953	11.1	10.6	4.6%	< 0.5	90%	80%	120%				94%	80%	120%
Mercury	42	8180953	<0.5	<0.5	NA	< 0.5	108%	80%	120%				97%	80%	120%
Molybdenum	42	8180953	2.2	2.0	NA	< 0.5	93%	80%	120%				99%	80%	120%
Nickel	42	8180953	25.5	24.6	3.6%	< 0.5	91%	80%	120%				92%	80%	120%
Selenium	42	8180953	0.7	0.5	NA	< 0.5	92%	80%	120%				98%	80%	120%
Silver	42	8180953	<0.5	<0.5	NA	< 0.5	86%	80%	120%				94%	80%	120%
Thallium	42	8180953	<0.5	<0.5	NA	< 0.5	89%	80%	120%				90%	80%	120%
Tin	42	8180953	0.8	0.6	NA	< 0.5	90%	80%	120%				85%	80%	120%
Uranium	42	8180953	1.2	1.1	NA	< 0.5	94%	80%	120%				89%	80%	120%
Vanadium	42	8180953	32.0	30.3	5.5%	< 0.5	91%	80%	120%				93%	80%	120%
Zinc	42	8180953	89	85	4.6%	< 1	95%	80%	120%				99%	80%	120%

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD
AGAT WORK ORDER: 17N186001
PROJECT: N-01
ATTENTION TO: Larry Yoon
SAMPLING SITE:
SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Apr 20, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)															
pH (CaCl2 Extraction)	51	8181152	6.92	7.11	2.7%	N/A	100%	90%	110%	NA			NA		
Electrical Conductivity (Sat. Paste)	51	8181152	0.28	0.28	0.0%	< 0.05	103%	90%	110%	NA			NA		
Chloride, Soluble	8181152	8181152	<5	<5	NA	< 5	103%	80%	120%	109%			107%	80%	120%
Calcium, Soluble	52	8200967	20	20	0.8%	< 1	97%	80%	120%				103%	80%	120%
Potassium, Soluble	52	8200967	3	3	NA	< 2	97%	80%	120%				94%	80%	120%
Magnesium, Soluble	52	8200967	8	7	1.7%	< 1	99%	80%	120%				96%	80%	120%
Sodium, Soluble	52	8200967	109	112	2.0%	< 2	100%	80%	120%				87%	80%	120%
Sulfate, Soluble	52	8200967	77	77	0.3%	< 2	91%	80%	120%				91%	80%	120%
CCME/ Tier 1 Metals - Ni															
Nickel	52	8200967	2.7	2.8	3.6%	< 0.5	90%	80%	120%				98%	80%	120%
Soil Analysis - Barium Guidelines															
Barium, Extractable	49	8199697	19	18	5.4%	< 2	82%	80%	120%				94%	80%	120%
Barium by Fusion ICP-OES	52	8181134	2690	3050	12.5%	< 40	96%	80%	120%				104%	80%	120%
Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)															
pH (CaCl2 Extraction)	65	8230298	7.55	7.60	0.7%	N/A	100%	90%	110%	NA			NA		
Electrical Conductivity (Sat. Paste)	65	8230298	8.00	8.65	7.8%	< 0.05	100%	90%	110%	NA			NA		
Saturation Percentage	65	8230298	52	46	12.2%	< 1	97%	80%	120%	NA			NA		
Chloride, Soluble	1824	8181093	5	6	NA	< 5	112%	80%	120%				111%	80%	120%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD
AGAT WORK ORDER: 17N186001
PROJECT: N-01
ATTENTION TO: Larry Yoon
SAMPLING SITE:
SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Apr 20, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)															
Antimony	106	8181245	0.6	0.5	NA	< 0.5	101%	80%	120%				93%	80%	120%
Arsenic	106	8181245	13.4	13.8	2.9%	< 0.5	98%	80%	120%				96%	80%	120%
Barium	106	8181245	311	298	4.3%	< 0.5	112%	80%	120%				104%	80%	120%
Beryllium	106	8181245	0.6	0.7	NA	< 0.5	105%	80%	120%				111%	80%	120%
Boron (Saturated Paste)	105	8181288	<0.5	<0.5	NA	< 0.5	110%	80%	120%				105%	80%	120%
Cadmium	106	8181245	<0.5	<0.5	NA	< 0.5	96%	80%	120%				98%	80%	120%
Chromium	106	8181245	21.5	20.6	4.3%	< 0.5	97%	80%	120%				99%	80%	120%
Chromium, Hexavalent	108	8181245	<0.3	<0.3	NA	< 0.3	83%	80%	120%				98%	80%	120%
Cobalt	106	8181245	9.0	8.7	3.4%	< 0.5	97%	80%	120%				91%	80%	120%
Copper	106	8181245	18.4	17.8	3.3%	< 0.5	94%	80%	120%				82%	80%	120%
Lead	106	8181245	14.9	14.4	3.4%	< 0.5	101%	80%	120%				104%	80%	120%
Mercury	106	8181245	<0.5	<0.5	NA	< 0.5	109%	80%	120%				110%	80%	120%
Molybdenum	106	8181245	1.5	1.4	NA	< 0.5	97%	80%	120%				100%	80%	120%
Nickel	106	8181245	26.1	24.9	4.7%	< 0.5	97%	80%	120%				86%	80%	120%
Selenium	106	8181245	0.6	0.5	NA	< 0.5	99%	80%	120%				95%	80%	120%
Silver	106	8181245	<0.5	<0.5	NA	< 0.5	94%	80%	120%				94%	80%	120%
Thallium	106	8181245	<0.5	<0.5	NA	< 0.5	100%	80%	120%				116%	80%	120%
Tin	106	8181245	0.7	0.6	NA	< 0.5	99%	80%	120%				94%	80%	120%
Uranium	106	8181245	1.3	1.2	NA	< 0.5	98%	80%	120%				103%	80%	120%
Vanadium	106	8181245	34.8	33.9	2.6%	< 0.5	94%	80%	120%				83%	80%	120%
Zinc	106	8181245	85	81	4.8%	< 1	104%	80%	120%				109%	80%	120%
Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)															
pH (CaCl2 Extraction)	105	8181288	6.84	6.87	0.4%	N/A	99%	90%	110%						
Electrical Conductivity (Sat. Paste)	105	8181288	0.56	0.56	0.2%	< 0.05	98%	90%	110%						
Saturation Percentage	105	8181288	52	50	3.9%	< 1	99%	80%	120%						
Chloride, Soluble	1849	8181288	<5	<5	NA	< 5	95%	80%	120%				91%	80%	120%
Calcium, Soluble	105	8181288	81	81	0.0%	< 1	95%	80%	120%				89%	80%	120%
Potassium, Soluble	105	8181288	5	5	NA	< 2	91%	80%	120%				93%	80%	120%
Magnesium, Soluble	105	8181288	13	13	0.0%	< 1	94%	80%	120%				91%	80%	120%
Sodium, Soluble	105	8181288	11	11	0.0%	< 2	90%	80%	120%				90%	80%	120%
Sulfate, Soluble	105	8181288	196	192	2.1%	< 2	102%	80%	120%				100%	80%	120%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated
If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17N186001

PROJECT: N-01

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Apr 20, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated
If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.

Certified By: Qiuhong Dong

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Trace Organics Analysis

RPT Date: Apr 20, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)															
Benzene	1173	8181128	<0.005	<0.005	NA	< 0.005	106%	80%	120%	111%	80%	120%	88%	60%	140%
Toluene	1173	8181128	<0.05	<0.05	NA	< 0.05	105%	80%	120%	100%	80%	120%	79%	60%	140%
Ethylbenzene	1173	8181128	0.01	0.01	NA	< 0.01	115%	80%	120%	116%	80%	120%	93%	60%	140%
Xylenes	1173	8181128	<0.05	<0.05	NA	< 0.05	114%	80%	120%	93%	80%	120%	71%	60%	140%
C6 - C10 (F1)	1173	8181128	<10	<10	NA	< 10	113%	80%	120%	89%	80%	120%	71%	60%	140%
C10 - C16 (F2)	1024	8181128	< 10	< 10	NA	< 10	102%	80%	120%	105%	80%	120%	112%	60%	140%
C16 - C34 (F3)	1024	8181128	58	45	NA	< 10	107%	80%	120%	99%	80%	120%	107%	60%	140%
C34 - C50 (F4)	1024	8181128	26	16	NA	< 10	107%	80%	120%	82%	80%	120%	92%	60%	140%
Moisture Content	1024	8181128	15	15	0.0%	< 1									
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Glycols Analysis in Soil															
Propylene Glycol	21	8180983	<10	<10	NA	< 10	111%	70%	130%	107%	70%	130%	106%	60%	140%
Ethylene Glycol	21	8180983	<10	<10	NA	< 10	126%	70%	130%	124%	70%	130%	123%	60%	140%
Diethylene Glycol	21	8180983	<10	<10	NA	< 10	124%	70%	130%	120%	70%	130%	121%	60%	140%
Triethylene Glycol	21	8180983	<10	<10	NA	< 10	122%	70%	130%	118%	70%	130%	119%	60%	140%
Tetraethylene Glycol	21	8180983	<10	<10	NA	< 10	79%	70%	130%	84%	70%	130%	84%	60%	140%
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)															
Benzene	1175	8189227	<0.005	<0.005	NA	< 0.005	104%	80%	120%	82%	80%	120%	108%	60%	140%
Toluene	1175	8189227	<0.05	<0.05	NA	< 0.05	105%	80%	120%	80%	80%	120%	107%	60%	140%
Ethylbenzene	1175	8189227	<0.01	<0.01	NA	< 0.01	113%	80%	120%	92%	80%	120%	125%	60%	140%
Xylenes	1175	8189227	<0.05	<0.05	NA	< 0.05	114%	80%	120%	80%	80%	120%	96%	60%	140%
C6 - C10 (F1)	1175	8189227	<10	<10	NA	< 10	110%	80%	120%	112%	80%	120%	110%	60%	140%
C10 - C16 (F2)	1124	8188915	<10	<10	0	< 10	110%	80%	120%	108%	80%	120%	94%	60%	140%
C16 - C34 (F3)	1124	8188915	21	18	15	< 10	110%	80%	120%	106%	80%	120%	96%	60%	140%
C34 - C50 (F4)	1124	8188915	<10	<10	0	< 10	112%	80%	120%	113%	80%	120%	100%	60%	140%
Moisture Content	1124	8188915	23	23	0.0%	< 1									
Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.															
Polyaromatic Hydrocarbon Analysis in Soil															
Naphthalene	1070	L S	<0.005	<0.005	NA	< 0.005	103%	70%	130%	99%	70%	130%	99%	70%	130%
2-Methylnaphthalene	1070	L S	<0.005	<0.005	NA	< 0.005				99%	70%	130%	98%	70%	130%
Quinoline	1070	L S	<0.05	<0.05	NA	< 0.05	104%	70%	130%	109%	70%	130%	111%	70%	130%
Acenaphthylene	1070	L S	<0.005	<0.005	NA	< 0.005	116%	70%	130%	101%	70%	130%	101%	70%	130%
Acenaphthene	1070	L S	<0.005	<0.005	NA	< 0.005	102%	70%	130%	87%	70%	130%	88%	70%	130%
Fluorene	1070	L S	<0.02	<0.02	NA	< 0.02	110%	70%	130%	96%	70%	130%	97%	70%	130%
Phenanthrene	1070	L S	<0.02	<0.02	NA	< 0.02	104%	70%	130%	103%	70%	130%	103%	70%	130%
Anthracene	1070	L S	<0.004	<0.004	NA	< 0.004	125%	70%	130%	103%	70%	130%	100%	70%	130%
Fluoranthene	1070	L S	<0.01	<0.01	NA	< 0.01	120%	70%	130%	127%	70%	130%	125%	70%	130%

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17N186001

PROJECT: N-01

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Apr 20, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Pyrene	1070	L S	<0.01	<0.01	NA	< 0.01	108%	70%	130%	119%	70%	130%	115%	70%	130%
Acridine	1070	L S	<0.05	<0.05	NA	< 0.05	91%	70%	130%	100%	70%	130%	108%	70%	130%
Benzo[a]anthracene	1070	L S	<0.02	<0.02	NA	< 0.02	96%	70%	130%	124%	70%	130%	123%	70%	130%
Chrysene	1070	L S	<0.05	<0.05	NA	< 0.05	103%	70%	130%	119%	70%	130%	123%	70%	130%
Benzo[b+j]fluoranthene	1070	L S	<0.03	<0.03	NA	< 0.03	102%	70%	130%	89%	70%	130%	89%	70%	130%
Benzo[k]fluoranthene	1070	L S	<0.02	<0.02	NA	< 0.02	101%	70%	130%	97%	70%	130%	98%	70%	130%
Benzo[a]pyrene	1070	L S	<0.03	<0.03	NA	< 0.03	95%	70%	130%	104%	70%	130%	102%	70%	130%
Indeno[1,2,3-cd]pyrene	1070	L S	<0.02	<0.02	NA	< 0.02	103%	70%	130%	104%	70%	130%	102%	70%	130%
Dibenzo[ah]anthracene	1070	L S	<0.005	<0.005	NA	< 0.005	102%	70%	130%	101%	70%	130%	99%	70%	130%
Benzo[ghi]perylene	1070	L S	<0.05	<0.05	NA	< 0.05	105%	70%	130%	99%	70%	130%	98%	70%	130%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Alcohol Analysis in Soil - Methanol															
Methanol	31	8181160	<0.5	<0.5	NA	< 0.5	90%	80%	120%	85%	70%	130%	110%	60%	140%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Alcohol Analysis in Soil - Methanol															
Methanol	5225	8191582	0.7	1.1	NA	< 0.5	111%	80%	120%	108%	70%	130%	97%	60%	140%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Arsenic	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Barium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Beryllium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Boron (Saturated Paste)	INOR-171-6002, 171-6201	CARTER & GREGORICH 2007	ICP/OES
Cadmium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Chromium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP/MS
Chromium, Hexavalent	INOR-171-6215	ASA 20-4.3; REISENAUER 1982	SPECTROPHOTOMETER
Cobalt	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Copper	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Lead	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Mercury	INOR-171-6006, -6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Molybdenum	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Nickel	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Selenium	INORG-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Silver	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Thallium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Tin	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Uranium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Vanadium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Zinc	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Sieve Analysis - 75 microns	INOR-171-6009	KROETSCH 2007; SHEPPARD 2007	SIEVE
Barium, Extractable	INOR-171-6007, INOR-171-6201	EPA SW - 846-3050/6010; SHEPPARD	ICP/OES
True Barium by Fusion ICP	INOR-171-60008	ASTM D4503.08	ICP/OES
pH (CaCl2 Extraction)	INOR-171-6207	SHEPPARD 2007; HENDERSHOT 2008	PH METER
Electrical Conductivity (Sat. Paste)	INO-171-6206	SHEPPARD 2007; MILLER 2007	CONDUCTIVITY METER
Sodium Adsorption Ratio	INOR-171-6201 & INOR-171-6002	McKeague 3.26	CALCULATION
Saturation Percentage	SOIL 0140; SOIL 0110; SOIL 0120	MILLER 2007; SHEPPARD 2007	GRAVIMETRIC
Chloride, Soluble			COLORIMETER
Chloride, Soluble	INOR-171-6212	CARTER & GREGORICH 2007, SM 3120B	COLORIMETER

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Calcium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Potassium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Magnesium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Sodium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Sulfate, Soluble	INOR-171-6201 & INOR-171-6002	SHEPPARD 2007; EATON 2005; MILLER 2007, SM 3120B	ICP/OES
Theoretical Gypsum Requirement	SOIL 0260	USDA HDBK 60, 22D	N/A

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Method Summary

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17N186001

PROJECT: N-01

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Methanol	TO 1420	EPA 8015	GC/FID
Methanol	ORG-170-5442	EPA SW-846 8015	GC/FID
4-Methyl-2-pentanone	TO 1420	EPA 8015	GC/FID
4-Methyl-2-pentanone	ORG-170-5442	EPA SW-846 8015	GC/FID
Propylene Glycol	TO-1410	EPA SW-846 8015	GC/FID
Ethylene Glycol	TO-1410	EPA SW-846 8015	GC/FID
Diethylene Glycol	TO-1410	EPA SW-846 8015	GC/FID
Triethylene Glycol	TO-1410	EPA SW-846 8015	GC/FID
Tetraethylene Glycol	TO-1410	EPA SW-846 8015	GC/FID
Heptanol	TO-1410	EPA SW-846 8015	GC/FID
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C10 - C16 (F2)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Moisture Content	LAB-175-4002	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Naphthalene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
2-Methylnaphthalene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Quinoline	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Acenaphthylene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Acenaphthene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Fluorene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Phenanthrene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Anthracene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Fluoranthene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Pyrene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Acridine	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Benzo[a]anthracene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Chrysene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Benzo[b+j]fluoranthene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Benzo[k]fluoranthene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Benzo[a]pyrene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Indeno[1,2,3-cd]pyrene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Dibenzo[ah]anthracene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
Benzo[ghi]perylene	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS

Results relate only to the items tested and to all the items tested

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
2-Fluorobiphenyl (PAH)	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
p-Terphenyl-d14 (PAH)	ORG-170-5420	EPA SW846 8270 D/3540 C/3570	GC/MS
B[a]P TPE	ORG-170-5420	CCME	CALCULATION
IACR (Coarse Soil)		CCME	CALCULATION
IACR (Fine Soil)		CCME	CALCULATION

Results relate only to the items tested and to all the items tested

Desk Top Remediation Report

PARA ET AL FORT LIARD
N-01 60-10-123-15
South Liard Field
WID# 1902

Prepared for:
Paramount Resources Ltd

SYNERGYASPEN PROJECT No. PAR6210

June 1, 2021



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- PAR6210-001 – Site Location Plan
- PAR6210-002 – Site Plan and Areas of Potential Environmental Concern
- PAR6210-003 –Areas of Potential Environmental Concern
- Well Site Survey

APPENDICES

I. Borehole Logs, Tables, and Drawings from North Shore Preliminary Stage 2 Report
II. Historical Borehole Logs
III. Water Well and Water Body Search Results

1. INTRODUCTION

At the request of Paramount Resources Limited (Paramount), SynergyAspen completed a Desktop Remediation™ (DTR) review of historical environmental site assessment information and data for the Paramount former wellsite *PARA ET AL* N-01 - 60-10-123-15, with Well Identification number 1902 (the Site). The Site is in the South Liard field of the Northwest Territories.

The scope of work for the DTR involved reviewing and assessing available analytical data to determine the applicability of various guidelines based on land uses and receptors at the Site. Recommendations for remediation at the Site will be provided based on regulatory requirements.

The areas of potential environmental concern (APECs) identified in the 2017 Phase 1 ESA for the Site by North Shore Environmental Limited (North Shore) were the Well centre; production facility areas; the flare stack/flare knockout drum area; spill area in the northeast corner; and other reported spill areas. (North Shore, 2017a). The areas of environmental concern (AECs) identified in North Shore's 2017 Phase 2 ESA for the Site were the Well centre area, due to one soil sample with exceedances of Fraction 2 petroleum hydrocarbons in soil (F2 PHC), and two soil samples with elevated salinity; and the Flare Area, due to one soil sample with an exceedance of ethylbenzene.

2. CURRENT SITE DESCRIPTION

The Site was winter-access, and the well-produced natural gas, produced water, and condensate from 2001 to 2005. The well was drilled to a depth of 1940 meters on December 12, 2000, with the rig released on January 16, 2001, in the South Liard field, approximately 27 kilometres (km) southwest of Fort Liard, Northwest Territories (NT). The Site location is presented on Drawing PAR6210-001.

The Site was approximately 150m x 150m, with a 30m x 60m campsite west along the main access road, and a proposed 40m x 60m borrow pit south along the main access road. Site details and surrounding land uses are shown on Drawing PAR6210-002 and PAR6210-003. Table A below summarizes general information regarding the Site's location, topography, hydrogeology, and surrounding land uses.

TABLE A: Summary of General Information

Item	Description
Site Latitude & Longitude	60° 00' 52.15" N, 123° 16' 04.45" W
NTS Map	N-01 - 60°-10'-123°-15'
Well ID #	1902
Land Owner(s)	Crown
Drilling Dates	December 12, 2000 to January 16, 2001
Total Depth	1940 m
Site Description & Size	Site dimensions are approximately 150 m x 150 m square, with the north boundary to the North, and access from the west.
Site Facilities	Wellhead was located at the centre of the Site; flare stack, production facilities
Topography:	
Regional Surface Grade	The regional grade is gently sloping northeast (0-1%) towards a tributary of the Liard River
On Site Drainage	The lease slopes northeast (0-1%) based on the survey details
Surface Cover	In 2017 the Site was covered in birch saplings.
Geology	Bedrock geology consists of Wapiti Formation which is comprised fine clastic sedimentary rocks, Conglomerate, fine to coarse grained sandstone; carbonaceous shale and coal from cretaceous geological period [BCGS online map resource].
Hydrology & Hydrogeology:	
Nearest Surface Water	Government of NWT ATLAS website shows no water bodies within 500m of the Site. A dugout/borrow pit is visible ~570m west of the Site.
Water Wells	Government of NWT ATLAS website shows no water wells within 500m of the Site (Appendix III).
Depth to Groundwater	Unknown
Groundwater Flow	Unknown but likely to the east towards the unnamed tributary of the Liard River

Item	Description
Surrounding Land Use (Site)	
North	Mixed wood Boreal forest
East	Mixed wood Boreal Forest
South	Mixed wood Boreal Forest
West	Mixed wood Boreal Forest

3. HISTORICAL REVIEW

The scope of this report included a review of available historical environmental site assessment (ESA) information for the Site. Findings from the review of the available reports are summarized below.

3.1 Phase 1 ESA - 2017

North Shore completed a Phase 1 ESA on the Site, published in March of 2017. The Phase 1 ESA indicated the well was a producing well from 2001 to 2005. Production facilities were located at well centre and the northwest and northeast corners of the Site. Based on Compliance Option #1 checklist, the on-site drilling waste disposal area (DWDA) did not require assessment for disposal of drilling waste (North Shore, 2017a).

Two spills were associated with the Site: 150 L of produced water from a pipeline in August 2006; and 135 L of methanol from a drum. A biopile was constructed on the Site for remediation of the 2007 produced water spill; sampling of the biopile found benzene, ethylbenzene, toluene, and PHC Fraction 3 (F3) PHC that exceeded applicable guidelines. Concentration of metals and salinity parameters were at natural level and below the applicable guidelines (Ready Environmental Inc., 2007). Ready Environmental and Crosshair Computing completed delineation of hydrocarbon at the Site. Approximately, 1200 m3 of contaminated soil was excavated and stockpiled in two biopiles and sampled in 2007 and 2008. The lab results indicated that hydrocarbon concentrations decreased except benzene and ethylbenzene were above applicable guidelines in some samples.

In 2008 the biopile was mixed, and soil from the southwest corner and northeast portion of the berm was added to the biopile. In March 2009, the biopile was turned; no further sampling information was available for review for the biopile.

In 2004, three groundwater wells were installed, with two more installed in 2005. Groundwater results from 2008 showed total dissolved solids, and dissolved manganese above applicable guidelines in all wells; well BH106 also had dissolved zinc above the freshwater aquatic life guideline limit. Groundwater monitoring wells were assessed in eight sampling events prior to June 2011. The concentration of BTEX and PHC fractions F1 and F2 in all groundwater samples were below the laboratory detection limit and the drinking water criteria in all wells. Cadmium and iron concentrations exceeded the FAL criteria in all surface water samples. Elevated aluminium concentrations reported in three monitoring wells at the Site. However, 2011 elevated results were due to a changed sampling technique since the samples were

not filtered and preserved in the field. Therefore, they do not reflect true dissolved concentrations. All hydrocarbon and methanol parameters in soil were below the soil quality guidelines. Paramount recommended to discontinue groundwater monitoring and soil monitoring at the site.

The site visit in February 2017 showed an excavated area on the northeast portion of the wellsite; two 400 barrel above-ground storage tanks (AST); and one AST south of the separator; two flare lines from well centre to the northeast; and above-ground piping from well centre to various production facilities. There were two flare stacks noted in the northeast of the Site, a separator, an incinerator, and 3 meter shacks noted (North Shore, 2017a).

3.2 Phase 2 ESA - 2017

North Shore completed a Phase 2 ESA on the Site, published in May of 2017. The Phase 2 ESA investigated the APECs identified in the Phase 1 ESA for the Site, and consisted of 30 boreholes advanced at the Site, to a maximum depth of 6.0 meters below ground (mbg). Analytical results from the Phase 2 ESA were compared to the following guidelines for the respective parameters: Canadian Council of Ministers of the Environment (CCME) 2017 Tier 1 Soil Remediation Guidelines and the 2003 Northwest Territories Environmental Guidelines for Contaminated Site Remediation for pH and salinity parameters (North Shore, 2017b). Results from the Phase 2 ESA showed elevated arsenic that was comparable to background levels across the Site, and one sample with elevated nickel comparable to background concentrations. Results showed one subsurface sample at the Well Centre exceeded for F2 PHC and sodium adsorption ratio (SAR), and two samples from the surface failed for pH and electrical conductivity (EC). Results from the Flare Area showed one surface sample exceeded CCME Tier 1 guidelines for ethylbenzene (North Shore, 2017b). Recommendations for further work were not provided in the Phase 2 ESA (North Shore, 2017b).

4. SUMMARY OF SITE SOIL CONDITIONS

Based on a review of historical reports, SynergyAspen developed a list of areas of environmental concern (AECs) for the Site. The AECs, along with contaminants of concern (COCs) and associated regulated parameters, are shown on Table B below. The AEC is shown in Drawing PAR6210-002.

TABLE B: AECs and Associated COCs in Soil

AEC Label	AECs	Impacted Borehole(s)	COCs (depth)
A	Well Centre	17BH01	pH & EC (0.3-1.0 mbg) Fraction 2 PHC & SAR (3.2-3.4 mbg)
B	Flare Area	17BH21	Ethylbenzene (0.8-1.0 mbg)

Soil Stratigraphy

There were two background boreholes advanced at the Site in the North Shore 2017 Phase 2 ESA. Soil stratigraphy at background borehole 17C01 was organic/muskeg to 0.8mbg, overlying clay-loam and clay to 2.0mbg, followed by a layer of wet sandy-loam to 2.2mbg, overlying firm clay to 6.0mbg, the total depth of assessment. The profile in 17C02 was organic/muskeg to 0.8mbg, overlying clay-loam to 1.5mbg, followed by firm clay to 4.5mbg, the total depth of assessment. (North Shore, 2017b).

The stratigraphy at the wellbore APEC was shown in boreholes 17BH01 through 17BH05. Stratigraphy was described as a sandy-clay pad to 0.1mbg, overlying clay or hard clay to 4.5mbg, the maximum depth of assessment. In 17BH03, clay or hard-clay was noted to 3.8mbg, followed by silty-clay-loam to 4.5mbg, the total depth of the borehole (North Shore, 2017b).

Hydrogeology

Four soil samples collected at varying depths from the background boreholes were analyzed for grain size analysis, using the sieve pan methodology. The sieve method provides the percentage split between coarse and fine-grained material based on retention on a 75µm mesh screen sieve. The grain size analysis results ranged from 10% to 26% retention on the sieve, indicating fine-grained material was dominant throughout the soil profile at the Site (North Shore, 2017b).

The shallow subsurface regional geology of the area north of Maxhamish Lake was reviewed through borehole logs from Phase 2 ESAs completed at four sites in the region. The borehole logs from the following sites were reviewed:

- PARA ET AL MAXHAMISH B- 21-K/094-O-14 (WA#03717) (North shore, 2017c)
- PARA ET AL MAXHAMISH B- 043-K/094-O-14 (WA#12563) (North shore, 2017d)
- PARA ET AL MAXHAMISH B- 083-K/094-O-14 (WA#13773) (North shore, 2017e)
- PARA ET AL MAXHAMISH A-96-J/094-O-14 (WA#13772) (North shore, 2017f)

The sites were located respectively approximately 9 kilometres (km) south, 7.1km south-southwest, 3.5km south, and 4.7km southeast of the N-01 Site. Soil stratigraphy at the b-21-K/94-O-14 site was topsoil and silty-clay overlying clay subsurface. Delineation boreholes around the site showed clay overlying hard clay, with minor occurrences of sandy loam. Hydraulic conductivity testing was completed at the site from 3 groundwater monitoring wells installed during the Phase 2 ESA: hydraulic conductivity values ranged from $1.0x10^{-9}$ meters per second (m/s) to $2.0x10^{-10}$ m/s, as expected from the soil type at the site (2017c).

The soil profile at background locations at the b-043-K site showed loam surface soil to 0.2m, overlying clay-loam soil to approximately 3.0mbg, followed by silty-clay-loam to 4.5mbg, and silty-loam to 6.0mbg. All samples from various depths submitted for grain-size analysis through sieve analysis showed fine-grained soils dominant in the soil profile at the site (North Shore, 2017d).

The borehole logs from background locations at the b-083-K and A-96-J sites showed consistent profiles with loam surface soil to 0.2mbg, followed by clay to approximately 3.0 mbg, overlying “hard clay” to 6.0mbg, the maximum depth of investigation; a layer of silty-clay was noted in one borehole from the a-069-J site. A sand layer was noted in one borehole from 2.4-2.8 mbg at the b-083-K site. All samples submitted for grain-size analysis through sieve analysis from both sites showed fine-grained soils dominant in the soil profile at the sites (North Shore, 2017e,f). Copies of the reviewed borehole logs and figures are provided in Appendix I and II.

From the Phase 2 ESA for the Site and hydraulic conductivity information the region, there was a sufficient minimum confining layer present between the Site and a deeper regional aquifer. Hydraulic conductivity values of the deeper soils at the Site would be expected to be low due to the hard clay soil at the Site. Therefore, drinking water (DW) standards would not apply at the Site within the shallow soils, but would apply in the deeper aquifer unit, if present. At the time of the assessments there were no water wells, water bodies, or residences within 500m of the Site.

5. ENVIRONMENTAL REGULATORY FRAMEWORK

Numerical soil standards for evaluating the results of the Phase 2 ESA were based on the CCME 2018 Canadian Environmental Soil Quality Guidelines (the CESQ), and the Northwest Territories Environmental Guidelines for Contaminated Site Remediation (the Environmental Guidelines) (Minister of the Environment and Natural Resources [ENR], 2003). The selection of applicable guideline limits in both documents are dependent upon site conditions, applicable receptors at a site, and relevant exposure pathways. From the land use definitions and soil depth considerations in the guideline documents, the Residential/Parkland land use was used to evaluate the 2017 Phase 2 ESA results for the Site.

For assessment of the available data for the N-01 Site, the Tier 1 – Criteria-based Approach described in the Environmental Guidelines and the CESQ guidelines were used to determine the applicable F2 PHC and salinity concentration limits for the Site.

For the evaluation of receptors and pathways related to groundwater protection, water use considered proximity to potable water and aquatic receptors, current and potential future use of groundwater aquifers as water sources, and the potential for groundwater extraction based on the hydraulic conductivity of the shallow regional soils.

From the Site information in Section 2, there were no groundwater wells, water bodies, or residences within 500m of the Site. Based on the rationale in Section 4 regarding low hydraulic conductivity due to fine-grained soil in the region, and the lack of water bodies, water wells or residences in proximity to the Site, the Protection of Potable Groundwater, Protection of Freshwater Aquatic Life, and Protection of Livestock Watering pathways would not be operative at the Site.

The following receptor pathways were determined to be applicable at the Site:

For analytical results from soil samples <1.5mbg:	For analytical results from soil samples >1.5mbg:
• Direct Contact; and • Ecological Soil Contact.	• Ecological Soil Contact; • Nutrient and Energy Cycling.

5.1 Guideline Derivation

From the evaluation of receptor pathways at the Site, the Protection of Potable Groundwater pathway was not applicable at the Site. Therefore, the guideline limit for F2 PHC in fine-grained surface for Residential/Parkland land use for the soil below 1.5 mbg was determined to be 2200 milligrams per kilogram (mg/kg), based on the Ecological Soil Contact pathway as described in the ENR *Tier 1 Criteria-based Approach*.

6. COMPARISON OF DATA

Based on the 2017 Phase 2 ESA, soil analytical results were compared to the applicable guideline limits with respect to the operative receptor pathways at the Site. Table C below shows the historic Site soil data compared to applicable soil guidelines at the Site:

TABLE C: Soil Quality Guidelines applicable at the Site (mg/kg)

Parameter	2017 Analytical Results	ENR 2003 Residential/ Parkland	ENR 2003 Residential/ Parkland*
F2	382	250	2200
Ethylbenzene	0.64	1.2	-
pH	3.42-4.46	6-8	-
EC	4.59-4.64	2	-
SAR	7.94	5	-

*Guideline for Ecological Soil Contact, samples >1.5mbg

Rationale regarding salinity on the Site because of the presence of naturally occurring salts of calcium and magnesium sulphates is provided in the next section. As well, further discussion regarding the applicability of various guidelines with respect to expected land uses, available receptors, and site-specific conditions is included in the next section.

7. RESULTS AND CONCLUSIONS

Exceedances for pH and EC in surface samples, and F2 PHC and SAR in the subsurface were noted in soil samples collected near the Wellbore at the Site. An ethylbenzene exceedance was noted in the surface soil of the Flare Area at the Site. Analytical soil data from the 2017 North Shore Phase 2 ESA were compared to current ENR and CCME guidelines applicable to the Site. A discussion of the results is presented below.

7.1 Soil Results

7.1.1 Ethylbenzene

The single exceedance for ethylbenzene at the Flare Area was noted at 0.8-1.0mbg, with the soil sample collected deeper showing results of non-detect/below guidelines. The concentration in the single sample, 0.64 mg/kg, was compared to the ENR 2003 guideline limit for ethylbenzene in fine-grained surface soil, with a limit of 1.2 mg/kg. The result from the single sample was found to be below the ENR guideline applicable to the Site. Therefore, the ethylbenzene exceedance noted at the Flare Area did not pose a risk to human or ecological receptors at the Site.

7.1.2 F2 Petroleum Hydrocarbons

The exceedance for F2 PHC in a soil sample collected near the Wellbore was in the subsurface, at a depth of 3.2-3.4mbg, with the samples above and below the affected sample showing non-detect/below guidelines. Based on the summary of site conditions in Section 4, the result was compared with the ENR guideline for PHC in subsurface soils (>1.5mbg) with the Protection of Groundwater pathway removed, a limit of 2200 mg/kg. The single sample result of 382mg/kg was below the ENR guideline applicable to the Site, therefore the result did not present a risk to human or ecological receptors at the Site.

7.1.3 Salinity

Soil samples from the Wellbore area showed pH below the acceptable range and elevated EC in two samples from 0.3-1.0mbg, and an elevated SAR at a depth of 3.2-3.4mbg in one sample. The elevated EC in the surface samples correlate with the increase in calcium and magnesium sulphate salts in the soil profile. Results from the background samples show an increase in calcium and magnesium sulphates at a depth of 4.7-4.9mbg. Therefore it is likely that the elevated EC at the Well Center was the result of bringing deeper profile soils with higher levels of naturally occurring sulphate salts to the surface during drilling. As the elevated EC is not associated with an increase of sodium or chloride, the elevated EC in the two surface samples was likely the result of the movement of soil from depth to the surface at the Site. Therefore, the elevated EC did not present a risk to receptors at the Site.

The increased SAR in the single soil sample from 3.2-3.5 mbg near the Wellbore was the result of decreased concentrations of calcium and magnesium, relative to a moderate increase in sodium in the soil profile. Calcium concentrations in the soil profile ranged from 17 to 386 mg/kg, magnesium concentrations ranged from 3 to 372 mg/g, and sodium ranged from 3 to 157 mg/kg. Calcium concentration in the sample was 35 mg/kg, and magnesium concentration was 7mg/kg, compared to a sodium concentration of 157 mg/kg; chloride concentration was 97mg/kg in the sample. While the increased sodium relative to calcium and magnesium in the sample resulted in an increase in SAR, the depth of the sample was below the Ecological Soil Contact pathway. Therefore, the elevated SAR did not present a risk to receptors at the Site.

7.1.4 Arsenic

Elevated arsenic concentration ranged from 13.4 mg/kg to 16.8 mg/kg, above the CCME guideline of 12mg/kg (North Shore, 2017) across the Site. The CCME Residential/Parkland guideline for arsenic in soils was based on protection of human health from soil ingestion with a limit of 12mg/kg, and the protection of environmental health, with a soil contact limit of 19mg/kg (CCME, 1997). The 1991 CCME interim guideline for arsenic was 50mg/kg.

Referring to fact sheets and guidance from the CCME and ENR, a discussion regarding application of guidelines for arsenic with respect to the site-specific conditions follows:

- If a spill or release led to the exceedances for arsenic, contamination from other chemicals, including hydrocarbons, salinity, and metals would be expected. As no residual hydrocarbon, salinity, or metals parameters were indicated in the analytical results for the samples, it was unlikely that the elevated Arsenic concentrations were the result of a spill or release.
- ENR Guidelines for soil in and around the Yellowknife area noted natural occurrences of Arsenic up to 300mg/kg, with the average in and around the Yellowknife area of 150mg/kg (ENR, 2003). The ENR determined a remediation objective of 160mg/kg for Residential land use in Yellowknife area soils, based on accessibility (soil ingestion and soil contact) to the yard for 2 hours per day, 5 months of the year (ENR, 2003). The Site is in a remote setting where access is limited to helicopter transport or winter roads, and toddlers or the public are not expected on a regular basis at the Site. For the Site, access by the public is currently less than 5 months of the year for the CCME maximum concentration of 12.0mg/kg in soil.

In addition, arsenic concentrations in the background/control boreholes show increasing arsenic with increasing depth. Based on the above rationale, the Arsenic exceedances detected at the DWDA did not pose a risk to human and ecological receptors at the Site.

7.2 Conclusions

Based on a review of results from the 2017 Stage 2 PSI at the Site, SynergyAspen determined that the F2 PHC, ethylbenzene, arsenic, EC and SAR exceedances at the Site were reasonably expected to pose no risk to receptors at the Site. Rationale for the determination was based on the applicable guideline limits; naturally occurring calcium and magnesium salts in the soil profile; and the depth of the samples.

8. CLOSURE

Based on the evaluation of the available historic data, no further environmental work is required at the Site prior to submission of the report to the ENR.

Thank you for the opportunity to conduct the work presented herein. If you have any questions or comments, please do not hesitate to contact the undersigned at 250-785-1030.

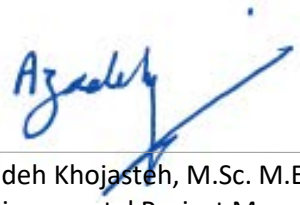
Respectfully Submitted,

SYNERGYASPEN ENVIRONMENTAL INC.

Written By:

Jason Richl, B.Sc.
Environmental Client Manager

Reviewed by:



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9. REFERENCES

BC MECCS. 2019. *Contaminated Sites Regulation. BC Reg 375-96*. Environmental Management Act. Amended January 24, 2019. Victoria, BC. March 19, 2019. 266 pp.

BC MECCS. 2017. *Protocol 2 for Contaminated Sites: Site-Specific Numerical Soil Standards.* Ver 2.1. Environmental Management Act. Victoria, BC. November 1, 2017. 18pp.

Canadian Council of Ministers of the Environment (CCME). 2018. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health: Zinc. In: Canadian Environmental Quality Guidelines. 8pp. Online: http://ceqg-rcqe.ccme.ca/download/en/359/ Accessed February 15, 2021.

Minister of the Environment and Natural Resources (ENR). 2003 Environmental Guidelines for Contaminated Site Remediation. Government of the Northwest Territories. November, 2003. 39pp.

North Shore Environmental Consultants Limited (North Shore). 2017a. Paramount Resources Ltd. Para et al Fort Liard N-01 60˚10' 123˚ 15'. Phase 1 Environmental Site Assessment – March 2017. March [], 2017. 55pp.

North Shore. 2017b. Paramount Resources Ltd. Para et al Fort Liard N-01 60˚10' 123˚ 15'. Phase 2 Environmental Site Assessment – May 2017. May 11, 2017. 107pp.

North Shore. 2017c. Paramount Resources Limited. 200/B-21-K/94-O-14 Stage II Preliminary Site Investigation – November 2017. November 28, 2017. 237pp.

North Shore. 2017d. Paramount Resources Limited. 200/B-43-K/94-O-14 Stage II Preliminary Site Investigation – May 2017. May 24, 2017. 114pp.

North Shore. 2017e. Paramount Resources Limited. 200/B-83-K/94-O-14 Stage II Preliminary Site Investigation – May 2017. May 30, 2017. 115pp.

North Shore. 2017f. Paramount Resources Limited. 200/A-69-J/94-O-14 Stage II Preliminary Site Investigation – March 2017. March 31, 2017. 93pp.

Paramount Resources Limited., 2011. 2011 Groundwater and Soil Monitoring Report N-01 Para et al Fort Liard N-01 – October 2011. October 28 30, 2011. 67pp.

Ready Environmental Inc., 2007. Assessment of the Flare Stack Area at The Paramount Liard South N-01 Facility – February 2007. 30pp.

10. USER RELIANCE AND GENERAL LIMITATIONS

10.1 User Reliance

SynergyAspen Environmental Inc. (SynergyAspen) prepared this report for the sole use of Paramount Resources Limited (the Client). The Client was privy to the establishment of this project's scope and is aware of its terms and conditions.

Should the Client submit this report to a regulatory authority, the regulatory authority may rely on the results within the context of the document's General Limitations for the purpose of determining whether the Client is meeting (has met) its requirements concerning applicable environmental regulations.

Third party reliance is subject to the scope of work agreed upon by SynergyAspen and the Client and is only suitable within the limitations of the project/document. The activities detailed herein were performed for the Client and this document may not be appropriate for the purposes of a relying party. Application of this document for aims beyond those practically intended by the Client and SynergyAspen is at the exclusive risk of the user. SynergyAspen does not accept legal responsibility for any damages toward any third party as a result of the application, use of, or any conclusion drawn based on this report.

As far as the nature of these investigative activities involves professional opinion, SynergyAspen offers no assurance that the results contained herein support a particular course of action. The investigative activities may have included the application of judgment to scientific principles; hence certain results of this work may be based on subjective interpretation. Professional opinions expressed herein are derived from the specifics currently available within the confines of the existing information, scope of work, budget, and schedule.

10.2 General Limitations

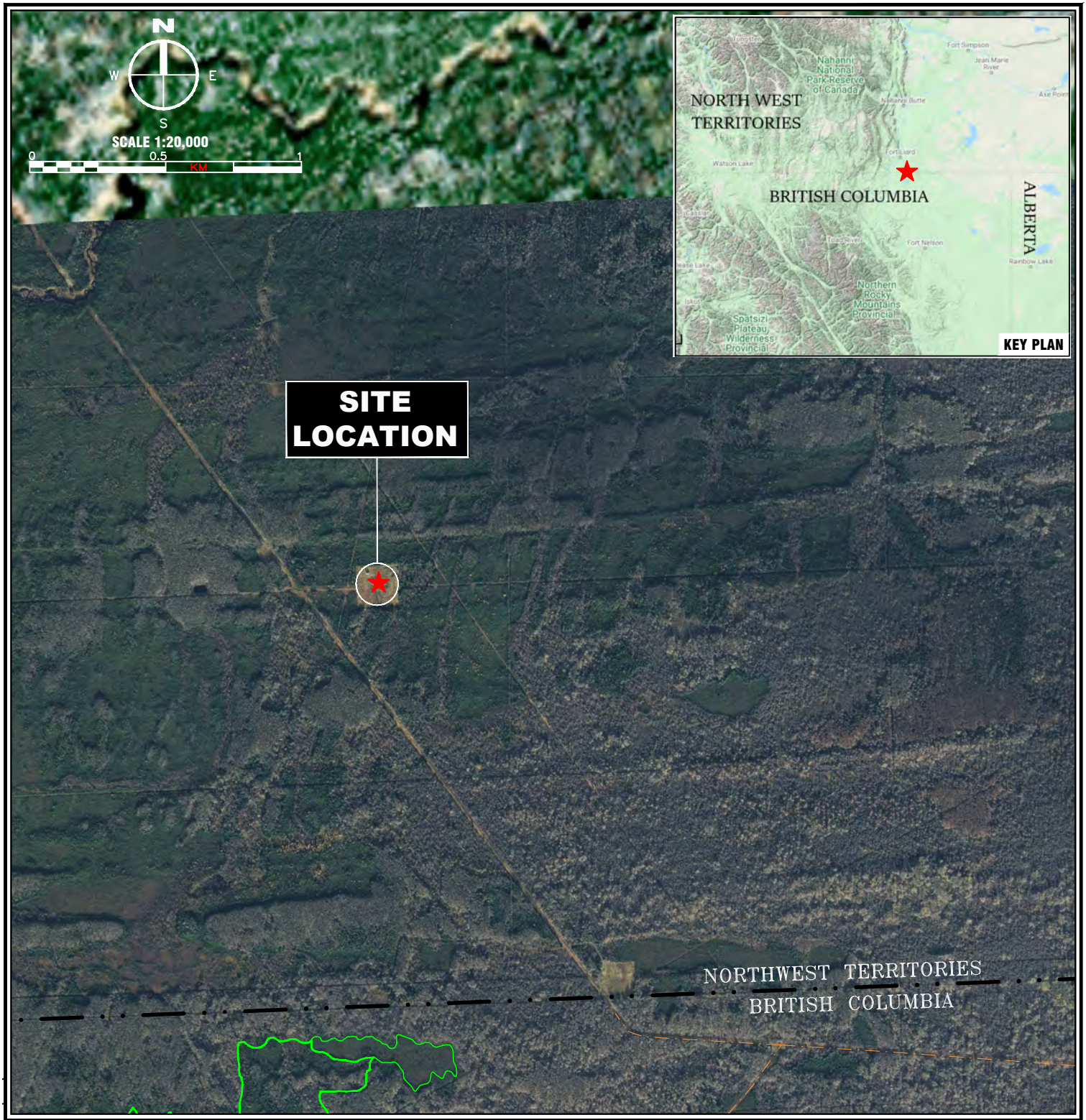
The results and conclusions herein were developed according to the degree of care and skill generally exercised by contemporary environmental professionals within similar conditions and localities. The findings herein are somewhat reliant upon information provided by others. If any of the information is erroneous, amendments to the results, conclusions, and recommendations may be required.

The results, conclusions and recommendations SynergyAspen presents herein represent SynergyAspen's best professional judgement according to the site conditions and on available information during preparation of this report. They were determined explicitly for this site and are somewhat reliant upon visual observation of the site, subsurface investigation at specific locations and depths, and select analysis of specific materials (as detailed herein).

While this assessment has attempted to identify all areas of potential environmental concern at the Site, it is possible that other areas of potential environmental concern may have escaped detection due to imprecise government records, undocumented historical environmental accidents, or other undocumented activities that resulted in contamination.

DRAWINGS

- PAR6210-001 – Site Location Plan
- PAR6210-002 – Site Plan and Areas of Potential Environmental Concern
- PAR6210-003 –Areas of Potential Environmental Concern
- Wellsite Survey



CHK	BY	REVISION DESCRIPTION	DATE	REV.
PS	TW	ISSUED TO CLIENT	–	–
–	–	–	–	–

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
–	–	–	–
–	–	–	–

LEGEND

- DRAINAGE LINE
- ROADS
- WETLAND/MUSKEG
- OIL AND GAS WELLS
- LIARD N–01 60–10–123–15

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. DATA COMPILED BY SYNGIS: SYNERGYASPEN GEOGRAPHIC INFORMATION SYSTEM.
3. VALTUS IMAGERY SERVICES – SEPTEMBER–OCTOBER 2011.
4. ORIGINAL DRAWING PAPER SIZE 8.5x11 INCHES.

SynergyAspen ENVIRONMENTAL

TITLE:

SITE LOCATION PLAN
(60° 00' 52.33" N, 123° 15' 58.51" W)

CLIENT NAME: PARAMOUNT RESOURCES LTD.			
SITE LOCATION:	DATE: 2021–05–14		PAR6210
N–01 60–10–123–15 LIARD	SCALE: 1:20,000	DWG No:	001
	DWN: TW CHK'D: PS		



CHK	BY	REVISION DESCRIPTION	DATE	REV.
PS	TW	ISSUED TO CLIENT	–	0

JOB. NO.	REFERENCE DESCRIPTION	DATE	REV.
3111-08117WS	SURVEY PLAN OF WELLSITE	2000-07-13	–

LEGEND

- WELLBORE
- APPROXIMATE LEASE BOUNDARY
- ROAD CENTRELINE (SOURCE: IHS)

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM MEASUREMENTS TAKEN IN THE FIELD. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.

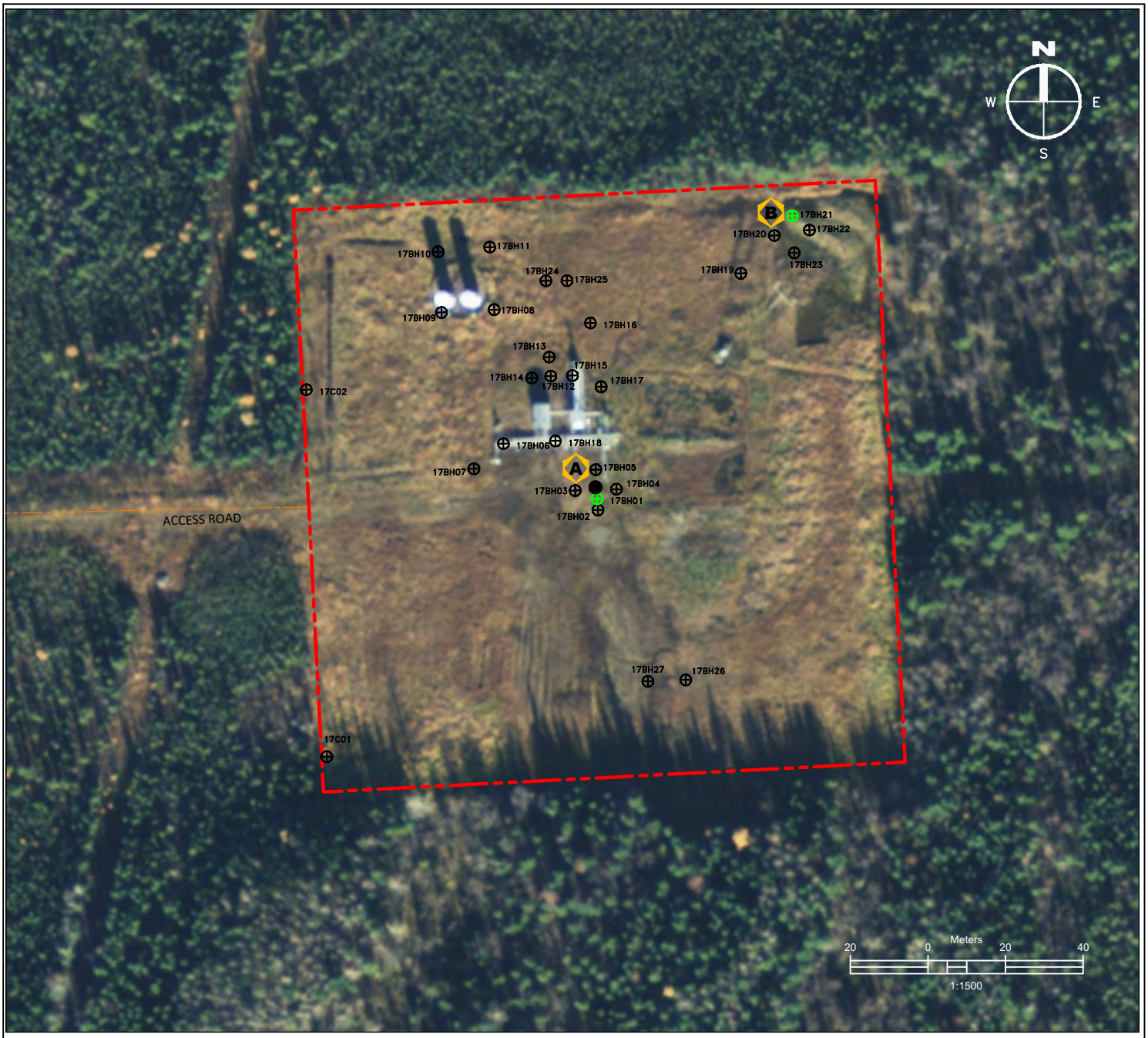
SynergyAspen ENVIRONMENTAL

TITLE:

SITE PLAN

CLIENT NAME: PARAMOUNT RESOURCES LTD.

SITE LOCATION:	DATE: 2021-05-14		PAR6210
N-01 60-10-123-15 LIARD	SCALE: 1:1,500	DWG No:	002
	DWN: TW CHK'D: PS		



AEC Label	AECs	Impacted Borehole(s)	COCs (depth)
A	Well Centre	17BH01	pH & EC (0.3-1.0 mbg) Fraction 2 PHC & SAR (3.2-3.4 mbg)
B	Flare Area	17BH21	Ethylbenzene (0.8-1.0 mbg)

CHK	BY	REVISION DESCRIPTION	DATE	REV.
PS	TW	ISSUED TO CLIENT	–	0

JOB. NO.	REFERENCE DESCRIPTION	DATE	REV.
3111-08117WS	SURVEY PLAN OF WELLSITE	2000-07-13	–

LEGEND

- WELLBORE
- APPROXIMATE BOREHOLE LOCATION (NORTH SHORE)
- APPROXIMATE BOREHOLE LOCATION (NORTH SHORE – PASSED)
- APPROXIMATE LEASE BOUNDARY
- ROAD CENTRELINE (SOURCE: IHS)

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM MEASUREMENTS TAKEN IN THE FIELD. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.

SynergyAspen ENVIRONMENTAL

TITLE:

AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

CLIENT NAME: PARAMOUNT RESOURCES LTD.

SITE LOCATION: N-01 60-10-123-15 LIARD

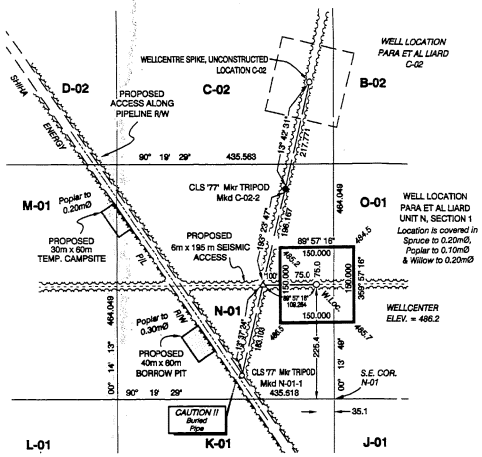
DATE: 2021-05-14

SCALE: 1:1,500

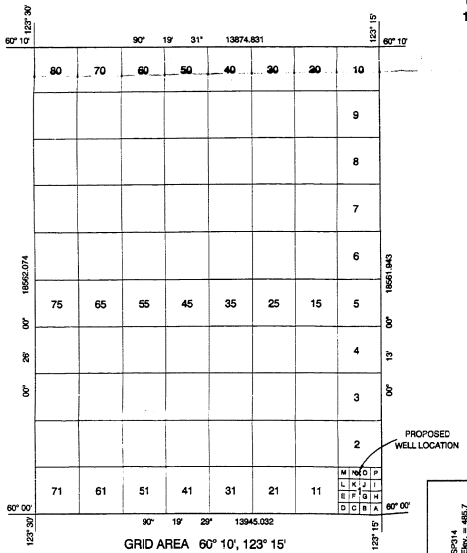
DWN: TW CHK'D: PS

PAR6210

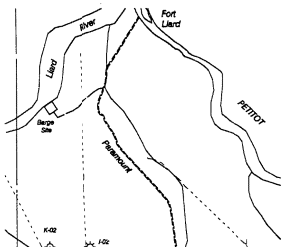
DWG No: 003

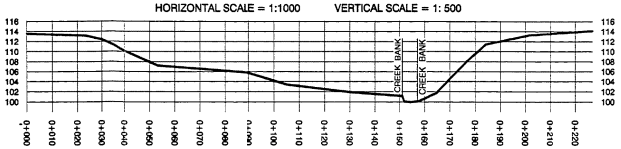


DETAIL
UNIT N, SECTION 01
SCALE 1:5,000

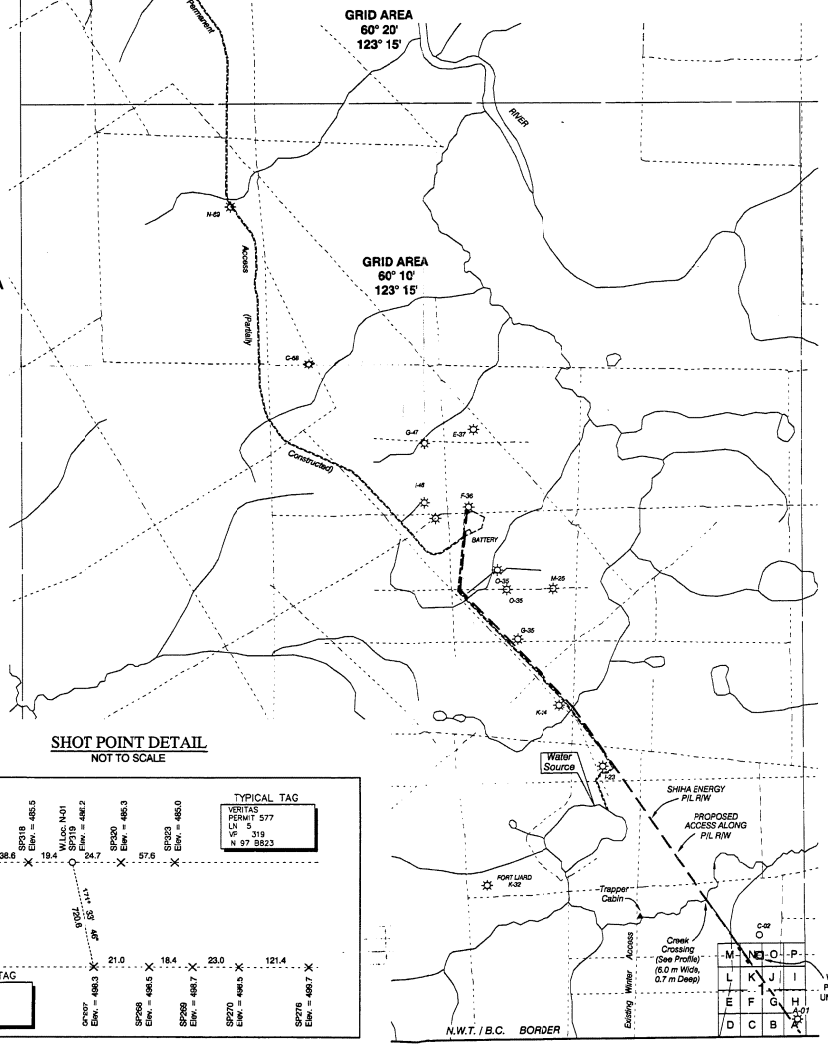


GRID AREA 60° 10', 123° 15'
SCALE 1:100,000





ELEVATIONS ARE BASED UPON ASSUMED DATUM



SHOT POINT DETAIL
NOT TO SCALE

AREAS REQUIRED:

WELLSITE:	150m x 150m =	2.25 ha.
TEMP. CAMPSITE:	30m x 60m =	0.18 ha.
BORROW PIT:	40m x 60m =	0.24 ha.
ACCESS:	6m x 195m =	0.12 ha.
TOTAL:		2.79 ha.

REV No	DESCRIPTION	DATE

McELHANNEY ASSOCIATES
PROFESSIONAL LAND SURVEYORS
10012 - 97th Ave.
Fort St. John, British Columbia
Phone:(250)787-0368, Fax:(250)787-0310

DATE 00/07/13 JOB No.: 3111-08117WS AW DSG

PLAN AND FIELD NOTES
OF SURVEY OF
PROPOSED EXPLORATORY WELL
PARA ET AL LIARD
IN UNIT N, SECTION 01
GRID AREA 60° 10', 123° 15'
NORTHWEST TERRITORIES
CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50,000
0m 500m 1000m 2000m 3000m 4000m 5000m

SURVEYED FOR
PARAMOUNT RESOURCES LTD.

BY : W.V. JOHNSON, CLS
JUNE, 2000

LEGEND

UTM coordinates are computed for Zone 10 Bearings were derived from the bearing 13° 42' 31" computed between Fd. CLS 77, Post C-02-2 and Wellcentre Spike for Wellsite C-02, and are referred to meridian 123° W.

Distances are expressed in metres and decimals thereof.
Distances shown in traverse are measured distances reduced to the horizontal at general ground level.
For the computation of coordinates measured distances have been reduced to the UTM plane by multiplying them by an average combined scale factor of 0.9996227.

Distances shown on grid area subdivisions are UTM plane.
Control monuments found ..... ●
Monuments placed ..... ○
Mkr. denotes metal marker post 2.0m long placed 0.30m away from Post.

Elevations were derived from Geodetic Survey of Canada Monument 'Fort Liard' Elev. = 218.299 m.

Survey was completed prior to drilling; therefore well as drilled may not necessarily agree with proposed location.
All coordinates shown are on 1927 North American Datum.
Coordinates were derived from Fd. CLS Post C-02-2 and Fd. Wellcentre spike from Wellsite Plan Para et al Liard Unit C, Sec. 02, Grid Area 60° 10', 123° 15'.

GEOGRAPHIC AND UTM COORDINATES, (1927 NAD)

Station	Latitude	Longitude(W)	Northings	Eastings
CONTROL MONUMENTS				
Fd. CLS C-02-2	60° 00' 58.493"	123° 18' 02.985"	6653044.322	485091.105
WELLCENTRE C-02	60° 01' 05.336"	123° 15' 59.410"	6653255.782	485142.589
GRID AREA				
N-01, NE	60° 01' 00.051"	123° 15' 56.250"	6653062.092	485190.968
N-01, NW	60° 01' 00.073"	123° 16' 24.374"	6653064.561	484755.412
N-01, SE	60° 00' 45.052"	123° 15' 56.252"	6652628.047	485189.103
N-01, SW	60° 00' 45.073"	123° 16' 24.375"	6652630.517	484753.493
TRAVERSE STATIONS				
N-01-1	60° 00' 46.587"	123° 16' 08.305"	6652675.717	485002.570
TH100'	60° 00' 52.322"	123° 16' 05.569"	6652853.584	485045.677
PROPOSED WELL				
N-01	60° 00' 52.339"	123° 15' 58.617"	6652853.670	485154.589

Certified Correct and completed on the 14th day of June, 2000.
Canada Lands Surveyor
Dated June 14, 2000

W.V. Johnson
Comm. No. 1393

PARAMOUNT RESOURCES LTD

WITNESS
July 18, 2000
DATE

APPENDIX I

Borehole Logs, Tables, and Drawings from North Shore Preliminary Stage 2 Report
(See Stage 2 Report)

APPENDIX II

Historical Borehole Logs

- 200/B-43-K/94-O-14 Stage II Preliminary Site Investigation (North Shore. 2017b)
- 200/B-83-K/94-O-14 Stage II Preliminary Site Investigation (North Shore. 2017c)
- 200/A-69-J/94-O-14 Stage II Preliminary Site Investigation (North Shore. 2017d)

Borehole Log: 17C01

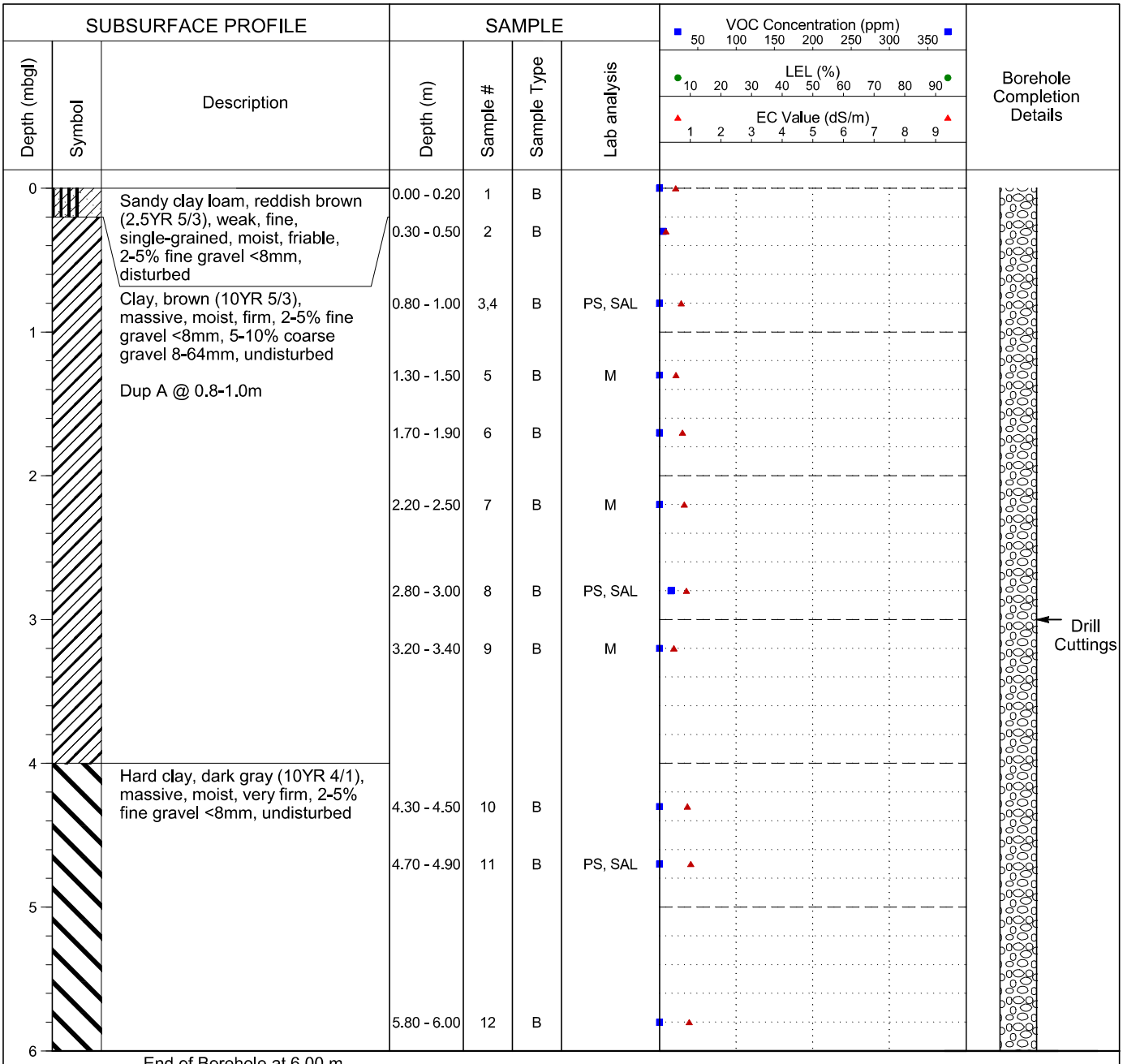
Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-021-K/094-O-14

Area of Concern: Background Control

NORTH SHORE Environmental Consultants



Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6643957 E: 485277

Drill Date: 2/15/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

NORTH SHORE
Environmental Consultants

Borehole Log: 17C02

Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-021-K/094-O-14

Area of Concern: Background Control

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0		Topsoil, Silty loam, black (10YR 2/1), weak, fine, granular, moist, friable, undisturbed, roots, silt inclusions	0.00 - 0.20	13	B			
			0.30 - 0.50	14	B	PS, SAL		
		Sandy clay, brown (10YR 4/3), massive, moist, firm, 5-10% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, sand inclusions	0.80 - 1.00	15	B			
1			1.30 - 1.50	16	B			
			1.70 - 1.90	17	B	PS, SAL		
2			2.20 - 2.50	18	B			Drill Cuttings
		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, 5-10% cobbles 64-256mm, undisturbed, sand inclusions	2.80 - 3.00	19	B	M		
3			3.20 - 3.40	20	B	PS, SAL		
4		Large rock at 4.0m	4.30 - 4.50	21	B	M		
		End of Borehole at 4.50 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6644100 E: 485324

Drill Date: 2/15/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

NORTH SHORE
Environmental Consultants

Borehole Log: 17C03

Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-021-K/094-O-14

Area of Concern: Background Control

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Subsoil, Silty loam, light brown (10YR 6/3), weak, fine, single-grained, dry, 2% fine gravel <8mm, silt inclusions	0.00 - 0.10	22	B+J	M		
0.5		Subsoil, Silty clay loam, brown (10YR 4/3), moderate, fine, massive, moist, friable, 2% fine gravel <8mm, iron and silt inclusions	0.50 - 0.60	23	B+J	M		
1.0			0.90 - 1.00	24	B+J	M		
1.5			1.50 - 2.00	25	B+J	M		Drill Cuttings
2.0								
2.5								
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: TCL Drilling

GPS Coordinates: UTM: 10 N: 6643964 E: 485244

Drill Date: 2/17/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

Borehole Log: 17C04

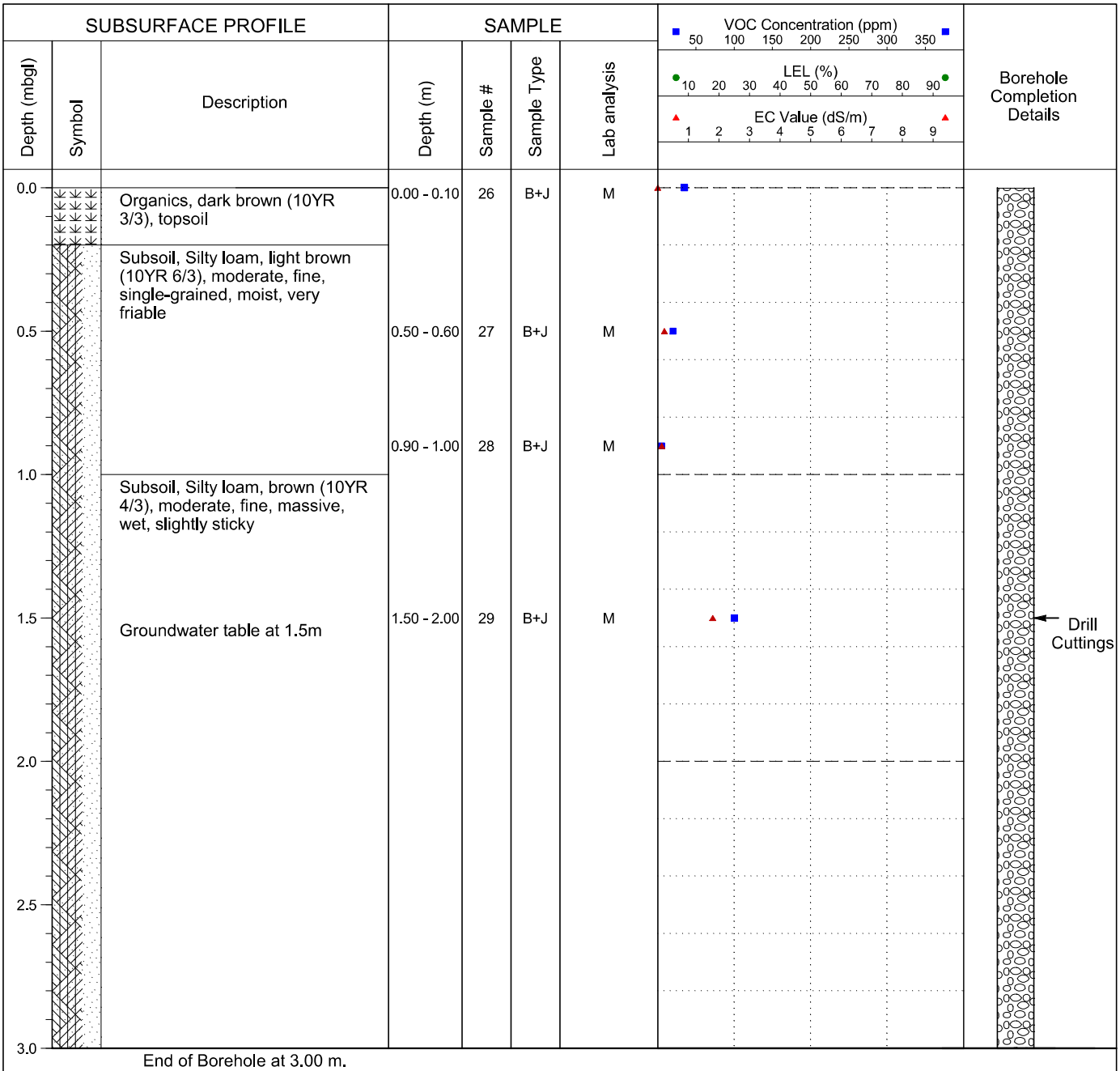
Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-021-K/094-O-14

Area of Concern: Background Control

NORTH SHORE Environmental Consultants



Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: TCL Drilling

GPS Coordinates: UTM: 10 N: 6644113 E: 485254

Drill Date: 2/17/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

Borehole Log: 17C05

Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-021-K/094-O-14

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Subsoil, Silty loam, brown (10YR 4/3), moderate, fine, massive, moist, friable, 2% fine gravel <8mm	0.00 - 0.10	30	B+J	M		
0.5			0.50 - 0.60	31	B+J	M		
1.0		Subsoil, Silty clay, brown (10YR 4/3), weak, fine, single-grained, moist, friable, 5% fine gravel <8mm, iron and sand inclusions	0.90 - 1.00	32	B+J	M		
1.5		Subsoil, Clay, brown (10YR 4/3), moderate, fine, massive, moist, very friable, 5% fine gravel <8mm, iron and silt inclusions	1.50 - 2.00	33	B+J	M		Drill Cuttings
2.0								
2.5								
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: TCL Drilling

GPS Coordinates: UTM: 10 N: 6644017 E: 485368

Drill Date: 2/17/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

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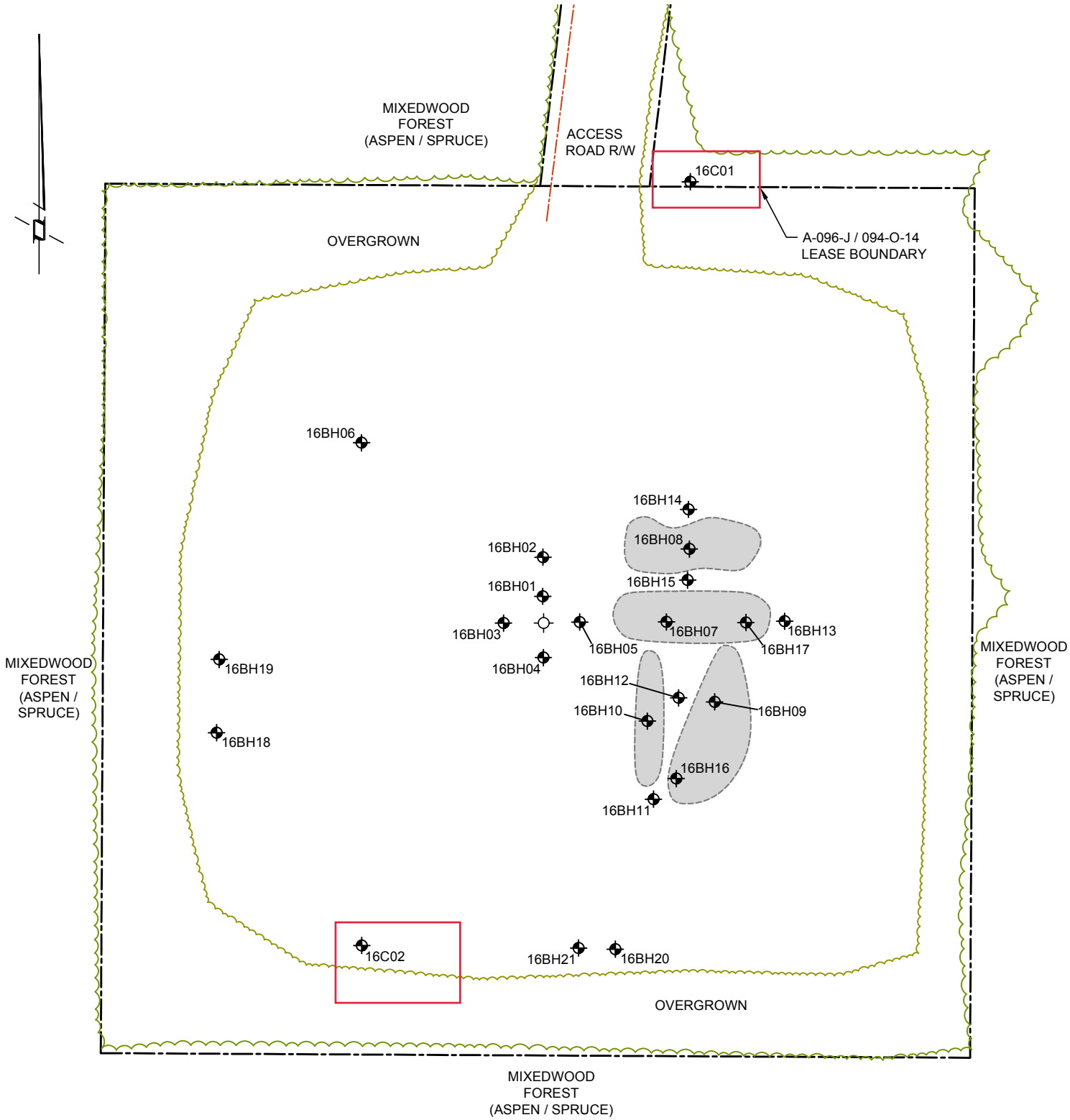


NOTES:

LOCATIONS ARE APPROXIMATE.

0 5 10 20 30m

Scale 1 : 750

LEGEND

- A-096-J / 094-O-14 WELL CENTRE
- SAMPLE LOCATION
- SUBSIDED AREA
- UNDERGROUND PIPELINE

SITE DIAGRAM

NORTH SHORE Environmental Consultants

Date: 28-FEB-17	Drawn by: DT	PARAMOUNT RESOURCES LTD. A-096-J / 094-O-14	Figure: 3
File name: A-096-J_094-O-14_16PH2-A.dwg	Requested by: DM		

Borehole Log: 17C01

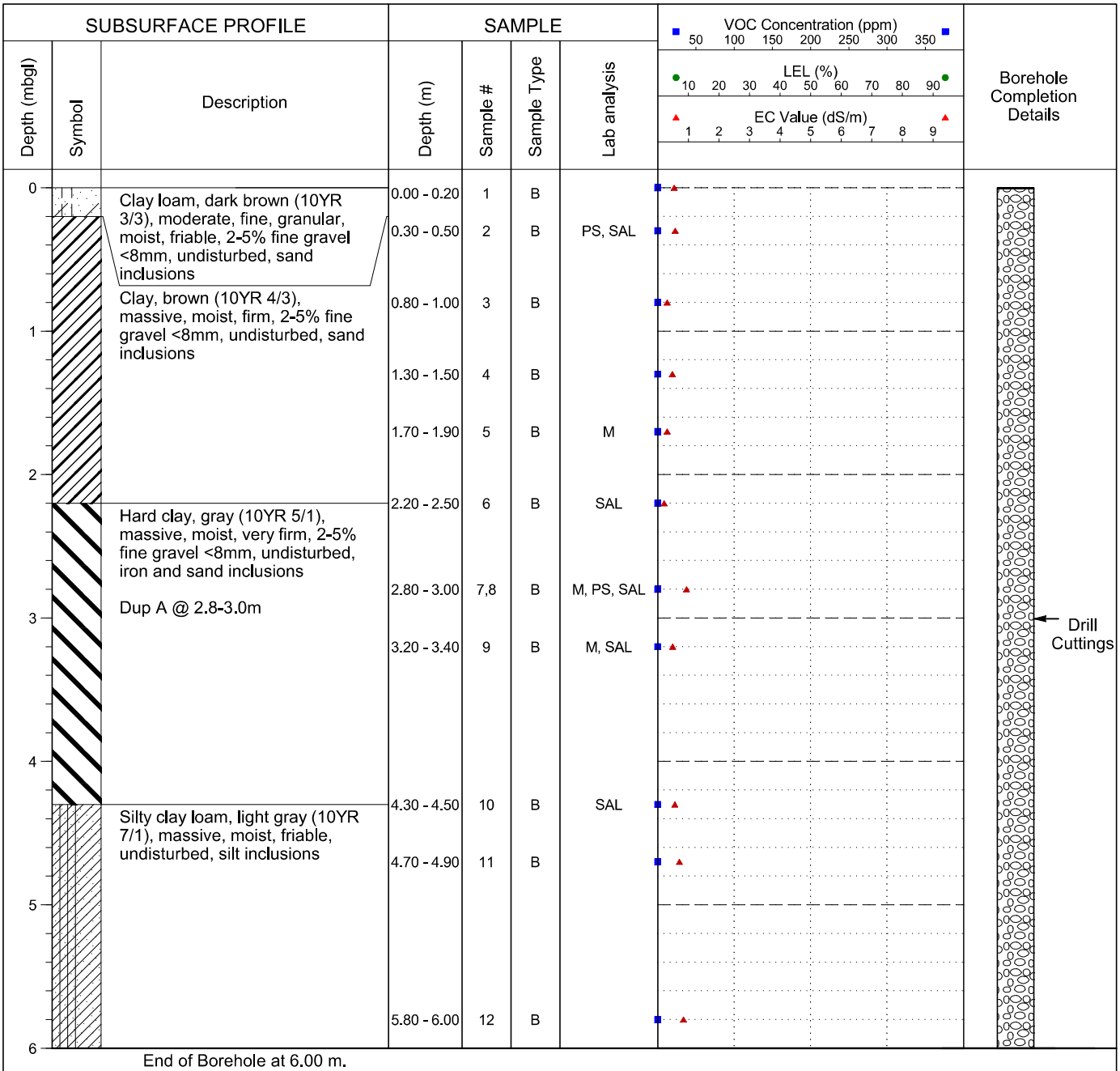
Client: Paramount Resources Ltd.

Project: Stage II Preliminary Site Investigation

Legal Location: A-096-J/094-O-14

Area of Concern: Background Control

NORTH SHORE Environmental Consultants



Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6650652 E: 489155

Drill Date: 2/11/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

Borehole Log: 17C02

Client: Paramount Resources Ltd.

Project: Stage II Preliminary Site Investigation

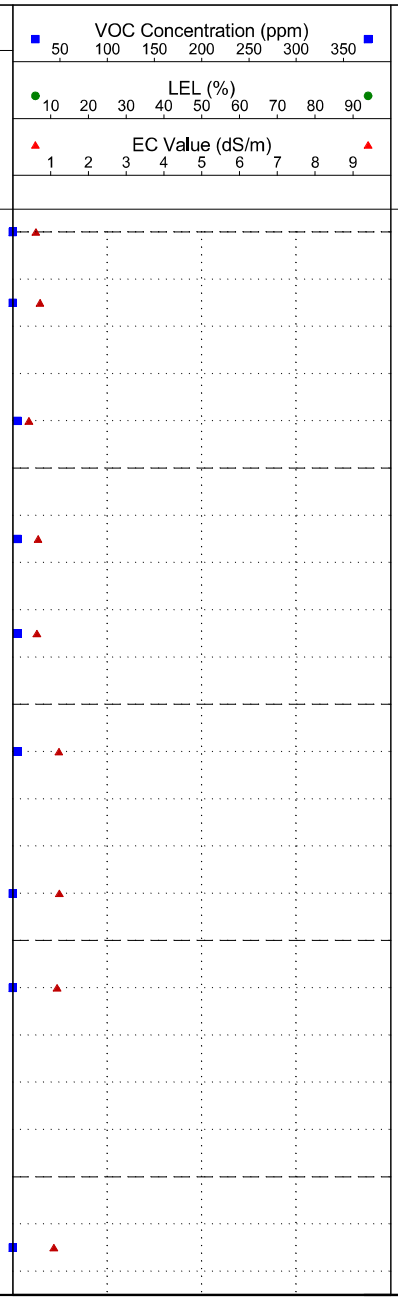
Legal Location: A-096-J/094-O-14

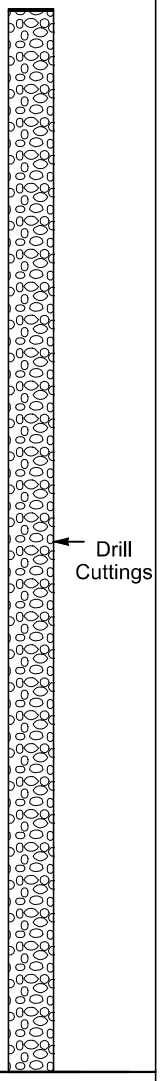
Area of Concern: Background Control

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0		Clay loam, reddish brown (2.5YR 4/3), moderate, fine, granular, moist, friable, 2-5% fine gravel <8mm, disturbed, sand inclusions	0.00 - 0.20	13	B	
			0.30 - 0.50	14	B	
		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, iron and sand inclusions	0.80 - 1.00	15	B	PS, SAL
1			1.30 - 1.50	16	B	
			1.70 - 1.90	17	B	
2		Hard clay, gray (10YR 5/1), massive, moist, very firm, 2-5% fine gravel <8mm, undisturbed, iron and sand inclusions	2.20 - 2.50	18	B	PS, SAL
			2.80 - 3.00	19	B	SAL
3			3.20 - 3.40	20	B	SAL
4			4.30 - 4.50	21	B	PS, SAL

End of Borehole at 4.50 m.





Borehole Completion Details

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6650550 E: 489104

Drill Date: 2/11/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

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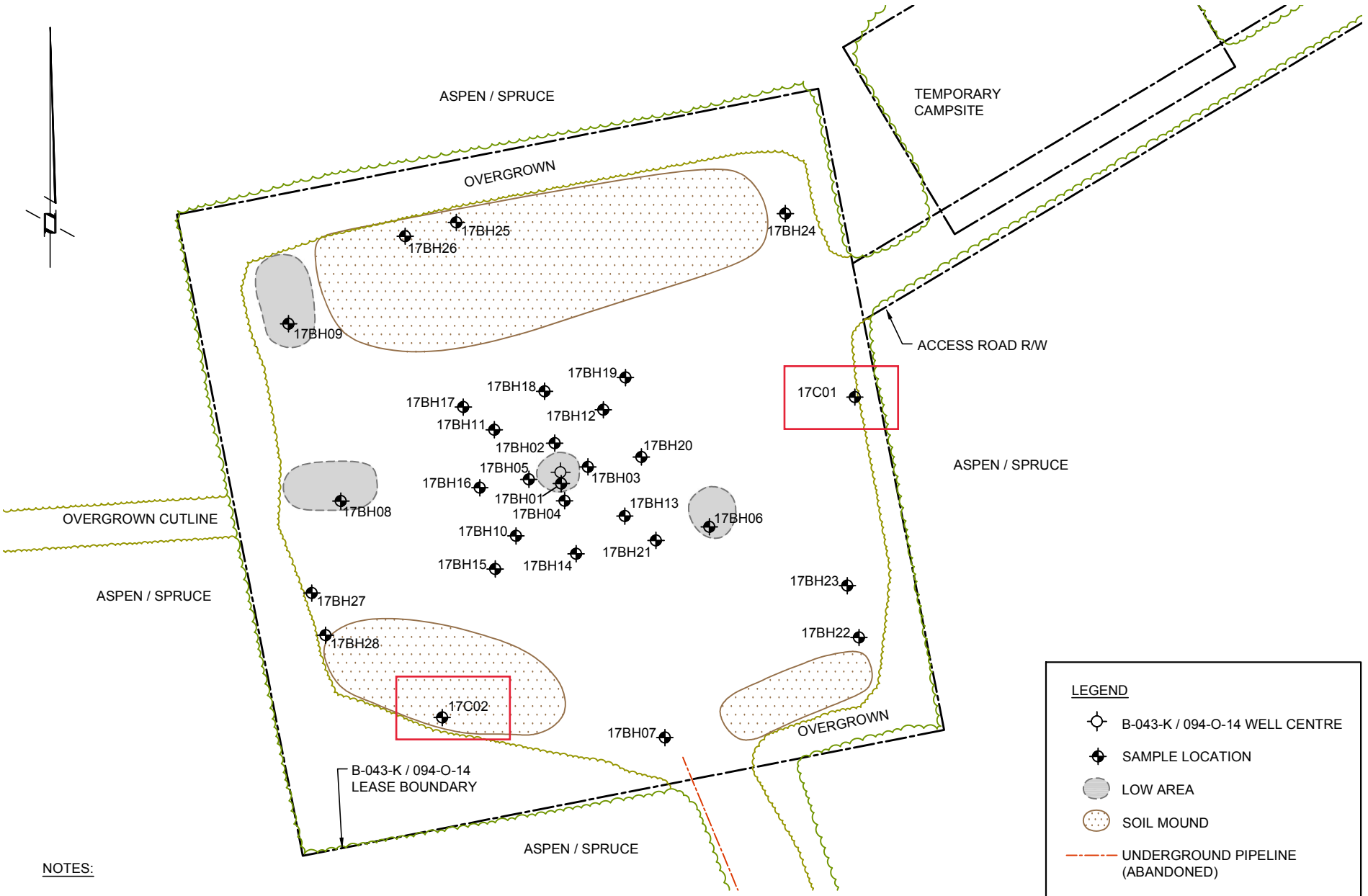

NOTES:

LOCATIONS ARE APPROXIMATE.

0 10 20 40m

Scale 1 : 1000

SITE DIAGRAM

NORTH SHORE Environmental Consultants

Date: 01-MAR-17	Drawn by: DT	PARAMOUNT RESOURCES LTD. B-043-K / 094-O-14	Figure: 3
File name: B-043-K_094-O-14_16PH2-A.dwg	Requested by: DM		

NORTH SHORE
Environmental Consultants

Borehole Log: 17C01

Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-043-K/094-O-14

Area of Concern: Background Control

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Loam, yellowish brown (10YR 5/6), weak, fine, granular, moist, friable, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed	0.00 - 0.20	1	B			
			0.30 - 0.50	2	B			
		Clay loam, brown (10YR 4/3), massive, moist, firm, undisturbed, sand inclusions	0.80 - 1.00	3	B	M, PS, SAL		
1		Clay loam, grayish brown (10YR 5/2), massive, moist, firm, undisturbed, sand inclusions	1.30 - 1.50	4	B			
			1.70 - 1.90	5	B	M		
2		Dup A @ 2.2-2.5m	2.20 - 2.50	6,7	B	PS, SAL		
		Silty clay loam, gray (10YR 5/1), massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, iron and sand inclusions	2.80 - 3.00	8	B			
3			3.20 - 3.40	9	B	M		Drill Cuttings
4			4.30 - 4.50	10	B			
		Silty loam, light gray (10YR 7/1), massive, dry, hard, undisturbed, silt inclusions	4.70 - 4.90	11	B	PS, SAL		
5								
			5.80 - 6.00	12	B			
6		End of Borehole at 6.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6645903 E: 483912

Drill Date: 2/13/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

Borehole Log: 17C02

Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-043-K/094-O-14

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Clay loam, yellowish brown (10YR 5/6), weak, fine, granular, moist, friable, undisturbed	0.00 - 0.20	13	B			
			0.30 - 0.50	14	B	M, PS, SAL		
		*1.5-0 horizon: clay loam, brown (10YR 5/3), disturbed, mounded topsoil, no samples obtained, EC 0.47 dS/m						
		Clay loam, grayish brown (10YR 5/2), massive, moist, friable, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, sand inclusions	0.80 - 1.00	15	B			
1			1.30 - 1.50	16	B			
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	1.70 - 1.90	17	B	PS, SAL		
2			2.20 - 2.50	18	B			Drill Cuttings
			2.80 - 3.00	19	B			
3		Silty clay loam, gray (10YR 5/1), massive, moist, very friable, 2-5% fine gravel <8mm, undisturbed, silt inclusions	3.20 - 3.40	20	B	PS, SAL		
4			4.30 - 4.50	21	B	M		

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6645829 E: 483833

Drill Date: 2/13/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

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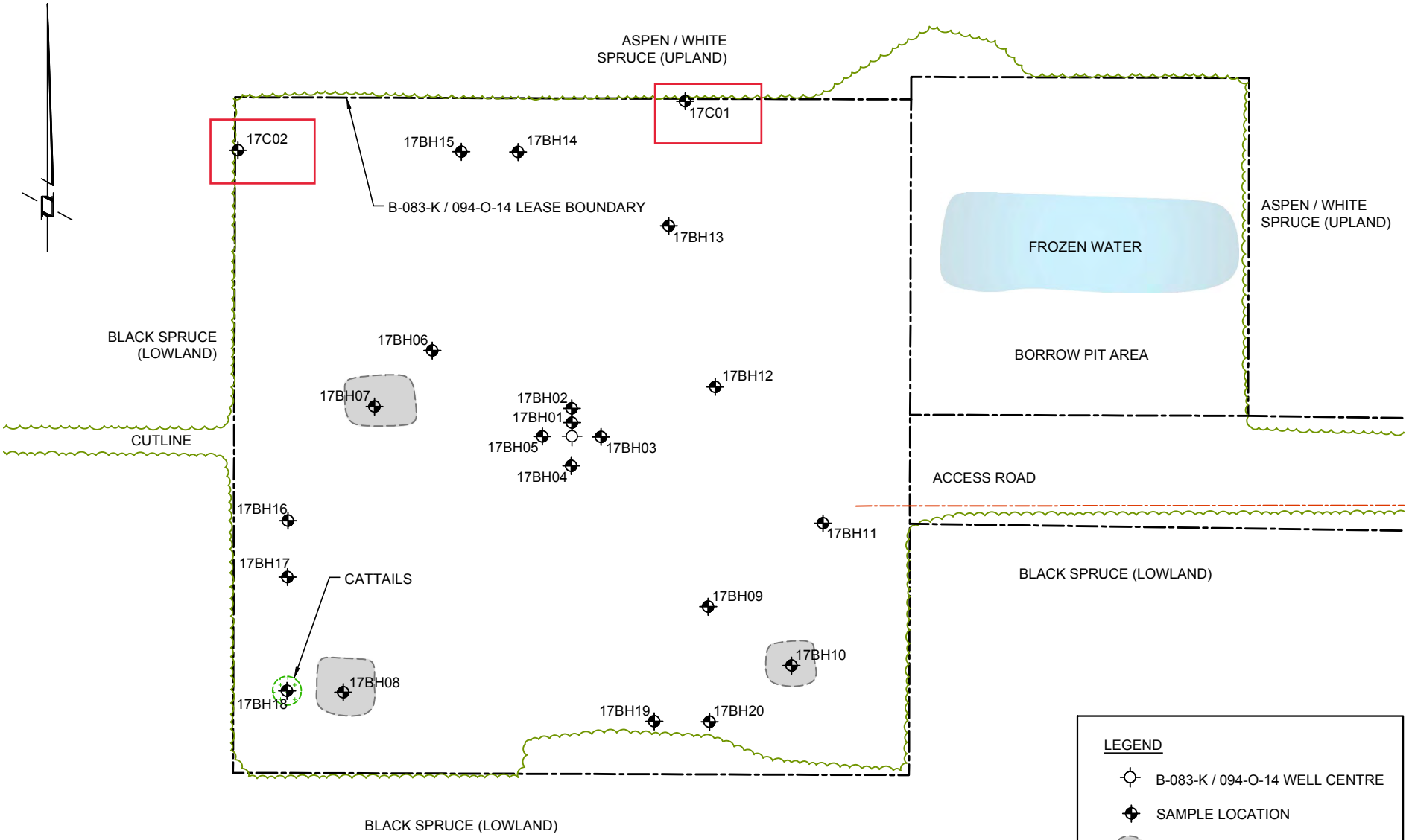

LEGEND

- B-083-K / 094-O-14 WELL CENTRE
- SAMPLE LOCATION
- LOW AREA
- UNDERGROUND PIPELINE

NOTES:

LOCATIONS ARE APPROXIMATE.

0 10 20 40m

Scale 1 : 1000

SITE DIAGRAM

NORTH SHORE Environmental Consultants

Date: 23-MAR-17	Drawn by: DT/LH	PARAMOUNT RESOURCES LTD. B-083-K / 094-O-14	Figure: 3
File name: B-083-K_094-O-14_16PH2-C.dwg	Requested by: DM		

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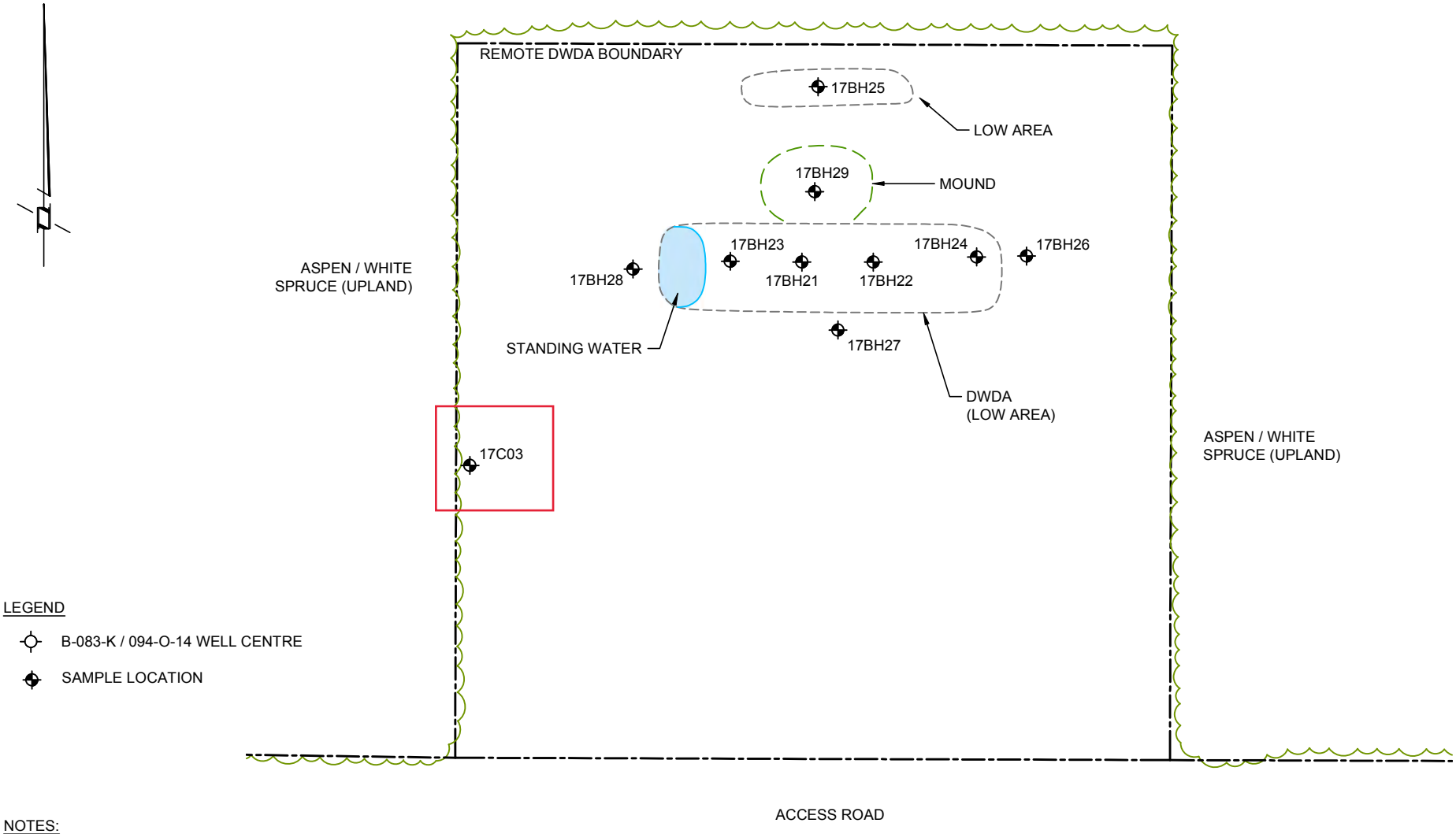


LEGEND

- B-083-K / 094-O-14 WELL CENTRE
- SAMPLE LOCATION

NOTES:

LOCATIONS ARE APPROXIMATE.

0 5 10 20m

Scale 1 : 500

REMOTE DWDA DIAGRAM

NORTH SHORE Environmental Consultants

Date: 23-MAY-17	Drawn by: DT/LH	PARAMOUNT RESOURCES LTD. B-083-K / 094-O-14	Figure: 6
File name: B-083-K_094-O-14_16PH2-D.dwg	Requested by: DM		

Borehole Log: 17C01

Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-083-K/094-O-14

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0		Sandy clay loam, reddish brown (2.5YR 5/3), weak, fine, single-grained, moist, friable, 5-10% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, roots, sand inclusions	0.00 - 0.20	1	B	
			0.30 - 0.50	2	B	
			0.80 - 1.00	3,4	B	M, PS, SAL
1		Clay, gray (10YR 6/1), massive, moist, firm, 2-5% fine gravel <8mm, undisturbed	1.30 - 1.50	5	B	
		Dup A @ 0.8-1.0m	1.70 - 1.90	6	B	M
2			2.20 - 2.50	7	B	
			2.80 - 3.00	8	B	M, PS, SAL
3		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, undisturbed, silt inclusions	3.20 - 3.40	9	B	
4			4.30 - 4.50	10	B	
			4.70 - 4.90	11	B	PS, SAL
5						
			5.80 - 6.00	12	B	
6		End of Borehole at 6.00 m.				

VOC Concentration (ppm): 50 100 150 200 250 300 350

LEL (%): 10 20 30 40 50 60 70 80 90

EC Value (dS/m): 1 2 3 4 5 6 7 8 9

Borehole Completion Details: Drill Cuttings

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6649705 E: 483910

Drill Date: 2/12/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

Borehole Log: 17C02

Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-083-K/094-O-14

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0		Organics, black (10YR 2/1), undisturbed	0.00 - 0.20	13	B			
		Clay, brown (10YR 5/3), massive, moist, firm, 2-5% fine gravel <8mm, 1-2% coarse gravel 8-64mm, undisturbed, silt inclusions	0.30 - 0.50	14	B	PS, SAL		
			0.80 - 1.00	15	B			
1			1.30 - 1.50	16	B	M		
			1.70 - 1.90	17	B	M, PS, SAL		
2			2.20 - 2.50	18	B			Drill Cuttings
		Sand (medium), reddish brown (2.5YR 5/3), single-grained, wet, non-sticky, 15-20% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, saturated soils	2.80 - 3.00	19	B			
3		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, 5-10% coarse gravel 8-64mm, undisturbed, silt inclusions	3.20 - 3.40	20	B	PS, SAL		
4			4.30 - 4.50	21	B			

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6649698 E: 483828

Drill Date: 2/12/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

Borehole Log: 17C03

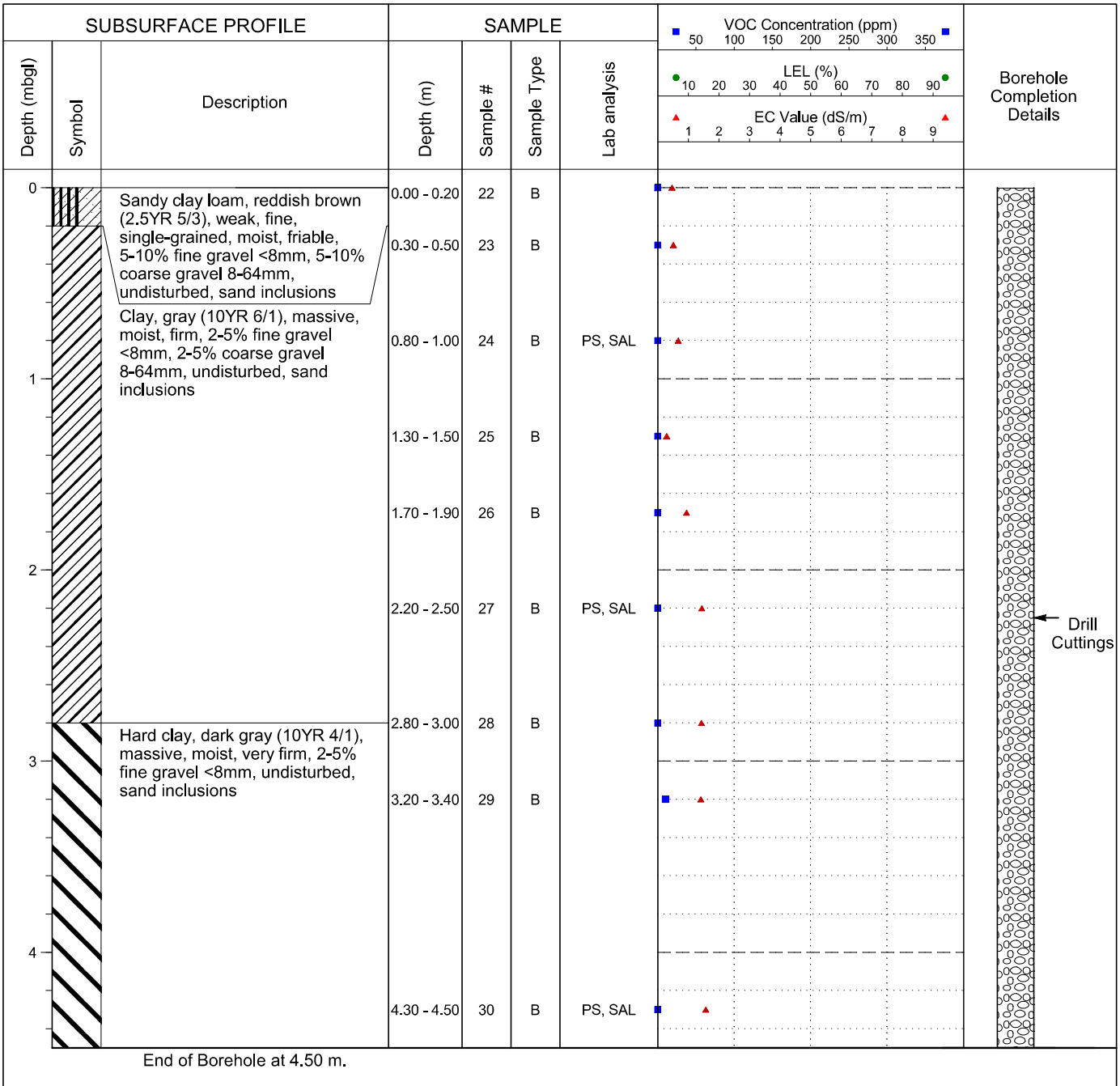
Client: Paramount Resources Ltd.

Project: Stage 2 Preliminary Site Investigation

Legal Location: B-083-K/094-O-14

Area of Concern: Background Control

NORTH SHORE Environmental Consultants



Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6649665 E: 484163

Drill Date: 2/13/2017 (mm/dd/yy)

From Benchmark: N/A

Drill Method: 15cm Solid Stem

Benchmark: N/A

APPENDIX III

Water Well and Water Body Search Results

ATLAS
Government of Northwest Territories

Paramount N-01
Water body Search



April 5, 2021

Legend

- Block Land Transfer Boundaries
- Development Areas
- Surveyed Parcels
- Line Approximately 31m from O.H.W.M.
- Municipal Boundaries
- Condominium Units
- Building Footprints

Scale 1: 10,000

250 metres

UTM Zone: 10

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A-01

NORTH SHORE
Environmental Consultants

Paramount Resources Ltd.
Para et al Fort Liard A-01 °10' 123°15'
Phase 1 Environmental Site Assessment
March 2017



Paramount Resources Ltd.
4700 Bankers Hall West
888 3rd Street SW
Calgary, Alberta T2P 5C5

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INTRODUCTION

Paramount Resources Ltd. (Paramount) retained North Shore Environmental Consultants Inc. (North Shore) to conduct a Phase 1 Environmental Site Assessment (ESA) for the Paramount et al Liard A-01 drilled and abandoned well located in the Northwest Territories (NWT) at Unit A, Section 01 Grid Area 60° 10', 123° 15' (Site).

The purpose of the Phase 1 ESA was to assess and qualify potential environmental concerns associated with the Site through a historic records review and site visit. The Phase 1 ESA was conducted in general accordance with the Canadian Standards Association (CSA) *Standard Z678-01: Phase I Environmental Site Assessment* (CSA, 2001). The Alberta Energy Regulator (AER) *Assessing Drilling Waste Disposal Areas: Compliance Option for Reclamation Certification* (AER, 2014) guidelines were used to assess the drilling waste associated with the Site.

FINDINGS

The Paramount et al Liard A-01 well was drilled between February 9, 1999 and March 19, 1999 to a depth of 2,046 m. The rig was released on March 25, 1999. The well was never put on production. The site is accessible by helicopter and winter roads which enter the lease from the west.

Infrastructure identified in association with the site includes only the wellhead. According to the Paramount June 2009 As-built sketch and survey plan, a 40 m x 60 m temporary campsite was located west of the wellsite on the north side of the road. There were no log decks, borrow pits or remote sumps identified in association with the wellsite.

A review of aerial photograph imagery from 2011 and 2014 did not identify any areas of potential concern on the wellsite. The wellsite appears well vegetated in the 2014 image.

Drilling Waste Disposal

According to the September 20, 2000 Environmental Inspection Report, sumps on the wellsite had slumped. It is assumed that the drilling waste was disposed of on site by mix-bury-cover.

The surface hole was drilled using a gel-chem drilling mud system and the main hole was drilled with calcium chloride invert. There was no drilling waste disposal documentation available for review and as a result North Shore completed a Compliance Option 2 checklist and associated calculations as per the *Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification* document (AER, 2014). The drilling waste exceeds salt and post-disposal oil concentration calculation criteria and an invert drilling mud was used without documentation of proper disposal. Further assessment of the drilling waste disposal area is required.

Spills & Complaints

A review of the NWT Resource Wildlife and Economic Development's Hazardous Material Spill Database was conducted. There were no spills identified in association with the wellsite.

Previous Assessments/Reports

An Environmental Impact Assessment (EIA) was completed by Golder Associates in December 1998 prior to the construction of the wellsite. The EIA documented pre-construction site conditions including vegetation, indication of wildlife and stream crossings on the proposed access road.

Interviews

There were no Paramount operations personnel with historic knowledge of drilling or construction activities associated with the wellsite.

Site Visit

A site visit was conducted at the wellsite on February 10, 2017. The topography of the area including the wellsite is gently rolling with drainage towards the north/northeast. Vegetation on and off site consisted of mosses, alder, willow, spruce and aspen. There was reduced woody vegetation cover on the southeast corner of the wellsite. The site was constructed using cut and fill construction methods; soil cut from the southern portion of the wellsite was used to fill the north-northeast portions of the lease. The wellhead was the only infrastructure identified on site at the time of the assessment. A minor amount of staining was noted on the snow near the wellhead.

CONCLUSIONS AND RECOMMENDATIONS

Based on the information gathered for this Phase 1 ESA from the historic records review and the site inspection, North Shore concludes that there is a potential for environmental impact in connection with the site. A Phase 2 ESA is recommended to assess the following areas of potential concern:

- On site drilling waste disposal area; and
- Well centre.

DISCLOSURE

North Shore Environmental Consultants Inc. (North Shore) has prepared this report taking into account government regulations available at the time of the assessment. North Shore has not made an independent verification of historical or analytical results provided by third parties and therefore makes no assurances regarding the accuracy of such information. It has assumed such information is correct. Where indicated or implied the conclusions are based on visual observation and/or analytical testing conducted at the time of the assessment. The conclusions do not apply to any areas of the site not investigated.

This report is intended for the exclusive use of the company, organization, or individual to whom it is addressed and may not be relied upon by any third party without the express written permission of North Shore. The investigation and reporting has been conducted with a reasonable level of attention and skill, in accordance with standards prevailing in the environmental consulting profession at the time of report date in the location in which the report was prepared.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. North Shore accepts no responsibility for damages, if any, suffered by any third party as a result of the use of this report or any decisions made or actions based on this report.

In the preparation of this report, selected Alberta Energy Regulator (AER) reference material has been gathered from AbaData™ (property of Abacus Datagraphics Ltd.), which is an online information source. The information provided by AbaData is received directly from the AER, electronically updated on a monthly basis and is assumed to be correct.

CLOSURE

North Shore appreciated the opportunity to work on this project. If we can provide clarification of any part of this report, please contact the undersigned at (780) 467-3354.

This report was prepared by:



Ann Tuson, R.T.(Ag.)
Environmental Consultant

Reviewed By:



Angela Bricker, B.Sc., P.Ag.
Environmental Consultant

REFERENCES

Alberta Energy Regulator (AER). 2015. *Directive 050: Drilling Waste Management*. Retrieved from: https://www.aer.ca/rules-and-regulations/directives/directive-050

Alberta Energy Regulator (AER). 2014. *Assessing Drilling Waste Disposal Areas: Compliance Options for Reclamation Certification*. Edmonton, Alberta. March 2014.

Alpine Environmental (Alpine). 2005. *Annual 2005 Environmental Site Assessment Report F-36 Wellsite, Northwest Territories Calgary, Alberta.* October 2005

Petroleum Services Association of Canada. 2016. *Drilling Fluid Product Listing for Potential Toxicity Information*. Retrieved from: www.psac.ca/mudlist/pdf/mud_list.pdf

Mackenzie Valley Land and Water Board. 2017. *Mackenzie Valley Land and Water Board – Public Registry – Online Review System*. Accessed January 2017. Retrieved from: https://mvlwb.com/

NWT Environment and Natural Resources. 2017. *Hazardous Materials Spills Database.* Accessed January 2017. Retrieved from: http://apps.enr.gov.nt.ca/app/spills/epd_spills/asp/login.asp

Government of NWT. 2017. *Office of the Regulator of Oil and Gas Operations – Public Registry.* Accessed January 2017. Retrieved from: http://www.orogo.gov.nt.ca/registry

Government of NWT. 2017. *Northwest Territories Geological Survey* Accessed January 2017. Retrieved from: http://www.nwtgeoscience.ca/

List of Appendices

Appendix A Survey Plan
Site Diagram

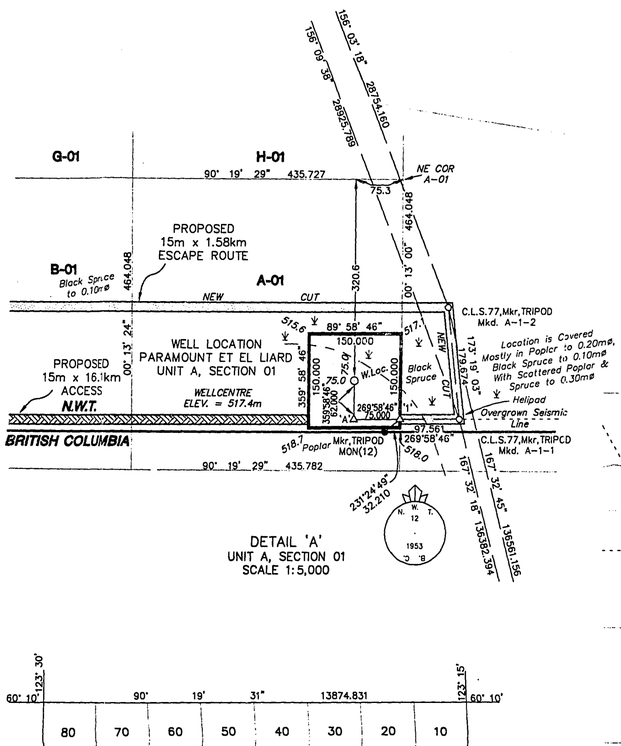
Appendix B Spill Report
Aerial Photographs

Appendix C Drilling Waste Documentation

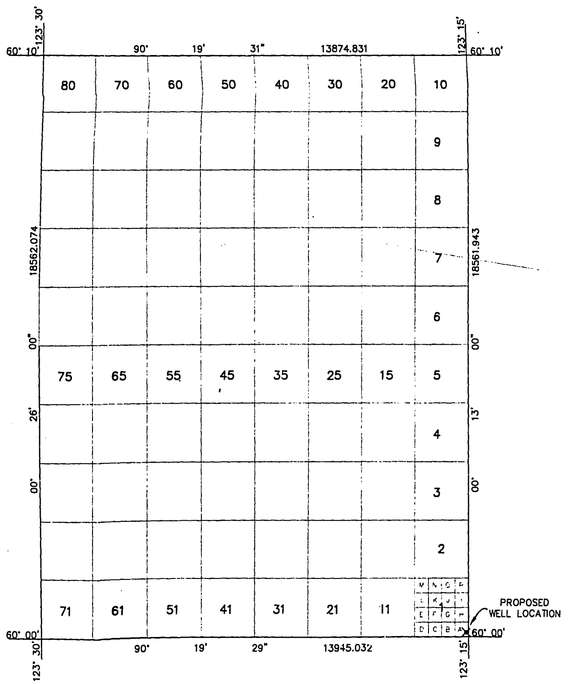
Appendix D Site Visit Photos

APPENDIX A

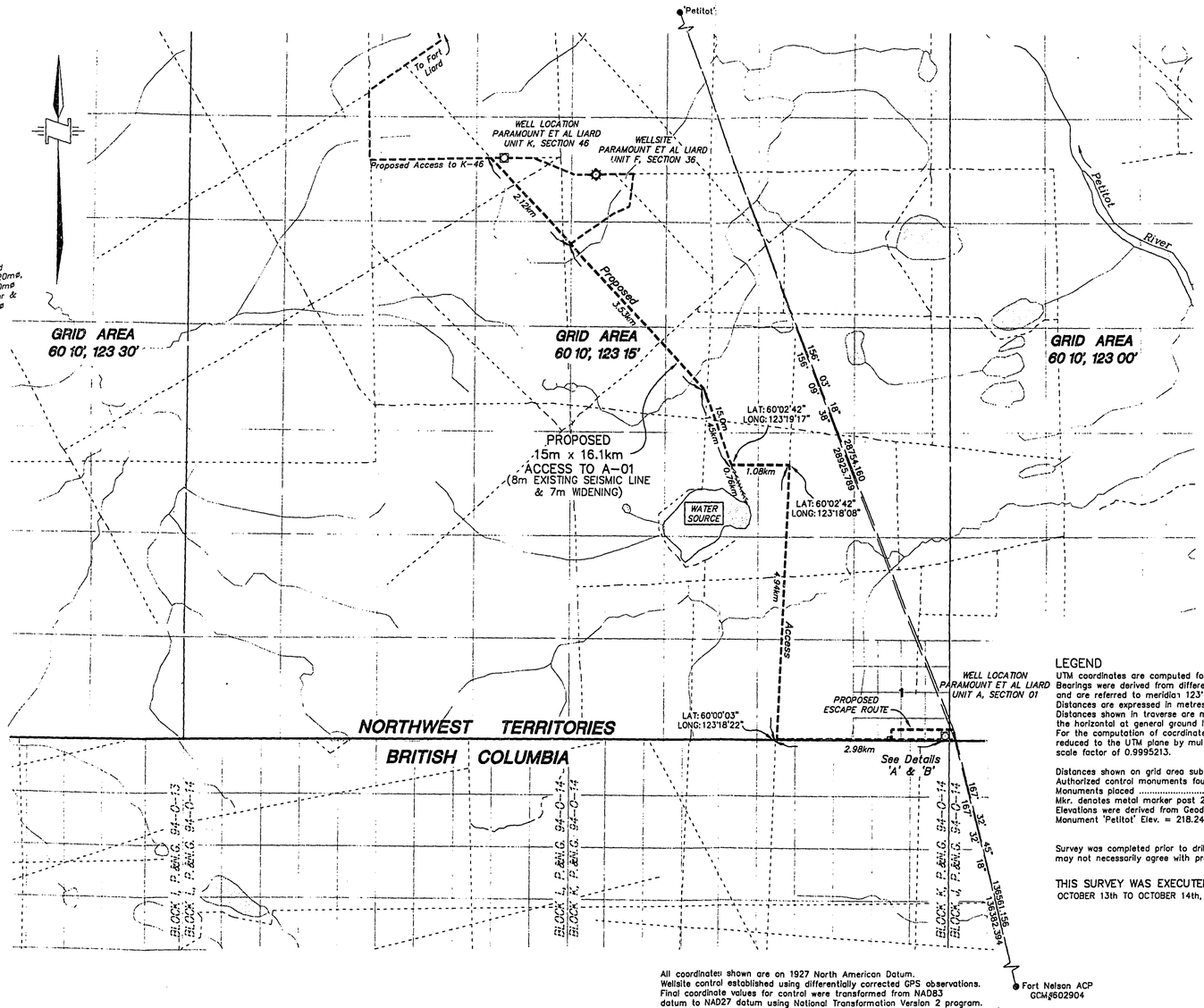
Survey Plan
Site Diagram



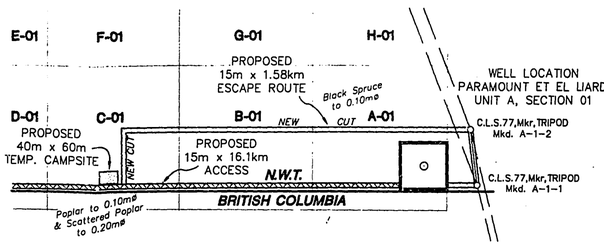
DETAIL 'A'
UNIT A, SECTION 01
SCALE 1:5,000



GRID AREA 60°10', 123°15'
SCALE 1:100,000



All coordinates shown are on 1927 North American Datum.
Wellsite control established using differentially corrected GPS observations. Final coordinate values for control were transformed from NAD83 datum to NAD27 datum using National Transformation Version 2 program. Geodetic Survey of Canada published coordinate values for monument 'Petitot' were held fixed. Adjusted values for Fort Nelson ACP GCM§602904 and comparison to Government of British Columbia published coordinates are shown below.



DETAIL 'B'
SCALE 1:10,000

AREAS REQUIRED:

WELLSITE:	150mx150m = 2.25 ha.
TEMP. CAMPSITE:	40mx60m = 0.24 ha.
ESCAPE ROUTE:	15mx1.58km = 2.37 ha.
ACCESS:	15mx16.1km = 24.2 ha.
TOTAL:	29.06 ha.

REV.No.	DESCRIPTION	DATE

McElhanney

McELHANNEY ASSOCIATES
PROFESSIONAL LAND SURVEYORS
10014 - 97th Ave., Suite 202
Fort St. John, British Columbia
Phone:(250)787-0356, Fax:(250)787-0310

DATE : 98/10/16 JOB No.: 3111-06783WS CW BRC

PLAN AND FIELD NOTES
OF SURVEY OF
PROPOSED EXPLORATORY WELL
PARAMOUNT ET AL FORT LIARD
IN UNIT A, SECTION 01
GRID AREA 60° 10' , 123° 15'
NORTHWEST TERRITORIES
CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50,000
1km 500m 0m 1km 2km 3km 4km

SURVEYED FOR
PARAMOUNT RESOURCES LTD.

BY : W.V. JOHNSON, CLS
OCTOBER, 1998.

LEGEND

UTM coordinates are computed for Zone 10, central meridian 123° W. Bearings were derived from differentially corrected GPS observations and are referred to meridian 123° W.
Distances are expressed in metres and decimals thereof.
Distances shown in traverse are measured distances reduced to the horizontal at general ground level.
For the computation of coordinates measured distances have been reduced to the UTM plane by multiplying them by an average combined scale factor of 0.9995213.

Distances shown on grid area subdivisions are UTM plane.
Authorized control monuments found ..... ●
Monuments placed ..... ○
Mkr. denotes metal marker post 2.0m long placed 0.30m N.
Elevations were derived from Geodetic Survey of Canada Monument 'Petitot' Elev. = 218.241m

Survey was completed prior to drilling; therefore well as drilled may not necessarily agree with proposed location.

THIS SURVEY WAS EXECUTED DURING THE PERIOD OCTOBER 13th TO OCTOBER 14th, 1998. BY W.V. JOHNSON, CLS

I, W.V. Johnson, of the City of Fort St. John, British Columbia, Canada Lands Surveyor, make oath and say that I have in my own proper person, according to law and the instructions of the Surveyor General of Canada Lands, faithfully and correctly executed the survey shown by this plan and field notes, and that the said plan and field notes are correct and true to the best of my knowledge and belief.
SO HELP ME GOD

W.V. Johnson, CLS

Sworn before me at Fort St. John, this 18th day of October, 1998.

R.O. Blackall, CLS

GEOGRAPHIC AND UTM COORDINATES, (1927 NAD)				
Station	Latitude	Longitude	Northings	Eastings
CONTROL MONUMENTS				
Petitot(Publ. & Fixed)	60°14'15.436"	123°27'39.795"	6677758.134	474467.253
Fort Nelson ACP(Adj.)	58°48'19.494"	122°43'49.914"	6518207.419	515569.399
Fort Nelson ACP(Publ.)	58°48'19.493"	122°43'49.968"	6518207.388	515568.539
GRID AREA				
NE	60° 10' 00"	123° 15' 00"	6669782.783	486125.259
NW	60° 10' 00"	123° 30' 00"	6669871.559	472250.651
SE	60° 00' 00"	123° 15' 00"	6651230.973	486055.060
SW	60° 00' 00"	123° 30' 00"	6651310.016	472110.252
A-01, NE	60°00'15.000"	123°15'00.000"	6651695.018	486056.815
A-01, NW	60°00'15.026"	123°15'28.125"	6651697.488	485621.095
A-01, SW	60°00'00.026"	123°15'28.125"	6651233.443	485619.285
A-01, SE	60°00'00.000"	123°15'00.000"	6651230.973	486055.060
TRAVERSE STATIONS				
A-01-1	60°00'02.661"	123°14'53.714"	6651312.924	486152.771
A-01-2	60°00'08.424"	123°14'55.106"	6651491.292	486131.873
TH 'A'	60°00'02.638"	123°15'04.849"	6651312.862	485980.293
TH '1'	60°00'02.648"	123°15'00.007"	6651312.889	486055.257
BC-NWT MON#12	60°00'01.996"	123°15'01.627"	6651292.810	486030.091
PROPOSED WELL				
A-01	60°00'04.641"	123°15'04.862"	6651374.833	485980.270

PARAMOUNT RESOURCES LTD.

WITNESS

Oct 20/98
DATE

MOUNT COTY

MCKAY LAKES

123°30'

60°20',123°15'

60°20',123°00'

STAGING AREA

CAMP

MAINTENANCE YARD

RESIDENCE

BARGE SITE

CAMP SITE

I-02 DECKING SITE

CAMP

BRIDGE 5X15m

FORT LIARD HIGHWAY

Betalamea Lake

Petitot River

FORT LIARD

A-47 (NOT DRILLED)

I-46

CAMP

F-36

DECKING SITE BORROW PIT

123°30'

60°10',123°00'

O-35

CAMP

M-25 (NOT DRILLED)

BORROW PIT & SUMP

60°10',123°15'

BORROW PIT

BRIDGE 18.4X5m

Water Source #3 (Mea Goh Cho Lake)

STANLEY BERTRAND TRAPPER CABIN

BRIDGE

CAMP

N-01

BORROW PIT

CAMP

A-01

NORTHWEST TERRITORIES

BRITISH COLUMBIA

94O13I

94O14L

94O14K

94O14J

94O14I

MAXHAMISH COMPRESSOR

LEGEND

- SEISMIC
- AIRSTRIP - (FOREIGN)
- AIRSTRIP
- PIPELINE R/W
- PIPELINE R/W FOREIGN
- ACCESS ROAD - (FOREIGN)
- WINTER ACCESS ROAD
- ALL SEASON ACCESS ROAD
- CONTOUR
- LEASE - (TIED-IN)
- LEASE - (NOT TIED-IN)
- LEASE - (FOREIGN)
- LEASE - RECLAIMED
- BORROW PIT
- CAMP SITE
- SUMP / PIT
- DECKING SITE
- BATTERY SITE
- OTHER CLEARING
- BRIDGE
- TOWER

SCALE 1:50,000

1250 0 1250 2500 3750 5000 METERS

2500 0 5000 10000 15000 FEET

N

DISCLAIMER: The information contained herein is compiled from various government and industry sources. The Universal Group of Companies and its data suppliers provide no warranty regarding the accuracy or completeness of this information. No liability can be assumed by The Universal Group of Companies or its data suppliers resulting from the use or interpretation of this information, or from any decisions made based on this information.

Paramount resources ltd.

FORT LIARD SOUTH

As-Built June 2009

94O14I (BC P&NG GRID) to

SE1/4 60°20',123°30' (NWT GRID)

REV.	DESCRIPTION	INI.	DATE
3	Updated map title	BPV	03-JUN-09
2	Removed I-03 W/S & updated map title	BPV	12-SEP-07
1	Added Bridge in Sec.12 and Road in Sec.1 & 11.	BPV	05-DEC-06
0	Original construction (from 2005 map)	WGT	13-JUN-06

SPECIFICATIONS	
Datum:	NAD 83
Projection:	UTM
NTS Ref:	95B
Zone:	10
Scale:	1:50 000
C.I.:	100m
Filename:	050399G01_2009
Model:	50K Ft Liard South
Job No:	05-0399G

IMAGERY (Air Photo / Satellite)	
Date:	2000
Type:	1m Orthophoto

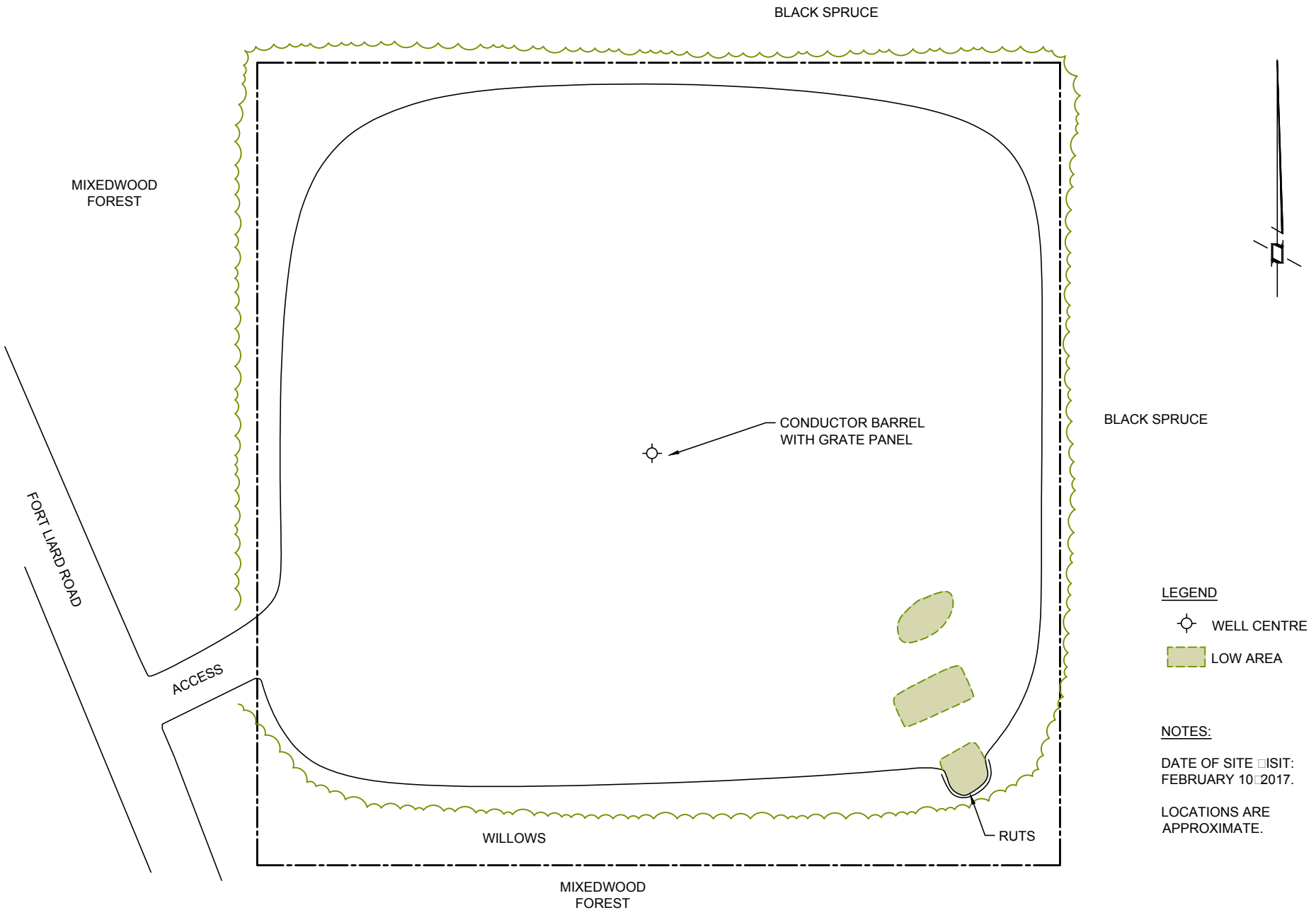
PREPARED BY:

UNIVERSAL GEOSYSTEMS U.G.S. SPATIAL INFORMATION SERVICES

Ph:. 262-1336
Fax: 262-1308
www.universalsurveys.com

REV. 3

File: A-01_17PH1.dwg Date: March-18-17 9:59:50 AM



SITE □ISIT DIAGRAM

NORTH SHORE Environmental Consultants

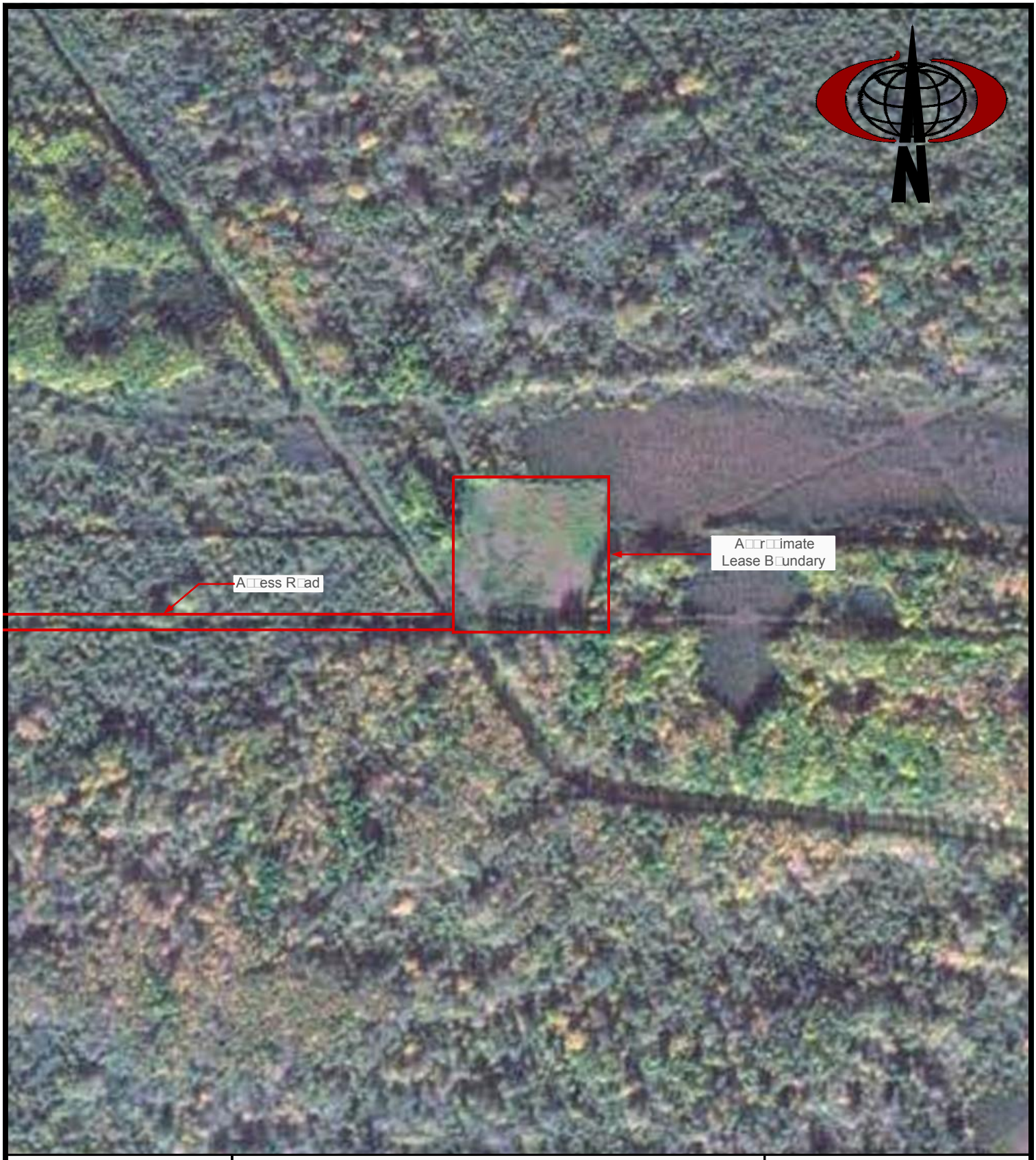
Date: 20-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. A-01 (NORTHWEST TERRITORIES)	Figure: 1
File name: A-01_SLM-B.dwg	Requested by: DM		

APPENDIX B

Spill Report
Aerial Photographs

No Spills Found

Your search returned zero results



NORTH SHORE
Environmental Consultants
□143□201 Kas□a R□ad
S□erw□□d Par□□AB
T8A 2□6

□aramount Resour□es □td□

Param□unt et al Liard A-01

G□□gle Eart□ Imagery - 2011

0 50 100 200

SCALE IN METERS

S□ale: 1:5000

NOTE: SCALE IS APPROXIMATE ± 1m



NORTH SHORE
Environmental Consultants

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T8A 2□6

□aramount Resour□es □td□

Param□unt et al Liard A-01

G□□gle Eart□ Imagery - 2011

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T8A 2□6

□aramount Resour□es □td□

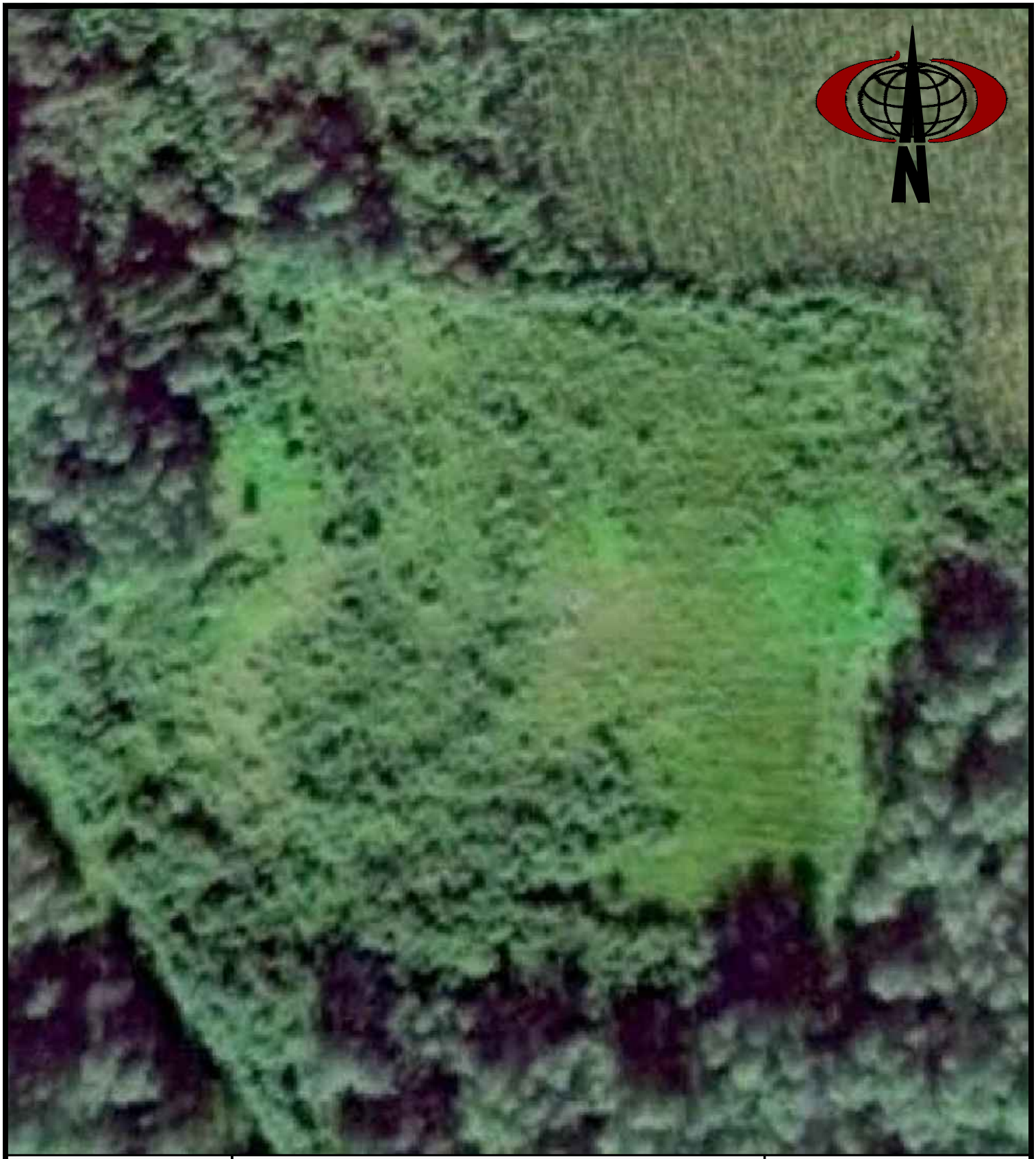
Param□unt et al Liard A-01

G□□gle Eart□ Imagery - 2014

0 50 100 200
SCALE IN METERS

S□ale: 1:5000

NOTE: SCALE IS APPROXIMATE ± 1m



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APPENDIX C

Drilling Waste Documentation

Compliance Option 2
Drilling Waste Disposal Assessment Checklist

Compliance Option 2 - Drilling Waste Disposal Assessment Checklist

If any response to the checklist questions leads to a Phase 2 ESA requirement or there is insufficient information to complete the Compliance Option Two Checklist, a Phase 2 ESA must be conducted in accordance with Compliance Option Three.

1. General Disposal and Drilling Fluid Information:
The well licensee should be able to review various sources of information pertaining to the drilling activities on-site. Many information sources, other than the *Notification of Drilling Waste Disposal*, *Drilling Waste Management Disposal Form*, or *Drilling Waste Pipeline Disposal Form* can be reviewed for information relating to the drilling waste disposal and drilling fluid systems. These can include Tour Reports, daily drilling records, well files, and contractor invoices.

1.0 Well Information:

Unique Identifier (UI)	Paramount et al Liard A-01
Spud Date	February 9, 1999
Well Depth	2046

1.1 Disposal Method (if known)*: Assumed mix-bury-cover

* If waste was disposed at an AER or ESRD approved facility, list supporting documentation under Reference Documents.

1.2 Disposal Location (if known)**: The sump was located on site

** If checklist indicates that a Phase 2 ESA (Compliance Option Three) is required, it must be undertaken at the disposal location. If the disposal location is unknown, the Phase 2 ESA must be undertaken at the wellsite.

For the purpose of this form: if the disposal method and/or location remains unknown after all available information sources have been checked, the drilling waste disposal location is assumed to be on-site.

	Yes	No
1.3 Were there other drilling waste disposal events on the site (e.g. wellbore re-entry or another well drilled, using fluids containing drilling fluid additives)?	☐	☒
If yes, were the disposal areas separate from one another?	☐ Drilling waste information must be evaluated for each disposal.	☐ Drilling waste information must be evaluated by combining the drilling fluid additives and well depths. If drilling waste information is missing or incomplete for one or both wells, a Phase 2 (Compliance Option Three) is required.

	Yes	No
1.4 Was a remote site used? If, Yes, is the remote site included in this reclamation application? If not included, is the remote site a multi-well disposal location?	☐ ☐ ☐ In Comments section, indicate which well the remote site will be tied to for the purposes of reclamation	☒ ☐ ☐ Single well remote disposal site must be included with reclamation certificate application, unless it already has received a Reclamation Certificate.
1.5 Has the well licensee reviewed the Daily Drilling Records and other available drilling documentation?	☒	☐ Phase 2 required
1.6 Can it be determined from the available records what type of drilling fluid system was used?	☒	☐ Phase 2 required
1.7 Were water-based drilling fluids used for all sections (i.e., gel chemical drilling fluid systems)? If No, is there evidence that demonstrates the non-water based wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., appropriately approved waste management facility)?	☒ ☐	☐ ☐ Phase 2 required
1.8 Is a mud list available? If Yes, can all the additives on the mud list be identified and described? Record the additives and their description (e.g., chrome-free lignosulfonate, aldehyde-based bactericide, etc.) on the attached form.	☒ ☒	☐ Phase 2 required ☐ Phase 2 required

	Yes	No
1.9 Do the Daily Drilling Records show evidence of a flow or kick that may have resulted in the introduction of produced fluids (i.e., hydrocarbons or salts) into the drilling fluids?	☐	☒
If Yes, is there information/documentation available to demonstrate that they were appropriately treated or disposed of as per *Directive 50* or *Directive 58* (i.e., approved waste management facility)?	☐	☐ Phase 2 required
1.10 Do the Daily Drilling Records show evidence of returned drill stem test fluids?	☒	☐
If Yes, is there information/documentation available to demonstrate that they were appropriately treated or disposed of as per *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐	☒
If treatment or disposal as per *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* cannot be confirmed, is there sufficient information/documentation available to complete the DST calculations?	☒ Show calculation on attached form	☐ Phase 2 required
1.11 Were cement returns buried on-site or at a remote site linked to the well?	☐	☐

2. Hydrocarbon Management

	Yes	No
2.1 Was hydrocarbon-based drilling fluid used?	☒	☐
If Yes, is there evidence that wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐	☒ Phase 2 required

	Yes	No
2.2 Was the well a horizontal oil well? If Yes, is there evidence that wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐ ☐	☒ ☐ Phase 2 required
2.3 Was the well drilled using under-balanced techniques? If Yes, is there information/documentation available to demonstrate that the drilling wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☐ ☐	☒ ☐ Phase 2 required
2.4 Was hydrocarbon added to the drilling fluid? If Yes, was the hydrocarbon contaminated drilling waste disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., approved waste management facility)?	☒ ☐	☐ ☒ Phase 2 required

3. Metals (Trace Elements) Management

	Yes	No
3.1 Was the disposal completed before November 1, 2012?	☒ Complete questions 3.2 to 3.5	☐ Go to question 3.6
3.2 Was barite added to the drilling fluid? If Yes, did it meet the requirements specified in the attached metal calculation table?	☒ ☒ Show calculation on attached form	☐ ☐ Phase 2 required

	Yes	No
3.3 Was zinc carbonate added to the drilling fluid? If Yes, did it meet the requirements specified in the attached metal calculation table?	☐ ☐ Show calculation on attached form	☒ ☐ Phase 2 required
3.4 Were chrome-based thinners added to the drilling fluid? If Yes, did it meet the requirements specified in the attached metal calculation table?	☒ ☒ Show calculation on attached form	☐ ☐ Phase 2 required
3.5 Were any other additives used that would have triggered testing for metals under Section 3 or 5 of *Directive 50 (1996 version)*? If Yes, are waste analytical data and application rates (land treatment, landspreading) or maximum application (mix-bury-cover) available? If above data are available, did the application rate or maximum application meet *Directive 50* requirements?	☐ ☐ ☐	☒ ☐ Phase 2 required ☐ Phase 2 required
3.6 Did metal concentrations in the waste trigger a requirement for post-disposal sampling? If yes, did all post-disposal samples meet the soil metal endpoints specified in Section 3 of *Directive 50* (2012 version)?	☐ ☐	☐ ☐ Phase 2 required

4. Salinity Management

	Yes	No
4.1 Does the water based drilling waste meet the requirements specified in the attached Salt Calculation Table?	☐ Show calculation on attached form	☒ Phase 2 required
4.2 Was a salt zone encountered during drilling?	☐	☒
If Yes, is there evidence that demonstrates the drilling wastes were disposed of in a manner consistent with *Directive 50* (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or *Directive 58* (i.e., appropriately approved waste management facility)?	☐	☐ Phase 2 required

Surface Hole Drilling Mud Additive List

Product Name	Amount Used	Brief Description of Product
Soda Ash	1 sack	Calcium Remover
Gel	224 sacks	Viscosifier
Defoamer	2 pails	Surface Active Agent
Desco	5 sacks	Chrome-based Thinner/Dispersant
Sawdust	10 sacks	Lost Circulation Material
Mil-clean	1 sack	Surface Active Agent
Lignite	6 sacks	Thinner/Dispersant
Drispac	1 sack	Viscosifier

Main Hole Drilling Mud Additive List

Product Name	Amount Used	Brief Description of Product
Bicarbonate of Soda	1 sack @ 22.7 kg	Alkalinity pH Control
Defoamer	2 pails @ 20 L	Surface Active Agent
Calcium Carbonate	425 kg @ 25 kg	Weighting Material
Calcium Chloride	53 sacks	Shale Control Inhibitor/ Weighting Material
Carbomul SEA	8 units @ 55 G	Emulsifier
Carbotec	4 units @ 55 G	Oil Mud Emulsifier
Carbo TEQ-E Invert	32 m^3	Hydrocarbon Lubricant
Caustic Soda	2 sacks @ 22.7 kg	Alkalinity pH Control
Chrome-free Desco	6 sacks @ 11.4 kg	Chrome-free Thinner/Dispersant
Diesel Fuel	37 m^3	Hydrocarbon Lubricant
Drispac Plus Regular	1 sack @ 22.7 kg	Viscosifier
Floor Dry	13 sacks @ 15 kg	Oil Absorbent
Ligco	6 sacks @ 22.7 kg	Thinner/Dispersant
Lime	68 sacks @ 22.7 kg	Alkalinity pH Control
Mil-bar	46 sacks @ 40 kg	Weighting Material (Barite)
Mil-clean	2 units @ 55 G	Surface Active Agent
Mil-gel	196 sacks @ 40 kg	Viscosifier
Milmica	2 sacks @ 25 kg	Lost Circulation Material
Milplug	1 sack	Lost Circulation Material
OilGel 3000	44 sacks @ 23 kg	Viscosifier
Sawdust	87 sacks @ 18.1 kg	Lost Circulation Material
Soda Ash	3 sacks @ 40 kg	Calcium Remover
Soluflake Fine	74 sacks @ 23 kg	Lost Circulation Material
Soluflake Medium	2 sacks @ 23 kg	Lost Circulation Material
X Foam	3 pails @ 20 L	Surface Active Agent

Reference Documents (List all source documents used in the completion of this checklist. Attach additional pages if necessary. Documents must be supplied to the AER if requested.)

Baker Hughes Inteq Products Used List
Daily Drilling Reports
Paramount Well File Information
PSAC Historic Drilling Fluid Products
September 2000 Environmental Inspection Report

Comments (Please provide any additional comments relevant to the decision process within the checklist. Attach additional pages if necessary.)

According to the September 20, 2000 Environmental Inspection Report, sumps on the wellsite had slumped. It is assumed that the drilling waste was disposed of by mix-bury-cover.

The surface hole was drilled using a gel-chem drilling mud system and the main hole was drilled with calcium chloride invert. There was no drilling was disposal documentation available for review and as a result a Compliance Option 2 checklist was completed.

The drilling waste exceeds salt and post-disposal oil concentration calculation criteria and a hydrocarbon drilling mud additive was used without documentation of proper disposal. Further assessment of the drilling waste disposal area is required.

Location: Paramount et al Liard A-01 **Spud:** 9-Feb-99

Metal Calculations for Compliance Options One and Two

Note: Different default mix ratios are provided depending on whether the well was drilled before or after October 22, 1996. The 1996 version of *Guide 50* , *Drilling Waste Management,* which was issued by the Energy Resources Conservation Board on this date, increased the minimum mix ratio requirement from 1:1 to 3:1.

Barite:

Directions: Fill in the number of sacks and adjust for sack weight if different than 40 kg. Enter the Well Depth in metres. The spreadsheet will calculate the number of sacks per metre. This value must be less than or equal to **0.22** If the value exceeds the objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Total Number of Sacks (40 kg/sack*)		Well Depth (m)		Mix Ratio**		Sacks per Metre	
46	÷	2046	÷	3	=	0.0074943	Meets

* Sack weight may be adjusted by dividing the number of sacks by 40 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

Location: Paramount et al Liard A-01 **Spud:** 9-Feb-99

Chromium-based Thinner:

Alternative 1:

If waste chromium, mix ratio and waste bulk density data are available use the following calculator to estimate post-disposal chromium concentration.

Directions: Enter the Total Chromium Concentration in mg/kg measured in the waste, the Waste Dry Bulk Density in kg/m3, and Mix Ratio in the appropriate cells. The spreadsheet will calculate the Post-Disposal Chromium Concentration. If this value is greater than 64 mg/kg, a Phase 2 ESA (Compliance Option 3) is required.

Waste Chromium Concentration (mg/kg)		Waste Dry Bulk Density* (kg/m^3)		Mix Ratio						Post-Disposal Cr Concentration (mg/kg)
	x		÷		÷	1500	+	30	=	#DIV/0!

* Waste Dry Bulk Density = (Waste Specific Gravity – 1) x 1600

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

Alternative 2:

If the above data is not available use the following equation to calculate the number of sacks of chrome thinner added per meter drilled. If the number of sacks exceeds the limits below, a Phase 2 is required.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Well Depth in metres. The spreadsheet will calculate the number of sacks per metre. This value must be less than or equal to **0.020.** If the value exceeds the objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Total Number of Sacks (25 kg/sack*)		Well Depth (m)		Mix Ratio**		Sacks per Metre	
5	÷	2046	÷	3	=	0.000814598	Meets

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

= Required Field

Location: Paramount et al Liard A-01 **Spud:** 9-Feb-99

Salt Calculations for Option 2:

Alternative 2

If the volume of drilling waste is not known, use the following calculator to determine the NaOH Equivalent Sacks per metre of well depth. This value must be less than **0.0260** for wells drilled before October 22 1996, or **0.0350** for wells drilled on or after this date. If the value exceeds the target, a Phase 2 ESA (Compliance Option 3) must be conducted.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Well Depth in metres. The spreadsheet will calculate the NaOH Equivalent Sacks per Metre.

Additive	Number of sacks (25 kg/sack*)		NaOH Equivalency Factor		NaOH Equivalent Sacks
Caustic Soda	1.816	X	1.00	=	1.816
Soda Ash	5.8	X	0.75	=	4.35
Sodium Chloride		X	0.68	=	0
Sodium Bicarbonate	0.908	X	0.95	=	0.8626
Sodium Silicate		X	1.37	=	0
Sodium acid pyrophosphate (SAPP)		X	0.22	=	0
Calcium Chloride	53	X	0.72	=	38.16
Calcium Nitrate		X	0.34	=	0
Envirofloc		X	0.41	=	0
Gypsum**		X	0.59	=	0
Lime**	40.92	X	1.08	=	44.1936
** Max = 0.02 x well depth (m)					
Potassium chloride		X	0.54	=	0
Potassium sulphate		X	0.46	=	0
Caustic potash		X	0.71	=	0
Potassium formate		X	0.47	=	0
Potassium silicate		X	0.32	=	0
Potassium nitrate		X	0.40	=	0
Diammonium phosphate		X	0.63	=	0
Ammonium nitrate		X	0.57	=	0
Ammonium sulphate		X	0.61	=	0
Drill Stem Test Returns	71.81371557	X	0.68	=	48.83332658

Total NaOH Equivalent Sacks	=	138.2155266
Well Depth (m)	÷	2046
NaOH Equivalent Sacks per Metre	=	**0.0676**

Result

Exceeds

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Note: Up to 0.02 sacks of gypsum and lime per metre of well depth should be counted with other salt additives. Because of the limited solubility of gypsum and lime, sacks in excess of this value need not be counted.

= Required Field

Alberta Energy Regulator

Drill Stem Test Returns for Option 2

Location: Paramount et al Liard A-01 **Spud:** 9-Feb-99

Hydrocarbons

Directions: Enter the drill stem diameter for the drill stem test (DST) section in millimeters, the length of the DST return in metres, the percent oil content of the DST fluid, the well depth in metres and the mix ratio. The spreadsheet will calculate the post disposal oil concentration If this value is greater than **0.10%** (dry weight) in subsoil or **0.50%** (dry weight) in topsoil, a Phase 2 ESA (Compliance Option 3) is required.

Inner Diameter of Pipe (mm)	Length of Drill Stem Test Return (m)	Volume of Returns (m^3)		Oil Content (%)*		Vol. of Oil (m^3 x 100)
97.2	15	0.111248316	x	100.00%	=	11.1248316
97.2	200	1.48331088	x	100.00%	=	148.331088
97.2	10	0.074165544	x	100.00%	=	7.4165544
97.2	45	0.333744948	x	100.00%	=	33.3744948
97.2	290	2.150800776	x	100.00%	=	215.080078
97.2	62	0.459826373	x	100.00%	=	45.9826373
97.2	100	0.74165544	x	100.00%	=	74.165544
97.2	50	0.37082772	x	100.00%	=	37.082772
				Total Volume of Oil	=	572.558
					÷	0.6
				Well Depth (m)	÷	2046
				Mix Ratio**	÷	3
				Post-Disposal Oil Concentration (%)	=	0.1554681

Result
Exceeds

* Actual measured oil concentration must be used if available. If only visual descriptions are available then use the following to estimate oil concentration:

Flecked = 5%

Emulsion = 25%

Oil or oil-cut mud= 100%

Do not include gas-cut mud or mud with no indication of oil.

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

= Required Field

Drill Stem Test Return Calculations for Compliance Option Two

Location: Paramount et al Liard A-01 **Spud:** 9-Feb-99

Alternative 2: Chloride

Directions: Enter the drill stem diameter for the drill stem test (DST) section in millimeters, the length of the DST return (including mud returns) in metres and the chloride concentration of the DST fluid in mg/L. The spreadsheet will calculate the equivalent number of sacks. This value must be entered in the salt calculation in the cell labelled "Drill Stem Test Returns".

Inner Diameter of Pipe (mm)	Length of Drill Stem Test Return (m)	Volume of Returns (m^3)*		Chloride Concentration* (mg/L)				Number of Sacks
97.2	660	4.894925904	x	22000	÷	7600	=	14.1695224
97.2	15	0.111248316	x	250000	÷	7600	=	3.65948408
97.2	200	1.48331088	x	34000	÷	7600	=	6.63586446
97.2	10	0.074165544	x	250000	÷	7600	=	2.43965605
97.2	45	0.333744948	x	250000	÷	7600	=	10.9784522
97.2	290	2.150800776	x	50000	÷	7600	=	14.1500051
97.2	62	0.459826373	x	250000	÷	7600	=	15.1258675
97.2	265	1.965386916	x	18000	÷	7600	=	4.65486375
						Total number of sacks	=	71.8137156

*If chloride concentration is not specified, use 215,000 mg/L. Chloride concentrations from formation water databases or adjacent wells are currently not acceptable.

= Required Field

APPENDIX D

Site Visit Photos



Photograph 1: View of wellhead.



Photograph 2: Looking north from well centre.



Photograph 3: Looking east from well centre.



Photograph 4: Looking south from well centre.



Photograph 5: Looking west from well centre.



Photograph 6: Minor staining at well centre.

May 16, 2017

Paramount Resources Ltd.
4700 Bankers Hall West
888 3rd Street SW
Calgary, Alberta T2P 5C5

Attention: **Larry Yoon, B.Sc., BIT**
Environmental Specialist

Reference: **Paramount Resources Ltd.**
Para et al Fort Liard A-01 60°10' 123°15'
Phase 2 Environmental Site Assessment

North Shore Environmental Consultants Inc. is pleased to submit our Phase 2 Environmental Site Assessment for the A-01 wellsite to Paramount Resources Ltd.

North Shore appreciated the opportunity to work on this project and if we can provide clarification of any part of this report, please call the undersigned at (780) 467-3354.

Yours truly,

North Shore Environmental Consultants Inc.



Brent Walchuk, B.Sc., P.Ag.
Remediation/Reclamation Supervisor

NORTH SHORE
Environmental Consultants

Paramount Resources Ltd
Para et al Fort Liard A-01 60°10' 123°15'
Phase 2 Environmental Site Assessment
May 2017



Paramount Resources Ltd.
4700 Bankers Hall West
888 3rd Street SW
Calgary, Alberta T2P 5C5

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North Shore Environmental Consultants Inc. (North Shore) was retained by Paramount Resources Ltd. (Paramount) to conduct a Phase 2 Environmental Site Assessment (ESA) for the Para et al Fort Liard A-01 wellsite located in the Northwest Territories (NWT) at Unit A, Section 01 Grid Area 60°10', 123°15' (Site). The site is located near Fort Liard, Northwest Territories. The objective of the Phase 2 ESA was to assess areas of potential environmental concern identified during the Phase 1 ESA conducted by North Shore in March 2017. Assessment activities included collecting soil samples to determine if select compounds used or produced on the Site exceed the applicable remediation guidelines. The areas of potential environmental concern included the following:

- Well centre
- Drilling waste disposal area

On February 10, 2017, 26 boreholes were advanced at the Site. Based on a review of the analytical data, field observations, and field screening information from the Phase 2 ESA, several analyzed soil parameters did not meet the applicable remediation guidelines. Additionally, soil impacts that were identified during the Phase 2 ESA were not fully delineated.

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1 INTRODUCTION

North Shore Environmental Consultants Inc. (North Shore) was retained by Paramount Resources Ltd. (Paramount) to conduct a Phase 2 Environmental Site Assessment (ESA) at the Para et al Fort Liard A-01 wellsite (Site) located near Fort Liard, Northwest Territories.

1.1 Objective

The objective of the Phase 2 ESA was to assess areas of potential environmental concern identified during the Phase 1 ESA conducted by North Shore in March 2017.

1.2 Scope of Work

The scope of work for the Phase 2 ESA included the following:

- Review background information to assist with establishing site specific protocols.
- Prepare for ground disturbance activities. The defined work area included the lease and a 30 meter (m) buffer zone around the lease boundary.
- Supervise two sets of private utility locating surrounding the proposed ground disturbance locations.
- Conduct a tailgate safety meeting prior to initiating work each day at the Site. This includes North Shore personnel and contractors.
- Characterize and delineate any suspected impacted areas and advance two control boreholes near the site boundary location in a landscape representative of onsite topography.
- Log soil stratigraphy according to the Canadian System of Soil Classification (CSSC) (Soil Classification Working Group, 1998) with additional comments on potential impacts. Collect samples from each borehole and record organic vapor readings.
- Collect borehole soil samples as required based on field screening results.
- Collect field duplicates for every ten samples submitted for analysis.
- Submit selected soil samples for laboratory analysis to determine concentrations of suspected contaminants and background concentrations for control soil.
- Prepare a Phase 2 ESA report to document the results of the laboratory analysis.

2 BACKGROUND

2.1 Site Description

The Site is located at surface location Unit A, Section 01 Grid Area 60° 10', 123° 15', approximately 27 kilometers (km) southeast of Fort Liard, Northwest Territories. Access to the Site is from the west. A location map of the Site is included as Figure 1 and a survey plan is included in Appendix A.

2.2 Land Use and Receptors

The lease is situated on Crown land in a mixed-wood forested area. The Site has not been reclaimed, but natural encroachment from the surrounding forest is evident throughout the lease. An aerial photograph or satellite image of the quarter section is included as Figure 2. Site photographs are included as Appendix B.

2.3 Site History and Infrastructure

The Paramount et al Liard A-01 well was drilled between February 9, 1999 and March 19, 1999 to a depth of 2,046 m. The rig was released on March 25, 1999. The well was never put on production.

Infrastructure identified in association with the site includes only the wellhead. According to the Paramount June 2009 As-built sketch and survey plan, a 40 m x 60 m temporary campsite was located west of the wellsite on the north side of the road. There were no log decks, borrow pits or remote sumps identified in association with the wellsite.

2.4 Previous Environmental Work

A Phase 1 ESA was completed by North Shore in March 2017 (North Shore, 2017). There was a wellhead surrounded by a conductor barrel with grate paneling present on the site at the time of the February 2017 site visit conducted by North Shore. Based on the information gathered from the Phase 1 ESA records, and the February 2017 site visit, North Shore concluded that there was a potential for environmental impact associated with the Site. North Shore recommended intrusive sampling on the Site to assess the well centre and the on site drilling waste disposal area.

3 METHODOLOGY

3.1 Safe Work Procedures

North Shore personnel adhered to Paramount's policies and procedures to complete the assessment and investigation program. Standard oilfield personal-protective equipment (hard hat, steel-toed boots, safety glasses, and fire retardant coveralls) were worn by all personnel on-site. A calibrated four way gas monitor for H_2S, O_2, CO, and organic vapors was also carried by each person participating in the field work. Nitrile gloves were worn when handling soil samples. All personnel onsite were required to possess copies of the applicable safety certification (Paramount Orientation, Ground Disturbance Level 2, H_2S Alive, Transportation of Dangerous Goods, Workplace Hazardous Material Information System, and Standard Level First Aid). North Shore personnel acquired a Paramount Safe Work Permit prior to commencing fieldwork and a tailgate safety meeting was conducted at the beginning of each work day.

Prior to initiating any ground disturbance the proposed assessment area was swept twice by a third party company for the presence of buried facilities. The wellhead surrounded by a conductor barrel with grate paneling was the only facilities present at the time of assessment. All ground disturbance documentation was peer reviewed prior to commencing the fieldwork.

3.2 Drilling Program

On February 10, 2017 26 boreholes (17C01 through 17C02 and 17BH01 through 17BH24) were advanced as part of the drilling program (Figure 3). Boreholes were completed using a tracked B-57 drill rig equipped with 15 cm solid-stem augers. Boreholes were completed to a maximum depth of 6.0 mbgl (meters below ground level), depending on the assessment location and subsurface conditions.

Delineation of potentially impacted areas was based on field screening, visual cues, and professional judgment. Vertical and horizontal delineations were completed to determine the spatial extent of the potentially impacted material. If potentially impacted material was identified during borehole logging, vertical delineation was completed by sampling parameters above the suspected impact zone and to a depth of 1.0 m below the suspected lowest point of contamination. Horizontal delineation was completed by advancing boreholes in 5.0 m horizontal increments in each direction (north, south, east, and west) until clean material, as determined by field screening and professional judgment, was identified. Select delineation samples were collected for laboratory analyses. The GPS location, reference from a fixed point, and rationale of each borehole is included in the borehole logs in Appendix C.

3.3 Soil Sampling

Throughout the sample collection process, North Shore adhered to sampling procedures described in the Canadian Council of Ministers of Environment (CCME) Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites (CCME, 1993). Samples of the recovered soil were visually inspected for evidence of impacts such as free product, staining, or discoloration. The outermost layer of the samples was trimmed using a soil tool to avoid cross-contamination. North Shore personnel wore a pair of clean, chemical resistant nitrile gloves for each soil sample collected as an added preventative cross-contamination measure.

Soil vapor concentrations were field screened for volatile hydrocarbon constituents using an RKI Eagle gas detector (RKI Eagle), calibrated with a 400 parts per million (ppm) concentration of hexane gas with the methane elimination switch turned on. Samples selected for vapor screening were placed into plastic bags, sealed, agitated, and allowed to volatilize. Volatile organic compounds (VOCs) that accumulated within the headspace were then measured in ppm and recorded on the borehole logs.

Soil samples were also field screened for salinity related parameters by measuring electrical conductivity (EC) using a Spectrum Technologies Inc. Field Scout Soil and Water EC Meter (EC Probe). Prior to sampling, the EC probe was calibrated with a 2.76 dS/m calibration solution. Once the soil on the auger had been trimmed, the EC probe was inserted directly into the soil media in order to obtain an in-situ EC reading. The EC reading was allowed to stabilize for three seconds before being recorded in the field documents.

All soil samples were placed in sealable plastic bags for field screening organic vapors while 40 mL vials with methanol and 125 mL glass jars with Teflon-lined lids were used for organic analyses. Jarred samples were packed tightly to minimize headspace, help prevent the loss of VOCs, and minimize biodegradation. All samples collected were labeled and placed in a cooler with ice or ice packs to

maintain a temperature as close to 4°C as possible. Soil samples were transported to an accredited laboratory for analysis. Standard chain of custody protocols were followed during the transport of the samples.

Soil characteristics at each borehole location were described using classification procedures and terminology from The Canadian System of Soil Classification (Soil Classification Working Group, 1998).

3.4 Quality Assurance and Quality Control

3.4.1 Laboratory QA/QC

Soil samples collected during the February 10, 2017 sampling event were submitted to AGAT Laboratory (AGAT) in Calgary, Alberta for analysis. The analytical suite was selected based on regulated compounds that are typically found on oil and gas sites.

AGAT is a Standards Council of Canada (SCC), ISO 9000 Series and ISO/IEC 17025 accredited laboratory and Canadian Association of Environmental Analytical Laboratories (CAEAL) accredited laboratory that uses ESRD recognized methods to conduct laboratory analyses. Method blanks, control standards samples, Certified Reference Material (CRM) standards, method spikes, replicates, duplicates, and instrument blanks are routinely analyzed as part of the QA/QC program at the laboratory. AGAT has indicated that analytical data is only released if it passes the laboratory QA/QC procedures. A summary of the QA/QC procedures adopted by AGAT during the analyses of samples for petroleum hydrocarbon concentrations, salinity parameters, and metals concentrations is included in Appendix D.

4 COMPARISON GUIDELINES

4.1 Comparison Guidelines

Selection of the appropriate set of guidelines is based on the texture of the dominant soil type along with current and potential future land use as determined in the assessment. Where both fine and coarse grain strata are present, grain size is determined by the stratum governing horizontal and vertical migration to a receptor. Seven soil samples collected from depths ranging from 0.0 to 6.0 mbgl were analyzed for particle size (75 micron sieve). All seven samples were reported to be fine-grained. As a result, the guidelines for fine-grained soils were applied.

As per the direction of Paramount, the guidelines for residential/parkland land use were applied to the Site and laboratory values were compared to the following:

- Soil regulated metals, benzene, toluene, ethylbenzene, and xylenes (BTEX), and PHC fractions F1-F4 results were compared to the Canadian Council of Ministers of the Environment (CCME) - Tier 1 Soil Remediation Guidelines (CCME, 2017).
- Saturated paste boron and methanol results were compared to the AEP Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Tier 1 Guidelines; AEP, 2016a).

- Soil EC, Sodium Adsorption Ration (SAR) and pH values were compared to Environmental Guidelines for Contaminated Site Remediation (EGCSR, 2003) Environment Division. Government of the Northwest Territories (EGCSR, 2003).

4.2 Background Control Characterization and Salinity Guidelines

All control pH and EC results complied with the CCME and EGCSR Guidelines. Two of the seven control samples reported SAR values ranging from 6.70 to 7.70 that did not meet the EGCSR Guidelines. This is an indication that the soils in the area may have naturally elevated SAR values. All of the other control samples met the applicable remediation guidelines for SAR.

All seven of the control samples reported arsenic values ranging from 12.3 mg/kg to 16.1 mg/kg, which exceed the applicable remediation guidelines indicating the soils in the area have naturally elevated arsenic values. Three samples were analysed for zinc, and all met applicable guidelines. (Tables 2 and 3).

5 RESULTS OF FIELD INVESTIGATION

5.1 Stratigraphy

Based on the boreholes advanced during the drilling program, soil conditions generally consisted of clay over silty clay loam or hard clay to 6.0 mbgl.

5.2 Soil Results

Soil results for areas of concern are summarized in Sections 5.2.1 through 5.2.2. The laboratory analyses for soil samples are presented in Tables 1 through 3 along with the applicable comparison guidelines.

5.2.1 Well Centre

One borehole (17BH01) was advanced to assess the well centre area. Four soil samples (17BH01 0.8 – 1.0 mbgl, 17BH01 2.2 – 2.5 mbgl, 17BH05 2.2 – 2.5 mbgl, Dup B 0.8 – 1.0 mbgl) were analyzed for petroleum hydrocarbon, metal, and/or detailed salinity parameters. Sample 17BH01 2.2 – 2.5 mbgl exceeded applicable guidelines for zinc concentration with values of 475 mg/kg, and sample Dup B 0.8 – 1.0 mbgl reported a PHC F2 value of 321 mg/kg, which exceed applicable guidelines. Three soil samples (17BH01 0.8 – 1.0 mbgl, 17BH01 2.2 – 2.5 mbgl, Dup B 0.8 – 1.0 mbgl) exceeded the applicable guidelines for arsenic concentrations but were comparable to background concentrations. All of other samples met the applicable guidelines for hydrocarbon concentrations, metals, and detailed salinity parameters.

Five boreholes (17BH02 through 17BH06) were advanced to delineate impacts at the former well centre area. Four soil samples (17BH02 2.2 – 2.5 mbgl, 17BH03 2.2 – 2.5 mbgl, 17BH04 2.2 – 2.5 mbgl, 17BH05 2.2 – 2.5 mbgl) were analyzed for zinc, and one sample (17BH05 2.2-2.5 mbgl) for hydrocarbon analysis. All of the samples met the CSR Standards for hydrocarbon concentrations and metals parameters; the zinc exceedance was delineated both horizontally and vertically. At the time

of the assessment, visual observations and field screening did not indicate the potential for hydrocarbon impacts so delineation samples were not collected for PHC analysis. As such, the PHC F2 exceedance was not delineated.

5.2.2 Exploratory Boreholes

No visual indicators (i.e., subsided areas or atypical vegetation) were present during the Phase 2 ESA to suggest the possible location of the DWDA. Therefore, 12 exploratory boreholes (17BH07 through 17BH18) were advanced within a 30 m radius of the wellbore and six exploratory boreholes (17BH19 through 17BH24) were advanced in the corners of the lease in an effort to locate the potential DWDA. Field observations did not identify any suspect material which would indicate a DWDA was located on the lease.

Two soil samples (17BH09 1.7 – 1.9 mbgl and 17BH19 1.7 – 1.9 mbgl), which reported the highest field screening values for EC and VOCs, were analyzed for hydrocarbon and detailed salinity parameters. Sample 17BH19 (1.7-1.9) reported a SAR value of 5.39, which is comparable to control SAR values. All other samples reported values that met applicable guidelines.

5.3 Quality Assurance/Quality Control

Quality assurance and quality control for analytical data was also assessed by comparing analytical results from select samples to duplicate samples obtained from the same sample location. Primary and duplicate samples were compared and the relative percent differences (RPD) were calculated.

RPD criteria has been applied to field duplicates in order to evaluate the precision of the results. If both the original and duplicate sample concentrations are greater than or equal to five times the laboratory detection limit for a given parameter, the RPD must be less than or equal to 40% (water) and 60% (soils) (CCME, 2016). If the results lie outside of the range, they should be considered estimates only. The results of North Shore's QA/QC program are discussed in Section 5.3.1.

5.3.1 North Shore Environmental's QA/QC Program

Two soil sampling QA/QC measurements were conducted by duplicating soil samples 17C01 2.8 – 3.0 mbgl and 17BH01 0.8 – 1.0 mbgl. Laboratory comparisons reported good reproducibility for all benzene, toluene, ethylbenzene and total xylene (BTEX), petroleum hydrocarbon (PHC) (F1 – F4), particle size, metals, soluble ions, pH, EC and/or SAR values. The calculated RPD value for the fraction 2 hydrocarbons suggests that the sample shows poor reproducibility for the purposes of this project. It should be noted that all other parameters with criteria (BTEX, PHC (F1 – F4), metals, pH, EC and SAR) met the applicable criteria or were similar to natural background soil values. RPD value calculations and results for the QA/QC measurements are included in Tables 4 through 6.

6 SUMMARY AND CONCLUSIONS

North Shore completed a Phase 2 ESA on the Site on February 10, 2017. The assessment consisted of an investigation of the well centre, and the potential on site drilling waste disposal area. A total of 26 boreholes were advanced, including two control locations.

Two soil samples within the well centre area did not meet the applicable remediation guidelines for PHC F2 and zinc. The zinc exceedance was vertically and laterally delineated, however the PHC F2 exceedence was not delineated.

All of the remaining analyzed samples met the applicable remediation guidelines. Based on field observations and laboratory analysis, further work is required in order for the wellsite to meet the applicable remediation guidelines.

7 DISCLOSURE

North Shore Environmental Consultants Inc. (North Shore) has prepared this report taking into account government regulations available at the time of the assessment. North Shore has not made an independent verification of historical or analytical results provided by third parties and therefore makes no assurances regarding the accuracy of such information. It has assumed such information is correct. Where indicated or implied the conclusions are based on visual observation and/or analytical testing conducted at the time of the assessment. The conclusions do not apply to any areas of the site not investigated.

This report is intended for the exclusive use of the company, organization, or individual to whom it is addressed and may not be relied upon by any third party without the express written permission of North Shore. The investigation and reporting has been conducted with a reasonable level of attention and skill, in accordance with standards prevailing in the environmental consulting profession at the time of report date in the location in which the report was prepared.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. North Shore accepts no responsibility for damages, if any, suffered by any third party as a result of the use of this report or any decisions made or actions based on this report.

8 CLOSURE

North Shore appreciated the opportunity to work on this project. If we can provide clarification of any part of this report, please contact the undersigned at (780) 467-3354.

This report was prepared by:



Derek Moore, B.Sc., P.Ag.
Environmental Consultant

Reviewed By:



Angela Bricker, B.Sc., P.Ag.
Environmental Consultant

9 REFERENCES

Alberta Environment and Parks (AEP). 2016a. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch, Policy and Planning Division. 197 pp. February 2, 2016. ISBN:978-1-4601-2695-0. (On-line Edition) Website http://aep.alberta.ca

Canadian Council of Ministers of Environment (CCME) 1993. Guidance Manual on Sampling, Analysis, and Data Management for Contaminated Sites (CCME 1993).

Canadian Council of Ministers of the Environment (CCME). 2016. Volume 1 Guidance Manual: Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment. PN 1551. ISBN 978-1-77202-026-7 PDF. 2016.

Canadian Council of Ministers of Environment (CCME) 2017. Canadian Environmental Quality Guidelines Summary Table. Accessed On-line March, 2017. (CCME 2017).

Environmental Guidelines for Contaminated Site Remediation (EGCSR). 2003. Department of Environment and Natural Resources – Government of the Northwest Territories. (On-line Edition) Website http://www.enr.gov.nt.ca/sites/default/files/guidelines/siteremediation.pdf

North Shore Environmental Consultants. 2017. *Phase 1 Environmental Site Assessment Para et al Fort Liard A-01* Fort Liard, Northwest Territories. March 2017.

Soil Classification Working Group. 1998. *The Canadian System of Soil Classification*. 3rd edition. Agriculture and Agri-Food Canada. Publication 1646 (revised). 187pp.

TABLES

Paramount Resources Ltd.
Table 1. Soil - BTEX, Petroleum Hydrocarbons (F1-F4) and Grain Size
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	BTEX and PHC (F1-F4)										
			Benzene	Toluene	Ethylbenzene	Total Xylenes	Fraction 1[2]	Fraction 2	Fraction 3	Fraction 4[3]	Chrom. returned to baseline	% Moisture	Grain Size 75 µm Sieve
CCME Surface Soil Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**150**	**1300**	**5600**	**NC**	**NC**	**NC**
CCME Subsurface Soils Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**230**	**3500**	**10000**	**NC**	**NC**	**NC**
BACKGROUND CONTROLS													
17C01	0.8-1.0	10-Feb-17											Fine (21)
17C01	2.8-3.0	10-Feb-17											Fine (32)
Dup A	2.8-3.0	10-Feb-17											Fine (33)
17C01	4.7-4.9	10-Feb-17											Fine (2)
17C02	0.3-0.5	10-Feb-17											Fine (20)
17C02	1.7-1.9	10-Feb-17											Fine (19)
17C02	3.2-3.4	10-Feb-17											Fine (7)
WELL CENTRE AREA													
17BH01	0.8-1.0	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	49	148	<10	Yes	15	
Dup B	0.8-1.0	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	**321**	837	24	Yes	19	
17BH01	2.2-2.5	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	93	278	<10	Yes	15	
17BH05	2.2-2.5	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	32	<10	Yes	16	
EXPLORATORY BOREHOLES													
17BH09	1.7-1.9	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	15	
17BH19	1.7-1.9	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	14	

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Fraction 1 petroleum hydrocarbons (C6-C10) minus benzene, toluene, ethylbenzene and xylene concentrations

[3] - Fraction 4 petroleum hydrocarbons (C34-C50 or >C34) as determined by high temperature gas chromatography

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 2. Soil - Regulated Metals
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Antimony (Sb)	Arsenic (As)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Fusion Barium (Ba) - True Total	Beryllium (Be)	Boron (B) Sat Paste (mg/L)	Cadmium (Cd)	Chromium (Cr) - Total	Hexavalent Chromium (Cr+6)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
CCME Guidelines[1] (mg/kg)			**20**	**12**	**500**	**0**	**0**	**4**	**nc**	**10**	**64**	**0.4**	**50**	**63**	**140**	**6.6**	**10**	**45**	**1**	**20**	**1**	**50**	**23**	**130**	**200**
BACKGROUND CONTROLS																									
17C01	0.8-1.0	10-Feb-17		**14.6**																					98
17C01	1.7-1.9	10-Feb-17		**16.1**																					97
17C01	2.2-2.5	10-Feb-17		**14.1**																					94
17C02	0.8-1.0	10-Feb-17		**13.4**																					
17C02	1.3-1.5	10-Feb-17		**13.7**																					
17C02	1.7-1.9	10-Feb-17		**12.3**																					
WELL CENTRE AREA																									
17BH01	0.8-1.0	10-Feb-17	<0.5	**14.0**	273			0.7	<0.5	<0.5	19.3	<0.3	10.6	19.3	11.9	<0.5	1.6	26.5	0.6	<0.5	<0.5	0.6	1.0	34.2	96
Dup B	0.8-1.0	10-Feb-17	0.5	**14.2**	297			0.7	<0.5	<0.5	19.1	<0.3	10.2	18.7	12.4	<0.5	1.6	26.2	0.6	<0.5	<0.5	<0.5	1.0	34.1	93
17BH01	2.2-2.5	10-Feb-17	<0.5	**13.7**	439			0.7	<0.5	1.1	19.9	<0.3	9.4	18.4	11.7	<0.5	1.5	24.2	0.6	<0.5	<0.5	<0.5	1.1	33.2	**475**
17BH01	4.3-4.5	10-Feb-17																							101
17BH02	2.2-2.5	10-Feb-17																							87
17BH03	2.2-2.5	10-Feb-17																							87
17BH04	2.2-2.5	10-Feb-17																							90
17BH05	2.2-2.5	10-Feb-17																							98

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 3. Soil - Detailed Salinity
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Lab pH (6.0-8.5)[1]	Lab EC (dS/m)	SAR	Saturation %	Soluble Ions						Guideline
							Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO4) mg/kg	
CCME Guidelines[1]					<5								1
EGCSR Guidelines[2]			6-8	<2	<5								2
BACKGROUND CONTROLS													
17C01	0.8-1.0	10-Feb-17	7.04	0.28	0.40	45	5	17	3	<2	<2	19	1,2
17C01	2.8-3.0	10-Feb-17	7.07	0.38	0.97	34	9	15	2	3	2	19	1,2
Dup A	2.8-3.0	10-Feb-17	7.10	0.32	0.84	40	8	16	2	3	2	20	1,2
17C01	4.7-4.9	10-Feb-17	7.79	0.76	**7.70**	62	79	9	2	9	12	148	1,2
17C02	0.3-0.5	10-Feb-17	7.35	0.42	1.47	42	16	14	4	<2	5	47	1,2
17C02	1.7-1.9	10-Feb-17	7.26	0.43	2.97	38	22	8	2	<2	3	40	1,2
17C02	3.2-3.4	10-Feb-17	7.74	0.97	**6.70**	47	72	13	3	10	9	185	1,2
WELL CENTRE AREA													
17BH01	0.8-1.0	10-Feb-17	7.28	0.33	0.81	54	11	19	4	<2	4	42	1,2
Dup B	0.8-1.0	10-Feb-17	7.30	0.34	0.61	54	9	21	4	<2	8	38	1,2
17BH01	2.2-2.5	10-Feb-17	7.31	0.57	2.12	46	26	17	4	2	42	41	1,2
EXPLORATORY BOREHOLES													
17BH09	1.7-1.9	10-Feb-17	7.17	0.41	1.81	56	24	17	4	3	<2	67	1,2
17BH19	1.7-1.9	10-Feb-17	7.38	0.75	**5.39**	52	62	14	3	3	<2	150	1,2

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Environmental Guidelines for Contaminated Site Remediation (EGCSR). 2003

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NA - Not Applicable

NS - Not Specified

Paramount Resources Ltd.

Table 4. Soil - Quality Control - BTEX and Petroleum Hydrocarbons (F1-F4)

Phase 2 Environmental Site Assessment Report A-01

May 2017

Sample ID	Sample Date (dd-mm-yy)	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	Fraction 1 mg/kg	Fraction 2 mg/kg	Fraction 3 mg/kg	Fraction 4 mg/kg	Grain Size 75 µm Sieve
17C01 2.8-3.0	10-Feb-17									32
Dup A 2.8-3.0	10-Feb-17									33
Detection Limit		---	---	---	---	---	---	---	---	1
Difference		---	---	---	---	---	---	---	---	-1
Relative Percent Difference		---	---	---	---	---	---	---	---	-3.08
Duplicate Sample Results		---	---	---	---	---	---	---	---	Good

Sample ID	Sample Date (dd-mm-yy)	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	F1 (C6-C10) mg/kg	F2 (C10-C16) mg/kg	Fraction 3 mg/kg	Fraction 4 mg/kg	Grain Size 75 µm Sieve
17BH01 0.8-1.0	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	49	148	<10	
Dup B 0.8-1.0	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	321	837	24	
Detection Limit		0.005	0.05	0.01	0.05	10	10	10	10	---
Difference		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	-272	-689	#VALUE!	---
Relative Percent Difference		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	-147.03	-139.90	#VALUE!	---
Duplicate Sample Results		---	---	---	---	---	NA	Poor	---	---

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility

Poor - Evaluation indicates poor reproducibility

Blank - Not analyzed

--- - Not applicable

NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 5. Soil - Quality Control - Regulated Metals
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Date	Antimony (An)	Arsenic (As)	Barium (Ba)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Beryllium (Be)	Boron (B)	Cadmium (Cd)	Chromium (Cr) - Total	Chromium (Cr) - Hex.	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thalium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
	(dd-mm-yy)	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
17BH01 0.8-1.0	10-Feb-17	<0.5	**14.0**	273			0.7	<0.5	<0.5	19.3	<0.3	10.6	19.3	11.9	<0.5	1.6	26.5	0.6	<0.5	<0.5	0.6	1.0	34.2	96
Dup B 0.8-1.0	10-Feb-17	0.5	**14.2**	297			0.7	<0.5	<0.5	19.1	<0.3	10.2	18.7	12.4	<0.5	1.6	26.2	0.6	<0.5	<0.5	<0.5	1.0	34.1	93
Detection Limit		0.5	0.5	0.5	---	---	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Difference		#VALUE!	0.2	24	---	---	0	#VALUE!	#VALUE!	-0.2	#VALUE!	-0.4	-0.6	0.5	#VALUE!	0	-0.3	0	#VALUE!	#VALUE!	#VALUE!	0	-0.1	3
Relative Percent Difference		#VALUE!	1.42	8.42	---	---	0.00	#VALUE!	#VALUE!	-1.04	#VALUE!	-3.85	-3.16	4.12	#VALUE!	0.00	-1.14	0.00	#VALUE!	#VALUE!	#VALUE!	0.00	-0.29	3.17
Duplicate Sample Results		---	Good	Good	---	---	---	---	---	Good	---	Good	Good	Good	---	Good	Good	Good	---	---	---	Good	Good	Good

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 6. Soil - Quality Control - Detailed Salinity
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17C01 2.8-3.0	10-Feb-17	7.07	0.38	0.97	9	15	2	3	2	19
Dup A 2.8-3.0	10-Feb-17	7.10	0.32	0.84	8	16	2	3	2	20
Detection Limit		---	0.05	---	2	1	1	2	2	2
Difference		-0.03	0.06	0.13	1	-1	0	0	0	-1
Relative Percent Difference		-0.42	17.14	14.36	11.76	-6.45	0.00	0.00	0.00	-5.13
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	Good	Good	Good

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17BH01 0.8-1.0	10-Feb-17	7.28	0.33	0.81	11	19	4	<2	4	42
Dup B 0.8-1.0	10-Feb-17	7.30	0.34	0.61	9	21	4	<2	8	38
Detection Limit		---	0.01	---	2	1	1	2	2	2
Difference		0	0	0.2	2	2	0	#VALUE!	-4	4
Relative Percent Difference		0.27	2.99	28.17	20.00	10.00	0.00	#VALUE!	-66.67	10.00
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	---	NA	Good

Rev: 17.01.25

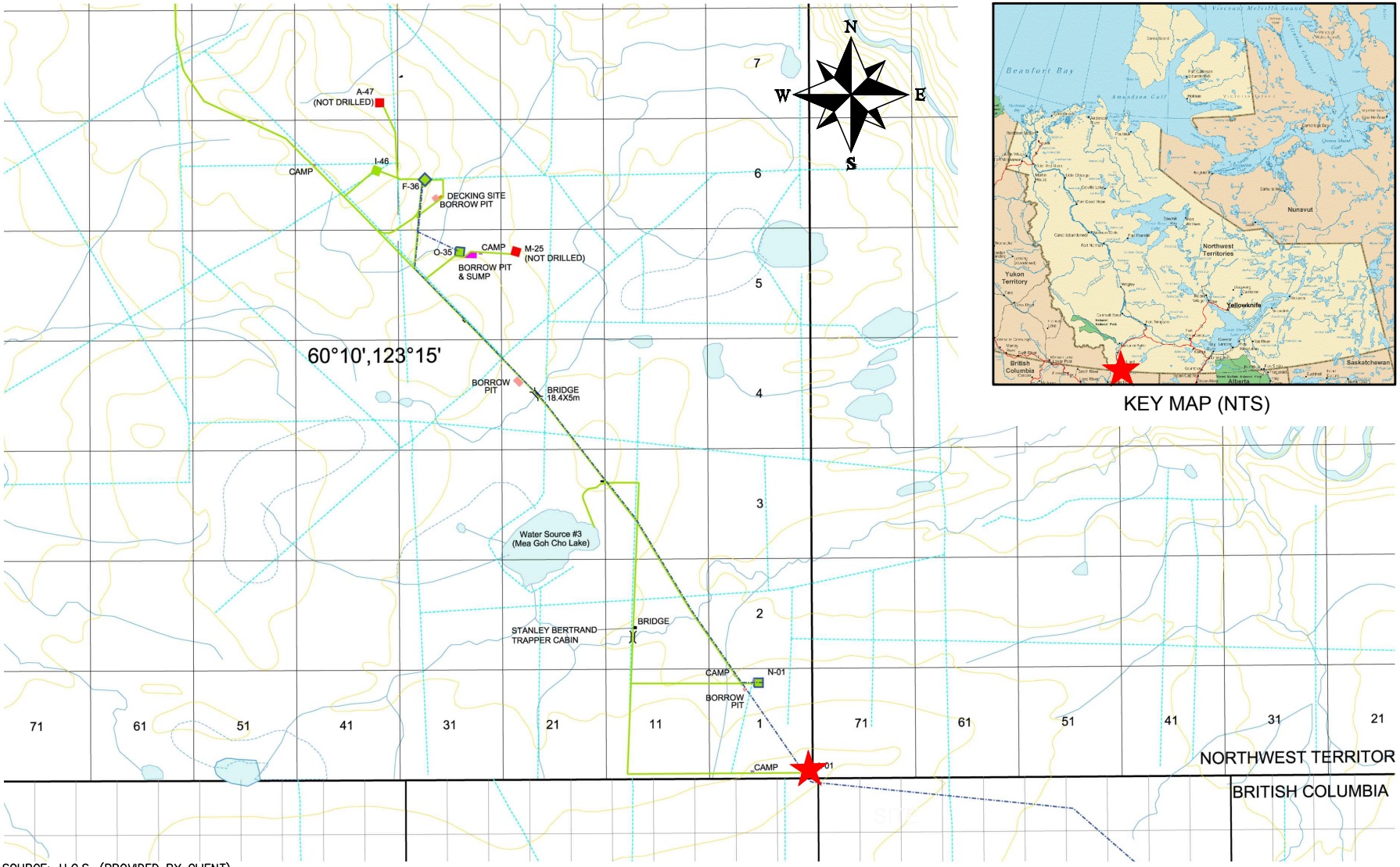
Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply



FIGURES

File: A-01_SLM.dwg Date: March-19-17 2:18:07 PM



KEY MAP (NTS)

SOURCE: U.G.S. (PROVIDED BY CLIENT)

LEGEND

★ SITE LOCATION

0 1000 2000 4000m

Scale 1 : 100 000

NORTH SHORE
Environmental Consultants

Date: 18-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. A-01 (NORTHWEST TERRITORIES)	Figure: 1
File name: A-01_SLM-B.dwg	Requested by: DM		

SITE LOCATION MAP

File: A-01_17PH2.dwg Date: March-18-17 10:22:25 AM



2014 AERIAL PHOTO SOURCE: BING

LEGEND

A-01 WELL CENTRE

NOTES:

LOCATIONS ARE APPROXIMATE.

0 50 100 200m

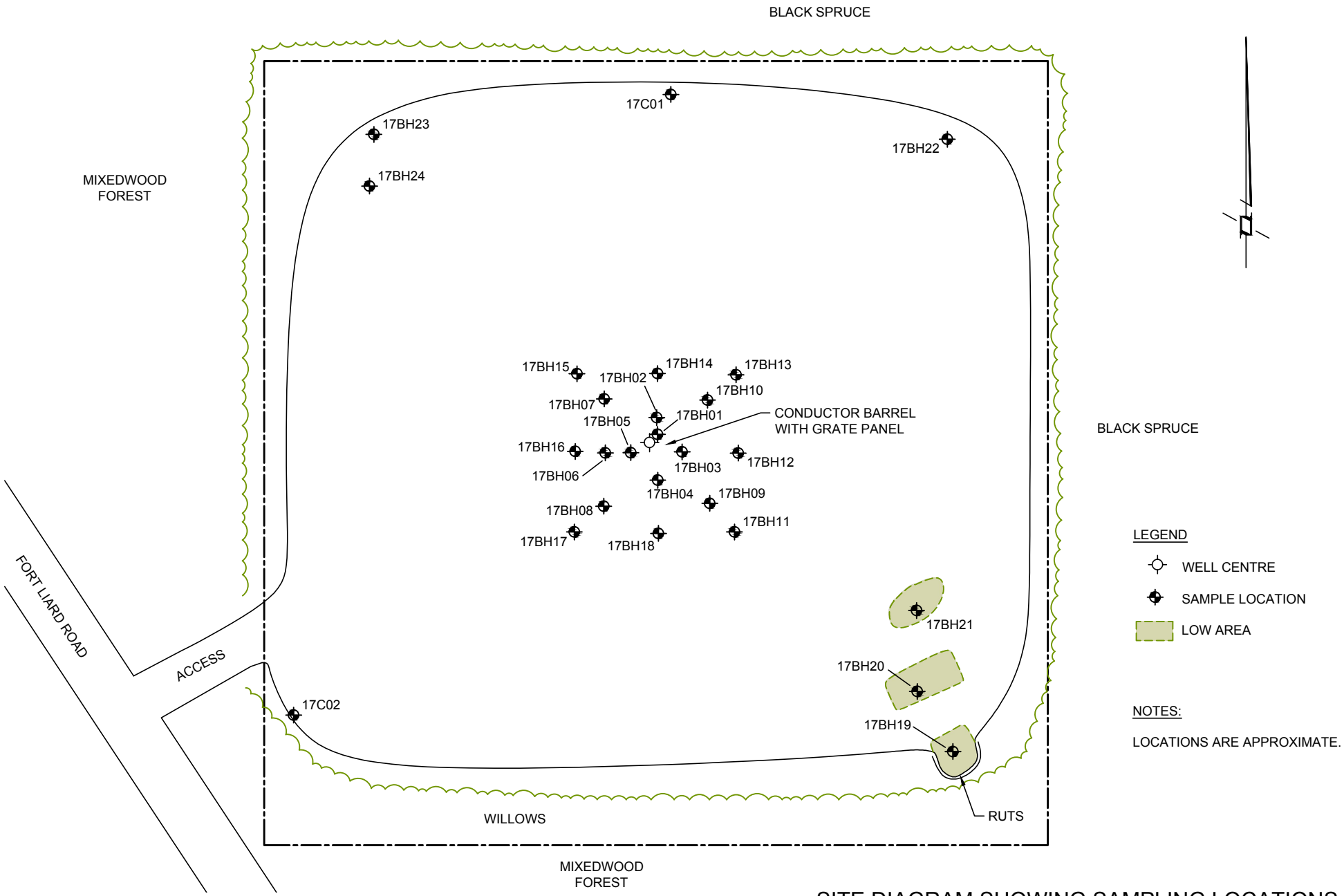
Scale 1 : 5000

AERIAL O□ER□IEW

NORTH SHORE Environmental Consultants

Date: 17-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. A-01 (NORTHWEST TERRITORIES)	Figure: 2
File name: A-01_SLM-A.dwg	Requested by: DM		

File: A-01_17PH2.dwg Date: March-22-17 8:37:17 AM



SITE DIAGRAM SHOWING SAMPLING LOCATIONS

0 10 20 40m

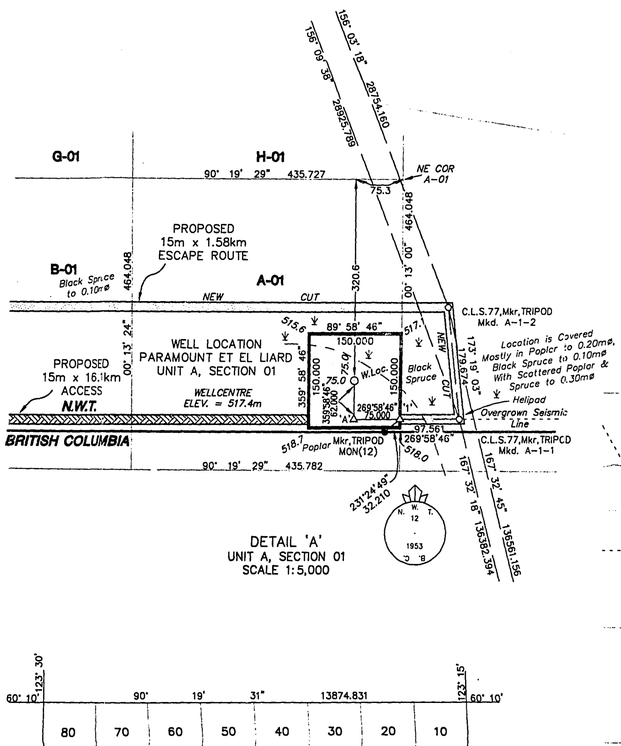
Scale 1 : 1000

NORTH SHORE Environmental Consultants

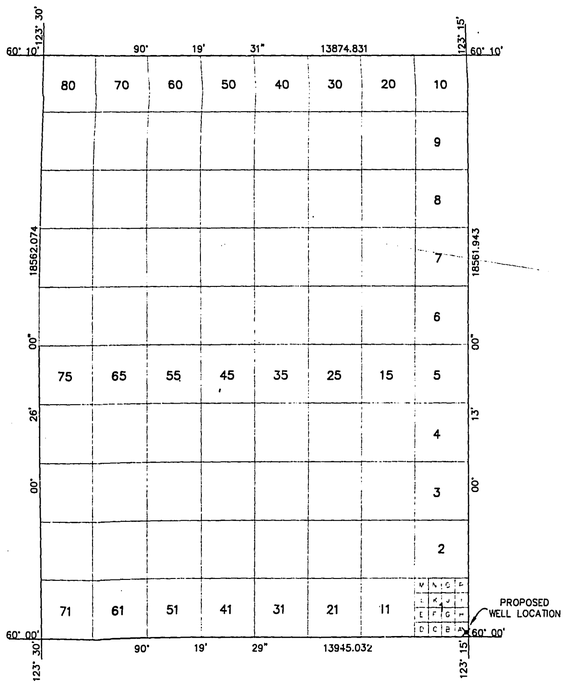
Date: 09-MAY-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. A-01 (NORTHWEST TERRITORIES)	Figure: 3
File name: A-01_17PH2-C.dwg	Requested by: DM		

APPENDIX A

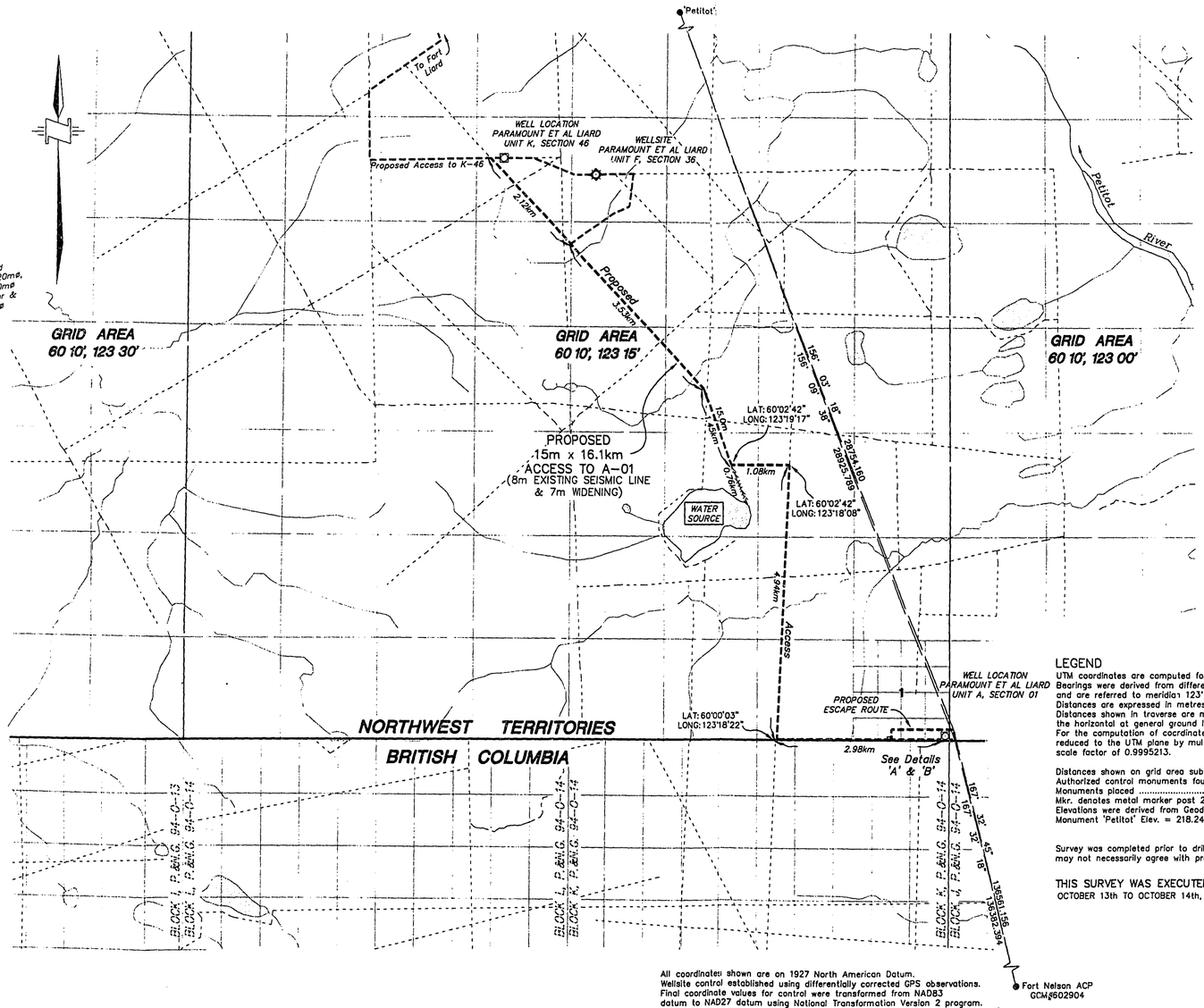
Survey Plan



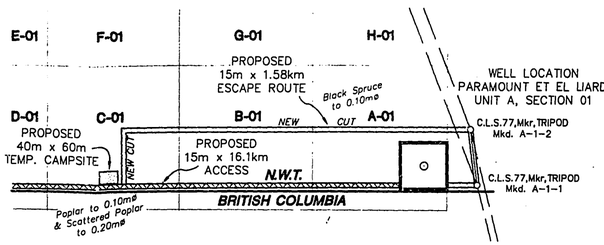
DETAIL 'A'
UNIT A, SECTION 01
SCALE 1:5,000



GRID AREA 60°10', 123°15'
SCALE 1:100,000



All coordinates shown are on 1927 North American Datum.
Wellsite control established using differentially corrected GPS observations. Final coordinate values for control were transformed from NAD83 datum to NAD27 datum using National Transformation Version 2 program. Geodetic Survey of Canada published coordinate values for monument 'Petitot' were held fixed. Adjusted values for Fort Nelson ACP GCM§602904 and comparison to Government of British Columbia published coordinates are shown below.



DETAIL 'B'
SCALE 1:10,000

AREAS REQUIRED:

WELLSITE:	150mx150m = 2.25 ha.
TEMP. CAMPSITE:	40mx60m = 0.24 ha.
ESCAPE ROUTE:	15mx1.58km = 2.37 ha.
ACCESS:	15mx16.1km = 24.2 ha.
TOTAL:	29.06 ha.

REV.No.	DESCRIPTION	DATE

McElhanney

McELHANNEY ASSOCIATES
PROFESSIONAL LAND SURVEYORS
10014 - 97th Ave., Suite 202
Fort St. John, British Columbia
Phone:(250)787-0356, Fax:(250)787-0310

DATE : 98/10/16 JOB No.: 3111-06783WS CW BRC

PLAN AND FIELD NOTES
OF SURVEY OF
PROPOSED EXPLORATORY WELL
PARAMOUNT ET AL FORT LIARD
IN UNIT A, SECTION 01
GRID AREA 60° 10' , 123° 15'
NORTHWEST TERRITORIES
CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50,000
1km 500m 0m 1km 2km 3km 4km

SURVEYED FOR
PARAMOUNT RESOURCES LTD.

BY : W.V. JOHNSON, CLS
OCTOBER, 1998.

LEGEND

UTM coordinates are computed for Zone 10, central meridian 123° W. Bearings were derived from differentially corrected GPS observations and are referred to meridian 123° W.
Distances are expressed in metres and decimals thereof.
Distances shown in traverse are measured distances reduced to the horizontal at general ground level.
For the computation of coordinates measured distances have been reduced to the UTM plane by multiplying them by an average combined scale factor of 0.9995213.

Distances shown on grid area subdivisions are UTM plane.
Authorized control monuments found ..... ●
Monuments placed ..... ○
Mkr. denotes metal marker post 2.0m long placed 0.30m N.
Elevations were derived from Geodetic Survey of Canada Monument 'Petitot' Elev. = 218.241m

Survey was completed prior to drilling; therefore well as drilled may not necessarily agree with proposed location.

THIS SURVEY WAS EXECUTED DURING THE PERIOD OCTOBER 13th TO OCTOBER 14th, 1998. BY W.V. JOHNSON, CLS

I, W.V. Johnson, of the City of Fort St. John, British Columbia, Canada Lands Surveyor, make oath and say that I have in my own proper person, according to law and the instructions of the Surveyor General of Canada Lands, faithfully and correctly executed the survey shown by this plan and field notes, and that the said plan and field notes are correct and true to the best of my knowledge and belief.
SO HELP ME GOD

W.V. Johnson, CLS

Sworn before me at Fort St. John, this 18th day of October, 1998.

R.O. Blackall, CLS

GEOGRAPHIC AND UTM COORDINATES, (1927 NAD)				
Station	Latitude	Longitude	Northings	Eastings
CONTROL MONUMENTS				
Petitot(Publ. & Fixed)	60°14'15.436"	123°27'39.795"	6677758.134	474467.253
Fort Nelson ACP(Adj.)	58°48'19.494"	122°43'49.914"	6518207.419	515569.399
Fort Nelson ACP(Publ.)	58°48'19.493"	122°43'49.968"	6518207.388	515568.539
GRID AREA				
NE	60° 10' 00"	123° 15' 00"	6669782.783	486125.259
NW	60° 10' 00"	123° 30' 00"	6669871.559	472250.651
SE	60° 00' 00"	123° 15' 00"	6651230.973	486055.060
SW	60° 00' 00"	123° 30' 00"	6651310.016	472110.252
A-01, NE	60°00'15.000"	123°15'00.000"	6651695.018	486056.815
A-01, NW	60°00'15.026"	123°15'28.125"	6651697.488	485621.095
A-01, SW	60°00'00.026"	123°15'28.125"	6651233.443	485619.285
A-01, SE	60°00'00.000"	123°15'00.000"	6651230.973	486055.060
TRAVERSE STATIONS				
A-01-1	60°00'02.661"	123°14'53.714"	6651312.924	486152.771
A-01-2	60°00'08.424"	123°14'55.106"	6651491.292	486131.873
TH 'A'	60°00'02.638"	123°15'04.849"	6651312.862	485980.293
TH '1'	60°00'02.648"	123°15'00.007"	6651312.889	486055.257
BC-NWT MON#12	60°00'01.996"	123°15'01.627"	6651292.810	486030.091
PROPOSED WELL				
A-01	60°00'04.641"	123°15'04.862"	6651374.833	485980.270

PARAMOUNT RESOURCES LTD.

WITNESS

Oct 20/98
DATE

MOUNT COTY

MCKAY LAKES

123°30'

60°20',123°15'

60°20',123°00'

STAGING AREA

CAMP

MAINTENANCE YARD

RESIDENCE

BARGE SITE

CAMP SITE

I-02 DECKING SITE

CAMP

BRIDGE 5X15m

FORT LIARD HIGHWAY

Betalamea Lake

Petitot River

FORT LIARD

A-47 (NOT DRILLED)

I-46

CAMP

F-36

DECKING SITE BORROW PIT

123°30'

60°10',123°00'

O-35

CAMP

M-25 (NOT DRILLED)

BORROW PIT & SUMP

60°10',123°15'

BORROW PIT

BRIDGE 18.4X5m

Water Source #3 (Mea Goh Cho Lake)

STANLEY BERTRAND TRAPPER CABIN

BRIDGE

CAMP

N-01

BORROW PIT

CAMP

A-01

NORTHWEST TERRITORIES

BRITISH COLUMBIA

94O13I

94O14L

94O14K

94O14J

94O14I

MAXHAMISH COMPRESSOR

LEGEND

- SEISMIC
- AIRSTRIP - (FOREIGN)
- AIRSTRIP
- PIPELINE R/W
- PIPELINE R/W FOREIGN
- ACCESS ROAD - (FOREIGN)
- WINTER ACCESS ROAD
- ALL SEASON ACCESS ROAD
- CONTOUR
- LEASE - (TIED-IN)
- LEASE - (NOT TIED-IN)
- LEASE - (FOREIGN)
- LEASE - RECLAIMED
- BORROW PIT
- CAMP SITE
- SUMP / PIT
- DECKING SITE
- BATTERY SITE
- OTHER CLEARING
- BRIDGE
- TOWER

SCALE 1:50,000

1250 0 1250 2500 3750 5000 METERS

2500 0 5000 10000 15000 FEET

N

DISCLAIMER: The information contained herein is compiled from various government and industry sources. The Universal Group of Companies and its data suppliers provide no warranty regarding the accuracy or completeness of this information. No liability can be assumed by The Universal Group of Companies or its data suppliers resulting from the use or interpretation of this information, or from any decisions made based on this information.

Paramount resources ltd.

FORT LIARD SOUTH

As-Built June 2009

94O14I (BC P&NG GRID) to

SE1/4 60°20',123°30' (NWT GRID)

REV.	DESCRIPTION	INI.	DATE
3	Updated map title	BPV	03-JUN-09
2	Removed I-03 W/S & updated map title	BPV	12-SEP-07
1	Added Bridge in Sec.12 and Road in Sec.1 & 11.	BPV	05-DEC-06
0	Original construction (from 2005 map)	WGT	13-JUN-06

SPECIFICATIONS	
Datum:	NAD 83
Projection:	UTM
NTS Ref:	95B
Zone:	10
Scale:	1:50 000
C.I.:	100m
Filename:	050399G01_2009
Model:	50K Ft Liard South
Job No:	05-0399G

IMAGERY (Air Photo / Satellite)	
Date:	2000
Type:	1m Orthophoto

PREPARED BY:

UNIVERSAL GEOSYSTEMS U.G.S. SPATIAL INFORMATION SERVICES

Ph:. 262-1336
Fax: 262-1308
www.universalsurveys.com

REV. 3

APPENDIX B

Site Photographs



Photograph 1: View of wellhead.



Photograph 2: Looking north from well centre.



Photograph 3: Looking east from well centre.



Photograph 4: Looking south from well centre.



Photograph 5: Looking west from well centre.



Photograph 6: Minor staining at well centre.

APPENDIX C

Borehole Logs

Borehole Log: 17C01

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0		Organic, black (10YR 2/1), undisturbed	0.00 - 0.20	1	B	
		Hard clay, dark brown (10YR 3/3), massive, 2-5% fine gravel <8mm, undisturbed, mottling and gleying	0.30 - 0.50	2	B	
1			0.80 - 1.00	3	B	M, PS, SAL
			1.30 - 1.50	4	B	
			1.70 - 1.90	5	B	M
2			2.20 - 2.50	6	B	M
		Sandy clay loam, dark gray (10YR 4/1), single-grained, 2-5% fine gravel <8mm, saturated soil from 2.5-4.2m	2.80 - 3.00	7,8	B	PS, SAL
3		Dup A @ 2.8-3.0m	3.20 - 3.40	9	B	
4		Hard clay, gray (10YR 6/1), massive, 2-5% fine gravel <8mm, iron and sand inclusions	4.30 - 4.50	10	B	
			4.70 - 4.90	11	B	PS, SAL
5						
6			5.80 - 6.00	12	B	

VOC Concentration (ppm): 50 100 150 200 250 300 350

LEL (%): 10 20 30 40 50 60 70 80 90

EC Value (dS/m): 1 2 3 4 5 6 7 8 9

Borehole Completion Details: Drill Cuttings

End of Borehole at 6.00 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651622 E: 485856

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 68m North, 2m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17C02

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Silty clay loam, light brown (10YR 6/3), massive, moist, friable, 2-5% fine gravel <8mm	0.00 - 0.20	13	B			
			0.30 - 0.50	14	B	PS, SAL		
		Silty clay loam, brown (10YR 4/3), massive, moist, friable, 2-5% fine gravel <8mm, undisturbed, iron and sand inclusions	0.80 - 1.00	15	B	M		
1			1.30 - 1.50	16	B	M		
			1.70 - 1.90	17	B	M, PS, SAL		
2			2.20 - 2.50	18	B			Drill Cuttings
		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, iron and sand inclusions	2.80 - 3.00	19	B			
3			3.20 - 3.40	20	B	PS, SAL		
4		Silty clay loam, light gray (10YR 7/1), massive, moist, friable, 1-2% fine gravel <8mm	4.30 - 4.50	21	B			

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651513 E: 485874

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 50m South, 69m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH01

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Clay, light brown (10YR 6/3), massive, moist, very firm, 2-5% fine gravel <8mm, 1-2% coarse gravel 8-64mm, iron and sand inclusions	0.00 - 0.20	22	B			
			0.30 - 0.50	23	B			
		Dup B @ 0.8-1.0m	0.80 - 1.00	24,25	B+J	HC, M, SAL		
1			1.30 - 1.50	26	B			
			1.70 - 1.90	27	B			
2		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, 1-2% coarse gravel 8-64mm, undisturbed, sand inclusions	2.20 - 2.50	28	B+J	HC, M, SAL		Drill Cuttings
			2.80 - 3.00	29	B			
3		Silty clay loam, light gray (10YR 7/1), massive, moist, friable, 1-2% coarse gravel 8-64mm, undisturbed, sand inclusions	3.20 - 3.40	30	B			
4			4.30 - 4.50	31	B	M		

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651571 E: 485882

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 3m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH02

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions	0.00 - 0.20	32	B			
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.30 - 0.50	33	B			
0.5								
			0.80 - 1.00	34	B+J			
1.0								
			1.30 - 1.50	35	B			
1.5								Drill Cuttings
			1.70 - 1.90	36	B			
2.0								
			2.20 - 2.50	37	B+J	M		
2.5								
			2.80 - 3.00	38	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651575 E: 485879

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 7m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH03

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20	39	B			
			0.30 - 0.50	40	B			
0.5								
			0.80 - 1.00	41	B+J			
1.0								
			1.30 - 1.50	42	B			
1.5								Drill Cuttings
			1.70 - 1.90	43	B			
2.0								
			2.20 - 2.50	44	B+J	M		
2.5								
			2.80 - 3.00	45	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651571 E: 485889

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 5m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH04

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5								
			0.80 - 1.00	46	B+J			
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50	47	B+J	M		
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651562 E: 485885

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 5m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH05

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Well Centre Area

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
			0.30 - 0.50					
			0.80 - 1.00	48	B+J			
1			1.30 - 1.50					
		Sandy clay loam, greenish gray (10G 5/1), massive, wet, slightly sticky, 1-2% fine gravel <8mm, saturated soil	1.70 - 1.90					
2			2.20 - 2.50	49	B+J	HC, M		Drill Cuttings
		Silty clay loam, gray (10YR 6/1), massive, moist, friable, 2-5% fine gravel <8mm	2.80 - 3.00					
3								
			3.80 - 4.00	50	B+J			
4			4.30 - 4.50					

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651571 E: 485874

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 5m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH06

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
			0.30 - 0.50					
0.5								
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50	51	B+J			
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651562 E: 485870

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 10m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH07

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350	LEL (%) 10 20 30 40 50 60 70 80 90	EC Value (dS/m) 1 2 3 4 5 6 7 8 9	
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm,	0.00 - 0.20							
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.30 - 0.50							
0.5		*Exploratory borehole; no samples obtained	0.80 - 1.00							
1.0										
			1.30 - 1.50							
1.5		Sandy clay loam, light brown (10YR 6/3), single-grained, wet, non-sticky, saturated soil from 1.6-2.4m								Drill Cuttings
			1.70 - 1.90							
2.0										
			2.20 - 2.50							
2.5		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm								
			2.80 - 3.00							
3.0		End of Borehole at 3.00 m.								

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651571 E: 485867

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 10m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH08

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions	0.00 - 0.20					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, iron and sand inclusions						Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651553 E: 485876

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 10m Southwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH09

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
0.5			0.30 - 0.50					
1.0			0.80 - 1.00					
1.5			1.30 - 1.50					Drill Cuttings
2.0		Silty clay loam, light gray (10YR 7/1), massive, moist, friable, 1-2% fine gravel <8mm, undisturbed, iron inclusions	1.70 - 1.90	52	B+J	HC, SAL		
2.5			2.20 - 2.50					
3.0		End of Borehole at 3.00 m.	2.80 - 3.00					

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651563 E: 485897

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 10m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH10

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

Depth (mbgl)	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0.0	Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, disturbed, pad material	0.00 - 0.20			
		0.30 - 0.50			
0.5					
	Organic, black (10YR 2/1)	0.80 - 1.00			
1.0	Silty clay loam, yellow (2.5Y 8/6), massive, moist, friable, 2-5% fine gravel <8mm, undisturbed				
	Hard clay, dark gray (10YR 4/1), massive, moist, firm, 2-5% fine gravel <8mm, undisturbed, sand inclusions	1.30 - 1.50			
1.5	*VOC field screening values not obtained at all sampling depths due to delineation sampling	1.70 - 1.90			
2.0	*Exploratory borehole; no samples obtained				
		2.20 - 2.50			
2.5					
		2.80 - 3.00			
3.0	End of Borehole at 3.00 m.				

SUBSURFACE PROFILE

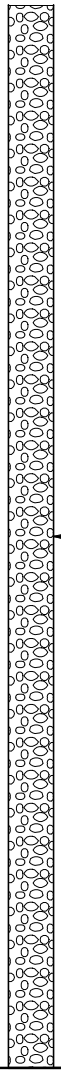
SAMPLE

VOC Concentration (ppm): 50 100 150 200 250 300 350

LEL (%): 10 20 30 40 50 60 70 80 90

EC Value (dS/m): 1 2 3 4 5 6 7 8 9

Borehole Completion Details



Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651582 E: 485889

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 10m Northeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH11

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling *Exploratory borehole; no samples obtained	0.00 - 0.20					
0.5			0.30 - 0.50					
1.0			0.80 - 1.00					
1.5			1.30 - 1.50					Drill Cuttings
2.0			1.70 - 1.90					
2.5			2.20 - 2.50					
3.0		Silty clay loam, light gray (10YR 7/1), massive, moist, friable, 2-5% fine gravel <8mm, undisturbed, silt inclusions	2.80 - 3.00					
		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651561 E: 485905

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 15m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH12

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions	0.00 - 0.20					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, undisturbed	2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651578 E: 485904

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 15m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH13

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, disturbed, pad material	0.00 - 0.20					
			0.30 - 0.50					
0.5		Organic, black (10YR 2/1)	0.80 - 1.00					
1.0		Silty clay loam, yellow (2.5Y 8/6), massive, moist, friable, 2-5% fine gravel <8mm, undisturbed						
		Hard clay, dark gray (10YR 4/1), massive, moist, firm, 2-5% fine gravel <8mm, undisturbed, sand inclusions	1.30 - 1.50					
1.5		*VOC field screening values not obtained at all sampling depths due to delineation sampling	1.70 - 1.90					Drill Cuttings
2.0		*Exploratory borehole; no samples obtained	2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651588 E: 485891

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 15m Northeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH14

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, disturbed, pad material	0.00 - 0.20					
			0.30 - 0.50					
0.5		Organic, black (10YR 2/1)	0.80 - 1.00					
1.0		Silty clay loam, yellow (2.5Y 8/6), massive, moist, friable, 2-5% fine gravel <8mm, undisturbed						
		Hard clay, dark gray (10YR 4/1), massive, moist, firm, 2-5% fine gravel <8mm, undisturbed, sand inclusions	1.30 - 1.50					
1.5		*VOC field screening values not obtained at all sampling depths due to delineation sampling	1.70 - 1.90					Drill Cuttings
2.0		*Exploratory borehole; no samples obtained	2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651585 E: 485876

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 15m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH15

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand and silt inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling *Exploratory borehole; no samples obtained	0.00 - 0.20					
0.5			0.30 - 0.50					
1.0			0.80 - 1.00					
1.5			1.30 - 1.50					Drill Cuttings
2.0			1.70 - 1.90					
2.5			2.20 - 2.50					
3.0			2.80 - 3.00					

End of Borehole at 3.00 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651572 E: 485861

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 15m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH16

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling *Exploratory borehole; no samples obtained	0.00 - 0.20					
0.5			0.30 - 0.50					
1.0			0.80 - 1.00					
1.5			1.30 - 1.50					Drill Cuttings
2.0			1.70 - 1.90					
2.5		Silty clay, light gray (10YR 7/1), massive, moist, friable, 2-5% fine gravel <8mm, sand inclusions	2.20 - 2.50					
3.0			2.80 - 3.00					

End of Borehole at 3.00 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651559 E: 485865

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 15m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH17

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling *Exploratory borehole; no samples obtained	0.00 - 0.20					
0.5			0.30 - 0.50					
1.0			0.80 - 1.00					
1.5			1.30 - 1.50					Drill Cuttings
2.0		Silty clay, light gray (10YR 7/1), massive, moist, friable, 2-5% fine gravel <8mm, sand inclusions	1.70 - 1.90					
2.5			2.20 - 2.50					
3.0		End of Borehole at 3.00 m.	2.80 - 3.00					

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651546 E: 485876

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 15m Southwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH18

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling *Exploratory borehole; no samples obtained	0.00 - 0.20					
0.5			0.30 - 0.50					
1.0			0.80 - 1.00					
1.5			1.30 - 1.50					Drill Cuttings
2.0			1.70 - 1.90					
2.5		Silty clay, light gray (10YR 7/1), massive, moist, friable, 2-5% fine gravel <8mm, sand inclusions	2.20 - 2.50					
3.0		End of Borehole at 3.00 m.	2.80 - 3.00					

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651552 E: 485892

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 15m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH19

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, dark brown (10YR 3/3), massive, moist, very firm,	0.00 - 0.20					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.30 - 0.50					
0.5								
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90	53	B+J	HC, SAL		
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651518 E: 485932

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 57m East, 56m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH20

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, dark brown (10YR 3/3), massive, moist, very firm,	0.00 - 0.20					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651530 E: 485921

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 50m East, 45m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH21

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, dark brown (10YR 3/3), massive, moist, very firm,	0.00 - 0.20					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651548 E: 485920

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 50m East, 30m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH22

Client: Paramount Resources Ltd.

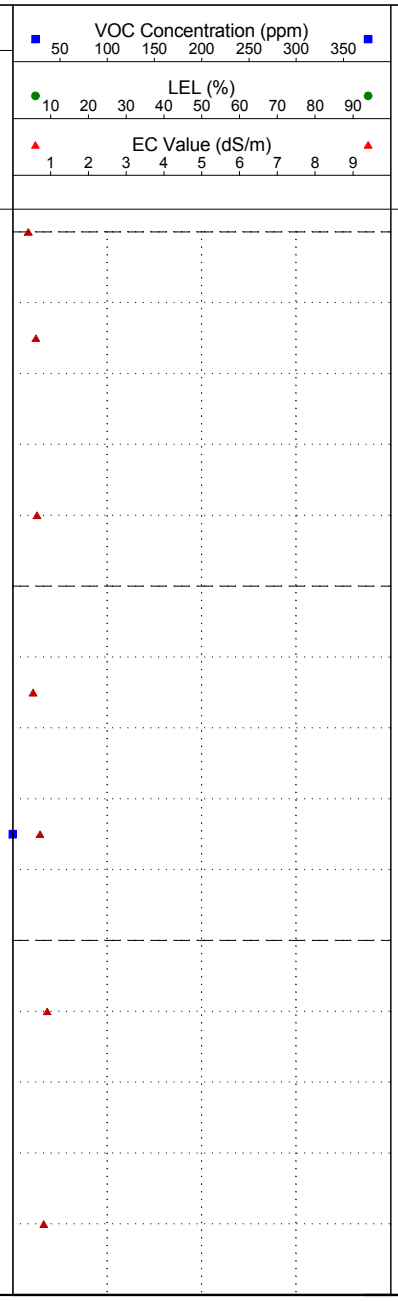
Project: Phase 2 Environmental Site Assessment

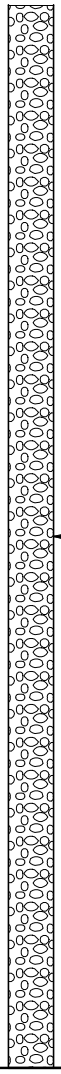
Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

Depth (mbgl)	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0.0	Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, disturbed, pad material	0.00 - 0.20			
		0.30 - 0.50			
0.5					
	Organic, black (10YR 2/1)	0.80 - 1.00			
1.0	Silty clay loam, yellow (2.5Y 8/6), massive, moist, friable, 2-5% fine gravel <8mm, undisturbed				
	Hard clay, dark gray (10YR 4/1), massive, moist, firm, 2-5% fine gravel <8mm, undisturbed, sand inclusions	1.30 - 1.50			
1.5	*VOC field screening values not obtained at all sampling depths due to delineation sampling	1.70 - 1.90			
2.0	*Exploratory borehole; no samples obtained				
		2.20 - 2.50			
2.5					
		2.80 - 3.00			
3.0	End of Borehole at 3.00 m.				





Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651617 E: 485901

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 60m North, 55m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH23

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Silty clay loam, brown (10YR 4/3), massive, moist, friable, 2-5% fine gravel <8mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5		*VOC field screening values not obtained at all sampling depths due to delineation sampling						
		*Exploratory borehole; no samples obtained	0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5		Clay, light gray (10YR 7/1), massive, moist, firm, 2-5% fine gravel <8mm, undisturbed, iron and sand inclusions						Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651610 E: 485841

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 60m North, 55m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH24

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Silty clay loam, brown (10YR 4/3), massive, moist, friable, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling *Exploratory borehole; no samples obtained	0.00 - 0.20					
0.5			0.30 - 0.50					
1.0			0.80 - 1.00					
1.5		Clay, light gray (10YR 7/1), massive, moist, firm, 2-5% fine gravel <8mm, undisturbed, iron and sand inclusions	1.30 - 1.50					Drill Cuttings
2.0			1.70 - 1.90					
2.5			2.20 - 2.50					
3.0		End of Borehole at 3.00 m.	2.80 - 3.00					

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651592 E: 485841

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 50m North, 55m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

APPENDIX D

Laboratory Certificates of Analyses

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: PARAMOUNT RESOURCES LTD
4700, 888 3rd ST SW
CALGARY, AB T2P5C5
(403) 290-3600

ATTENTION TO: Larry Yoon

PROJECT: A-01

AGAT WORK ORDER: 17F187370

SOIL ANALYSIS REVIEWED BY: Melinda Guay, Technical Reviewer

TRACE ORGANICS REVIEWED BY: Ngoc (Ruby) Vu, Lab Technician

DATE REPORTED: Mar 02, 2017

PAGES (INCLUDING COVER): 19

VERSION*: 3

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*NOTES

VERSION 3:Added total arsenic to samples: 366, 367, 368, 355, 357, 358 and total zinc to samples: 355, 357 and 358. Samples: 375, 378 and 396 were re-prepped and re-ran for arsenic and confirmed original values reported no data has been changed. Sample: 378 was re-prepped and re-ran for zinc and confirmed original value reported no data has been changed. Sample: 396 was re-prepped and re-ran for F2-F4 paramaters and confirmed original values reported. No data has been changed - March 2nd 2017 CS.

Version 2 supersedes version 1 issued on March 2nd 2017. Added total zinc to samples: 381, 383, 385, 387 and 390 - March 31st 2017 CS.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)
Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Results relate only to the items tested and to all the items tested
All reportable information as specified by ISO 17025:2005 is available from AGAT Laboratories upon request

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 17F187370

PROJECT: A-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-02

SAMPLE DESCRIPTION:				17BH01 0.8-1.0	17BH01 2.2-2.5	Dup B 0.8-1.0
SAMPLE TYPE:				Soil	Soil	Soil
DATE SAMPLED:				2017-02-10	2017-02-10	2017-02-10
Parameter	Unit	G / S	RDL	8191375	8191378	8191396
Antimony	mg/kg	20	0.5	<0.5	<0.5	0.5
Arsenic	mg/kg	17	0.5	14.0	13.7	14.2
Barium	mg/kg	750	0.5	273	439	297
Beryllium	mg/kg	5	0.5	0.7	0.7	0.7
Boron (Saturated Paste)	mg/L	3.3	0.5	<0.5	<0.5	<0.5
Cadmium	mg/kg	1.4	0.5	<0.5	1.1	<0.5
Chromium	mg/kg	64	0.5	19.3	19.9	19.1
Chromium, Hexavalent	mg/kg	0.4	0.3	<0.3	<0.3	<0.3
Cobalt	mg/kg	20	0.5	10.6	9.4	10.2
Copper	mg/kg	63	0.5	19.3	18.4	18.7
Lead	mg/kg	70	0.5	11.9	11.7	12.4
Mercury	mg/kg	6.6	0.5	<0.5	<0.5	<0.5
Molybdenum	mg/kg	4	0.5	1.6	1.5	1.6
Nickel	mg/kg	45	0.5	26.5	24.2	26.2
Selenium	mg/kg	1	0.5	0.6	0.6	0.6
Silver	mg/kg	20	0.5	<0.5	<0.5	<0.5
Thallium	mg/kg	1	0.5	<0.5	<0.5	<0.5
Tin	mg/kg	5	0.5	0.6	<0.5	<0.5
Uranium	mg/kg	23	0.5	1.0	1.1	1.0
Vanadium	mg/kg	130	0.5	34.2	33.2	34.1
Zinc	mg/kg	200	1	96	475	93

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Alberta Tier 1 - Soil - Agricultural - Fine

8191375-8191396 Results are based on the dry weight of the sample.

Certified By:

Results relate only to the items tested and to all the items tested

AGAT Laboratories

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EDMONTON, ALBERTA
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FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 17F187370

PROJECT: A-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME/ Tier 1 Metals

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-02

SAMPLE DESCRIPTION:				17BH01 4.3-4.5	17BH02 2.2-2.5	17BH03 2.2-2.5	17BH04 2.2-2.5	17BH05 2.2-2.5
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-10	2017-02-10	2017-02-10	2017-02-10	2017-02-10
Parameter	Unit	G / S	RDL	8191381	8191383	8191385	8191387	8191390
Zinc	mg/kg	200	1	101	87	87	90	98

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Alberta Tier 1 - Soil - Agricultural - Fine

8191381-8191390 Results are based on the dry weight of the sample.

Certified By:

Results relate only to the items tested and to all the items tested

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 17F187370

PROJECT: A-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME/ Tier 1 Metals - Arsenic

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-02

SAMPLE DESCRIPTION:				17C02 0.8-1.0	17C02 1.3-1.5	17C02 1.7-1.9
SAMPLE TYPE:				Soil	Soil	Soil
DATE SAMPLED:				2017-02-10	2017-02-10	2017-02-10
Parameter	Unit	G / S	RDL	8191366	8191367	8191368
Arsenic	mg/kg		0.5	13.4	13.7	12.3

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8191366-8191368 Results are based on the dry weight of the sample.

Certified By:

Results relate only to the items tested and to all the items tested

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17F187370

PROJECT: A-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

CCME/ Tier 1 Metals - Arsenic and Zinc

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-02

SAMPLE DESCRIPTION:				17C01 0.8-1.0	17C01 1.7-1.9	17C01 2.2-2.5
SAMPLE TYPE:				Soil	Soil	Soil
DATE SAMPLED:				2017-02-10	2017-02-10	2017-02-10
Parameter	Unit	G / S	RDL	8191355	8191357	8191358
Arsenic	mg/kg		0.5	14.6	16.1	14.1
Zinc	mg/kg		1	98	97	94

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8191355-8191358 Results are based on the dry weight of the sample.

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AGAT WORK ORDER: 17F187370

PROJECT: A-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Particle Size by Sieve

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-02

SAMPLE DESCRIPTION:				17C01 0.8-1.0	17C01 2.8-3.0	17C01 4.7-4.9	17C02 0.3-0.5	17C02 1.7-1.9	17C02 3.2-3.4	Dup A 2.8-3.0
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-10	2017-02-10	2017-02-10	2017-02-10	2017-02-10	2017-02-10	2017-02-10
Parameter	Unit	G / S	RDL	8191355	8191359	8191362	8191365	8191368	8191371	8191395
Sieve Analysis - 75 microns	%		1	21	32	2	20	19	7	33
Sieve Texture				Fine	Fine	Fine	Fine	Fine	Fine	Fine

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8191355-8191395 Value reported is amount of sample retained on a 75 micron sieve after wash with water and represents proportion by weight particles larger than indicated sieve size.

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AGAT WORK ORDER: 17F187370

PROJECT: A-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-02

		SAMPLE DESCRIPTION:		17C01 0.8-1.0	17C01 2.8-3.0	17C01 4.7-4.9	17C02 0.3-0.5	17C02 1.7-1.9	17C02 3.2-3.4	17BH01 0.8-1.0	17BH01 2.2-2.5
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-02-10	2017-02-10	2017-02-10	2017-02-10	2017-02-10	2017-02-10	2017-02-10	2017-02-10
Parameter	Unit	G / S	RDL	8191355	8191359	8191362	8191365	8191368	8191371	8191375	8191378
pH (CaCl2 Extraction)	pH Units		N/A	7.04	7.07	7.79	7.35	7.26	7.74	7.28	7.31
Electrical Conductivity (Sat. Paste)	dS/m		0.05	0.28	0.38	0.76	0.42	0.43	0.97	0.33	0.57
Sodium Adsorption Ratio	N/A			0.40	0.97	7.70	1.47	2.97	6.70	0.81	2.12
Saturation Percentage	%		1	45	34	62	42	38	47	54	46
Chloride, Soluble	mg/L		5	<5	7	19	13	9	20	8	91
Calcium, Soluble	mg/L		1	38	44	14	34	20	28	35	38
Potassium, Soluble	mg/L		2	3	10	15	<2	4	22	2	5
Magnesium, Soluble	mg/L		1	6	6	4	10	6	7	7	9
Sodium, Soluble	mg/L		2	10	26	127	38	59	153	20	56
Sulfate, Soluble	mg/L		2	43	56	238	113	106	394	77	89
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	0	0.0225	0	0	0	0	0
Calcium, Soluble (meq/L)	meq/L		0.05	1.90	2.20	0.70	1.70	1.00	1.40	1.75	1.90
Calcium, Soluble (mg/kg)	mg/kg		1	17	15	9	14	8	13	19	17
Chloride, Soluble (meq/L)	meq/L		0.06	<0.06	0.20	0.54	0.37	0.25	0.56	0.23	2.57
Chloride, Soluble (mg/kg)	mg/kg		2	<2	2	12	5	3	9	4	42
Magnesium, Soluble (meq/L)	meq/L		0.08	0.49	0.49	0.33	0.82	0.49	0.58	0.58	0.74
Magnesium, Soluble (mg/kg)	mg/kg		1	3	2	2	4	2	3	4	4
Potassium, Soluble (meq/L)	meq/L		0.05	0.08	0.26	0.38	<0.05	0.10	0.56	0.05	0.13
Potassium, Soluble (mg/kg)	mg/kg		2	<2	3	9	<2	<2	10	<2	2
Sodium, Soluble (meq/L)	meq/L		0.09	0.43	1.13	5.52	1.65	2.57	6.66	0.87	2.44
Sodium, Soluble (mg/kg)	mg/kg		2	5	9	79	16	22	72	11	26
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	0.90	1.17	4.96	2.35	2.21	8.20	1.60	1.85
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	19	19	148	47	40	185	42	41

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Certificate of Analysis

AGAT WORK ORDER: 17F187370

PROJECT: A-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-02

SAMPLE DESCRIPTION:				17BH09 1.7-1.9	17BH19 1.7-1.9	Dup A 2.8-3.0	Dup B 0.8-1.0
SAMPLE TYPE:				Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-10	2017-02-10	2017-02-10	2017-02-10
Parameter	Unit	G / S	RDL	8191393	8191394	8191395	8191396
pH (CaCl2 Extraction)	pH Units		N/A	7.17	7.38	7.10	7.30
Electrical Conductivity (Sat. Paste)	dS/m		0.05	0.41	0.75	0.32	0.34
Sodium Adsorption Ratio	N/A			1.81	5.39	0.84	0.61
Saturation Percentage	%		1	56	52	40	54
Chloride, Soluble	mg/L		5	<5	<5	5	15
Calcium, Soluble	mg/L		1	31	27	39	39
Potassium, Soluble	mg/L		2	5	5	8	<2
Magnesium, Soluble	mg/L		1	7	6	5	8
Sodium, Soluble	mg/L		2	43	119	21	16
Sulfate, Soluble	mg/L		2	119	289	50	70
Theoretical Gypsum Requirement	tonnes/ha		N/A	0	0	0	0
Calcium, Soluble (meq/L)	meq/L		0.05	1.55	1.35	1.95	1.95
Calcium, Soluble (mg/kg)	mg/kg		1	17	14	16	21
Chloride, Soluble (meq/L)	meq/L		0.06	<0.06	<0.06	0.14	0.42
Chloride, Soluble (mg/kg)	mg/kg		2	<2	<2	2	8
Magnesium, Soluble (meq/L)	meq/L		0.08	0.58	0.49	0.41	0.66
Magnesium, Soluble (mg/kg)	mg/kg		1	4	3	2	4
Potassium, Soluble (meq/L)	meq/L		0.05	0.13	0.13	0.20	<0.05
Potassium, Soluble (mg/kg)	mg/kg		2	3	3	3	<2
Sodium, Soluble (meq/L)	meq/L		0.09	1.87	5.18	0.91	0.70
Sodium, Soluble (mg/kg)	mg/kg		2	24	62	8	9
Sulfur (as Sulfate), Soluble (meq/L)	meq/L		0.04	2.48	6.02	1.04	1.46
Sulfur (as Sulfate), Soluble (mg/kg)	mg/kg		2	67	150	20	38

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8191355-8191396 If sodium results in mg/L are less than detection, SAR is non-calculable and is reported as 0.
Sodium Adsorption Ratio is a calculated parameter. The calculated value is the ratio of the sodium concentration in mmol/L over the square rooted sum of the calcium and magnesium concentrations in mmol/L.
Theoretical Gypsum Requirement is a calculated parameter. The calculation is from “A Comparison of Methods for Gypsum Requirement of Brine-Contaminated Soils”, Canadian Journal of Soil Science, 1998.

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AGAT WORK ORDER: 17F187370

PROJECT: A-01

CLIENT NAME: PARAMOUNT RESOURCES LTD

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)

DATE RECEIVED: 2017-02-15

DATE REPORTED: 2017-03-02

SAMPLE DESCRIPTION:				17BH01 0.8-1.0	17BH01 2.2-2.5	17BH05 2.2-2.5	17BH09 1.7-1.9	17BH19 1.7-1.9	Dup B 0.8-1.0
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				2017-02-10	2017-02-10	2017-02-10	2017-02-10	2017-02-10	2017-02-10
Parameter	Unit	G / S	RDL	8191375	8191378	8191390	8191393	8191394	8191396
Benzene	mg/kg		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg		0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
C6 - C10 (F1)	mg/kg		10	<10	<10	<10	<10	<10	<10
C6 - C10 (F1 minus BTEX)	mg/kg		10	<10	<10	<10	<10	<10	<10
C10 - C16 (F2)	mg/kg		10	49	93	<10	<10	<10	321
C16 - C34 (F3)	mg/kg		10	148	278	32	<10	<10	837
C34 - C50 (F4)	mg/kg		10	<10	<10	<10	<10	<10	24
Gravimetric Heavy Hydrocarbons	mg/kg		1000	NA	NA	NA	NA	NA	NA
Moisture Content	%		1	15	15	16	15	14	19
Surrogate	Unit	Acceptable Limits							
Toluene-d8 (BTEX)	%	50-150		101	83	100	102	77	102
Ethylbenzene-d10 (BTEX)	%	50-150		64	69	74	78	78	84
o-Terphenyl (F2-F4)	%	50-150		95	98	97	98	98	103

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8191375-8191396 Results are based on the dry weight of the sample.
The C6-C10 (F1) fraction is calculated using toluene response factor.
The C10 - C16 (F2), C16 - C34 (F3), and C34 - C50 (F4) fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons (F4g) are not included in and cannot be added to the Total C6-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
Total C6 - C50 results are corrected for BTEX and PAH contributions (if requested).
Quality control data is available upon request.
Assistance in the interpretation of data is available upon request.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
The chromatogram returned to baseline by the retention time of nC50.
Extraction and holding times were met for this sample.
C6 –C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylenes + o-Xylene.

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17F187370

PROJECT: A-01

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Mar 02, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Soil Analysis - Salinity (AB Tier 1 - pH Calcium Chloride)															
pH (CaCl2 Extraction)	47	8191359	7.07	7.07	0.0%	N/A	99%	90%	110%						
Electrical Conductivity (Sat. Paste)	47	8191359	0.38	0.36	5.4%	< 0.05	90%	90%	110%						
Saturation Percentage	47	8191359	34	38	11.1%	< 1	88%	80%	120%						
Chloride, Soluble	1806	8191359	7	6	NA	< 5	106%	80%	120%				101%	80%	120%
Calcium, Soluble	47	8191359	44	42	4.7%	< 1	88%	80%	120%				100%	80%	120%
Potassium, Soluble	47	8191359	10	9	NA	< 2	90%	80%	120%				95%	80%	120%
Magnesium, Soluble	47	8191359	6	5	18.2%	< 1	80%	80%	120%				89%	80%	120%
Sodium, Soluble	47	8191359	26	25	3.9%	< 2	88%	80%	120%				90%	80%	120%
Sulfate, Soluble	47	8191359	56	51	9.3%	< 2	101%	80%	120%				105%	80%	120%
Particle Size by Sieve															
Sieve Analysis - 75 microns	47	8193744	37	35	3.2%	< 1	111%	80%	120%						
CCME / Tier 1 Metals + Hg + Boron (Sat Paste) + Cr6 (soil)															
Antimony	47	8191375	<0.5	<0.5	NA	< 0.5	96%	80%	120%				96%	80%	120%
Arsenic	47	8191375	14.0	14.2	1.4%	< 0.5	93%	80%	120%				109%	80%	120%
Barium	47	8191375	273	284	3.9%	< 0.5	95%	80%	120%				102%	80%	120%
Beryllium	47	8191375	0.7	0.8	NA	< 0.5	118%	80%	120%				120%	80%	120%
Boron (Saturated Paste)	47	8191359	<0.5	<0.5	NA	< 0.5	115%	80%	120%				100%	80%	120%
Cadmium	47	8191375	<0.5	<0.5	NA	< 0.5	100%	80%	120%				99%	80%	120%
Chromium	47	8191375	19.3	19.6	1.5%	< 0.5	99%	80%	120%				113%	80%	120%
Chromium, Hexavalent	47	8191375	<0.3	<0.3	NA	< 0.3	89%	80%	120%				81%	80%	120%
Cobalt	47	8191375	10.6	10.6	0.0%	< 0.5	99%	80%	120%				102%	80%	120%
Copper	47	8191375	19.3	18.7	3.2%	< 0.5	97%	80%	120%				103%	80%	120%
Lead	47	8191375	11.9	12.2	2.5%	< 0.5	100%	80%	120%				105%	80%	120%
Mercury	47	8191375	<0.5	<0.5	NA	< 0.5	104%	80%	120%				102%	80%	120%
Molybdenum	47	8191375	1.6	1.6	NA	< 0.5	102%	80%	120%				107%	80%	120%
Nickel	47	8191375	26.5	26.3	0.8%	< 0.5	97%	80%	120%				101%	80%	120%
Selenium	47	8191375	0.6	0.6	NA	< 0.5	104%	80%	120%				102%	80%	120%
Silver	47	8191375	<0.5	<0.5	NA	< 0.5	100%	80%	120%				98%	80%	120%
Thallium	47	8191375	<0.5	<0.5	NA	< 0.5	97%	80%	120%				96%	80%	120%
Tin	47	8191375	0.6	<0.5	NA	< 0.5	101%	80%	120%				100%	80%	120%
Uranium	47	8191375	1.0	1.0	NA	< 0.5	105%	80%	120%				110%	80%	120%
Vanadium	47	8191375	34.2	35.6	4.0%	< 0.5	100%	80%	120%				110%	80%	120%
Zinc	47	8191375	96	90	6.5%	< 1	97%	80%	120%				101%	80%	120%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated
If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17F187370

PROJECT: A-01

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Soil Analysis (Continued)

RPT Date: Mar 02, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
CCME/ Tier 1 Metals - Arsenic															
Arsenic	61	8191355	14.6	16.4	11.6%	< 0.5	88%	80%	120%				92%	80%	120%
CCME/ Tier 1 Metals - Arsenic and Zinc															
Arsenic	61	8191355	14.6	16.4	11.7%	< 0.5	88%	80%	120%				92%	80%	120%
Zinc	61	8191355	98	98	0.0%	< 1	102%	80%	120%				98%	80%	120%
CCME/ Tier 1 Metals															
Zinc	87	8271937	31	28	10.2%	< 1	99%	80%	120%				109%	80%	120%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

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Quality Assurance

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17F187370

PROJECT: A-01

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Mar 02, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Petroleum Hydrocarbons (BTEX/F1-F4) in Soil (CWS)															
Benzene	1176	8191147	<0.005	<0.005	NA	< 0.005	114%	80%	120%	93%	80%	120%	114%	60%	140%
Toluene	1176	8191147	<0.05	<0.05	NA	< 0.05	90%	80%	120%	89%	80%	120%	109%	60%	140%
Ethylbenzene	1176	8191147	<0.01	<0.01	NA	< 0.01	94%	80%	120%	100%	80%	120%	120%	60%	140%
Xylenes	1176	8191147	<0.05	<0.05	NA	< 0.05	93%	80%	120%	81%	80%	120%	91%	60%	140%
C6 - C10 (F1)	1176	8191147	<10	<10	NA	< 10	88%	80%	120%	89%	80%	120%	91%	60%	140%
C10 - C16 (F2)	1030	8191147	< 10	< 10	NA	< 10	96%	80%	120%	102%	80%	120%	103%	60%	140%
C16 - C34 (F3)	1030	8191147	11	< 10	NA	< 10	100%	80%	120%	98%	80%	120%	98%	60%	140%
C34 - C50 (F4)	1030	8191147	< 10	< 10	NA	< 10	100%	80%	120%	80%	80%	120%	76%	60%	140%
Moisture Content	1030	8191147	12	13	8.0%	< 1									

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By:

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Results relate only to the items tested and to all the items tested

AGAT Laboratories

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Method Summary

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17F187370

PROJECT: A-01

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Arsenic	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Barium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Beryllium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Boron (Saturated Paste)	INOR-171-6002, 171-6201	CARTER & GREGORICH 2007	ICP/OES
Cadmium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Chromium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP/MS
Chromium, Hexavalent	INOR-171-6215	ASA 20-4.3; REISENAUER 1982	SPECTROPHOTOMETER
Cobalt	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Copper	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Lead	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Mercury	INOR-171-6006, -6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Molybdenum	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Nickel	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Selenium	INORG-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Silver	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Thallium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Tin	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Uranium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Vanadium	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Zinc	INOR-171-6006, INOR-171-6202	EPA SW 846-3050; SM 3125 B	ICP-MS
Sieve Analysis - 75 microns	INOR-171-6009	KROETSCH 2007; SHEPPARD 2007	SIEVE
pH (CaCl2 Extraction)	INOR-171-6207	SHEPPARD 2007; HENDERSHOT 2008	PH METER
Electrical Conductivity (Sat. Paste)	INO-171-6206	SHEPPARD 2007; MILLER 2007	CONDUCTIVITY METER
Sodium Adsorption Ratio	INOR-171-6201 & INOR-171-6002	McKeague 3.26	CALCULATION
Saturation Percentage	SOIL 0140; SOIL 0110; SOIL 0120	MILLER 2007; SHEPPARD 2007	GRAVIMETRIC
Chloride, Soluble			COLORIMETER
Calcium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Potassium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Magnesium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES

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Method Summary

CLIENT NAME: PARAMOUNT RESOURCES LTD

AGAT WORK ORDER: 17F187370

PROJECT: A-01

ATTENTION TO: Larry Yoon

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Sodium, Soluble	INOR-171-6201	CARTER & GREGORICH 2007, SM 3120B	ICP/OES
Sulfate, Soluble	INOR-171-6201 & INOR-171-6002	SHEPPARD 2007; EATON 2005; MILLER 2007, SM 3120B	ICP/OES
Theoretical Gypsum Requirement	SOIL 0260	USDA HDBK 60, 22D	N/A
Trace Organics Analysis			
Benzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Toluene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Xylenes	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
C6 - C10 (F1)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C6 - C10 (F1 minus BTEX)	ORG-170-5110/5140/5430/5440	CCME Tier 1 Method-S L	GC/FID
C10 - C16 (F2)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C16 - C34 (F3)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
C34 - C50 (F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Gravimetric Heavy Hydrocarbons	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID
Moisture Content	LAB-175-4002	CCME Tier 1 Method-S %	GRAVIMETRIC
Toluene-d8 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
Ethylbenzene-d10 (BTEX)	ORG-170-5110/5140/5430/5440	EPA SW-846 8260-S	GC/MS
o-Terphenyl (F2-F4)	ORG-170-5120/5300	CCME Tier 1 Method-S H	GC/FID

Results relate only to the items tested and to all the items tested

Desktop Remediation Report

PARA ET AL FORT LIARD
A-01-60-10-123-15
South Liard Field
WID# 1858

Prepared for:
Paramount Resources Ltd

SYNERGYASPEN PROJECT No. PAR6208

July 29, 2021



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II. Historical Borehole Logs and Drawings
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1. INTRODUCTION

At the request of Paramount Resources Limited (Paramount), SynergyAspen completed a Desktop Remediation™ (DTR) review of historical environmental site assessment information and data for the Paramount former wellsite *PARA ET AL* A-01-60-10-123-15 (the Site). The Site is in the South Liard field in the Northwest Territories.

The scope of work for the DTR involved reviewing and assessing available analytical data for the Site in order to determine the applicability of the receptor pathways at the Site. The only area of environmental concern (AEC) identified in the 2017 Phase 2 ESA for the Site was the wellbore area. The AEC information is presented in Section 5 of this report, along with the associated contaminants of concern (COCs) and relevant regulatory guideline information.

2. CURRENT SITE DESCRIPTION

The Site is a drilled and abandoned well, it was drilled to a depth of 2,046 meters between February 9 and March 19, 1999, in the South Liard field, approximately 60 kilometres (km) southwest of Fort Liard, Northwest Territories (NT). The Site location is presented on Drawing PAR6208-001.

The Site is approximately 150m x 150m, with a 40m x 60m campsite west along the access road. Site details and surrounding land uses are shown on Drawing PAR6208-002, and PAR6208-003. Table A, below, summarizes general information regarding the Site's location, topography, hydrogeology, and surrounding land uses.

TABLE A: Summary of General Information

Item	Description
Site Latitude & Longitude	60° 00' 04.30" N, 123° 15' 11.00" W
NTS Map	A-01 - 60°-00'-123°-15'
Well ID #	1858
Land Owner(s)	Crown
Drilling Dates	February 9 to March 19, 1999
Total Depth	2046 m
Site Description & Size	Site dimensions are approximately 150 m x 150 m, square aligned to the north, with access from the southwest.
Site Facilities	Wellhead was located at the centre of the Site;
Topography:	
Regional Surface Grade	The regional grade is gently sloping north (0-1%) towards the Liard River
On Site Drainage	The lease slopes northeast (0-1%) towards a low area northeast
Surface Cover	The Site is covered in grass vegetation. The forest is encroaching at the margins of the lease.
Geology	Bedrock geology consists of Wapiti Formation which is comprised fine clastic sedimentary rocks, Conglomerate, fine to coarse grained sandstone; carbonaceous shale and coal from cretaceous geological period [BCGS online map resource].
Hydrology & Hydrogeology:	
Nearest Surface Water	Government of NWT ATLAS website shows no water bodies within 500 m of the Site.
Water Wells	Government of NWT ATLAS website shows no water wells within 500 m of the Site (Appendix III).
Depth to Groundwater	Unknown
Groundwater Flow	Unknown but likely to the north towards the unnamed tributary of the Liard River
Surrounding Land Use (Site)	
North	Mixed wood forest to the northwest, and low muskeg area to the northeast

Item	Description
East	Mixed wood Boreal Forest
South	Mixed wood Boreal Forest
West	Access seismic line and mixed wood Boreal Forest

3. HISTORICAL REVIEW

The scope of this report included a review of available historical environmental site assessment (ESA) information for the Site. Findings from the review of the available reports are summarized below.

3.1 Phase 1 ESA - 2017

North Shore Environmental Consultants Inc. (North Shore) completed a Phase 1 ESA on the Site, published in March of 2017. The Phase 1 ESA indicated the well was a drilled and abandoned well from 1999, with a wellhead, conductor barrel and grate panel as the only structures present at the time of assessment. Based on Compliance Option #2 checklist, the drilling waste disposal area required assessment for exceeding the salt-loading and post-disposal oil concentration, and lack of documentation for the disposal of invert drilling fluid used in the well (North Shore, 2017a).

3.2 Phase 2 ESA - 2017

North Shore completed a Phase 2 ESA on the Site, published in May of 2017. The Phase 2 ESA investigated the wellbore and the drilling waste disposal area (DWDA) at the Site, and consisted of advancing 26 boreholes at the Site to a maximum depth of 6.0 meters below ground (mbg). Analytical results of soil samples collected during the Phase 2 ESA were compared to the following guidelines for the respective parameters: Canadian Council of Ministers of the Environment (CCME) 2017 Tier 1 Soil Remediation Guidelines for hydrocarbons; the 2016 Alberta Tier 1 Soil and Groundwater Remediation Guidelines for boron and methanol; and the 2003 Northwest Territories Environmental Guidelines for Contaminated Site Remediation for pH and salinity parameters (North Shore, 2017b). Results from the Phase 2 ESA showed elevated salinity and arsenic across the Site, comparable to background levels. Results from one duplicate soil sample collected from the wellbore area at a depth of 0.8-1.0 mbg, had a Fraction 2 petroleum hydrocarbon (F2 PHC) concentration above the applicable CCME guideline for the Site; as well, one soil sample collected from a depth of 2.2-2.5mbg from the same borehole advanced at the wellbore had a zinc concentration above the CCME guideline (North Shore, 2017b). The conclusion from the Phase 2 ESA was two soil samples collected from near the wellbore at the Site did not meet the applicable guidelines for F2 PHC and zinc, with the zinc exceedance delineated (North Shore, 2017b). Soil samples collected from the DWDA had concentrations of all parameters of concern below the applicable guidelines.

4. SUMMARY OF SITE SOIL CONDITIONS

Based on a review of historical reports, SynergyAspen developed a list of AECs for the Site. The AECs, along with contaminants of concern (COCs) and associated regulated parameters, are shown on Table B below. The AECs and their locations are shown in Drawing PAR6208-003, in the Drawings Appendix.

TABLE B: AECs and associated COCs in Soil

AEC Label	AECs	Impacted Borehole(s)	COCs (depth)
A	Wellbore	17BH01	Fraction 2 petroleum hydrocarbons (0.8-1.0mbg); Zinc (2.2-2.5mbg)

Soil Stratigraphy

There were two background boreholes advanced at the Site in the North Shore 2017 Phase 2 ESA. Soil stratigraphy at background borehole 17C01 was topsoil and hard clay to 2.5mbg, overlying sandy clay-loam to 4.2mbg, and hard clay to 6.0mbg, the total depth of assessment. In background borehole 17C02, the stratigraphy was described as silty-clay loam to 2.6mbg, overlying had clay to 4.0mbg, overlying sily-clay loam, to 4.5mbg, the total depth of assessment. The stratigraphy at the wellbore APEC was determined in 3 boreholes 17BH02, 17BH03, and 17BH04, and was described as clay to 3.0 mbg, the maximum depth of assessment. In 17BH01, the soil profile was described as clay to 2.2mbg, overlying hard clay to 3.0mbg, and silty-clay loam to 4.5mbg; in 17BH05, the soil profile is shown as clay to 1.4mbg, overlying sandy-clay loam to 2.6mbg, and silty-clay loam to 4.5mbg, the maximum depth of assessment.

Hydrogeology

Seven soil samples collected at varying depths from the background boreholes were analyzed for grain size analysis, by sieve. The sieve method provides the percentage split between coarse and fine-grained material based on retention on a 75µm mesh screen sieve. The grain size analysis results ranged from 2% to 33% retention on the sieve, indicating that fine-grained material was dominant at the Site (North Shore, 2017b).

The shallow subsurface regional geology of the area north of Maxhamish Lake was reviewed through borehole logs from Phase 2 ESAs completed at four sites in the region. The borehole logs were from sites located respectively approximately 7200m south, 6000m south-southwest, 2600m southwest, and 3400m east-southeast of the A-01 Site. The borehole logs from the following sites were reviewed:

- PARA ET AL MAXHAMISH B- 21-K/094-O-14 (WA#03717) (North Shore, 2017c)
- PARA ET AL MAXHAMISH B- 043-K/094-O-14 (WA#12563) (North Shore, 2017d)
- PARA ET AL MAXHAMISH B- 083-K/094-O-14 (WA#13773) (North Shore, 2017e)
- PARA ET AL MAXHAMISH A-96-J/094-O-14 (WA#13772) (North Shore, 2017f)

Soil stratigraphy at the b-21-K/94-O-14 site was topsoil and silty-clay overlying clay subsurface. Delineation boreholes around the site showed clay overlying hard clay, with minor occurrences of sandy loam. Hydraulic conductivity testing was completed at the site from 3 groundwater monitoring wells installed during the Phase 2 ESA: hydraulic conductivity values ranged from $1.0x10^{-9}$ meters per second (m/s) to $2.0x10^{-10}$ m/s, as expected from the soil type at the site (2017c).

The soil profile at background locations at the b-043-K site showed loam surface soil to 0.2m, overlying clay-loam soil to approximately 3.0mbg, followed by silty-clay-loam to 4.5mbg, and silty-loam to 6.0mbg. All samples from various depths submitted for grain-size analysis through sieve analysis showed fine-grained soils dominant in the soil profile at the site (North Shore, 2017d).

The borehole logs from background locations at the b-083-K and A-96-J sites showed consistent profiles with loam surface soil to 0.2mbg, followed by clay to approximately 3.0 mbg, overlying “hard clay” to 6.0mbg, the maximum depth of investigation; a layer of silty-clay was noted in one borehole from the a-069-J site. A sand layer was noted in one borehole from 2.4-2.8 mbg at the b-083-K site. All samples submitted for grain-size analysis through sieve analysis from both sites showed fine-grained soils dominant in the soil profile at the sites (North Shore, 2017e,f). Copies of the reviewed borehole logs and figures are provided in Appendix I and II.

From the Phase 2 ESA for the Site and hydraulic conductivity information the region, there was a sufficient minimum confining layer present between the Site and a deeper regional aquifer. Hydraulic conductivity values of the deeper soils at the Site would be expected to be low due to the hard clay soil at the Site. Therefore, drinking water (DW) standards would not apply at the Site within the shallow soils, but would apply in the deeper aquifer unit, if present. At the time of the assessments there were no water wells or residences within 500m of the Site.

5. ENVIRONMENTAL REGULATORY FRAMEWORK

Numerical soil standards for evaluating the results of the Phase 2 ESA were based on the CCME 2018 Canadian Environmental Soil Quality Guidelines (the CESQ), and the Northwest Territories Environmental Guidelines for Contaminated Site Remediation (the Environmental Guidelines) (Minister of the Environment and Natural Resources [ENR], 2003). The selection of applicable guideline limits in both documents are dependent upon site conditions, applicable receptors at a site, and relevant exposure pathways. From the land use definitions and soil depth considerations in the guideline documents, the following criteria were used to evaluate the 2017 Phase 2 ESA results for the Site:

- Residential / Parkland land use (RES) for surface soil, samples from 0.0 to 1.5 mbg;
- Residential / Parkland land use (RES) for sub-surface soil, samples from >1.5 mbg.

For assessment of the available data for the A-01 Site, the *Tier 1 – Criteria-Based Approach* described in the Environmental Guidelines was used to determine the applicable guidelines for PHC concentration limits, and the CESQ guidelines were used to determine the applicable zinc concentration limits for the Site.

For the evaluation of receptors and pathways related to groundwater protection, water use determination considered proximity to potable water and aquatic receptors, current and potential future use of groundwater aquifers as water sources, and the potential for groundwater extraction based on the low hydraulic conductivity of the shallow soils. From the Site information in Section 2, there were no groundwater wells, water bodies, or residences within 500m of the Site. Based on the rationale in Section 4 regarding low hydraulic conductivity due to fine-grained soil at the Site, and the lack of water bodies, water wells, or residences in the vicinity, the Protection of Potable Groundwater, Protection of Freshwater Aquatic Life, and Protection of Livestock Watering pathways would not be operative at the Site.

The following receptor pathways were determined to be applicable at the Site:

For Analytical Results from Soil Samples <1.5mbg:

- Direct Contact; and,
- Ecological Soil Contact.

For Analytical Results from Soil Samples >1.5mbg:

- Ecological Soil Contact; and,
- Nutrient and Energy Cycling check.

5.1 Guideline Derivation

From the evaluation of receptor pathways at the Site, the Protection of Potable Groundwater pathway was not applicable at the Site. Therefore, the guideline limit for F2 PHC in fine-grained surface soil was determined to be 900 milligrams per kilogram (mg/kg), based on the ENR *Tier 1 Criteria-Based Approach*.

The applicable guideline limit for zinc in fine-grained sub-surface soil in residential land use was determined to be the 2018 CCME Human Direct Contact limit of 10,000 mg/kg. The limit is based on the depth of the zinc exceedance at 2.2-2.5mbg, which is:

- Below the usual root zone of rooting plants, therefore outside the Nutrient Cycling pathway (350 mg/kg);
- Below the depth at which Soil Contact (200 mg/kg) would reasonably be considered to occur without mechanical excavation.

6. COMPARISON OF DATA

Based on the 2017 Phase 2 ESA, soil analytical results were compared to the applicable guideline limits with respect to the operative receptor pathways at the Site. The ENR *Tier 1 Criteria-Based Approach* was considered for the Site by excluding Protection of Potable Water, Protection of Aquatic Life, and Livestock Watering pathways. Table C shows the current applicable soil guideline for surface soil, and the change in the guideline limit based on the operative receptor pathways at the Site:

TABLE C: Surface Soil Quality Guidelines applicable at the Site (mg/kg)

Parameter	ENR (< 1.5m)	Analytical Results (mg/kg)	Tier 1 Level (mg/kg)*	Pass / Fail
F2 PHC	150	321	900	Pass

*Tier 1 Criteria- Based Approach

Table D below shows the current applicable soil guideline for surface soil, and the change in the guideline limit based on the operative receptor pathways at the Site:

TABLE D: Subsurface Soil Quality Guidelines applicable at the Site (mg/kg)

Parameter	ENR (> 1.5mbg)	Analytical Results (mg/kg)	CCME Removed Pathways**	Pass / Fail
Zinc	200	475	10,000	Pass

**excluding Environmental Soil Contact and Nutrient Cycling.

Based on the above results comparing historic soil data to site-specific standards, the impacts as noted in 2017 were below the guideline limits applicable at the Site. Further discussion is included in the next section.

7. RESULTS AND CONCLUSIONS

Single exceedances for F2 PHC and Zinc were noted in 2 samples from 17BH01, at the Wellbore at the Site. Analytical soil data from the 2017 North Shore Phase 2 ESA were compared to the current ENR and CCME guidelines applicable to the Site. A discussion of the results is presented below.

7.1 Soil Results

7.1.1 Fraction 2 PHC

There was a single F2 PHC exceedance in a duplicate sample from 17BH01, with a concentration of 321mg/kg, from 0.8-1.0mbg at the Well Center. The original sample from 17BH01 was identified with a F2 PHC concentration below the standard, contrasted to the duplicate sample with an F2 PHC exceedance. The difference in results is likely due to sample heterogeneity.

Comparing the results to the ENR guideline for PHC in surface soils, with the Protection of Groundwater pathway removed, the sample result was below the surface soil guideline of 900mg/kg. Therefore, the result did not present a risk to groundwater receptors at the Site.

Additionally, If there was a spill or release leading to the single exceedance for F2 PHC, contamination from other chemicals would be expected, including other hydrocarbon constituents, sodium and/or chloride. As no other contaminants of concern were encountered in the sample, it was unlikely that the elevated F2 concentration at the Well Center was the result of a spill or release.

Based on the above rationale, the minimal F2 impact at Well Center did not pose a risk to receptors at the Site.

7.1.2 Zinc

There was a single soil sample that had an exceedance for Zinc, with a concentration of 475mg/kg, from 2.2-2.5mbg at the Well Center. Comparing the results to the CCME guideline for Zinc in subsurface soils, with the Soil Contact and Nutrient Cycling pathways for Environmental Health removed due to the depth of the sample, the result was below the Human Health Direct Contact guideline of 10,000mg/kg, applicable at the Site.

Referring to fact sheets and guidance from the CCME and ENR, a discussion regarding application of guidelines for Zinc with respect to the site-specific conditions follows:

- The Site is not currently occupied by humans and the Site is unlikely to be occupied by humans in the future. While the zinc concentration in one soil sample at the Well Center was above the guideline limit for Environmental Soil Contact and Nutrient Cycling, the depth of the impact at 2.2-2.5mbg was below the rooting depth for plants, and at a depth that would require mechanical excavation to expose the impacted soil.

- The mobility of zinc is dependent mainly on the pH of the soil at the Site. For all samples, the pH at the Site was above 7.0, under which conditions Zinc will tend to stay adsorbed to soil colloids, and leaching of Zinc from soil is prevented. Therefore, the zinc in soil at the Site would be unable to migrate a significant distance from the Site. In order to pose a potential risk to freshwater aquatic life, zinc at the Site would have to migrate to the nearest surface water body: a potential stream, located > 500 m of the Site. Considering the low-permeability silts and clays in the area, and the associated low hydraulic conductivity values ranging from 1.0x10-9 meters per second (m/s) to 2.0x10-10 m/s, the migration of adsorbed zinc would not reasonably be expected to pose a risk to the aquatic receptor.

- The Site is in a remote setting where access is limited to helicopter transport or winter roads, and identifies with Industrial land uses, over Residential/Parkland. Toddlers or the public are not expected on a regular basis at the Site, in contrast to the models for guideline development for residential/parkland areas.

- If removal of the single elevated Zinc exceedance was undertaken, the heavy equipment used to excavate the soil would likely cause significant impacts to the conditions at the Site compared to the low risk to the environment that may be imposed by the metals remaining in-situ.

- Elevated zinc concentration were not identified in other samples across the Site. Besides, Zinc mud additives were not noted in the mud list.

- No other elevated concentrations of metals, hydrocarbons or salinity parameters were encountered in this sample.

- Further rationale includes that if there was a spill or release leading to the single exceedance for Zinc, contamination in soil from other chemicals, including other hydrocarbon constituents, sodium or chloride, would be expected. Therefore it was unlikely that the elevated Zinc concentration at the Well Center was the result of a spill or release.

Further rationale includes that if there was a spill or release leading to the single exceedance for Zinc, contamination in soil from other chemicals, including other hydrocarbon constituents, sodium or chloride, would be expected. Therefore, it was unlikely that the elevated Zinc concentration at the Wellbore was the result of a spill or release.

Based on the above rationale, the single Zinc exceedance detected in one subsurface soil sample from the Well Center at the Site does not pose a risk to human and ecological receptors at the Site.

7.2 Conclusions

Based on a comparison of results from the 2017 Stage 2 PSI and 2019 Groundwater Monitoring by North Shore, the historic data showed results were below the ENR and CCME guidelines applicable at the Site.

As a result of the evaluation of the historic data, all sample results met the guidelines applicable to the Site. Therefore, no further environmental work is required at the Site prior to submission of the report to the ENR.

8. CLOSURE

Thank you for the opportunity to conduct the work presented herein. If you have any questions or comments, please do not hesitate to contact the undersigned at 250-785-1030.

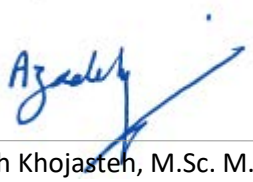
Respectfully Submitted,

SYNERGYASPEN ENVIRONMENTAL INC.

Written By:

Jason Richl, B.Sc.
Environmental Client Manager

Reviewed by:



Azadeh Khojasteh, M.Sc. M.Eng.
Environmental Project Manager



Adrian Renneberg, M.Sc.
Environmental Client Manager

9. REFERENCES

Canadian Council of Ministers of the Environment (CCME). 2018. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health: Zinc. In: Canadian Environmental Quality Guidelines. 8pp. Online: http://ceqg-rcqe.ccme.ca/download/en/359/ Accessed February 15, 2021.

Minister of the Environment and Natural Resources (ENR). 2003 Environmental Guidelines for Contaminated Site Remediation. Government of the Northwest Territories. November, 2003. 39pp.

North Shore Environmental Consultants Limited (North Shore). 2017a. Paramount Resources Ltd. Para et al Fort Liard A-01 ˚10' 123˚ 15'. Phase 1 Environmental Site Assessment – March 2017. March [], 2017. 35pp.

North Shore. 2017b. Paramount Resources Ltd. Para et al Fort Liard A-01 60˚10' 123˚ 15'. Phase 2 Environmental Site Assessment – May 2017. May 16, 2017. 75pp.

North Shore. 2017c. Paramount Resources Limited. 200/B-21-K/94-O-14 Stage II Preliminary Site Investigation – November 2017. November 28, 2017. 237pp.

North Shore. 2017d. Paramount Resources Limited. 200/B-43-K/94-O-14 Stage II Preliminary Site Investigation – May 2017. May 24, 2017. 114pp.

North Shore. 2017e. Paramount Resources Limited. 200/B-83-K/94-O-14 Stage II Preliminary Site Investigation – May 2017. May 30, 2017. 115pp.

North Shore. 2017f. Paramount Resources Limited. 200/A-69-J/94-O-14 Stage II Preliminary Site Investigation – March 2017. March 31, 2017. 93pp.

10. USER RELIANCE AND GENERAL LIMITATIONS

10.1 User Reliance

SynergyAspen Environmental Inc. (SynergyAspen) prepared this report for the sole use of Paramount Resources Limited (the Client). The Client was privy to the establishment of this project's scope and is aware of its terms and conditions.

Should the Client submit this report to a regulatory authority, the regulatory authority may rely on the results within the context of the document's General Limitations for the purpose of determining whether the Client is meeting (has met) its requirements concerning applicable environmental regulations.

Third party reliance is subject to the scope of work agreed upon by SynergyAspen and the Client and is only suitable within the limitations of the project/document. The activities detailed herein were performed for the Client and this document may not be appropriate for the purposes of a relying party. Application of this document for aims beyond those practically intended by the Client and SynergyAspen is at the exclusive risk of the user. SynergyAspen does not accept legal responsibility for any damages toward any third party as a result of the application, use of, or any conclusion drawn based on this report.

As far as the nature of these investigative activities involves professional opinion, SynergyAspen offers no assurance that the results contained herein support a particular course of action. The investigative activities may have included the application of judgment to scientific principles; hence certain results of this work may be based on subjective interpretation. Professional opinions expressed herein are derived from the specifics currently available within the confines of the existing information, scope of work, budget, and schedule.

10.2 General Limitations

The results and conclusions herein were developed according to the degree of care and skill generally exercised by contemporary environmental professionals within similar conditions and localities. The findings herein are somewhat reliant upon information provided by others. If any of the information is erroneous, amendments to the results, conclusions, and recommendations may be required.

The results, conclusions and recommendations SynergyAspen presents herein represent SynergyAspen's best professional judgement according to the site conditions and on available information during preparation of this report. They were determined explicitly for this site and are somewhat reliant upon visual observation of the site, subsurface investigation at specific locations and depths, and select analysis of specific materials (as detailed herein).

While this assessment has attempted to identify all areas of potential environmental concern at the Site, it is possible that other areas of potential environmental concern may have escaped detection due to imprecise government records, undocumented historical environmental accidents, or other undocumented activities that resulted in contamination.

TABLES

- Table 1. 2017 Stage 2 PSI Analytical Results Summary (North Shore, 2017a)
- North Shore 2017 Soil Analytical Results Summary Tables
- North Shore 2019 Groundwater Results Summary Tables

Paramount Resources Ltd.
Table 1. Soil - BTEX, Petroleum Hydrocarbons (F1-F4) and Grain Size
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	BTEX and PHC (F1-F4)										
			Benzene	Toluene	Ethylbenzene	Total Xylenes	Fraction 1[2]	Fraction 2	Fraction 3	Fraction 4[3]	Chrom. returned to baseline	% Moisture	Grain Size 75 µm Sieve
CCME Surface Soil Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**150**	**1300**	**5600**	**NC**	**NC**	**NC**
CCME Subsurface Soils Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**230**	**3500**	**10000**	**NC**	**NC**	**NC**
BACKGROUND CONTROLS													
17C01	0.8-1.0	10-Feb-17											Fine (21)
17C01	2.8-3.0	10-Feb-17											Fine (32)
Dup A	2.8-3.0	10-Feb-17											Fine (33)
17C01	4.7-4.9	10-Feb-17											Fine (2)
17C02	0.3-0.5	10-Feb-17											Fine (20)
17C02	1.7-1.9	10-Feb-17											Fine (19)
17C02	3.2-3.4	10-Feb-17											Fine (7)
WELL CENTRE AREA													
17BH01	0.8-1.0	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	49	148	<10	Yes	15	
Dup B	0.8-1.0	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	**321**	837	24	Yes	19	
17BH01	2.2-2.5	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	93	278	<10	Yes	15	
17BH05	2.2-2.5	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	32	<10	Yes	16	
EXPLORATORY BOREHOLES													
17BH09	1.7-1.9	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	15	
17BH19	1.7-1.9	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	14	

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Fraction 1 petroleum hydrocarbons (C6-C10) minus benzene, toluene, ethylbenzene and xylene concentrations

[3] - Fraction 4 petroleum hydrocarbons (C34-C50 or >C34) as determined by high temperature gas chromatography

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 2. Soil - Regulated Metals
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Antimony (Sb)	Arsenic (As)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Fusion Barium (Ba) - True Total	Beryllium (Be)	Boron (B) Sat Paste (mg/L)	Cadmium (Cd)	Chromium (Cr) - Total	Hexavalent Chromium (Cr+6)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
CCME Guidelines[1] (mg/kg)			**20**	**12**	**500**	**0**	**0**	**4**	**nc**	**10**	**64**	**0.4**	**50**	**63**	**140**	**6.6**	**10**	**45**	**1**	**20**	**1**	**50**	**23**	**130**	**200**
BACKGROUND CONTROLS																									
17C01	0.8-1.0	10-Feb-17		**14.6**																					98
17C01	1.7-1.9	10-Feb-17		**16.1**																					97
17C01	2.2-2.5	10-Feb-17		**14.1**																					94
17C02	0.8-1.0	10-Feb-17		**13.4**																					
17C02	1.3-1.5	10-Feb-17		**13.7**																					
17C02	1.7-1.9	10-Feb-17		**12.3**																					
WELL CENTRE AREA																									
17BH01	0.8-1.0	10-Feb-17	<0.5	**14.0**	273			0.7	<0.5	<0.5	19.3	<0.3	10.6	19.3	11.9	<0.5	1.6	26.5	0.6	<0.5	<0.5	0.6	1.0	34.2	96
Dup B	0.8-1.0	10-Feb-17	0.5	**14.2**	297			0.7	<0.5	<0.5	19.1	<0.3	10.2	18.7	12.4	<0.5	1.6	26.2	0.6	<0.5	<0.5	<0.5	1.0	34.1	93
17BH01	2.2-2.5	10-Feb-17	<0.5	**13.7**	439			0.7	<0.5	1.1	19.9	<0.3	9.4	18.4	11.7	<0.5	1.5	24.2	0.6	<0.5	<0.5	<0.5	1.1	33.2	**475**
17BH01	4.3-4.5	10-Feb-17																							101
17BH02	2.2-2.5	10-Feb-17																							87
17BH03	2.2-2.5	10-Feb-17																							87
17BH04	2.2-2.5	10-Feb-17																							90
17BH05	2.2-2.5	10-Feb-17																							98

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 3. Soil - Detailed Salinity
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Lab pH (6.0-8.5)[1]	Lab EC (dS/m)	SAR	Saturation %	Soluble Ions						Guideline
							Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO4) mg/kg	
CCME Guidelines[1]					<5								1
EGCSR Guidelines[2]			6-8	<2	<5								2
BACKGROUND CONTROLS													
17C01	0.8-1.0	10-Feb-17	7.04	0.28	0.40	45	5	17	3	<2	<2	19	1,2
17C01	2.8-3.0	10-Feb-17	7.07	0.38	0.97	34	9	15	2	3	2	19	1,2
Dup A	2.8-3.0	10-Feb-17	7.10	0.32	0.84	40	8	16	2	3	2	20	1,2
17C01	4.7-4.9	10-Feb-17	7.79	0.76	**7.70**	62	79	9	2	9	12	148	1,2
17C02	0.3-0.5	10-Feb-17	7.35	0.42	1.47	42	16	14	4	<2	5	47	1,2
17C02	1.7-1.9	10-Feb-17	7.26	0.43	2.97	38	22	8	2	<2	3	40	1,2
17C02	3.2-3.4	10-Feb-17	7.74	0.97	**6.70**	47	72	13	3	10	9	185	1,2
WELL CENTRE AREA													
17BH01	0.8-1.0	10-Feb-17	7.28	0.33	0.81	54	11	19	4	<2	4	42	1,2
Dup B	0.8-1.0	10-Feb-17	7.30	0.34	0.61	54	9	21	4	<2	8	38	1,2
17BH01	2.2-2.5	10-Feb-17	7.31	0.57	2.12	46	26	17	4	2	42	41	1,2
EXPLORATORY BOREHOLES													
17BH09	1.7-1.9	10-Feb-17	7.17	0.41	1.81	56	24	17	4	3	<2	67	1,2
17BH19	1.7-1.9	10-Feb-17	7.38	0.75	**5.39**	52	62	14	3	3	<2	150	1,2

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Environmental Guidelines for Contaminated Site Remediation (EGCSR). 2003

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NA - Not Applicable

NS - Not Specified

Paramount Resources Ltd.
Table 4. Soil - Quality Control - BTEX and Petroleum Hydrocarbons (F1-F4)
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Date (dd-mm-yy)	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	Fraction 1 mg/kg	Fraction 2 mg/kg	Fraction 3 mg/kg	Fraction 4 mg/kg	Grain Size 75 µm Sieve
17C01 2.8-3.0	10-Feb-17									32
Dup A 2.8-3.0	10-Feb-17									33
Detection Limit		---	---	---	---	---	---	---	---	1
Difference		---	---	---	---	---	---	---	---	-1
Relative Percent Difference		---	---	---	---	---	---	---	---	-3.08
Duplicate Sample Results		---	---	---	---	---	---	---	---	Good

Sample ID	Sample Date (dd-mm-yy)	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	F1 (C6-C10) mg/kg	F2 (C10-C16) mg/kg	Fraction 3 mg/kg	Fraction 4 mg/kg	Grain Size 75 µm Sieve
17BH01 0.8-1.0	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	49	148	<10	
Dup B 0.8-1.0	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	321	837	24	
Detection Limit		0.005	0.05	0.01	0.05	10	10	10	10	---
Difference		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	-272	-689	#VALUE!	---
Relative Percent Difference		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	-147.03	-139.90	#VALUE!	---
Duplicate Sample Results		---	---	---	---	---	NA	Poor	---	---

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 5. Soil - Quality Control - Regulated Metals
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Date (dd-mm-yy)	Antimony (An) mg/kg	Arsenic (As) mg/kg	Barium (Ba) mg/kg	Barium (Ba) - Total mg/kg	Extractable Barium (Ex Ba) mg/kg	Beryllium (Be) mg/kg	Boron (B) mg/kg	Cadmium (Cd) mg/kg	Chromium (Cr) - Total mg/kg	Chromium (Cr) - Hex. mg/kg	Cobalt (Co) mg/kg	Copper (Cu) mg/kg	Lead (Pb) mg/kg	Mercury (Hg) mg/kg	Molybdenum (Mo) mg/kg	Nickel (Ni) mg/kg	Selenium (Se) mg/kg	Silver (Ag) mg/kg	Thalium (Tl) mg/kg	Tin (Sn) mg/kg	Uranium (U) mg/kg	Vanadium (V) mg/kg	Zinc (Zn) mg/kg
17BH01 0.8-1.0	10-Feb-17	<0.5	**14.0**	273			0.7	<0.5	<0.5	19.3	<0.3	10.6	19.3	11.9	<0.5	1.6	26.5	0.6	<0.5	<0.5	0.6	1.0	34.2	96
Dup B 0.8-1.0	10-Feb-17	0.5	**14.2**	297			0.7	<0.5	<0.5	19.1	<0.3	10.2	18.7	12.4	<0.5	1.6	26.2	0.6	<0.5	<0.5	<0.5	1.0	34.1	93
Detection Limit		0.5	0.5	0.5	---	---	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Difference		#VALUE!	0.2	24	---	---	0	#VALUE!	#VALUE!	-0.2	#VALUE!	-0.4	-0.6	0.5	#VALUE!	0	-0.3	0	#VALUE!	#VALUE!	#VALUE!	0	-0.1	3
Relative Percent Difference		#VALUE!	1.42	8.42	---	---	0.00	#VALUE!	#VALUE!	-1.04	#VALUE!	-3.85	-3.16	4.12	#VALUE!	0.00	-1.14	0.00	#VALUE!	#VALUE!	#VALUE!	0.00	-0.29	3.17
Duplicate Sample Results		---	Good	Good	---	---	---	---	---	Good	---	Good	Good	Good	---	Good	Good	Good	---	---	---	Good	Good	Good

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 6. Soil - Quality Control - Detailed Salinity
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17C01 2.8-3.0	10-Feb-17	7.07	0.38	0.97	9	15	2	3	2	19
Dup A 2.8-3.0	10-Feb-17	7.10	0.32	0.84	8	16	2	3	2	20
Detection Limit		---	0.05	---	2	1	1	2	2	2
Difference		-0.03	0.06	0.13	1	-1	0	0	0	-1
Relative Percent Difference		-0.42	17.14	14.36	11.76	-6.45	0.00	0.00	0.00	-5.13
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	Good	Good	Good

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17BH01 0.8-1.0	10-Feb-17	7.28	0.33	0.81	11	19	4	<2	4	42
Dup B 0.8-1.0	10-Feb-17	7.30	0.34	0.61	9	21	4	<2	8	38
Detection Limit		---	0.01	---	2	1	1	2	2	2
Difference		0	0	0.2	2	2	0	#VALUE!	-4	4
Relative Percent Difference		0.27	2.99	28.17	20.00	10.00	0.00	#VALUE!	-66.67	10.00
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	---	NA	Good

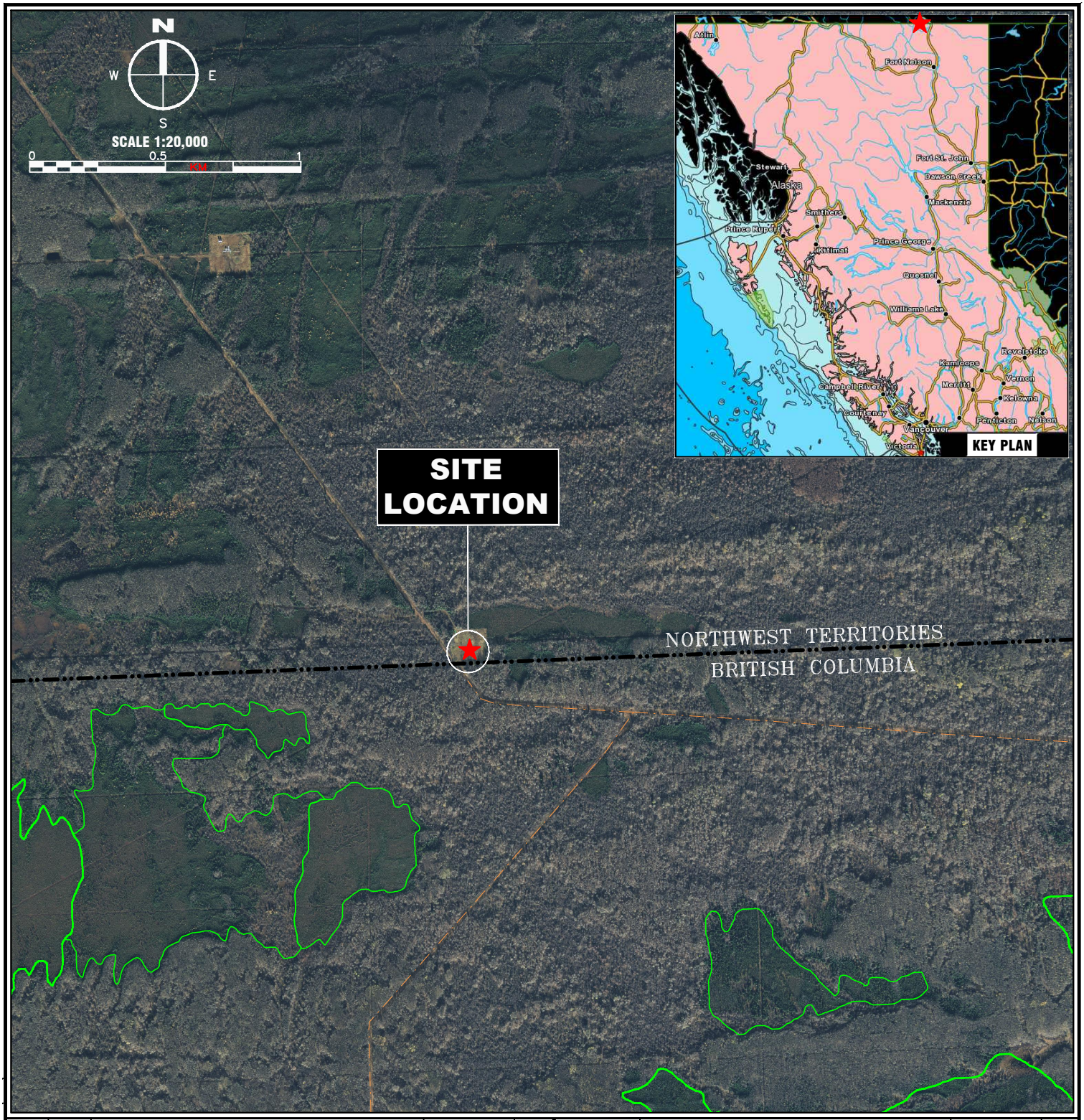
Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

DRAWINGS

- PAR6208-001 – Site Location Plan
- PAR6208-002 – Site Plan
- PAR6208-003 –Areas of Potential Environmental Concern
- Wellsite Survey



CHK	BY	REVISION DESCRIPTION	DATE	REV.
JR	TW	ISSUED TO CLIENT	–	–
–	–	–	–	–

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
–	–	–	–
–	–	–	–

LEGEND

- DRAINAGE LINE
- ROADS
- WETLAND/MUSKEG
- OIL AND GAS WELLS
- A-01 wellsite

NOTES

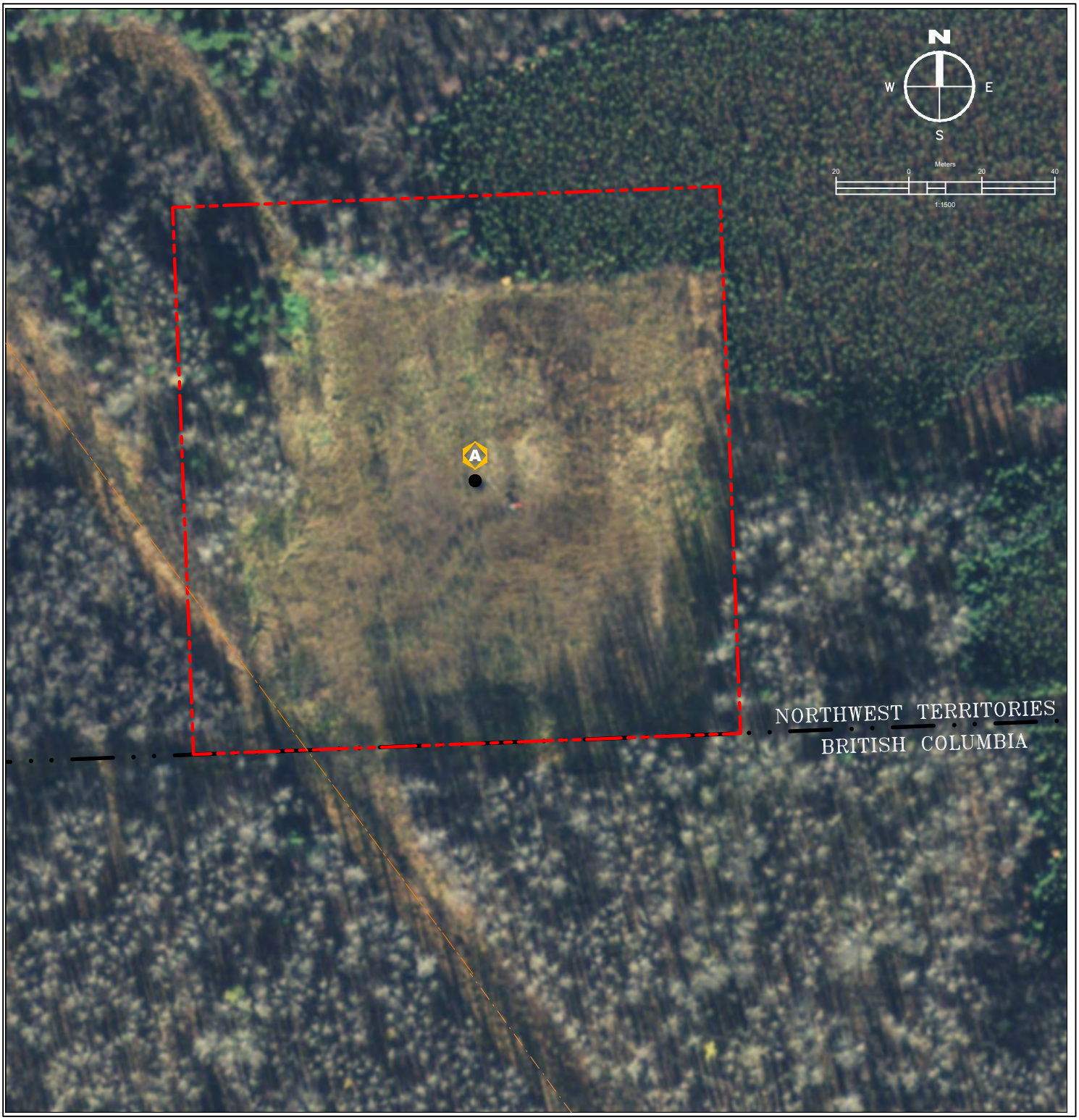
1. ORIGINAL DRAWING IN COLOUR.
2. DATA COMPILED BY SYNGIS: SYNERGYASPEN GEOGRAPHIC INFORMATION SYSTEM.
3. VALTUS IMAGERY SERVICES – SEPTEMBER–OCTOBER 2011.
4. ORIGINAL DRAWING PAPER SIZE 8.5x11 INCHES.

SynergyAspen ENVIRONMENTAL

TITLE:

SITE LOCATION PLAN
(60° 00' 04.64" N, 123° 15' 04.86" W)

CLIENT NAME: PARAMOUNT RESOURCES LTD.			
SITE LOCATION:	DATE: 2021–05–14		PAR6208
A–01 60–10–123–15 LIARD	SCALE: 1:20,000	DWG No:	001
	DWN: TW CHK'D: JR		



CHK	BY	REVISION DESCRIPTION	DATE	REV.
JR	TW	ISSUED TO CLIENT	–	0

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
3111-06783WS	SURVEY PLAN OF WELLSITE	1998-10-16	–

LEGEND

- WELLBORE
- APPROXIMATE LEASE BOUNDARY
- PROVINCIAL BOUNDARY
- PIPELINE (SOURCE: IHS)
- ROAD CENTRELINE (SOURCE: IHS)

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM MEASUREMENTS TAKEN IN THE FIELD. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.

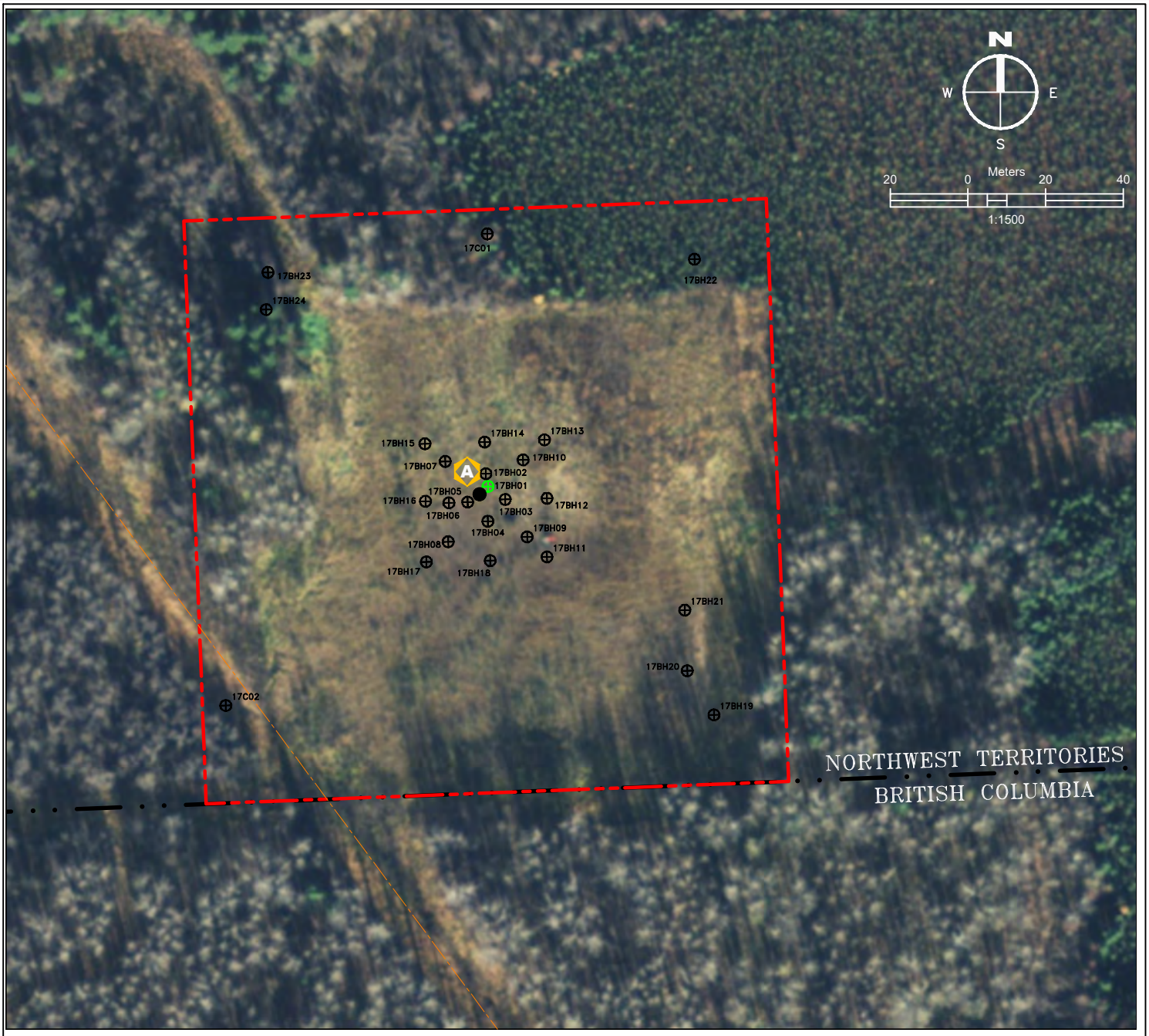
SynergyAspen ENVIRONMENTAL

TITLE:

SITE PLAN

CLIENT NAME: PARAMOUNT RESOURCES LTD.

SITE LOCATION:	DATE: 2021-05-14		PAR6208
A-01 60-10-123-15 LIARD	SCALE: 1:1,500	DWG No:	002
	DWN: TW CHK'D: JR		



APEC Label	AECs	Impacted Borehole(s)	COCs (depth)
A	Well Centre	17BH01	Fraction 2 Petroleum Hydrocarbons (0.8-1.0 mbg); Zinc (2.2-2.5 mbg)

CHK	BY	REVISION DESCRIPTION	DATE	REV.
JR	TW	ISSUED TO CLIENT	–	0

DWG. NO.	REFERENCE DESCRIPTION	DATE	REV.
3111-06783WS	SURVEY PLAN OF WELLSITE	1998-10-16	–

LEGEND

- WELLBORE
- APPROXIMATE BOREHOLE LOCATION (NORTH SHORE)
- APPROXIMATE BOREHOLE LOCATION (NORTH SHORE – PASSED)
- APPROXIMATE LEASE BOUNDARY
- PROVINCIAL BOUNDARY
- PIPELINE (SOURCE: IHS)
- ROAD CENTRELINE (SOURCE: IHS)

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. BASE PLAN CREATED FROM MEASUREMENTS TAKEN IN THE FIELD. ALL LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.

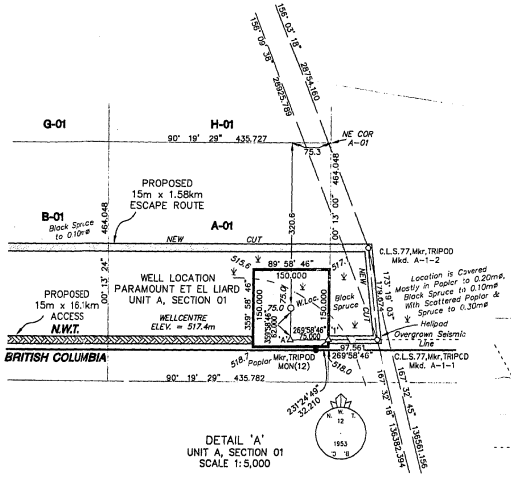
SynergyAspen ENVIRONMENTAL

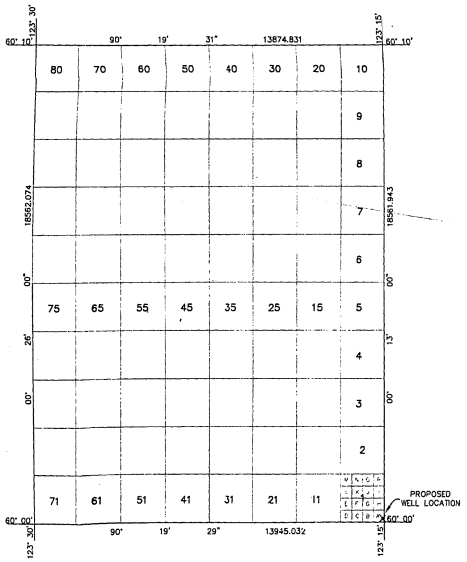
TITLE:

AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

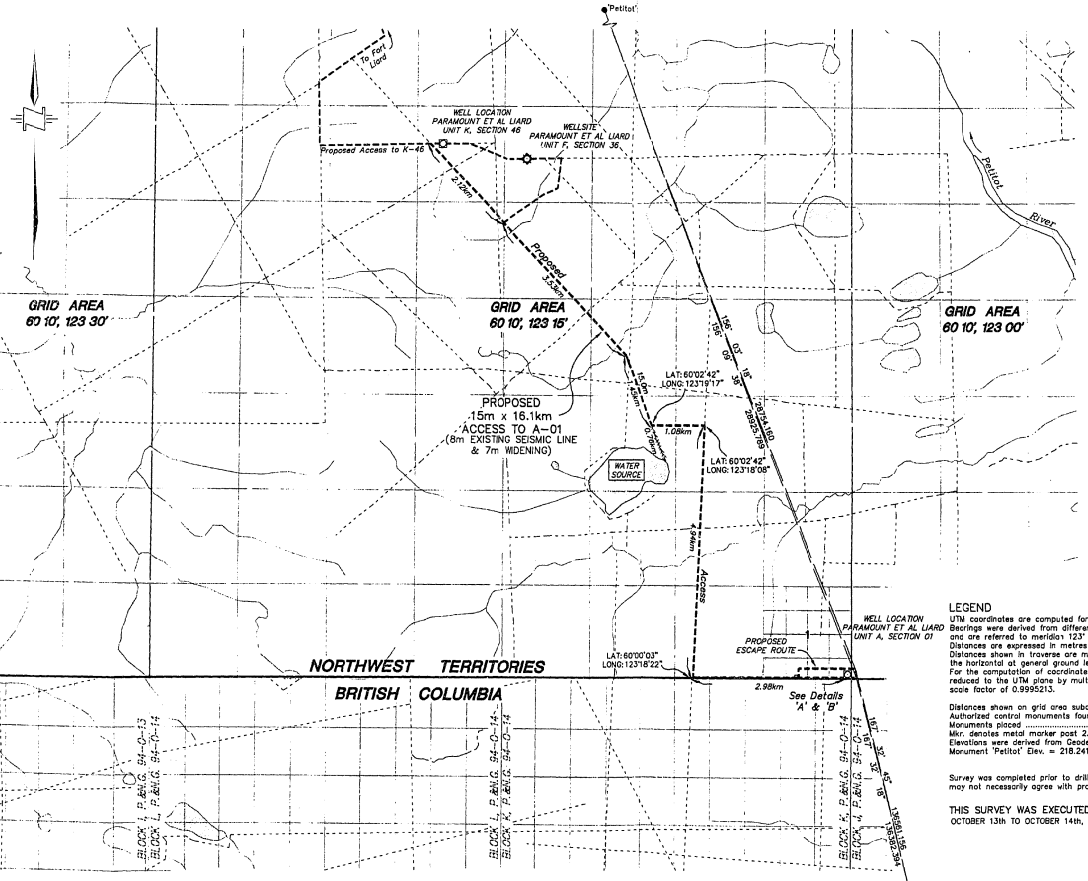
CLIENT NAME: PARAMOUNT RESOURCES LTD.

SITE LOCATION:	DATE: 2021-05-14	PAR6208
A-01 60-10-123-15 LIARD	SCALE: 1:1,500	DWG No: 003
	DWN: TW CHK'D: JR	

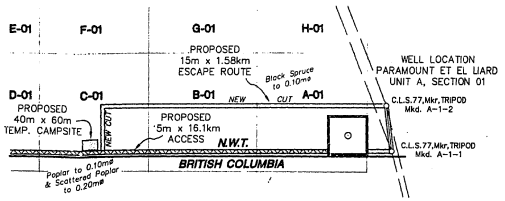




GRID AREA 60°10', 123°15'
SCALE 1:100,000



All coordinates shown are on 1927 North American Datum.
Wellsite control established using differentially corrected GPS observations. Final coordinate values for control were transformed from NAD83 datum to NAD27 datum using National Transformation Version 2 program. Geodetic Survey of Canada published coordinate values for monument 'Petitot' were held fixed. Adjusted values for Fort Nelson ACP GCM602904 and comparison to Government of British Columbia published coordinates are shown below.



DETAIL 'B'
SCALE 1:10,000

AREAS REQUIRED:

WELLSITE:	150mx150m = 2.25 ha.
TEMP. CAMPSITE:	40mx60m = 0.24 ha.
ESCAPE ROUTE:	15mx1.58km = 2.37 ha.
ACCESS:	15mx16.1km = 24.2 ha.
TOTAL:	29.06 ha.

REV.No.	DESCRIPTION	DATE

McELHANNEY ASSOCIATES
PROFESSIONAL LAND SURVEYORS
10014 - 97th Ave., Suite 202
Fort St. John, British Columbia
Phone:(250)787-0356, Fax:(250)787-0310

DATE : 98/10/16 JOB No.: 3111-0678WS CW BRO

PLAN AND FIELD NOTES
OF SURVEY OF
PROPOSED EXPLORATORY WELL
PARAMOUNT ET AL LIARD FOR
IN UNIT A, SECTION 01
GRID AREA 60° 10' , 123° 15'
NORTHWEST TERRITORIES
CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50,000
1km 500m 0m 1km 2km 3km 4km

SURVEYED FOR
PARAMOUNT RESOURCES LTD.
BY : W.V. JOHNSON, CLS
OCTOBER, 1998.

LEGEND
UTM coordinates are computed for Zone 10, central meridian 123° W.
Bearings were derived from differentially corrected GPS observations and are referred to meridian 123° W.
Distances are expressed in metres and decimals thereof.
Distances shown in traverse are measured distances reduced to the horizontal at general ground level.
For the computation of coordinates measured distances have been reduced to the UTM plane by multiplying them by an average combined scale factor of 0.9995213.

Distances shown on grid area subdivisions are UTM plane.
Authorized control monuments found ..... ●
Monuments placed ..... ○
Mkr. denotes metal marker post 2.0m long placed 0.30m N.
Elevations were derived from Geodetic Survey of Canada Monument 'Petitot' Elev. = 218.241m

Survey was completed prior to drilling; therefore well as drilled may not necessarily agree with proposed location.

THIS SURVEY WAS EXECUTED DURING THE PERIOD OCTOBER 13th TO OCTOBER 14th, 1998. BY W.V. JOHNSON, CLS

GEOGRAPHIC AND UTM COORDINATES, (1927 NAD)				
Station	Latitude	Longitude	Northings	Eastings
CONTROL MONUMENTS				
Petitot(Publ. & Fixed)	60°14'15.436"	123°27'39.795"	6677758.134	474467.253
Fort Nelson ACP(Adj.)	58°48'19.494"	122°43'49.914"	6518207.419	515569.399
Fort Nelson ACP(Publ.)	58°48'19.493"	122°43'49.968"	6518207.388	515568.539
GRID AREA				
NE	60° 10' 00"	123° 15' 00"	6669792.783	486125.259
NW	60° 10' 00"	123° 30' 00"	6669871.559	472250.651
SE	60° 00' 00"	123° 15' 00"	6651230.973	486055.060
SW	60° 00' 00"	123° 30' 00"	6651310.016	472110.252
A-01, NE	60°00'15.000"	123°15'00.000"	6651695.018	486056.815
A-01, NW	60°00'15.026"	123°15'28.125"	6651697.488	485621.095
A-01, SW	60°00'00.026"	123°15'28.125"	6651233.443	485619.285
A-01, SE	60°00'00.000"	123°15'00.000"	6651230.973	486055.060
TRAVERSE STATIONS				
A-01-1	60°00'02.661"	123°14'53.714"	6651312.924	486152.771
A-01-2	60°00'08.424"	123°14'55.106"	6651491.292	486131.873
TH 'A'	60°00'02.638"	123°15'04.845"	6651312.862	485980.293
TH '1'	60°00'02.648"	123°15'00.007"	6651312.889	486055.257
BC-NWT MON#12	60°00'01.996"	123°15'01.627"	6651292.810	486030.091
PROPOSED WELL				
A-01	60°00'04.641"	123°15'04.862"	6651374.833	485980.270

I, W.V. Johnson, of the City of Fort St. John, British Columbia, Canada Lands Surveyor, make oath and say that: I have in my own paper person, according to law and the instructions of the Surveyor General of Canada Lands, faithfully and correctly executed the survey shown by this plan and field notes, and that the said plan and field notes are correct and true to the best of my knowledge and belief.
SO HELP ME GOD

W.V. Johnson, CLS

Sworn before me at Fort St. John, this 18th day of October, 1998.

R.D. Blackall, CLS

PARAMOUNT RESOURCES LTD.

WITNESS

Oct 20/98
DATE

APPENDIX I

Borehole Logs and Drawings from North Shore Preliminary Stage 2 Report
(See Stage 2 Report)

APPENDIX II

Historical Borehole Logs and Drawings

- 200/B-43-K/94-O-14 Stage II Preliminary Site Investigation (North Shore. 2017b)
- 200/B-83-K/94-O-14 Stage II Preliminary Site Investigation (North Shore. 2017c)
- 200/A-69-J/94-O-14 Stage II Preliminary Site Investigation (North Shore. 2017d)

Borehole Log: 17C01

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0		Organic, black (10YR 2/1), undisturbed	0.00 - 0.20	1	B	
		Hard clay, dark brown (10YR 3/3), massive, 2-5% fine gravel <8mm, undisturbed, mottling and gleying	0.30 - 0.50	2	B	
			0.80 - 1.00	3	B	M, PS, SAL
1			1.30 - 1.50	4	B	
			1.70 - 1.90	5	B	M
2			2.20 - 2.50	6	B	M
		Sandy clay loam, dark gray (10YR 4/1), single-grained, 2-5% fine gravel <8mm, saturated soil from 2.5-4.2m	2.80 - 3.00	7,8	B	PS, SAL
3		Dup A @ 2.8-3.0m	3.20 - 3.40	9	B	
4		Hard clay, gray (10YR 6/1), massive, 2-5% fine gravel <8mm, iron and sand inclusions	4.30 - 4.50	10	B	
			4.70 - 4.90	11	B	PS, SAL
5						
			5.80 - 6.00	12	B	
6		End of Borehole at 6.00 m.				

VOC Concentration (ppm): 50 100 150 200 250 300 350

LEL (%): 10 20 30 40 50 60 70 80 90

EC Value (dS/m): 1 2 3 4 5 6 7 8 9

Borehole Completion Details: Drill Cuttings

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651622 E: 485856

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 68m North, 2m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17C02

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Background Control

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Silty clay loam, light brown (10YR 6/3), massive, moist, friable, 2-5% fine gravel <8mm	0.00 - 0.20	13	B			
			0.30 - 0.50	14	B	PS, SAL		
		Silty clay loam, brown (10YR 4/3), massive, moist, friable, 2-5% fine gravel <8mm, undisturbed, iron and sand inclusions	0.80 - 1.00	15	B	M		
1			1.30 - 1.50	16	B	M		
			1.70 - 1.90	17	B	M, PS, SAL		
2			2.20 - 2.50	18	B			Drill Cuttings
		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, iron and sand inclusions	2.80 - 3.00	19	B			
3			3.20 - 3.40	20	B	PS, SAL		
4		Silty clay loam, light gray (10YR 7/1), massive, moist, friable, 1-2% fine gravel <8mm	4.30 - 4.50	21	B			

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651513 E: 485874

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 50m South, 69m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH01

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Clay, light brown (10YR 6/3), massive, moist, very firm, 2-5% fine gravel <8mm, 1-2% coarse gravel 8-64mm, iron and sand inclusions	0.00 - 0.20	22	B			
			0.30 - 0.50	23	B			
		Dup B @ 0.8-1.0m	0.80 - 1.00	24,25	B+J	HC, M, SAL		
1			1.30 - 1.50	26	B			
			1.70 - 1.90	27	B			
2		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, 1-2% coarse gravel 8-64mm, undisturbed, sand inclusions	2.20 - 2.50	28	B+J	HC, M, SAL		Drill Cuttings
			2.80 - 3.00	29	B			
3		Silty clay loam, light gray (10YR 7/1), massive, moist, friable, 1-2% coarse gravel 8-64mm, undisturbed, sand inclusions	3.20 - 3.40	30	B			
4			4.30 - 4.50	31	B	M		

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651571 E: 485882

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 3m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH02

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20	32	B			
			0.30 - 0.50	33	B			
0.5								
			0.80 - 1.00	34	B+J			
1.0								
			1.30 - 1.50	35	B			
1.5								Drill Cuttings
			1.70 - 1.90	36	B			
2.0								
			2.20 - 2.50	37	B+J	M		
2.5								
			2.80 - 3.00	38	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651575 E: 485879

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 7m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH03

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20	39	B			
			0.30 - 0.50	40	B			
0.5								
			0.80 - 1.00	41	B+J			
1.0								
			1.30 - 1.50	42	B			
1.5								Drill Cuttings
			1.70 - 1.90	43	B			
2.0								
			2.20 - 2.50	44	B+J	M		
2.5								
			2.80 - 3.00	45	B			
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651571 E: 485889

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 5m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH04

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions	0.00 - 0.20					
			0.30 - 0.50					
0.5								
			0.80 - 1.00	46	B+J			
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50	47	B+J	M		
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651562 E: 485885

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 5m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

NORTH SHORE
Environmental Consultants

Borehole Log: 17BH05

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Well Centre Area

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
			0.30 - 0.50					
			0.80 - 1.00	48	B+J			
1			1.30 - 1.50					
		Sandy clay loam, greenish gray (10G 5/1), massive, wet, slightly sticky, 1-2% fine gravel <8mm, saturated soil	1.70 - 1.90					
2			2.20 - 2.50	49	B+J	HC, M		Drill Cuttings
		Silty clay loam, gray (10YR 6/1), massive, moist, friable, 2-5% fine gravel <8mm	2.80 - 3.00					
3								
			3.80 - 4.00	50	B+J			
4			4.30 - 4.50					

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651571 E: 485874

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 5m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH06

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
			0.30 - 0.50					
0.5								
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50	51	B+J			
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651562 E: 485870

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 10m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH07

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm,	0.00 - 0.20					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5		Sandy clay loam, light brown (10YR 6/3), single-grained, wet, non-sticky, saturated soil from 1.6-2.4m						Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm						
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651571 E: 485867

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 10m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH08

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9		
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling *Exploratory borehole; no samples obtained	0.00 - 0.20						
0.5			0.30 - 0.50						
1.0			0.80 - 1.00						
1.5			1.30 - 1.50						Drill Cuttings
2.0		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, 2-5% coarse gravel 8-64mm, undisturbed, iron and sand inclusions	1.70 - 1.90						
2.5			2.20 - 2.50						
3.0			2.80 - 3.00						

End of Borehole at 3.00 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651553 E: 485876

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 10m Southwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH09

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
			0.30 - 0.50					
0.5								
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90	52	B+J	HC, SAL		
2.0		Silty clay loam, light gray (10YR 7/1), massive, moist, friable, 1-2% fine gravel <8mm, undisturbed, iron inclusions						
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651563 E: 485897

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 10m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH10

Client: Paramount Resources Ltd.

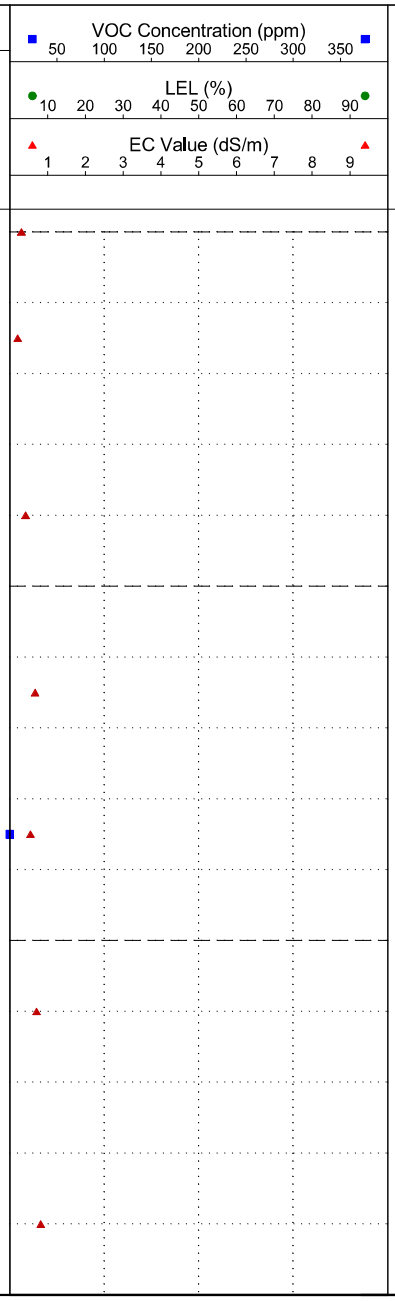
Project: Phase 2 Environmental Site Assessment

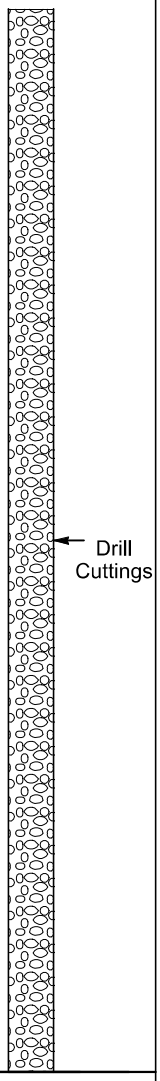
Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, disturbed, pad material	0.00 - 0.20			
			0.30 - 0.50			
0.5						
		Organic, black (10YR 2/1)	0.80 - 1.00			
1.0		Silty clay loam, yellow (2.5Y 8/6), massive, moist, friable, 2-5% fine gravel <8mm, undisturbed				
		Hard clay, dark gray (10YR 4/1), massive, moist, firm, 2-5% fine gravel <8mm, undisturbed, sand inclusions	1.30 - 1.50			
1.5		*VOC field screening values not obtained at all sampling depths due to delineation sampling	1.70 - 1.90			
2.0		*Exploratory borehole; no samples obtained				
			2.20 - 2.50			
2.5						
			2.80 - 3.00			
3.0		End of Borehole at 3.00 m.				





Borehole Completion Details

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651582 E: 485889

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 10m Northeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH11

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling *Exploratory borehole; no samples obtained	0.00 - 0.20					
0.5			0.30 - 0.50					
1.0			0.80 - 1.00					
1.5			1.30 - 1.50					Drill Cuttings
2.0			1.70 - 1.90					
2.5			2.20 - 2.50					
3.0		Silty clay loam, light gray (10YR 7/1), massive, moist, friable, 2-5% fine gravel <8mm, undisturbed, silt inclusions	2.80 - 3.00					
		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651561 E: 485905

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 15m Southeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH12

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling *Exploratory borehole; no samples obtained	0.00 - 0.20					
0.5			0.30 - 0.50					
1.0			0.80 - 1.00					
1.5			1.30 - 1.50					Drill Cuttings
2.0			1.70 - 1.90					
2.5			2.20 - 2.50					
3.0		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, undisturbed	2.80 - 3.00					
		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651578 E: 485904

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 15m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH13

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, disturbed, pad material	0.00 - 0.20			
			0.30 - 0.50			
0.5		Organic, black (10YR 2/1)	0.80 - 1.00			
1.0		Silty clay loam, yellow (2.5Y 8/6), massive, moist, friable, 2-5% fine gravel <8mm, undisturbed				
		Hard clay, dark gray (10YR 4/1), massive, moist, firm, 2-5% fine gravel <8mm, undisturbed, sand inclusions	1.30 - 1.50			
1.5		*VOC field screening values not obtained at all sampling depths due to delineation sampling	1.70 - 1.90			
2.0		*Exploratory borehole; no samples obtained				
			2.20 - 2.50			
2.5						
			2.80 - 3.00			
3.0		End of Borehole at 3.00 m.				

VOC Concentration (ppm): 50 100 150 200 250 300 350

LEL (%): 10 20 30 40 50 60 70 80 90

EC Value (dS/m): 1 2 3 4 5 6 7 8 9

Borehole Completion Details: Drill Cuttings

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651588 E: 485891

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 15m Northeast

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH14

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350	LEL (%) 10 20 30 40 50 60 70 80 90	EC Value (dS/m) 1 2 3 4 5 6 7 8 9	
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, disturbed, pad material	0.00 - 0.20							
			0.30 - 0.50							
0.5										
		Organic, black (10YR 2/1)	0.80 - 1.00							
1.0		Silty clay loam, yellow (2.5Y 8/6), massive, moist, friable, 2-5% fine gravel <8mm, undisturbed								
		Hard clay, dark gray (10YR 4/1), massive, moist, firm, 2-5% fine gravel <8mm, undisturbed, sand inclusions	1.30 - 1.50							
1.5										Drill Cuttings
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	1.70 - 1.90							
2.0		*Exploratory borehole; no samples obtained								
			2.20 - 2.50							
2.5										
			2.80 - 3.00							
3.0		End of Borehole at 3.00 m.								

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651585 E: 485876

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 15m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH15

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9		
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand and silt inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling *Exploratory borehole; no samples obtained	0.00 - 0.20						
0.5			0.30 - 0.50						
1.0			0.80 - 1.00						
1.5			1.30 - 1.50						Drill Cuttings
2.0			1.70 - 1.90						
2.5			2.20 - 2.50						
3.0			2.80 - 3.00						

End of Borehole at 3.00 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651572 E: 485861

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 15m Northwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH16

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions	0.00 - 0.20					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0		Silty clay, light gray (10YR 7/1), massive, moist, friable, 2-5% fine gravel <8mm, sand inclusions						
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651559 E: 485865

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 15m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH17

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9		
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions	0.00 - 0.20						
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.30 - 0.50						
0.5		*Exploratory borehole; no samples obtained							
			0.80 - 1.00						
1.0									
			1.30 - 1.50						
1.5									Drill Cuttings
			1.70 - 1.90						
2.0		Silty clay, light gray (10YR 7/1), massive, moist, friable, 2-5% fine gravel <8mm, sand inclusions							
			2.20 - 2.50						
2.5									
			2.80 - 3.00						
3.0		End of Borehole at 3.00 m.							

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651546 E: 485876

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 15m Southwest

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH18

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE						
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 / LEL (%) 10 20 30 40 50 60 70 80 90 / EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, sand inclusions	0.00 - 0.20					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0		Silty clay, light gray (10YR 7/1), massive, moist, friable, 2-5% fine gravel <8mm, sand inclusions						
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651552 E: 485892

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 15m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH19

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Clay, dark brown (10YR 3/3), massive, moist, very firm, *VOC field screening values not obtained at all sampling depths due to delineation sampling	0.00 - 0.20					
			0.30 - 0.50					
0.5								
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90	53	B+J	HC, SAL		
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651518 E: 485932

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 57m East, 56m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH20

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Clay, dark brown (10YR 3/3), massive, moist, very firm,	0.00 - 0.20					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651530 E: 485921

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 50m East, 45m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH21

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE				VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis		
0.0		Clay, dark brown (10YR 3/3), massive, moist, very firm,	0.00 - 0.20					
		*VOC field screening values not obtained at all sampling depths due to delineation sampling	0.30 - 0.50					
0.5		*Exploratory borehole; no samples obtained						
			0.80 - 1.00					
1.0								
			1.30 - 1.50					
1.5								Drill Cuttings
			1.70 - 1.90					
2.0								
			2.20 - 2.50					
2.5								
			2.80 - 3.00					
3.0		End of Borehole at 3.00 m.						

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651548 E: 485920

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 50m East, 30m South

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH22

Client: Paramount Resources Ltd.

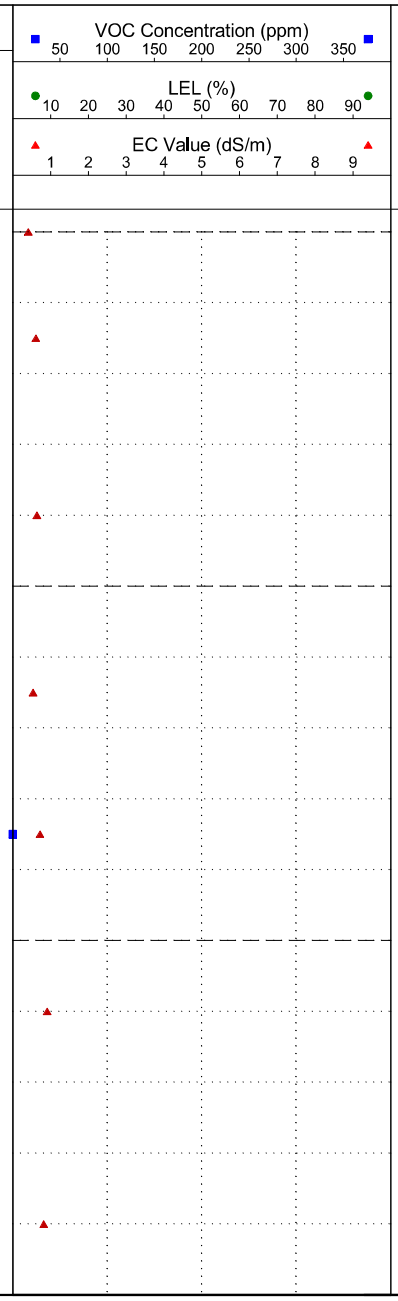
Project: Phase 2 Environmental Site Assessment

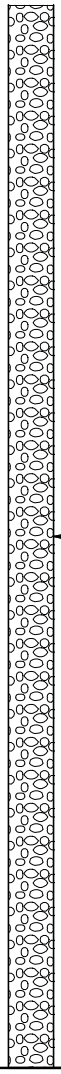
Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

Depth (mbgl)	Description	Depth (m)	Sample #	Sample Type	Lab analysis
0.0	Clay, brown (10YR 4/3), massive, moist, firm, 2-5% fine gravel <8mm, disturbed, pad material	0.00 - 0.20			
		0.30 - 0.50			
0.5					
	Organic, black (10YR 2/1)	0.80 - 1.00			
1.0	Silty clay loam, yellow (2.5Y 8/6), massive, moist, friable, 2-5% fine gravel <8mm, undisturbed				
	Hard clay, dark gray (10YR 4/1), massive, moist, firm, 2-5% fine gravel <8mm, undisturbed, sand inclusions	1.30 - 1.50			
1.5	*VOC field screening values not obtained at all sampling depths due to delineation sampling	1.70 - 1.90			
2.0	*Exploratory borehole; no samples obtained				
		2.20 - 2.50			
2.5					
		2.80 - 3.00			
3.0	End of Borehole at 3.00 m.				





Borehole Completion Details

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651617 E: 485901

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 60m North, 55m East

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH23

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Silty clay loam, brown (10YR 4/3), massive, moist, friable, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling *Exploratory borehole; no samples obtained	0.00 - 0.20					
0.5			0.30 - 0.50					
1.0			0.80 - 1.00					
1.5		Clay, light gray (10YR 7/1), massive, moist, firm, 2-5% fine gravel <8mm, undisturbed, iron and sand inclusions	1.30 - 1.50					Drill Cuttings
2.0			1.70 - 1.90					
2.5			2.20 - 2.50					
3.0		End of Borehole at 3.00 m.	2.80 - 3.00					

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651610 E: 485841

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 60m North, 55m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH24

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Exploratory Boreholes

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0.0		Silty clay loam, brown (10YR 4/3), massive, moist, friable, 2-5% fine gravel <8mm, sand inclusions *VOC field screening values not obtained at all sampling depths due to delineation sampling *Exploratory borehole; no samples obtained	0.00 - 0.20					
0.5			0.30 - 0.50					
1.0			0.80 - 1.00					
1.5		Clay, light gray (10YR 7/1), massive, moist, firm, 2-5% fine gravel <8mm, undisturbed, iron and sand inclusions	1.30 - 1.50					Drill Cuttings
2.0			1.70 - 1.90					
2.5			2.20 - 2.50					
3.0		End of Borehole at 3.00 m.	2.80 - 3.00					

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651592 E: 485841

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 50m North, 55m West

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

Borehole Log: 17BH01

Client: Paramount Resources Ltd.

Project: Phase 2 Environmental Site Assessment

Legal Location: A-01

Area of Concern: Well Centre Area

NORTH SHORE Environmental Consultants

SUBSURFACE PROFILE			SAMPLE					
Depth (mbgl)	Symbol	Description	Depth (m)	Sample #	Sample Type	Lab analysis	VOC Concentration (ppm) 50 100 150 200 250 300 350 LEL (%) 10 20 30 40 50 60 70 80 90 EC Value (dS/m) 1 2 3 4 5 6 7 8 9	Borehole Completion Details
0		Clay, light brown (10YR 6/3), massive, moist, very firm, 2-5% fine gravel <8mm, 1-2% coarse gravel 8-64mm, iron and sand inclusions	0.00 - 0.20	22	B			
			0.30 - 0.50	23	B			
		Dup B @ 0.8-1.0m	0.80 - 1.00	24,25	B+J	HC, M, SAL		
1			1.30 - 1.50	26	B			
			1.70 - 1.90	27	B			
2		Hard clay, dark gray (10YR 4/1), massive, moist, very firm, 2-5% fine gravel <8mm, 1-2% coarse gravel 8-64mm, undisturbed, sand inclusions	2.20 - 2.50	28	B+J	HC, M, SAL		Drill Cuttings
			2.80 - 3.00	29	B			
3		Silty clay loam, light gray (10YR 7/1), massive, moist, friable, 1-2% coarse gravel 8-64mm, undisturbed, sand inclusions	3.20 - 3.40	30	B			
4			4.30 - 4.50	31	B	M		

End of Borehole at 4.50 m.

Legend
B - Bag; J - Jar
HC - Hydrocarbons
SAL - Salts
PS - Particle Size
M - Metals
PAH - Polycyclic Aromatic Hydrocarbons
ST - Sterilants
ALC - Alcohol Screen
GLY - Glycol Screen
MTH - Methanol

Drilling Contractor: Diverse Drilling

GPS Coordinates: UTM: 10 N: 6651571 E: 485882

Drill Date: 2/10/2017 (mm/dd/yy)

From Benchmark: 3m North

Drill Method: 15cm Solid Stem

Benchmark: Well Centre

File: A-01_17PH2.dwg Date: March-18-17 10:22:25 AM



2014 AERIAL PHOTO SOURCE: BING

LEGEND

A-01 WELL CENTRE

NOTES:

LOCATIONS ARE APPROXIMATE.

0 50 100 200m

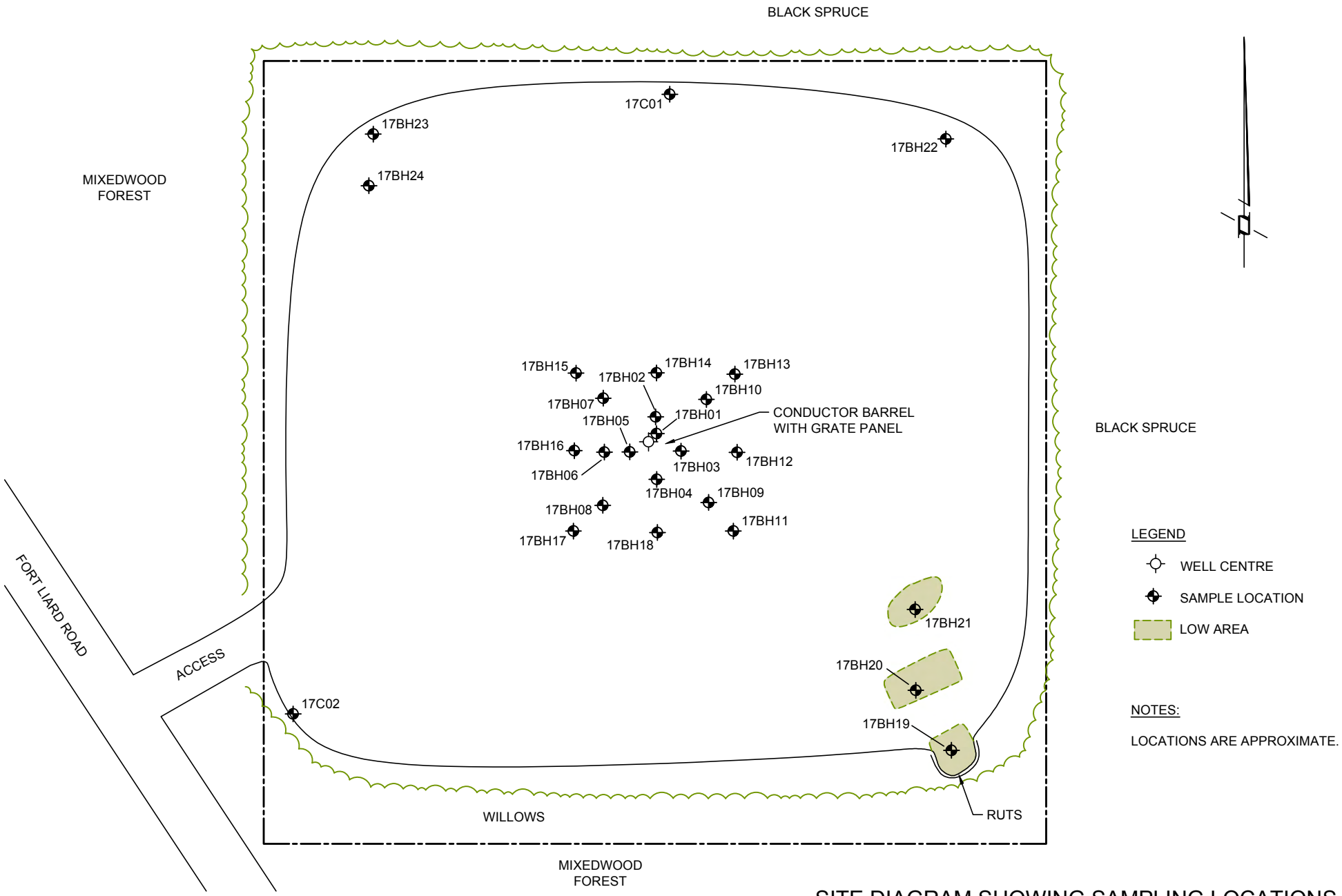
Scale 1 : 5000

AERIAL OVERVIEW

NORTH SHORE Environmental Consultants

Date: 17-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. A-01 (NORTHWEST TERRITORIES)	Figure: 2
File name: A-01_SLM-A.dwg	Requested by: DM		

File: A-01_17PH2.dwg Date: March-22-17 8:37:17 AM



SITE DIAGRAM SHOWING SAMPLING LOCATIONS

0 10 20 40m

Scale 1 : 1000

NORTH SHORE Environmental Consultants

Date: 09-MAY-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. A-01 (NORTHWEST TERRITORIES)	Figure: 3
File name: A-01_17PH2-C.dwg	Requested by: DM		

File: A-01_17PH2.dwg Date: March-18-17 10:22:25 AM



2014 AERIAL PHOTO SOURCE: BING

LEGEND

A-01 WELL CENTRE

NOTES:

LOCATIONS ARE APPROXIMATE.

0 50 100 200m

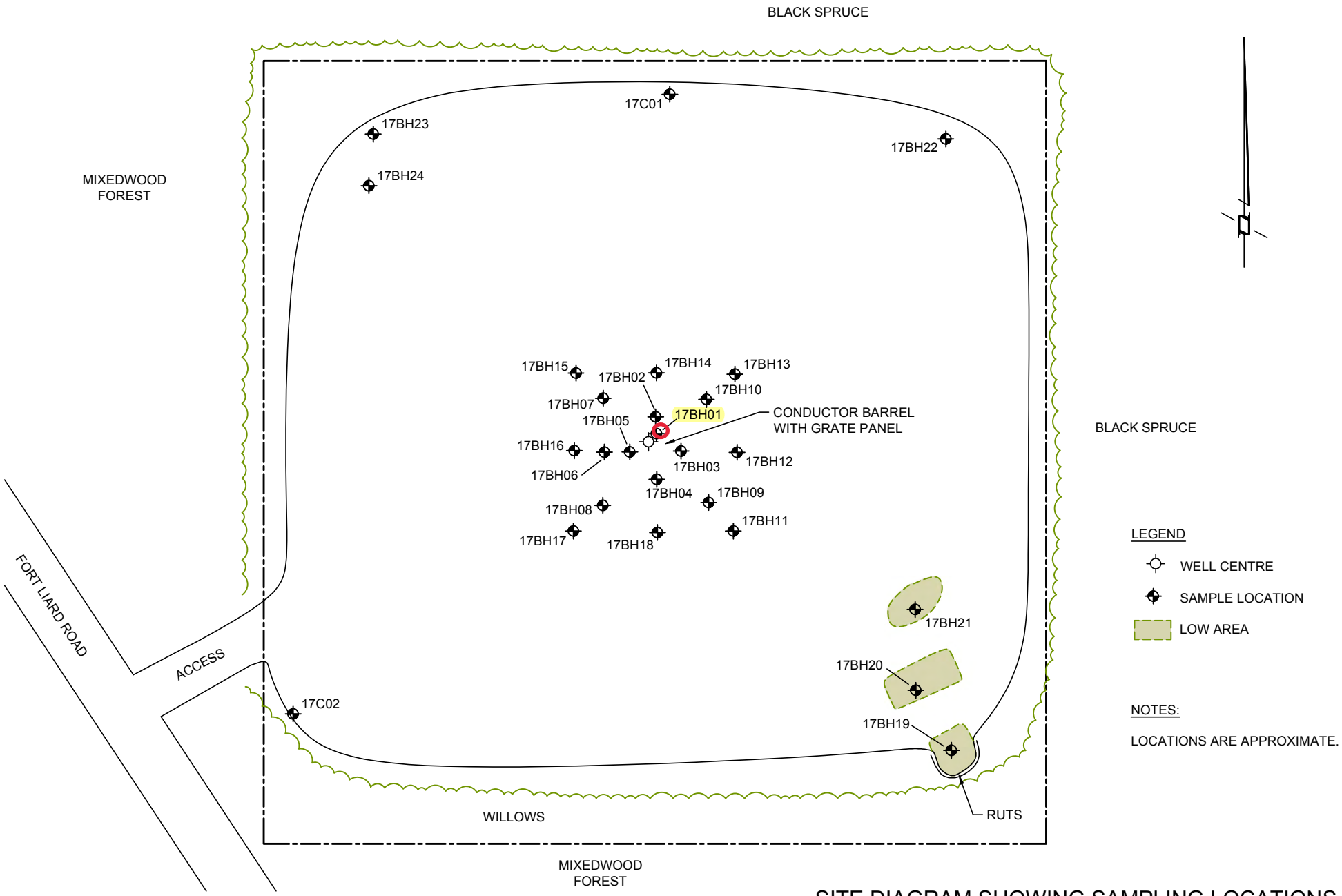
Scale 1 : 5000

AERIAL OVERVIEW

NORTH SHORE Environmental Consultants

Date: 17-MAR-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. A-01 (NORTHWEST TERRITORIES)	Figure: 2
File name: A-01_SLM-A.dwg	Requested by: DM		

File: A-01_17PH2.dwg Date: March-22-17 8:37:17 AM



SITE DIAGRAM SHOWING SAMPLING LOCATIONS

0 10 20 40m

Scale 1 : 1000

NORTH SHORE Environmental Consultants

Date: 09-MAY-17	Drawn by: LH	PARAMOUNT RESOURCES LTD. A-01 (NORTHWEST TERRITORIES)	Figure: 3
File name: A-01_17PH2-C.dwg	Requested by: DM		

Paramount Resources Ltd.
Table 1. Soil - BTEX, Petroleum Hydrocarbons (F1-F4) and Grain Size
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	BTEX and PHC (F1-F4)										
			Benzene	Toluene	Ethylbenzene	Total Xylenes	Fraction 1[2]	Fraction 2	Fraction 3	Fraction 4[3]	Chrom. returned to baseline	% Moisture	Grain Size 75 µm Sieve
CCME Surface Soil Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**150**	**1300**	**5600**	**NC**	**NC**	**NC**
CCME Subsurface Soils Guidelines[1] (mg/kg)			**0.0068**	**0.08**	**0.018**	**2.4**	**170**	**230**	**3500**	**10000**	**NC**	**NC**	**NC**
BACKGROUND CONTROLS													
17C01	0.8-1.0	10-Feb-17											Fine (21)
17C01	2.8-3.0	10-Feb-17											Fine (32)
Dup A	2.8-3.0	10-Feb-17											Fine (33)
17C01	4.7-4.9	10-Feb-17											Fine (2)
17C02	0.3-0.5	10-Feb-17											Fine (20)
17C02	1.7-1.9	10-Feb-17											Fine (19)
17C02	3.2-3.4	10-Feb-17											Fine (7)
WELL CENTRE AREA													
17BH01	0.8-1.0	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	49	148	<10	Yes	15	
Dup B	0.8-1.0	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	**321**	837	24	Yes	19	
17BH01	2.2-2.5	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	93	278	<10	Yes	15	
17BH05	2.2-2.5	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	32	<10	Yes	16	
EXPLORATORY BOREHOLES													
17BH09	1.7-1.9	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	15	
17BH19	1.7-1.9	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	<10	Yes	14	

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Fraction 1 petroleum hydrocarbons (C6-C10) minus benzene, toluene, ethylbenzene and xylene concentrations

[3] - Fraction 4 petroleum hydrocarbons (C34-C50 or >C34) as determined by high temperature gas chromatography

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 2. Soil - Regulated Metals
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Antimony (Sb)	Arsenic (As)	Barium (Ba) - Total	Extractable Barium (Ex Ba)	Fusion Barium (Ba) - True Total	Beryllium (Be)	Boron (B) Sat Paste (mg/L)	Cadmium (Cd)	Chromium (Cr) - Total	Hexavalent Chromium (Cr+6)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Selenium (Se)	Silver (Ag)	Thallium (Tl)	Tin (Sn)	Uranium (U)	Vanadium (V)	Zinc (Zn)
CCME Guidelines[1] (mg/kg)			**20**	**12**	**500**	**0**	**0**	**4**	**nc**	**10**	**64**	**0.4**	**50**	**63**	**140**	**6.6**	**10**	**45**	**1**	**20**	**1**	**50**	**23**	**130**	**200**
BACKGROUND CONTROLS																									
17C01	0.8-1.0	10-Feb-17		**14.6**																					98
17C01	1.7-1.9	10-Feb-17		**16.1**																					97
17C01	2.2-2.5	10-Feb-17		**14.1**																					94
17C02	0.8-1.0	10-Feb-17		**13.4**																					
17C02	1.3-1.5	10-Feb-17		**13.7**																					
17C02	1.7-1.9	10-Feb-17		**12.3**																					
WELL CENTRE AREA																									
17BH01	0.8-1.0	10-Feb-17	<0.5	**14.0**	273			0.7	<0.5	<0.5	19.3	<0.3	10.6	19.3	11.9	<0.5	1.6	26.5	0.6	<0.5	<0.5	0.6	1.0	34.2	96
Dup B	0.8-1.0	10-Feb-17	0.5	**14.2**	297			0.7	<0.5	<0.5	19.1	<0.3	10.2	18.7	12.4	<0.5	1.6	26.2	0.6	<0.5	<0.5	<0.5	1.0	34.1	93
17BH01	2.2-2.5	10-Feb-17	<0.5	**13.7**	439			0.7	<0.5	1.1	19.9	<0.3	9.4	18.4	11.7	<0.5	1.5	24.2	0.6	<0.5	<0.5	<0.5	1.1	33.2	**475**
17BH01	4.3-4.5	10-Feb-17																							101
17BH02	2.2-2.5	10-Feb-17																							87
17BH03	2.2-2.5	10-Feb-17																							87
17BH04	2.2-2.5	10-Feb-17																							90
17BH05	2.2-2.5	10-Feb-17																							98

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NC - No criteria established

Paramount Resources Ltd.
Table 3. Soil - Detailed Salinity
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Depth (mbgl)	Sample Date (dd-mm-yy)	Lab pH (6.0-8.5)[1]	Lab EC (dS/m)	SAR	Saturation %	Soluble Ions						Guideline
							Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO4) mg/kg	
CCME Guidelines[1]					<5								1
EGCSR Guidelines[2]			6-8	<2	<5								2
BACKGROUND CONTROLS													
17C01	0.8-1.0	10-Feb-17	7.04	0.28	0.40	45	5	17	3	<2	<2	19	1,2
17C01	2.8-3.0	10-Feb-17	7.07	0.38	0.97	34	9	15	2	3	2	19	1,2
Dup A	2.8-3.0	10-Feb-17	7.10	0.32	0.84	40	8	16	2	3	2	20	1,2
17C01	4.7-4.9	10-Feb-17	7.79	0.76	**7.70**	62	79	9	2	9	12	148	1,2
17C02	0.3-0.5	10-Feb-17	7.35	0.42	1.47	42	16	14	4	<2	5	47	1,2
17C02	1.7-1.9	10-Feb-17	7.26	0.43	2.97	38	22	8	2	<2	3	40	1,2
17C02	3.2-3.4	10-Feb-17	7.74	0.97	**6.70**	47	72	13	3	10	9	185	1,2
WELL CENTRE AREA													
17BH01	0.8-1.0	10-Feb-17	7.28	0.33	0.81	54	11	19	4	<2	4	42	1,2
Dup B	0.8-1.0	10-Feb-17	7.30	0.34	0.61	54	9	21	4	<2	8	38	1,2
17BH01	2.2-2.5	10-Feb-17	7.31	0.57	2.12	46	26	17	4	2	42	41	1,2
EXPLORATORY BOREHOLES													
17BH09	1.7-1.9	10-Feb-17	7.17	0.41	1.81	56	24	17	4	3	<2	67	1,2
17BH19	1.7-1.9	10-Feb-17	7.38	0.75	**5.39**	52	62	14	3	3	<2	150	1,2

Rev: 17.01.25

Notes:

Land Use: **Residential/Parkland** Grain Size: **Fine**

[1] - Canadian Council of Ministers of the Environment (CCME). 2017. Tier 1 Soil Remediation Guidelines

[2] - Environmental Guidelines for Contaminated Site Remediation (EGCSR). 2003

Bold - Value exceeds specified guideline

Bold - Value exceeds specified guideline but comparable to background conditions

Blank - Not analyzed

NA - Not Applicable

NS - Not Specified

Paramount Resources Ltd.
Table 4. Soil - Quality Control - BTEX and Petroleum Hydrocarbons (F1-F4)
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Date (dd-mm-yy)	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	Fraction 1 mg/kg	Fraction 2 mg/kg	Fraction 3 mg/kg	Fraction 4 mg/kg	Grain Size 75 µm Sieve
17C01 2.8-3.0	10-Feb-17									32
Dup A 2.8-3.0	10-Feb-17									33
Detection Limit		---	---	---	---	---	---	---	---	1
Difference		---	---	---	---	---	---	---	---	-1
Relative Percent Difference		---	---	---	---	---	---	---	---	-3.08
Duplicate Sample Results		---	---	---	---	---	---	---	---	Good

Sample ID	Sample Date (dd-mm-yy)	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	F1 (C6-C10) mg/kg	F2 (C10-C16) mg/kg	Fraction 3 mg/kg	Fraction 4 mg/kg	Grain Size 75 µm Sieve
17BH01 0.8-1.0	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	49	148	<10	
Dup B 0.8-1.0	10-Feb-17	<0.005	<0.05	<0.01	<0.05	<10	321	837	24	
Detection Limit		0.005	0.05	0.01	0.05	10	10	10	10	---
Difference		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	-272	-689	#VALUE!	---
Relative Percent Difference		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	-147.03	-139.90	#VALUE!	---
Duplicate Sample Results		---	---	---	---	---	NA	Poor	---	---

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 5. Soil - Quality Control - Regulated Metals
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Date (dd-mm-yy)	Antimony (An) mg/kg	Arsenic (As) mg/kg	Barium (Ba) mg/kg	Barium (Ba) - Total mg/kg	Extractable Barium (Ex Ba) mg/kg	Beryllium (Be) mg/kg	Boron (B) mg/kg	Cadmium (Cd) mg/kg	Chromium (Cr) - Total mg/kg	Chromium (Cr) - Hex. mg/kg	Cobalt (Co) mg/kg	Copper (Cu) mg/kg	Lead (Pb) mg/kg	Mercury (Hg) mg/kg	Molybdenum (Mo) mg/kg	Nickel (Ni) mg/kg	Selenium (Se) mg/kg	Silver (Ag) mg/kg	Thalium (Tl) mg/kg	Tin (Sn) mg/kg	Uranium (U) mg/kg	Vanadium (V) mg/kg	Zinc (Zn) mg/kg
17BH01 0.8-1.0	10-Feb-17	<0.5	**14.0**	273			0.7	<0.5	<0.5	19.3	<0.3	10.6	19.3	11.9	<0.5	1.6	26.5	0.6	<0.5	<0.5	0.6	1.0	34.2	96
Dup B 0.8-1.0	10-Feb-17	0.5	**14.2**	297			0.7	<0.5	<0.5	19.1	<0.3	10.2	18.7	12.4	<0.5	1.6	26.2	0.6	<0.5	<0.5	<0.5	1.0	34.1	93
Detection Limit		0.5	0.5	0.5	---	---	0.5	0.5	0.5	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
Difference		#VALUE!	0.2	24	---	---	0	#VALUE!	#VALUE!	-0.2	#VALUE!	-0.4	-0.6	0.5	#VALUE!	0	-0.3	0	#VALUE!	#VALUE!	#VALUE!	0	-0.1	3
Relative Percent Difference		#VALUE!	1.42	8.42	---	---	0.00	#VALUE!	#VALUE!	-1.04	#VALUE!	-3.85	-3.16	4.12	#VALUE!	0.00	-1.14	0.00	#VALUE!	#VALUE!	#VALUE!	0.00	-0.29	3.17
Duplicate Sample Results		---	Good	Good	---	---	---	---	---	Good	---	Good	Good	Good	---	Good	Good	Good	---	---	---	Good	Good	Good

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

Paramount Resources Ltd.
Table 6. Soil - Quality Control - Detailed Salinity
Phase 2 Environmental Site Assessment Report A-01
May 2017

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17C01 2.8-3.0	10-Feb-17	7.07	0.38	0.97	9	15	2	3	2	19
Dup A 2.8-3.0	10-Feb-17	7.10	0.32	0.84	8	16	2	3	2	20
Detection Limit		---	0.05	---	2	1	1	2	2	2
Difference		-0.03	0.06	0.13	1	-1	0	0	0	-1
Relative Percent Difference		-0.42	17.14	14.36	11.76	-6.45	0.00	0.00	0.00	-5.13
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	Good	Good	Good

Sample ID	Sample Date (dd-mm-yy)	Lab pH	Lab EC (dS/m)	SAR	Soluble Ions					
					Sodium (Na) mg/kg	Calcium (Ca) mg/kg	Magnesium (Mg) mg/kg	Potassium (K) mg/kg	Chloride (Cl) mg/kg	Sulphate (SO_4) mg/kg
17BH01 0.8-1.0	10-Feb-17	7.28	0.33	0.81	11	19	4	<2	4	42
Dup B 0.8-1.0	10-Feb-17	7.30	0.34	0.61	9	21	4	<2	8	38
Detection Limit		---	0.01	---	2	1	1	2	2	2
Difference		0	0	0.2	2	2	0	#VALUE!	-4	4
Relative Percent Difference		0.27	2.99	28.17	20.00	10.00	0.00	#VALUE!	-66.67	10.00
Duplicate Sample Results		Good	Good	Good	Good	Good	Good	---	NA	Good

Rev: 17.01.25

Notes:

Good - Evaluation indicates acceptable reproducibility
Poor - Evaluation indicates poor reproducibility
Blank - Not analyzed
--- - Not applicable
NA - Concentration is <5x detection limit therefore RPD does not apply

APPENDIX III

Water Body Search

ATLAS
Government of Northwest Territories

Paramount-A-01
Water Body Search



May 28, 2021

Legend

- Block Land Transfer Boundaries
- Development Areas
- Surveyed Parcels
- Surveyed Easements
- Municipal Boundaries
- Condominium Units
- Building Footprints
- Line Approximately 31m from O.H.W.M.

Scale 1: 10,000

250 metres

UTM Zone: 10

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