

From: [Erica Janes](#)
To: [Permits](#)
Subject: FW: Pointed Mnt 2017 Annual Progress Report for LUP MV2014X0011
Date: April 6, 2018 10:18:08 AM
Attachments: [image001.png](#)
[407011-00610-100-LET-0001-PointedMtn-Rev1.pdf](#)

Please post email and attachment to MV2014X0011 – Paramount – 5 Reports and Studies / Annual Reports -2017 Annual Progress Report – Apr3-18

From: Bird, Sam (Calgary) <SAM.BIRD@advisian.com>
Sent: Tuesday, April 3, 2018 3:44 PM
To: Erica Janes <ejanes@mvlwb.com>
Cc: Lynn Huntley - Apache Corp. (Lynn.Huntley@paramountres.com) <Lynn.Huntley@paramountres.com>
Subject: Pointed Mnt 2017 Annual Progress Report for LUP MV2014X0011

Hello Erica,
On behalf of Paramount Resources Ltd., I have attached an annual progress report to satisfy Condition 8 of Land Use Permit MV2014X0011. If you have any questions regarding this report, please feel free to contact either me.
Thank-you,
Sam

Sam Bird
Environmental Scientist

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03 April 2018

Proj. No.: 407011-00610-100

Mackenzie Valley Land and Water Board
7th Floor, 4922 - 48 Street
Yellowknife, NT X1A 2P6

Attention Erica Janes, Regulatory Officer

Dear Ms. Janes:

**Re: Former Pointed Mountain Gas Field, Land Use Permit
MV2014X0011, Condition 8, 2017 Annual Progress Report**

1. Introduction

This letter has been prepared on behalf of Paramount Resources Ltd. (Paramount) by Advisian and is intended to address the annual progress report requirement under Condition 8 of Land Use Permit (LUP) MV2014X0011 for activities undertaken in 2017.

2. Background

Land Use Permit MV2014X0011 covers remediation activities at the former Pointed Mountain Gas Field (Site) located west of the Liard River within the Liard Range of the Franklin Mountains, approximately 30 km northwest of Fort Liard, Northwest Territories (NT). The LUP covers activities at the following locations: a Former Plant Site with an abandoned disposal well (C-1), airstrip, pipeline network, roadways, a barge landing, and six well sites (A-1, A-2, A-3, A-4, B-1, and B-2). The well sites and associated infrastructure are located within an area of approximately 740 km². The Site is located on Public Land and is an area of interest to the Acho Dene Koe First Nation (ADKFN). It is accessible by air or by crossing the Liard River via ice bridge or by boat (WorleyParsons 2015a).

Land Use Permit MV2014X0011 was originally issued to Apache Canada Ltd. and has since been transferred, along with ownership of the former Pointed Mountain Gas Field, to Paramount Resources Ltd.

3. MVLWB Requirements for Reporting

Pursuant to Condition 8 of LUP MV2014X0011, Paramount is required to submit an annual progress report. The report shall include, but not be limited to, the information listed in Condition 8 of the LUP.

Table A summarizes the required information and references the corresponding location in this report.



Table A Annual Progress Report Content Requirements Concordance Table

Condition 8 Information Requirement	Report Location
<i>a. a detailed description of work completed during the [reporting] year to remediate the site;</i>	Section 4
<i>b. any engineering studies/designs, monitoring results, or remediation research completed or updated during the [reporting] year;</i>	Section 4
<i>c. a detailed waste audit of all waste produced, transported, and disposal method/location (in volumes and by types). This includes all hazardous waste, waste petroleum products, and any other wastes identified in the Waste Management Plan;</i>	Section 5
<i>d. a list of unauthorized discharges;</i>	Section 6
<i>e. a summary of residual risks on the site to environmental, human and wildlife health;</i>	Section 7
<i>f. updated remediation cost liability and financial security estimates;</i>	Section 8
<i>g. updated life of project work plan for all project activities including reclamation and monitoring activities; and</i>	Table C
<i>h. a summary of all activities that took place under the Engagement Plan.</i>	Section 9

4. Work Completed in 2017

4.1 Monitoring

Long-term monitoring (LTM) of groundwater, surface water, soil, and vegetation was conducted in 2017 at the Former Plant Site and a summary of the events is described below. The results of the monitoring program are detailed in a separate report that will be submitted to the MVLWB when finalized.

The purpose of the 2017 LTM event was to monitor conditions downgradient of the surge pond at the Former Plant Site where a plume of chloride-affected soil and groundwater extends from the surge pond downgradient, and off of the original cleared lease area.

A network of groundwater monitoring wells was established at the Former Plant Site, primarily down gradient of the surge pond. Groundwater samples were collected from select monitoring wells in 2017. Laboratory results were compared to site-specific remediation guidelines (WorleyParsons 2015b) for primary contaminants (i.e. chloride) and assessed relative to up gradient concentrations for secondary contaminants (i.e. sulphate and TDS). Results were also compared to historic values for each well. The continued acquisition of groundwater chemistry results will provide data to statistically evaluate trend changes of groundwater chemistry over time. At present there are an insufficient number of results to reliably calculate trends (Advisian 2018a).

Vegetation down gradient of the surge pond appears to have been affected by the chloride (WorleyParsons2015a). Vegetation plots were initially established across the plume in 2012 and 2013 and were resurveyed in 2017 to assess potential changes in vegetation (i.e. health parameters, percent cover, species



composition). Trends in vegetation cover over time, and comparison to background vegetation parameters will be used as an indicator of the effects of the chloride plume on the environment.

Shallow soil samples were collected at each of the vegetation plots to correlate soil salinity with vegetation monitoring.

Surface water samples were collected at the edge of the wetland downgradient of the surge pond and from Fisherman Lake. Electrical conductivity and chloride concentrations above background conditions were found at the wetland closest to the slope leading to the surge pond; however, no changes in vegetation were observed within the wetland that would indicate an effect of the elevated parameters. Elevated electrical conductivity and chloride concentrations were not detected in Fisherman Lake. (Advisian 2018a)

4.2 Assessment and Studies

Field work for assessments and studies conducted at the Site were conducted in August and September of 2017. Reports detailing the results of these studies are currently being completed.

4.2.1 Geophysics

A shallow geophysics program using electrical resistivity was conducted downgradient of the surge pond to map the plume in greater detail. The survey confirmed the results of previous geophysics surveys of the area and can be used to provide improved estimates of contaminated soil volume.

4.2.2 Background Geochemistry

Background soil and bedrock samples were collected from the A and B mountains to confirm a conclusion that some metal concentration exceedances found in soil at the well sites are naturally occurring and are not the result of contamination and to more accurately define contaminants of concern (Advisian 2018b).

4.2.3 Environmental Assessment

Soil assessment samples were collected from two areas of concern that had not previously been sampled. Hydrocarbons were confirmed to exist in soil at a location where a barrel was found in the forest along the road to the A-4 well site. The barrel has since been removed for disposal. A community member expressed a belief that there may have been a small pipeline spill at a location west of the A-4 well site. Soil samples were collected along this section of pipeline. The analytical results for this soil did not indicate a pipeline release in this location (Advisian 2018c).

4.2.4 NORM Survey

A Naturally Occurring Radioactive Materials (NORM) assessment was conducted to further evaluate the possible presence or extent of NORM contamination at the Former Plant Site and well sites. The 2017 NORM survey confirmed the extent of NORM impacted soil at the Former Plant Site and found no areas of contamination at the well sites or additional areas at the Former Plant Site (Advisian 2018c).



4.3 Remediation Activities

Two remedial excavations of contaminated soil were completed in 2017. NORM impacted soil at the Former Plant Site and an area of hydrocarbon contaminated soil at a pipeline junction approximately 300 m north of the Former Plant Site were excavated and removed from site (Advisian 2018c).

The first excavation was conducted at the Former Plant Site after the confirmed area of NORM impacted soil was re-assessed. NORM and chloride impacted soil was excavated and transported for disposal at the Silverberry Landfill near Fort St. John, British Columbia. NORM surveys of the excavation base confirmed that the remaining soil was at background concentrations for NORM. The location will require further remediation of chloride impacted soil. The excavation was backfilled with surrounding soil and re-contoured to promote positive drainage (Advisian 2018c).

The second excavation removed hydrocarbon contaminated soil located at a pipeline junction approximately 300 m north of the Former Plant Site. The hydrocarbon impacted soil was sent to the Northern Rockies landfill near Fort Nelson, British Columbia. Following the receipt of confirmatory laboratory results, the excavation was backfilled to promote positive drainage with soil sourced from the Former Plant Site area (Advisian 2018c).

Inert metal debris was collected from areas around the Former Plant Site and the Airstrip and sent to Fort Nelson for recycling. Additional accessible on-site inert debris was opportunistically collected and stockpiled at the Former Plant Site for future disposal (Advisian 2018c).

As part of the Weed Management Plan (Advisian 2017b), a crew of local labourers picked scentless camomile at the airstrip and along the access road to the barge landing. The objective of the picking was to remove the plants and seed heads. Approximately 500 kg of weeds were picked, bagged and removed from Site for disposal at the Northern Rockies Landfill (Advisian 2018c).

The materials removed from site are detailed in Appendix 1.

5. Waste Summary

The waste removed from Site is described above and detailed in Appendix 1. The waste transported from Site in 2017 was inert scrap metal, contaminated soil, water from excavations, barrels of fuel and weeds. No equipment or usable materials were removed from Site in 2017.

6. Unauthorized Discharges

No unauthorized discharges occurred in 2017.

7. Residual Risks

With the removal of NORM impacted material, inert scrap metal and barrels of fuel in 2017, there was a decrease in residual risks to the environment.

The residual risk from historical activities has most recently been described in the Supplemental Phase 2 ESA (WorleyParsons 2015a) and the Site-Specific Remediation Guidelines (WorleyParsons 2015b). Based on a further analysis of background geochemistry and the historic analytical results of metal concentrations in soil



at the well sites, the volume of suspected metal contaminated soil is less than previously interpreted. Soils once suspected of being contaminated with metal impacts are representative of background conditions.

Contaminated soil and groundwater at the Site are summarized in Table B. Additional risks at the Site have been identified as scattered inert debris, localized hydrocarbon impacts, potential remnant liquids within the pipelines and 10 landfills or areas of buried debris.

Table B Contaminants of Concern at the Former Pointed Mountain Gas Field

Location	Media to be Remediated	Hydrocarbons	Polycyclic Aromatic Hydrocarbons	Metals	EC/Salinity/pH
A-1	Soil	X		X	pH (acidic)
A-2	Soil	X	X	X	
A-3	Soil	X		X	
A-4	Soil	X		X	
B-1	Soil	X		X	pH (acidic)
B-2	Soil	X		X	
Former Plant Site	Soil and Groundwater	X		X	chloride
Air Strip	Soil	X		X	
Barge Landing	Soil (as required)	possible		unlikely	unlikely
Pipeline junctions/valves	Soil (as required)	isolated		unlikely	unlikely

Note: "X" indicates the presence of a contaminant of concern that has been identified at a location.

8. Cost Estimates and Remediation Timeline

Paramount has determined that the anticipated cost of the remediation and long term monitoring of the Site is estimated to be between approximately 15 and 20 million dollars.

An updated draft remediation schedule for the Former Pointed Mountain Gas Field is summarized in Table C.

Subsequent updates to this schedule will be communicated to the ADKFN, Metis Local 67, the Community of Fort Liard, and the MVLWB as Paramount becomes aware of changes.



Table C Draft Remediation Schedule

Year	Activity
2018	<ul style="list-style-type: none"> ▪ Fencing and bird deterrent flagging at surge pond will be assessed and may be modified to improve visibility; ▪ An LTM event will be conducted; ▪ A weed control event will be conducted; and, ▪ Community engagement will be conducted.
2019	<ul style="list-style-type: none"> ▪ Apply for two-year extension to LUP; ▪ Apply for a Water Licence as determined by future Site activities as required; ▪ LTM water monitoring; ▪ Conduct weed control program; and, ▪ Community engagement will be conducted.
2020	<ul style="list-style-type: none"> ▪ Vegetation and archaeological assessments (desktop or field) of new vegetation clearing activity (if required). ▪ An application will be submitted for an amendment to the LUP to clear additional areas of vegetation for collection of remaining surface debris and possible development of borrow sources. ▪ Conceptual engineering will be performed for site roads to accommodate expected haul rates. ▪ Repair or construction of site roads will be performed as needed. ▪ Remove water from surge pond. Sample and discharge at site to surface if water meets discharge criteria or haul for off-site disposal. ▪ Excavation of impacted soil from surge pond area and transport to licensed landfill. ▪ Backfill and re-grade the area of the surge pond. ▪ Excavation and remediation of soil at Former Plant Site (tank farm bio-remediation), A-4 (re-mix), Airstrip (bio-remediation), A-1 (bio-remediation). ▪ Excavation and transport of untreatable soil from all locations to licensed landfill (may involve winter work). ▪ Re-grading of disturbed areas as required. ▪ Post-remediation vegetation assessments to be conducted. ▪ LTM water monitoring. ▪ Conduct weed control program. ▪ Community engagement will be conducted.



Year	Activity
2020–2021	<ul style="list-style-type: none"> ▪ Reclamation monitoring of all disturbed areas and vegetation assessments. ▪ LTM water and vegetation monitoring (well sites and natural attenuation down-gradient of surge pond). ▪ Initiate geotechnical monitoring program as part of LTM. ▪ Weed control program. ▪ Removal or sign over to community site infrastructure (culverts, bridges) as required. ▪ Community engagement will be conducted.
2022–2045	<ul style="list-style-type: none"> ▪ LTM water and vegetation monitoring (well sites and natural attenuation down-gradient of surge pond). ▪ Geotechnical monitoring program. ▪ Re-evaluate LTM monitoring schedule based on evidence collected.

9. Engagement Plan

A summary of the key engagement activities that occurred during 2017 are listed in Table D. The names of individuals involved have been omitted to preserve confidentiality in this public document.

Table D Summary of Engagement Activities

Date	Activity	Attendees (other than Paramount)
Sept 18, 2017	Personal Communication at Site	ADKFN member
Sept 19, 2017	Personal Communication at Site	ADKFN member
September 29, 2017	Meeting with Paramount and ADKFN representatives	ADKFN representatives, (Chief, Operations Manager, Lawyers)
October 2017	Letter and replies to comments re: Weed Management Plan	Landmark Resource Management/ADKFN
November 2017	Letter and replies to comments re: Pointed Mountain Remediation Plan Rev 3 (Advisian 2017a)	Landmark Resource Management/ADKFN



10. Closure

We trust that this report satisfies your current requirements and provides suitable documentation for your records. If you have any questions or require further details, please contact the undersigned at any time.

Sincerely,

Sam Bird, B.Sc.
Environmental Scientist

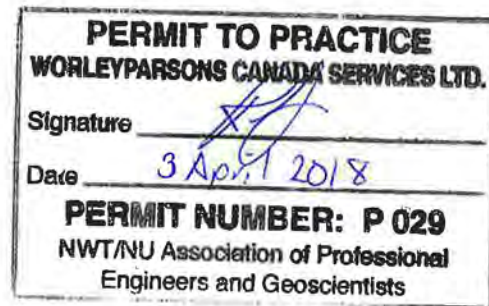


3 April 2018

Ron Thiessen, M.Sc.(Eng.), P.Eng., EP
Principal Consultant

Advisian, Americas

enc.cc: Lynn Huntley, Paramount Resources Ltd.





11. References

Advisian, 2017a. Remediation Plan (Revision 3), Former Pointed Mountain Gas Field. Prepared for Apache Canada Ltd. File No. 407074-00349.100. 19 June 2017.

Advisian, 2017b. Weed Management Plan Pointed Mountain Northwest Territories. Prepared for Apache Canada Ltd. File No. 407074-00349.100. 28 July 2017.

Advisian, 2018a. 2017 Long Term Monitoring Report Pointed Mountain Northwest Territories. Being prepared for Paramount Resources Ltd. File No. 407074-00349.100.

Advisian, 2018b. 2017 Background Geochemistry Assessment Pointed Mountain Northwest Territories. Being prepared for Paramount Resources Ltd. File No. 407074-00349.100.

Advisian, 2018c. 2017 Remediation Activity Report Pointed Mountain Northwest Territories. Being prepared for Paramount Resources Ltd. File No. 407074-00349.100.

WorleyParsons (WorleyParsons Canada Services Ltd.), 2015a. 2014 Supplemental Phase 2 Environmental Site Assessment, Former Pointed Mountain Gas Field. Prepared for Apache Canada Ltd. File No. 407074-00280.100. 29 June 2015.

WorleyParsons (WorleyParsons Canada Services Ltd.), 2015b. Site-Specific Remediation Guidelines, Former Pointed Mountain Gas Field. Prepared for Apache Canada Ltd. Final. File No. 407074-00280.300. 29 June 2015.



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Appendix 1

Annual Report Waste Summary





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Appendix 1: 2017 Waste Disposal Summary

Waste Type	Source	Waste Volume (kg, Tonne, L or m³)	Disposal Facility
Inert Scrap Metal	Debris	50 Tonne (estimated)	Wide Sky Disposal, Fort Nelson, British Columbia
Non-Hazardous NORM Impacted Soil	Remedial Excavation	209.61 Tonnes	Tervita Silverberry Landfill - Block A-18-088-20 W6M, British Columbia
Non-hazardous Hydrocarbon Impacted Soil	Remedial Excavation	812.96 Tonnes	Tervita Northern Rockies Landfill A-77-G/94-J-10 Fort Nelson, British Columbia
Water	Remedial Excavation	18 m ³	Secure Energy Services, Kotcho Lake FST, D-98-I/94-I-14, British Columbia
Fuel in Barrels	Debris, Former Plant Site	410 L	Fort Nelson Bulk Sales, Fort Nelson, British Columbia
Weeds	Ditches, Airstrip	500 kg	Tervita Northern Rockies Landfill A-77-G/94-J-10 Fort Nelson, British Columbia