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December 13, 2023 File: 123514555

Attention: Karolina Mlynczak

Senior Environmental Specialist Ovintiv Canada ULC 500 Centre Street SE Calgary, AB T2P 1A6

Dear Ms. Mlynczak,

## Reference: Land Use Permit S99A-015, G-18 Wellsite, Camp, and Remote Sump, within the Sahtu Settlement Area, Northwest Territories

#### **1** INTRODUCTION

K'alo-Stantec Limited (K'alo-Stantec) was retained by Ovintiv Canada ULC (Ovintiv) to provide an annual regulatory response for the S99A-05 G-18 wellsite, camp, and remote sump (collectively referred to as the "Site") within the Sahtu Settlement Area (SSA), Northwest Territories (NT). This annual update letter is provided as part of the Remedial Plan that was submitted to Sahtu Land and Water Board (SLWB) in December 2022<sup>1</sup>. This annual update letter summarizes the findings of the 2023 Site Assessment Program and provides an update for the Remedial Plan submitted in December 2022.

#### 1.1 Background

The Site is located 3.4 km southeast of Tate Lake at 64<sup>0</sup>27'17".306 latitude and 125<sup>0</sup>17'33".14824 longitude (NAD 27 datum) within the SSA. The Site consists of a wellsite, a campsite located approximately 112 m northeast of the wellsite, and a remote sump site located approximately 75 m southwest of the wellsite. The Site was permitted under Sahtu Land and Water Board Class A Permit S99A-015 and associated Water License S99L1-009 on January 4, 2000, under exploration license #392. The G-18 well was drilled and abandoned during February and March 2000.

Previous regulatory inspection reports from 2013<sup>2</sup>, 2019<sup>3</sup>, and 2022<sup>4</sup> have reported concerns regarding the integrity of the remote sump. An October 2019 regulatory letter included soil sample results from the

<sup>&</sup>lt;sup>1</sup> K'alo-Stantec. 2022. *Re: Land Use Permit S99A-015, G-18 Wellsite, Camp, and Remote Sump, within the Sahtu Settlement Area, Northwest Territories.* Prepared for Ovintiv Canada, December 13, 2022, File No. 123514183.

<sup>&</sup>lt;sup>2</sup> Aboriginal Affairs and Northern Development Canada, 2013. *Land Use Permit S99A-015 G-18 Remote Sump*. Issued to Encana, November 20, 2013.

<sup>&</sup>lt;sup>3</sup> Government of Northwest Territories, 2019. S99A-015 Oil and Gas Drilling – Wellsite; Remote Sump for Wellsite G-18. Issued to Ovintiv. July 16, 2019.

<sup>&</sup>lt;sup>4</sup> Government of Northwest Territories, 2022. S99A-015 Oil and Gas Drilling – Wellsite and Sump Environmental Inspection Report. Issued Ovintiv. June 20, 2022.

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## Reference: Land Use Permit S99A-015, G-18 Wellsite, Camp, and Remote Sump, within the Sahtu Settlement Area, Northwest Territories

inspection and soil sampling completed in July 2019<sup>5</sup>, where results from the soil samples indicated elevated sodium adsorption ratio (SAR) in samples collected downgradient of the sump from a wallow pit.

In response to the findings from the inspection reports, K'alo-Stantec completed a records review of the Site and a Limited Phase I ESA in 2022 to identify areas of potential environmental concerns (APECs) and potential contaminants of concern (PCOCs) resulting from historical oil and gas operations at the Site. The results were used to identify where further assessment may be required to address the inspection report concerns and data gaps associated with the identified APECs and PCOCs. Findings from the 2022 Limited Phase I ESA are summarized in Table 1.1.

#### Table 1.1 Summary of APECs and PCOCs

APEC	Location	Matrix	PCOCs
APEC 1: Well Centre within the wellsite	Well head	Soil Surface Water	Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Petroleum Hydrocarbons (PHCs), salinity, metals
APEC 2: Remote drilling waste disposal site and remote sump cell	Approximately 75 m southwest of the wellsite.	Soil Surface Water	Salinity, metals, BTEX, PHCs
APEC 3: Camp site and assumed camp sump (unknown location)	Approximately 112 m northeast of the wellsite within the camp site area. Exact location is unknown.	Soil Surface Water	Salinity, metals, BTEX, PHCs
APEC 4: Cleared area	Cleared area between the remote sump and wellsite.	Soil Surface Water	Salinity, metals, BTEX, PHCs

Based on the results of the 2022 Limited Phase I ESA, a Remedial Plan was established, which included a site monitoring program proposed for the summer/fall of 2023. The monitoring program was developed to assess the current conditions at the Site, such as tension cracks, evidence of subsidence, bare areas, or stressed vegetation. Additionally, an electromagnetic (EM) survey was conducted in the area of the remote drilling sump (APEC 2) to guide soil and standing water sampling (should standing water be observed).

<sup>&</sup>lt;sup>5</sup> Government of Northwest Territories, 2019. S99A-015 Oil and Gas Drilling – Wellsite; Remote Sump for Wellsite G-18. Issued to Ovintiv. October 9, 2019.



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#### 2 2023 SITE ASSESSMENT PROGRAM

In September 2023, the Site was visited by Frontier Geosciences Inc. and K'alo-Stantec to complete electromagnetic (EM) surveys along with a site inspection and soil sampling. Standing water was observed in a wallow area located southeast of the remote sump area. However, the conditions (i.e., very soft ground) did not allow for safe sampling access. As such, no standing water samples were collected. A report detailing the scope of work and findings including the EM survey report is provided in **Attachment A**. A summary of the results from the attached 2023 Site Assessment and Soil Sampling program includes the following:

- A total of 17 soil sample locations including three background locations were advanced by hand auger to assess the soils within the APECs.
- Soils at the Site generally consisted of 0.05 m of topsoil underlain by silty clay to a depth of 0.5 to 0.6 m BGS. Organic (peat) type soils were present in several areas of the Site, including the southwest portion of the Wellsite (APEC 1), the Cleared Area (APEC 4), and the southwest portion of the Remote Sump (APEC 2). Evidence of permafrost was not encountered during soil sampling.
- Both mineral (silty clay) and organic (peat) type soils were sampled at background locations. Results reported a selenium concentration above the applied guideline (and low (acidic) pH attributed to organic (peat) conditions.
- During the site inspection, dense vegetation was observed throughout the Site. The campsite and cleared area were heavily vegetated with deciduous shrubs, coniferous trees, and various grasses and herbaceous plants. The wellsite and remote sump areas were well vegetated with few bare locations, fewer deciduous shrub species were observed in these areas.
- A permafrost thaw/slump area was reported in an area along the southern portion of the sump cell. As a result of the exposed soil and lack of vegetation, ungulates (muskox) have developed a wallow. Additional wallow areas were noted to the north and southwest of the sump cell.
- Based on field observations and soil sample results, no further assessment was recommended for the Wellsite (APEC 1), Campsite (APEC 3), and Cleared Area (APEC 4). APECs 1, 3, and 4 appear to meet the requirements of the Land Use Permit.
- Based on field observations and soil sample results, additional assessment is required to delineate and characterize the remote sump (APEC 2). Soil sample results indicated leaching of the sump cell contents (drilling mud) is likely occurring from remote sump and migrating downgradient (south-southeast) within the active layer.

Following the results of these activities, it was concluded that further lateral delineation of the reported salinity exceedances (chloride and sodium) is required downgradient of the remote sump (APEC 2) and extending offsite to the south-southeast as well as cross gradient to the west. Permafrost slumping and erosion, as well as the ungulate wallows may have contributed to integrity issues at the remote sump, which has resulted in elevated concentrations of inorganics to migrate within the active layer



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downgradient (south-southeast) of the sump cell. The elevated apparent conductivity reported during the EM 38 extends downgradient (south-southeast) of the remote sump cell beyond the current soil chemistry and EM dataset. As a result, the current Site conditions at the remote sump area do not meet requirements of Land Use Permit. The complete report detailing these findings is provided in **Attachment A**.

#### 3 UPDATED REMEDIAL PLAN

Based on the findings of the 2023 Site Assessment Program, a Site Assessment Program is recommended in 2024 that has been developed to address the identified data gaps at the remote sump area. The results of the 2024 Site Assessment Program will be used to develop an updated Remedial Plan, if deemed necessary.

#### 3.1 2024 Site Assessment Program

During the summer of 2024, Ovintiv plans to complete an additional Site Assessment Program (the 2024 Program). The 2024 Program will focus on lateral delineation of the salinity exceedances, and detailed vegetation, and terrain assessments. The purpose of the 2024 Program is to characterize the extent of the salinity exceedances, sump stability issues, and identify potential risks and/or impacts to site receptors (e.g., vegetation). To complete the objectives, the 2024 Program will include the following tasks:

- Additional soil sampling southwest/downgradient of the sump cell where the 2023 analytical data and the EM survey did not appear to achieve delineation. Soil sample locations will be determined in the field based on field observations and soil field screening with a Field Scout Direct Contact EC meter. It is anticipated that approximately 10 sample locations will be required to achieve lateral downgradient delineation to background field EC conditions. Two soil samples from each location will be collected for analysis of detailed salinity parameters.
- Soil sampling to be conducted in the area where the wallows have developed adjacent to the sump to determine the soil chemistry to help support reclamation efforts to establish vegetation. Three soil sample locations are proposed with two soil samples from each location to be submitted for detailed salinity analysis.
- Three additional background soil sample locations in comparable geology (peat) to support background reference chemistry. Two soil samples from each location (0-0.25 m BGS and 0.25-0.5 m BGS) will be submitted for detailed salinity analysis.
- Detailed vegetation assessment to characterize both onsite and offsite vegetation species and health with a focus on how the vegetation downgradient of the sump compares to offsite controls.
- Terrain assessment will be conducted to determine how to repair potential permafrost slump/thaw issues and re-enforce the sump stability.



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Results from the 2024 Site Assessment Program will be summarized and submitted to the SLWB in December 2024 along with any updates to the Remedial Plan if deemed necessary.

#### 4 LIMITATIONS

This report documents work that was performed in accordance with generally accepted professional standards at the time and location in which the services were provided. No other representations, warranties or guarantees are made concerning the accuracy or completeness of the data or conclusions contained within this report, including no assurance that this work has uncovered all potential liabilities associated with the identified property.

This report provides an evaluation of selected environmental conditions associated with the identified portion of the property that was assessed at the time the work was conducted and is based on information obtained by and/or provided to K'alo-Stantec at that time. There are no assurances regarding the accuracy and completeness of this information. All information received from the client or third parties in the preparation of this report has been assumed by K'alo-Stantec to be correct. K'alo-Stantec assumes no responsibility for any deficiency or inaccuracy in information received from others.

The opinions in this report can only be relied upon as they relate to the condition of the portion of the identified property that was assessed at the time the work was conducted. Activities at the property subsequent to K'alo-Stantec's assessment may have significantly altered the property's condition. K'alo-Stantec cannot comment on other areas of the property that were not assessed.

Conclusions made within this report consist of K'alo-Stantec's professional opinion as of the time of the writing of this report and are based solely on the scope of work described in the report, the limited data available and the results of the work. They are not a certification of the property's environmental condition. This report should not be construed as legal advice.

This report has been prepared for the exclusive use of the client identified herein and any use by any third party is prohibited. K'alo-Stantec assumes no responsibility for losses, damages, liabilities or claims, howsoever arising, from third party use of this report.

This report is limited by the following:

- Availability of historical information and records.
- Availability of an operator and/or landowner for interviews pertaining to the wellsite activity.

The locations of any utilities, buildings and structures, and property boundaries illustrated in or described within this report, if any, including pole lines, conduits, water mains, sewers and other surface or sub-surface utilities and structures are not guaranteed. Before starting work, the exact location of all such utilities and structures should be confirmed and K'alo-Stantec assumes no liability for damage to them.



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The conclusions are based on the site conditions encountered by K'alo-Stantec at the time the work was performed at the specific assessment locations, and conditions may vary among assessment locations. Factors such as areas of potential concern identified in previous studies, site conditions (e.g., utilities) and cost may have constrained the assessment discussed in this report. Due to the nature of the investigation and the limited data available, K'alo-Stantec does not warrant against undiscovered environmental liabilities nor that the assessment results are indicative of the condition of the entire Site. As the purpose of this report is to identify site conditions which may pose an environmental risk; the identification of non-environmental risks to structures or people on the Site is beyond the scope of this assessment.

Should additional information become available, which differs significantly from our understanding of conditions presented in this report, K'alo-Stantec specifically disclaims any responsibility to update the conclusions in this report.

Sincerely,

#### **K'alo-Stantec Limited**

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Attachment A Site Inspection and Soil Sampling AEC WEST ET AL TATE G-18



December 13, 2023 Attention: Karolina Mlynczak

Reference: Land Use Permit S99A-015, G-18 Wellsite, Camp, and Remote Sump, within the Sahtu Settlement Area, Northwest Territories

Attachment A Site Inspection and Soil Sampling AEC WEST ET AL TATE G-18





Well ID: 300/G-18-6430-12515/0

Sahtu Settlement Area Land Use Permit S99A-015

Prepared for:

**Ovintiv Canada ULC** 

Prepared by:

**K'alo-Stantec Limited** 

November 27, 2023

Project No.: 123514555



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Section 1: Introduction November 27, 2023

# 1 Introduction

K'alo-Stantec Limited (K'alo-Stantec) was retained by Ovintiv Canada ULC (Ovintiv) to complete a site inspection and soil sampling activities at the AEC WEST ET AL TATE G-18 abandoned wellsite (hereinafter referred to as the "Site"), well ID 300/G-18-6430-12515/0, located within the Tulita District of the Sahtu Settlement Area (SSA), Northwest Territories (NT) at 64<sup>o</sup>27'17".306 latitude and 125<sup>o</sup>17'33".14824 longitude (NAD 27 datum). A Site Location plan is provided as **Figure A.1** in **Appendix A**. This report presents a summary of field data gathered in September 2023.



Site Inspection and Soil Sampling AEC WEST ET AL TATE G-18

Section 2: Objective and Scope of Work November 27, 2023

## 2 Objective and Scope of Work

The objective of the site inspection and soil sampling activities was to assess surface conditions, as well as areas of potential environmental concerns (APECs), identified in a 2022 Limited Phase I ESA (Stantec, 2022a) and outlined as part of a December 2022 remedial plan (Stantec, 2022b) prepared for the Government of the Northwest Territories (GNWT). To achieve the objective of the site inspection and soil sampling, the following scope of work was completed by Stantec:

- Prepare a health and safety plan to identify and address site specific hazards and potential hazard mitigation.
- Complete required utility notifications and clearances.
- Assess current Site surface conditions, such as tension cracks, evidence of subsidence, bare areas, or stressed vegetation.
- Complete electromagnetic (EM) 31 and 38 surveys at the remote sump and surrounding area to determine if areas of elevated apparent conductivity are present.
- Complete soil sampling at the remote sump based on preliminary EM survey results and field observations.
- Complete soil sampling at well centre.
- Complete soil sampling at the campsite, cleared area, and other potential areas of concern, based upon visual observations.
- Submit soil samples for laboratory analysis of potential contaminants of concern (PCOCs) including salinity, metals, benzene, toluene, ethylbenzene, xylenes (BTEX), and/or petroleum hydrocarbon (PHC) fractions 1 through 4 (F1-F4).
- Collect standing surface water samples at APECs, if water is present.
- Prepare a report summarizing the site inspection and soil sampling program.



Section 3: Background November 27, 2023

# 3 Background

The AEC WEST ET AL TATE G-18 wellsite was drilled and abandoned during February and March of 2000. Drilling activities were permitted under Sahtu Land and Water Board Class A Permit S99A-015 and associated Water Licence S99L1-009 on January 4, 2000, under Exploration Licence #392. The Site consisted of the wellsite, a cleared area immediately southwest of the wellsite, a campsite located approximately 112 metres (m) to the northeast, and a remote sump area located approximately 75 m southwest of the wellsite (**Figure A.2, Appendix A**).

Previous regulatory inspections completed by Aboriginal Affairs and Northern Development Canada (AANDC) and the GNWT in 2013, 2019, and 2022, reported concerns regarding the integrity of the remote sump and concerns that ungulates were wallowing in the area as a result. A July 2019 inspection letter (GNWT, 2019a) indicated an action plan was necessary to "remediate adverse effects caused by the sump" and that soil samples had been collected by GNWT. An October 2019 follow up letter (GWNT, 2019b) included soil sample analytical results from the July 2019 inspection and soil sampling conducted by the GNWT. A total of nine soil samples from locations around the remote sump were collected and analyzed for detailed salinity parameters. Soil analytical results indicated electrical conductivity (EC) and sodium adsorption ratio (SAR) values greater than the GNWT and CCME guidelines for agricultural land use. These samples were collected downgradient of the sump, from the ungulate wallowing area located directly southwest of the remote sump cell (**Figure A.2, Appendix A**). The EC and SAR exceedances were attributed to elevated sodium and chloride concentrations. In June 2022, GNWT completed a site inspection and indicated conditions at the Site had not improved and a remedial plan was to be submitted to GNWT by December 21, 2022 (GNWT, 2022).

In response to the findings of the 2019 and 2022 GNWT site inspection reports, a Limited Phase I ESA of the Site was completed in December 2022 (K'Alo-Stantec, 2022a). The APECs and PCOCs identified as part of the Limited Phase I ESA are outlined in Table 3.1, below.

APEC	Location	Matrix	PCOCs
APEC 1: Well Centre	Well bore	Soil Surface Water	Salinity, metals, BTEX, PHCs
APEC 2: Remote drilling waste disposal site and remote sump cell	Approximately 75 m southwest of the wellsite.	Soil Surface Water	Salinity, metals, BTEX, PHCs
APEC 3: Camp site and assumed camp sump (unknown location).	Approximately 112 m northeast of the wellsite within the camp site area. Exact location is unknown.	Soil Surface Water	Salinity, metals, BTEX, PHCs
APEC 4: Cleared area	Cleared area between the remote sump and wellsite	Soil Surface Water	Salinity, metals, BTEX, PHCs

#### Table 3.1 Summary of APECs and PCOCs

To address the findings of both the GNWT site inspection letter and the Limited Phase I ESA, a remedial plan was developed to address data gaps and the identified APECs (K'Alo-Stantec, 2022b).



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# 4 Site Setting

The Site is located approximately 114 kilometres (km) southeast of the Town of Norman Wells, NT, and approximately 10 km west of the Mackenzie River (**Figure A.1, Appendix A**). Land use surrounding the Site consists of dense coniferous forests. The Site is situated on a hillside between two unnamed lakes to the north and south. The Site is located within the Mackenzie Foothills, Low Subarctic (LS) boreal-subalpine (bs) Ecoregion, which is the largest level IV Ecoregion in the Taiga Cordillera (ECG, 2010). The topography of the Site is generally sloping to the southwest. Topographically, surface water generally drains southwest towards the unnamed lake approximately 2.0 km southwest of the Site.

### 4.1 Surficial Soils

Soils in the Mackenzie Foothills LSbs Ecoregion consist of Crysols that are associated with tills and lacustrine deposits; Brunisols and Regosols are associated with well drained, south facing slopes and alluvium. Organic Crysols are associated with peat plateaus (ECG, 2010).

### 4.2 Geology

Sandstones, siltstones, shales and limestones underlie the Mackenzie Foothills LSbs Ecoregion. These lithological units are exposed in ridges, along eroded plateau edges as well as river valleys. Erosion and mass wasting of shales is observed throughout the Ecoregion and have resulted in dissected and slumped complexes of till and colluvial deposits. Moderately dissected and rolling terrain is characteristic of the southern half of the Ecoregion. Level and gently sloping till plains are prevalent on the valley bottoms and sides of the Wrigley and Johnson rivers; alluvial, lacustrine and glacofluvial deposits occur along the larger rivers. Permafrost is widespread and observed by runnels, vaneer bogs, retrogressive flow slides and peat plateaus (ECG, 2010).



November 27, 2023

# 5 Regulatory Framework

The territorial *Environmental Protection Act* authorizes the GNWT to take all necessary measures to ensure the preservation, protection, or enhancement of the environment. This includes the ability to develop, coordinate, and administer environmental guidelines.

The Environmental Guideline for Contaminated Site Remediation (EGCSR) was issued by the GNWT in November 2003. The guideline adopted the criteria outlined in the Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines (CSQG) and the CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil. The CCME guidelines are risk-based and are typically the preliminary means for evaluating soil quality.

The GNWT and CCME soil quality guidelines were developed considering land uses, with different guidelines for agricultural, residential/parkland, commercial and industrial land uses. The Site is located within a natural area and cannot be realistically categorized under one of these defined land uses. Therefore, K'alo-Stantec will compare the analytical results with the agricultural guidelines as defined in the 2003 GNWT EGCSR document and CCME, 2006, which suggest "As a conservative approach, the soil quality guidelines for agricultural land use could be applied to natural areas".

The analytical results for soil will be compared to the following guidelines (applied guidelines):

- GNWT Environmental Guideline for Contaminated Site Remediation (GNWT, 2003)
- CCME Canadian Soil Quality Guidelines (CCME, 2023)
- CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (CCME, 2008)

The surface soil conditions at the Site consisted of both fine-grained soil and organic soil. As such, soil analytical results are compared to the most stringent of the coarse and fine-grained soil guidelines in an agricultural land use.



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# 6 Results

Access to the Site during summer months is only achieved via helicopter. On September 20, 2023, K'alo-Stantec chartered Great Slave Helicopters out of the Town of Normal Wells, NT to provide transportation to the Site. Activities to be completed included a site inspection, EM survey, and soil sampling. Prior to landing on the Site, photographs were collected from multiple directions to document the conditions of Site and surrounding areas. Photographs are presented in **Appendix B**. The Site was heavily vegetated at the time of the inspection; however, a suitable landing location was identified within the wellsite area. The locations of areas discussed below are shown on **Figure A.2, Appendix A**.

### 6.1 Site Inspection

#### 6.1.1 On Site Infrastructure

A well sign was observed near the abandoned wellbore within the wellsite area. No other infrastructure was observed at the wellsite, campsite, cleared area, or remote sump area.

#### 6.1.2 Vegetation

During the site inspection, dense vegetation was observed throughout each of the wellsite, cleared area, campsite, and remote sump area. The campsite and cleared area were heavily vegetated with deciduous shrubs, coniferous trees, and various grasses and herbaceous plants. The wellsite and remote sump areas were well vegetated with few bare locations, fewer deciduous shrub species were observed in these areas.

#### 6.1.3 Wildlife

Signs of wildlife were not observed at the wellsite, campsite, or cleared areas. Three ungulate wallowing areas were observed within the remote sump area, two directly adjacent to the northeast and southwest of the remote sump cell and the third directly adjacent to the southeast of the southwest entrance.

#### 6.1.4 Terrain

At the wellsite, a small depression was observed at well centre, likely subsidence related to the abandoned wellbore. Subsidence in the form of ungulate wallowing areas was observed in the remote sump area, as described in Section 6.1.3. Mounding was observed on the remote sump cell. No terrain issues were observed at the campsite or cleared areas.



Section 6: Results November 27, 2023

#### 6.1.5 Standing Water

Shallow standing water was observed in the ungulate wallowing area located southeast of the southwest entrance of the remote sump area. The ground was very soft in this area which did not allow K-Alo Stantec personnel to safely field screen this water or collect a sample. Sheen, odour, or other visible indications of impacted water were not observed.

Additional photographs taken during the site inspection are provided in **Appendix B**.

### 6.2 EM Survey

Frontier Geosciences Inc. (Frontier) completed EM31 and EM38 EM surveys of the remote sump area. The EM31 survey indicated the maximum terrain conductivities were recorded over the remote sump cell to the northeast, moderate terrain conductivities were recorded to the southwest of the remote sump cell and less intense terrain conductivities were recorded in the southern portion of the surveyed area. The EM38 survey indicated an EM anomaly over the remote sump cell, as well as an anomaly to the southwest, broader than in the EM31 survey. Anomalous elevated terrain conductivities were recorded in the southern portion of the surveyed area. The conductivity Survey Report provided by Frontier is included in **Appendix C**.

### 6.3 Soil Results

The soil sampling program included the advancement of 17 hand auger locations (23-01 to 23-17). Hand auger locations were generally completed to depths of 0.5 - 0.6 meters (m) below ground surface (bgs) where typically refusal, due to permafrost conditions, was met. Hand auger locations are shown on **Figure A.2, Appendix A**. Soil samples collected for laboratory analysis were submitted to Bureau Veritas (BV) in Calgary, Alberta.

#### 6.3.1 Soil Stratigraphy

The surficial soil stratigraphy at the Site generally consisted of 0.05 m of topsoil underlain by silty clay to a depth of 0.5 to 0.6 m bgs. Organic soils were present in several areas of the Site, including the southwest boundary of the wellsite (G18-SS23-17), the cleared area (G18-SS23-06), and extending from the southeast to southwest corners of the remote sump cell (G18-SS23-09, G18-SS23-13, G18-SS23-14, G18-SS23-15, and G18-SS23-16). Organic soil in these areas was present to a refusal depth of 0.6 m bgs. Soil stratigraphy encountered during the site inspection and soil sampling program is summarized in **Table D.1, Appendix D**.

#### 6.3.2 Soil Quality Field Screening

Soil samples collected were field screened for electrical conductivity (EC) using a Field Scout Direct Contact EC meter and for combustible soil vapour (CSV) concentrations using an RKI Eagle 2<sup>™</sup> operated in methane elimination mode. Select soil samples were submitted for laboratory analysis of salinity, metals, BTEX, PHC F1 to F4, and/or particle size analysis. Descriptions of the soil conditions encountered, and field screening results are presented in **Table D.1**, **Appendix D**.



Based on field observations and laboratory particle size analysis, the surficial soils were predominately fine-grained with organic soil present as discussed above. Laboratory particle size analysis results are included in **Table D.2** in **Appendix D**.

The soil analytical results from the soil samples collected by K'Alo-Stantec during the site inspection and soil sampling, compared to the applied guidelines, are presented in **Table D.2**, **Appendix D**. The 2019 soil analytical results provided by the GNWT, compared to the applied guidelines, are presented in **Table D.3**, **Appendix D**. Copies of the laboratory analytical reports for the soil samples collected by K'Alo-Stantec are provided in **Appendix E**. Field methodology is presented in **Appendix F**.

#### 6.3.3 Background

Three hand auger locations, G18-SS23-07, G18-SS23-08, and G18-SS23-17, were considered as background locations for the following reasons:

- G18-SS23-07 was completed to compare general soil lithology at the remote sump area. One sample was collected and analyzed for particle size analysis.
- G18-SS23-08 was completed to compare general soil lithology at the remote sump area. Samples collected were analyzed for salinity, metals and/or particle size to establish background chemistry.
- G18-SS23-17 was completed near the southwest boundary of the wellsite, upgradient of the remote sump area, to compare organic soil within the remote sump area. Samples collected were analyzed for salinity, metals and/or particle size to establish background chemistry.

The background EC and SAR values were less than the applied guidelines. The background EC values ranged from 0.14 to 0.17 deciSiemens per metre (dS/m) while the background SAR values ranged from 0.44 to 0.87. Chloride concentrations in the background locations ranged from less than 5.1 to 49 milligrams per kilogram (mg/kg).

The analytical results for G18-SS23-08 indicated a selenium value of 1.7 mg/kg, greater than the applied guideline of 1.0 mg/kg.

The analytical results for G18-SS23-17 indicated a pH value of 5.15, outside of the acceptable guideline range of 6 - 8; however, a lower pH value was anticipated given the presence of organic soils.

#### 6.3.4 APEC 1: Wellsite

Three hand auger locations, G18-SS23-03, G18-SS23-04, and G18-SS23-05, were completed around well centre, which was marked by a sign and confirmed with a pin finder. Soil samples were collected from G18-SS23-03 and G18-SS23-04 and analyzed for salinity, metals, BTEX, and PHC F1 to F4. Analytical results for the well centre area are summarized below:

• Reported pH values were within the acceptable guideline range of 6 - 8.



- EC and SAR values were less than the applied guideline values. The EC values ranged from 0.20 to 0.27dS/m while the SAR values ranged from 0.66 to 0.97.
- Chloride concentrations in these locations were less than the laboratory reportable detection limits (RDLs).
- Metals and PHC concentrations were either less than the laboratory RDLs or applied guidelines.
- BTEX and PHC F1 to F4 concentrations were either less than the laboratory RDLs or applied guidelines.

Analytical results are shown for both salinity and BTEX, PHC F1-F4 on **Figures A.5** and **A.6**, respectively, in **Appendix A**.

#### 6.3.5 APEC 2: Remote Sump

Eight hand auger locations, G18-SS23-09 through G18-SS23-16, were advanced in the remote sump area. Two soil samples were collected from each borehole location and analyzed for one or more of the following parameters: salinity, metals, BTEX, and PHC F1-F4. Analytical results for the remote sump area are summarized below:

- pH values in samples collected from G18-SS23-09, G18-SS23-13, and G18-SS23-15 ranged from 4.19 to 5.49, outside of the acceptable guideline range; however, a lower pH was anticipated given the presence of organic soil at these locations.
- EC and SAR values were greater than the applied guideline values in six samples collected from three hand auger locations (G18-SS23-10, G18-SS23-13, and G18-SS23-14). EC values at these locations ranged from 2.3 to 8.7 dS/cm, while SAR values ranged from 4.5 to 11. The highest EC and SAR values were located at the western border of the remote sump at G18-SS23-14, downgradient of the wallowing area.
- Chloride concentrations from hand auger locations G18-SS23-10, G18-SS23-13, and G18-SS23-14 ranged from 200 to 7,600 mg/kg with the highest chloride concentration at the western border of the remote sump at G18-SS23-14, downgradient of the wallowing area.
- Metal parameters analyzed were less than the applied guidelines.
- BTEX and PHC F1-F4 concentrations were either less than the laboratory RDL or applied guidelines except for the following locations: G18-SS23-010, G18-SS23-14, G18-SS23-15, and G18-SS23-16.
  - Samples collected at each of these locations consisted of organic soil. Organic soil can often have a higher moisture content that can lead to detection limits raised above guideline values. Benzene, ethylbenzene, xylenes, and PHC F1 concentrations were not found at detectable concentrations within these samples; however, the laboratory RDLs were raised above the applied guideline values.



Section 6: Results November 27, 2023

- Toluene concentrations were reported greater than the applied guidelines in G18-SS23-10 and G18-SS23-14. However, given benzene, ethylbenzene, and xylene concentrations were not detected and samples that consisted of organic soil, the potential for biogenic toluene was evaluated. K'Alo-Stantec requested BV to complete a Biogenic Toluene Assessment (BTA) of two sample locations (G18-SS23-010 and G18-SS23-14) with toluene concentrations reported greater than applied guideline values. The BTA determined toluene concentrations to be of biogenic origin. The BTA report is presented in **Appendix E**.
- Concentrations of PHC F3 were reported greater than the applied guidelines in G18-SS23-14, G18-SS23-15, and G18-SS23-16. Organic soil can often display similar analytical patterns as the PHC F2-F4 range and therefore may present a false positive of petrogenic impacts. As such, K'Alo-Stantec requested BV to complete a hydrocarbon resemblance interpretation of the sample chromatograms for each location (G18-SS23-14, G18-SS23-15, and G18-SS23-16) to determine if the chromatograms were consistent with biogenic organic soil. The BV chromatogram interpretations indicated each sample was consistent with biogenic organic material. The interpretations are presented in the BV report located in **Appendix E**.

Analytical results are shown for both salinity and BTEX, PHC F1-F4 on **Figures A.3** and **A.4**, respectively, in **Appendix A**.

#### 6.3.6 APEC 3: Campsite

One hand auger location, G18-SS23-01 was completed within the campsite area. Two soil samples were collected from this location and analyzed for one or more of the following parameters: particle size, salinity, metals, BTEX, and PHC F1-F4. Analytical results for the campsite area are summarized below:

- EC and SAR values were less than the applied guideline values. The EC value was 0.29 dS/m while the SAR value was 0.22.
- Chloride concentration in this location was less than the laboratory detection limits.
- Metal and hydrocarbon parameters that were analyzed for this location are reported to be less than the applied guidelines.

Analytical results are shown for both salinity and BTEX, PHC F1-F4 on **Figures A.5** and **A.6**, respectively, in **Appendix A**.

#### 6.3.7 APEC 4: Cleared Area

One hand auger location, G18-SS23-06 was completed within the cleared area. One soil sample and duplicate were collected from this location and analyzed for salinity, metals, BTEX, and PHC F1-F4. Analytical results for the cleared area are summarized below:

• pH value of in samples and duplicate ranged from 4.01 to 4.16, outside of the acceptable guideline range; however, a lower pH was anticipated given the presence of organic soil at this location.



- EC and SAR values were less than the applied guidelines. The EC value ranged from 0.089 to 0.093 dS/m while the SAR value ranged from 0.40 to 0.47.
- Chloride concentration in this location was less than the laboratory RDLs.
- Metal parameters analyzed were less than that the applied guidelines except for hexavalent chromium and selenium as the laboratory RDLS were raised above the applied guidelines due to the high moisture content of the sample.
- The sample collected at G18-SS23-06 consisted of organic soil. Organic soil can often have higher moisture content that can lead to detection limits raised above guideline values. Benzene, ethylbenzene, xylenes, and PHC F1 concentrations were not found at detectable concentrations within these samples; however, the laboratory RDLS were raised above guideline values.
- Toluene was reported at a concentration greater than the applied guidelines. However, given benzene, ethylbenzene, and xylene concentrations were not detected and samples consisted of organic soil, the potential for biogenic toluene was evaluated. K'Alo-Stantec requested BV to complete a BTA of the sample from G18-SS23-06. The BTA determined toluene concentrations to be of biogenic origin. The BTA report is presented in **Appendix E**.
- Concentrations of PHC F2-F3 were reported greater than the applied guidelines. Organic soil can
  often display similar analytical patterns as the PHC F2-F4 range and therefore may present a
  false positive of petrogenic impacts. As such, K'Alo-Stantec requested BV to complete a
  hydrocarbon resemblance interpretation of the sample chromatograms for G18-SS23-06 to
  determine if the chromatograms were consistent with biogenic organic soil. The BV
  chromatogram interpretations indicated the sample was consistent with biogenic organic material.
  The interpretation is presented in the BV report located in Appendix E.

Analytical results are shown for both salinity and BTEX, PHC F1-F4 on **Figures A.5** and **A.6**, respectively, in **Appendix A**.



Section 7: Quality Assurance/Quality Control (QA/QC) November 27, 2023

# 7 Quality Assurance/Quality Control (QA/QC)

The purpose of the QA/QC program implemented as part of the soil sampling program was to assess the reliability and reproducibility of the analytical data. The QA/QC review consisted of evaluating sample collection and handling methods, sample hold times, general laboratory comments, and field and laboratory duplicate results. Samples collected during the program were submitted to BV who is accredited by the Standards Council of Canada (SCC). K'Alo-Stantec's QA/QC process is described in **Appendix F**. A summary of the QA/QC program is provided in Table 7.1, below.

QA/QC Parameter	Comment
Collection and Handling	Samples were collected in appropriate containers and had preservation measures. Sample temperatures for organic analyses were below 10°C. Samples for particle size analysis were completed past hold time; however, particle size is a physical test and results are considered acceptable.
Laboratory QA/QC	Matrix spikes, method blanks, replicates, referenced criteria, and surrogate recoveries were within acceptable ranges except for the relative percent difference (RPD) for total vanadium, which was outside control limits, but the analysis meets acceptability criteria.

#### Table 7.1 Summary of QA/QC

No sample hold times for chemical analyses were exceeded as prescribed for soil samples with the exception of particle size analysis. Samples for particle size analysis were completed past hold time; however, particle size analysis is a physical test, and the results are considered acceptable. Sample temperatures for organic analyses were kept as close to 4°C as possible. Sample hold times and temperatures, when submitted to BV, did not exceed laboratory, or method QA/QC limits.

A review of the BV internal QA/QC results for the soil samples did not indicate any QA/QC concerns except for the relative percent difference (RPD) for total vanadium, which was outside control limits, but analysis met acceptability criteria.

The method of relative percent difference (RPD) was used to evaluate the sample and field duplicate result variability and is calculated by the following equation:

$$RPD = \left[\frac{|S1 - S2|}{S3}\right] \times 100$$

Where:

S1 = original soil or groundwater sample concentration

S2 = duplicate soil or groundwater sample concentration

S3 = average concentration = (S1 + S2)/2



#### Site Inspection and Soil Sampling AEC WEST ET AL TATE G-18

Section 7: Quality Assurance/Quality Control (QA/QC) November 27, 2023

If the analytical result for either sample is less than five times the laboratory RDL, any calculated RPD is considered not to be valid, and no conclusion can be made with respect to the data reproducibility. The generally accepted industry standard for RPD's is less than or equal to 60% for field duplicated soil samples (CCME, 2016).

Where they could be calculated, the RPDs were less than 60% and were considered acceptable.

Based on the above results, the analytical data for the soil samples analyzed are considered reliable. Based on the QA/QC review, the laboratory results are considered to have an acceptable level of reproducibility.



Section 8: Discussion November 27, 2023

## 8 Discussion

### 8.1 Background

Background borehole locations were focused on background data as it relates to the remote sump location. As both mineral and organic soil were present at the remote sump location, hand auger locations were completed up or cross gradient from the sump cell location at G18-SS23-07 and G18-SS23-08 for mineral soil, and G18-SS23-17 for organic soil. Samples were collected to assess soil type and background soil chemistry. Background analytical results were less than the applied guidelines with the exception of selenium at G18-SS23-08 from 0.25 to 0.5 m bgs (1.7 mg/kg) and a pH value of 5.15 at G18-SS23-17. Selenium concentrations above the applied guidelines were not reported at other sampling locations and appear to be localized with no additional investigation warranted. The low pH value was attributed to the presence of organic soil and is likely naturally occurring.

### 8.2 APEC 1: Wellsite

A well sign was the only remaining infrastructure present on the wellsite. A minor depression was observed at well center and vegetation at the wellsite was dense with few bare areas. Based on soil samples collected during the assessment of the wellsite, analytical results were less than the applied guidelines.

No further assessment within the wellsite area is recommended.

### 8.3 APEC 2: Remote Sump

No infrastructure was present at the remote sump area and vegetation appeared dense. Areas of ungulate wallowing were observed adjacent to the northeast and southwest of the remote sump cell and at a third location south of the sump cell near the southwest Site entrance. The remote sump cell had mounding overtop.

EM survey results indicated elevated response in the northeast and southwest areas of the remote sump cell. An elevated response was also noted southwest of the remote sump cell and appears to migrate outside the remote sump area boundary. These elevated response areas align with the ungulate wallowing areas observed on-Site.

Soil analytical results for BTEX and PHC were greater than the reference guidelines for toluene and PHC F3; however, these exceedances were a result of organic soil present at the remote sump area and were considered biogenic in nature. Soil pH was also out of the range of the applied guidelines. The low soil pH was attributed to the presence of organic soil and is likely naturally occurring.

EC and SAR values in and near the wallowing areas around the sump cell, at sample locations G18-SS23-10, G18-SS23-13, and G18-SS23-14, were greater than the applied guidelines. As well, concentrations of chloride and sodium were elevated indicating the source of EC and SAR exceedances



is likely leaching from the remote sump cell. Horizontal delineation of these salinity impacts has not been achieved to the west and south of the remote sump cell. Vertical delineation of impacts was not achieved due to hand auger refusal.

### 8.4 APEC 3: Campsite

The campsite was heavily vegetated with deciduous shrubs, coniferous trees, and various grasses and herbaceous plants. No signs of a camp sump were observed. Based on soil samples collected during the assessment of the campsite, analytical results were less than the applied guidelines.

No further assessment within the campsite area is recommended.

### 8.5 APEC 4: Cleared Area

The cleared area was heavily vegetated with deciduous shrubs, coniferous trees, and various grasses and herbaceous plants. No issues were observed.

Soil analytical results for BTEX and PHC were greater than the applied guidelines for toluene and PHC F2-F3; however, these exceedances were a result of organic soil present within the cleared area and were considered biogenic in nature. Soil pH was also out of the range of the applied guidelines but was attributed to the presence of organic soil and is likely naturally occurring.

No further assessment within the campsite area is recommended.



Section 9: Conclusions November 27, 2023

# 9 Conclusions

Based on the results of the site inspection and soil sampling, the contaminants of concern include EC and SAR values above the applied guidelines around the remote sump cell. Delineation of these impacts has not been demonstrated horizontally to the west or south, or vertically. An elevated EM response extends southwest of the Site, indicating impacts may be present off-Site due to lateral migration of leached sump material through shallow soils. The presence of these impacts appears to be attracting ungulates and creating wallowing areas around the remote sump cell. As a result, erosion of soil around the remote sump cell is occurring. The current Site conditions do not meet requirements of Land Use Permit S99A-015.



Section 10: Limitations November 27, 2023

# 10 Limitations

This report documents work that was performed in accordance with generally accepted professional standards at the time and location in which the services were provided. No other representations, warranties or guarantees are made concerning the accuracy or completeness of the data or conclusions contained within this report, including no assurance that this work has uncovered all potential liabilities associated with the identified property.

This report provides an evaluation of selected environmental conditions associated with the identified portion of the property that was assessed at the time the work was conducted and is based on information obtained by and/or provided to K'Alo-Stantec at that time. There are no assurances regarding the accuracy and completeness of this information. All information received from the client or third parties in the preparation of this report has been assumed by K'Alo-Stantec to be correct. K'Alo-Stantec assumes no responsibility for any deficiency or inaccuracy in information received from others.

The opinions in this report can only be relied upon as they relate to the condition of the portion of the identified property that was assessed at the time the work was conducted. Activities at the property subsequent to K'Alo-Stantec's assessment may have significantly altered the property's condition. K'Alo-Stantec cannot comment on other areas of the property that were not assessed.

Conclusions made within this report consist of K'Alo-Stantec's professional opinion as of the time of the writing of this report and are based solely on the scope of work described in the report, the limited data available and the results of the work. They are not a certification of the property's environmental condition. This report should not be construed as legal advice.

This report has been prepared for the exclusive use of the client identified herein and any use by any third party is prohibited. K'Alo-Stantec assumes no responsibility for losses, damages, liabilities, or claims, howsoever arising, from third party use of this report.

This report is limited by the following:

- locations of features present in figures should be considered approximate locations.
- investigation was limited to those parameters specifically outlined in this report.
- samples were only analyzed for parameters outlined in this report.
- soil analytical results were compared to the most current regulatory guidelines at the time that the results were reported.

The locations of any utilities, buildings and structures, and property boundaries illustrated in or described within this report, if any, including pole lines, conduits, water mains, sewers and other surface or sub-surface utilities and structures are not guaranteed. Before starting work, the exact location of all such utilities and structures should be confirmed and K'Alo-Stantec assumes no liability for damage to them.



Section 10: Limitations November 27, 2023

The conclusions are based on the site conditions encountered by K'Alo-Stantec at the time the work was performed at the specific testing and/or sampling locations, and conditions may vary among sampling locations. Factors such as areas of potential concern identified in previous studies, site conditions (e.g., utilities) and cost may have constrained the sampling locations used in this assessment. In addition, analysis has been carried out for only a limited number of chemical parameters, and it should not be inferred that other chemical species are not present. Due to the nature of the investigation and the limited data available, K'Alo-Stantec does not warrant against undiscovered environmental liabilities nor that the sampling results are indicative of the condition of the entire Site. As the purpose of this report is to identify site conditions which may pose an environmental risk; the identification of non-environmental risks to structures or people on the Site is beyond the scope of this assessment.

Should additional information become available, which differs significantly from our understanding of conditions presented in this report, K'Alo-Stantec specifically disclaims any responsibility to update the conclusions in this report.



Section 11: References November 27, 2023

## 11 References

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Site Inspection and Soil Sampling AEC WEST ET AL TATE G-18 Section 12: K'Alo-Stantec Quality Management Program

November 27, 2023

## 12 K'Alo-Stantec Quality Management Program

This report, entitled "*Site Inspection and Soil Sampling, AEC WEST ET AL TATE G-18* " was prepared for Ovintiv by Stantec Consulting Ltd.; and was produced by the following individual(s):

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This report has been reviewed and approved for transmittal by:

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Appendix A Figures November 27, 2023

## Appendix A Figures





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Appendix B Photographs November 27, 2023

# Appendix B Photographs

















Client:	Ovintiv Canada ULC	Project:	123514555
Site Name:	AEC WEST ET AL TATE G-18	Site Location:	Sahtu Settlement Area, NWT
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<b>Direction:</b> South		North H	
Survey Date: 9/20/2023	2 PM		2 Ster
Comments: View of cleared area.			
Photograph ID: 34			
Photo Location: G-18 Wellsite, Remote Sump, Campsite and Cleared Areas			
Direction: Northwest	the the all	1 13 1 1 10	at the market
<b>Survey Date:</b> 9/20/2023			
Comments: View from top of sump	cap.		



Client:	Ovintiv Canada ULC	Project:	123514555
Site Name:	AEC WEST ET AL TATE G-18	Site Location:	Sahtu Settlement Area, NWT
Photograph ID: 35			
<b>Photo Location:</b> G-18 Wellsite, Remote Sump, Campsite and Cleared Areas	e		
<b>Direction:</b> North	a the state of the state	1	Company of the second
<b>Survey Date:</b> 9/20/2023		<b>新兴性性</b> 能创建	Web frish web it he have men
Comments: View from top of sum	p cap.		
Photograph ID: 36			and the second second
Photo Location: G-18 Wellsite, Remote Sump, Campsite and Cleared Areas	e		
<b>Direction:</b> Northeast			Mar
<b>Survey Date:</b> 9/20/2023	a new production of the second	and a start of a start of the	Look Bright Balling Balling
Comments: View from top of sum	o cap.		



Client:	Ovintiv Canada ULC	Project:	123514555
Site Name:	AEC WEST ET AL TATE G-18	Site Location:	Sahtu Settlement Area, NWT
Photograph ID: 37		Lat C. 2.	SULL STA
Photo Location: G-18 Wellsite, Remote Sump, Campsite and Cleared Areas	9		
Direction: East	( a se a man a schutte the	Jush Mary malifest	wallber failuride sound and the south
<b>Survey Date:</b> 9/20/2023			
Comments: View from top of sump	o cap.		
Photograph ID: 38	ALL CONTRACTOR	10000	Martine 16 1993
Photo Location: G-18 Wellsite, Remote Sump, Campsite and Cleared Areas	e		
<b>Direction:</b> Southeast	and a some fold at a contribute ( it	trad and here all but	when a most die a fiel a lorden
<b>Survey Date:</b> 9/20/2023		A CONTRACTOR OF STATE	
Comments: View from top of sump	o cap.		



Client:	Ovintiv Canada ULC	Project:	123514555
Site Name:	AEC WEST ET AL TATE G-18	Site Location:	Sahtu Settlement Area, NWT
Photograph ID: 39		and optim	Same States - March
<b>Photo Location:</b> G-18 Wellsite, Remote Sump, Campsite and Cleared Areas	e		
<b>Direction:</b> South	and the second		
<b>Survey Date:</b> 9/20/2023	Second and the second states	alikan manifal di mali dan anan	en all also dette dettille under an alter omer antibille aller broug
Comments: View from top of sump	p cap.		
Photograph ID: 40		Contraction of the second	L'ARTIN - S
<b>Photo Location:</b> G-18 Wellsite, Remote Sump, Campsite and Cleared Areas	e		
Direction: Southwest			Carrow Sector
<b>Survey Date:</b> 9/20/2023	a the set of the she had be been in the	united to be station that	Where the sex aller the estimate and
Comments: View from top of sump	o cap.		



			• • •
Client:	Ovintiv Canada ULC	Project:	123514555
Site Name:	AEC WEST ET AL TATE G-18	Site Location:	Sahtu Settlement Area, NWT
Photograph ID: 41 Photo Location: G-18 Wellsite, Remote Sump, Campsite and Cleared Areas	e		
<b>Direction:</b> West	1 Leikittel	1. a. a. t. Jan 14 14	Heller Burgh
Survey Date: 9/20/2023			
Comments: View from top of sum	p cap.		
Photograph ID: 42			
Photo Location: G-18 Wellsite, Remote Sump, Campsite and Cleared Areas	e ti	duć -	. t.t.
Direction: Northeast	1 . h. A. 144	a shall be at the	INTO ANTEL BUILD A TOWN
<b>Survey Date:</b> 9/20/2023			國家的理想
<b>Comments:</b> View of ungulate wallo area northeast of sum cap.	pwing pp		



Client:	Ovintiv Canada ULC	Project:	123514555
Site Name:	AEC WEST ET AL TATE G-18	Site Location:	Sahtu Settlement Area, NWT
Photograph ID: 43 Photo Location: G-18 Wellsite, Remote Sump, Campsite and Cleared Areas	e		
Direction: South			
<b>Survey Date:</b> 9/20/2023			
Comments: View of ungulate wallo area southwest of sun cap.	bwing np		
Photograph ID: 44			
Photo Location: G-18 Wellsite, Remote Sump, Campsite and Cleared Areas Direction:	e		
<b>Survey Date:</b> 9/20/2023		Hild Attinduced	which the stand and the last
<b>Comments:</b> View of sump cap and adjacent ungulate wallowing area, from borehole location G18-SS23-15.			



Client:	Ovintiv Canada ULC	Project:	123514555
Site Name:	AEC WEST ET AL TATE G-18	Site Location:	Sahtu Settlement Area, NWT
Photograph ID: 45 Photo Location: G-18 Wellsite, Remote	e		
Cleared Areas			
Northeast	alle de	4	
Survey Date: 9/20/2023	had been and the second	hanna haber and	Lindsle to many work of the
<b>Comments:</b> View of sump cap, fro borehole location G18-SS23-15.	m		
Photograph ID: 46	4	1	the state
<b>Photo Location:</b> G-18 Wellsite, Remote Sump, Campsite and Cleared Areas	e	HANNEL H	國為自然
<b>Direction:</b> South			
<b>Survey Date:</b> 9/20/2023			
<b>Comments:</b> View of ungulate wallo area, adjacent to the southwest entrance of remote sump area.	owing f the		

Appendix C EM Survey Report November 27, 2023

# Appendix C EM Survey Report



# ELECTROMAGNETIC TERRAIN CONDUCTIVITY SURVEY REPORT OVINTIV G-18 APEC 2 SUMP PROJECT SAHTU SETTLEMENT REGION, NT

Submitted to: Stantec November 8, 2023

Authors: Somayeh Asadi Shekafti, M.Sc. Cliff Candy, P.Geo.

Project: FGI-1847

### Change Log

<u>Version</u>	<u>Date</u>	<u>Changes</u>
1	October 25, 2023	Final Report
2	November 8, 2023	Spatial reference to second anomaly
		from "southeast" to "southwest"

corrected

237 St. Georges Ave. North Vancouver, B.C. V7L 4T4

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### Illustrations

		Location
Figure 1	Survey Location Plan	Appendix
Figure 2	EM31 Terrain Conductivity Plan	Appendix
Figure 3	EM38 Terrain Conductivity Plan	Appendix

### 1. Introduction

An Electromagnetic Terrain Conductivity survey was conducted by Frontier Geosciences Inc. for Stantec at the Ovintiv G-18 Apec 2 sump site in the Sahtu Settlement Region within the Northwest Territories, on September 20, 2023. A survey location plan of the area is presented at a scale of 1:250,000 in Figure 1 of the Appendix.

The purpose of the terrain conductivity survey on the G-18 Apec 2 sump was to assist in the identification of potential contaminants in the 110 metres by 70 metres cleared footprint of the site. This area covered the sump, situated in the northern part of the survey grid, as well as an area in the cleared footprint to the south of the sump. Surveying was conducted with the Geonics EM31 terrain conductivity meter, to a depth range of approximately 6 metres, and the Geonics EM38 terrain conductivity meter, to a depth range of approximately 1.5 metres.



Aerial view of G-18 Apec 2 Sump Area, clearing on right, looking eastwards

### 2. Instrumentation

### 2.1 Electromagnetic Terrain Conductivity Survey

The electromagnetic terrain conductivity surveying was carried out with two Geonics Ltd., terrain conductivity meters, the EM31 and EM38. The EM31 unit is an electromagnetic instrument consisting of a transmitter coil and receiver coil at opposing ends of a 3.66 m boom. The effective penetration of the instrument under usual conditions is 6 metres. The EM38 consists of a transmitter coil and receiver coil at opposing ends of a 1 m boom. It operates in the same manner as the EM31, and the effective penetration of the instrument under usual conditions is 1.5 metres. The instruments are operated at audio frequencies and makes use of the fact that earth conductivity information is contained in the behaviour of the phase of the received EM field. This phase information is calibrated to read directly in milliSiemens/metre (mS/m), units of conductivity.

The electrical conductivity or resistivity of soil recorded in a terrain conductivity survey is determined by the amount of contaminated water, the distribution of water within the unit, the quantity of total dissolved salt in the water, and the presence of minerals such as clays with conductive ion exchange properties. Thus, the resistivity of most granular soils and rocks is controlled more by porosity, water content and water quality than by the conductivity of matrix materials.

### 2.2 Survey Procedure

Field procedure entailed establishing a grid around the area of interest, with ten metre line spacing. For the EM31 surveying, at each station the instrument was held parallel to the ground surface, and a reading was taken and recorded. Readings with the EM31 were made in the vertical dipole configuration and at a constant terrain clearance of approximately one metre. Nominal station spacing was 5 metres. For the EM38 surveying, the instrument was held parallel to the ground surface, and the data were recorded continuously by the EM38MK2win software on a MESA3 tablet, at a rate of 5 readings per second. Readings with the EM38 were made in the vertical dipole configuration, at a constant terrain clearance of approximately dipole configuration, at a constant terrain clearance of approximately 30 centimetres.

### 2.3 Interpretive Method

The EM31 data were recorded in a field notebook and the EM38 data were recorded by the MESA3 tablet. Additional notes were taken regarding notable cultural features and vegetation. The data was then inputted, gridded, contoured and registered on imagery, showing areas of high and low terrain conductivity.

### 3. Geophysical Results

#### 3.1 General

The EM31 and EM38 survey stations are shown at a scale of 1:500 in Figures 2 and 3 of the Appendix, respectively, overlain on Google Earth imagery. The contoured EM31 and EM38 responses are shown on these figures with areas of low conductivity shown in cool colours, and areas of high conductivity shown in warm colours.

#### 3.2 Discussion

### 3.2.1 EM31 Results

The EM31 indicates an average background apparent conductivity of between 20 mS/m and 30 mS/m, as shown in Figure 2 of the Appendix. Over the sump in the northern part of the grid, an anomaly approximately 15 metres by 25 metres is shown, with a maximum terrain conductivity value of approximately 65 mS/m. A second anomaly is located to the southwest, at 389479E, 7149595, with a terrain conductivity value of approximately 48 mS/m. A broader, less intense anomaly was recorded in the south of the survey area, with conductivity levels up to 48 mS/m. Both the northern and southern anomalies exhibit a southwest-northeast directional trend.

### 3.2.2 EM38 Results

The EM38 indicates an average background apparent conductivity of between 17 mS/m and 20 mS/m, as shown in Figure 3 of the Appendix. The sump anomaly in the northeast area of the grid is broader areally than the corresponding EM31 anomaly, approximately 20 metres by 30 metres, at the shallower depths recorded by the EM38. The second southwest anomaly located at 389479E, 7149595, has a terrain conductivity value of approximately 47 mS/m. Further anomalous zones are shown in the southern portion of the survey area, with conductivity values approaching 30 mS/m. Anomalous readings over the survey area correspond well with the EM31 results.



G-18 Apec2 Survey Area

#### 4. Limitations

The terrain conductivity response is measured by the EM31 and EM38 at the location where the readings are taken. In order for the data to be of use, readings on the background conductivity of the soil are necessary. This helps in the identification of areas with high or low conductivity. The reliability of the reading can be affected by near-surface metal objects, such as metal pipes, due to the sensitivity of the instruments. Additionally, factors such as air temperature and weather conditions can affect the readings.

The locations of survey areas and features are approximate. The information in this report is based upon geophysical measurements, field procedures, and the interpretation of the acquired data. The results are interpretive in nature and are considered to be a reasonably accurate representation of existing subsurface conditions within the limitations of the methods that were used.

For: Frontier Geosciences Inc.

Somayeh Asadi Shekafti, M.Sc.

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PT/NO

Cliff Candy, P.Geo.

Engineers and Geoscientists of Northwest Territories/Nunavut Permit to Practice # P1551

APPENDIX






Appendix D Tables November 27, 2023

# Appendix D Tables



Area of Potential Environmental Concern Combustible Headspace Vapor Concentration Electrical Conductivity Not Applicable Parts per million Microsiemens per centimetre

G18-SS APEC CHV EC N/A ppm µS/cm

						Field Sc	reening	
		Depth				Sample Depth	cvc	EC
Borehole ID	APEC	(m)	Lithological Description	Comments	Sample ID	(m)	(PPM)	(µS/cm)
G18-SS23-01	Campsite	0.0-0.05	Topsoil: black, moist, friable, some organics.	refusal at 0.5 m	G18-SS23-01-01	0.05-0.25	<5	33.5
		0.05-0.5	Silty Clay: brown, moist, friable, some sand, trace gravel.		G18-SS23-01-02	0.25-0.5	<5	212
G18-SS23-02	Wellsite	0.0-0.05	Topsoil: black, moist, friable, some organics.	N/A	G18-SS23-02-01	0.05-0.25	5	61.2
		0.05-0.25	Silty Clay: brown, moist, friable, some sand, trace gravel.					
G18-SS23-03	Wellsite	0.0-0.05	Topsoil: black, moist, friable, some organics.	auger refusal at 0.3 m	G18-SS23-03-01	0.05-0.25	<5	105.7
		0.05-0.25	Silty Clay: brown, moist, friable, some sand, trace gravel.					
G18-SS23-04	Wellsite	0.0-0.05	Topsoil: black, moist, friable, some organics.	auger refusal at 0.3 m	G18-SS23-04-01	0.05-0.25	<5	36.9
		0.05-0.25	Silty Clay: brown, moist, friable, some sand, trace gravel.					
G18-SS23-05	Wellsite	0.0-0.05	Topsoil: black, moist, friable, some organics.	auger refusal at 0.2 m	G18-SS23-05-01	0.05-0.20	<5	15.9
		0.05-0.25	Silty Clay: brown, moist, friable, some sand, trace gravel.	-				
G18-SS23-06	Cleared Area	0.0-0.6	Peat: black, moist, loose.	wet below 0.3 m; auger	G18-SS23-06-01	0.0-0.3	60	89.7
				refusal at 0.6 m	G18-SS23-06-02	0.3-0.6	290	108.2
G18-SS23-07	Background, Soil	0.0-0.05	Topsoil: black, moist, friable, some organics.	auger refusal at 0.3 m	G18-SS23-07-01	0.05-0.25	<5	87.3
	Lithology	0.05-0.3	Silty Clay: brown, moist, firm, some sand, trace gravel.					
G18-SS23-08	Background, Mineral Soil	0.0-0.05	Topsoil: black, moist, friable, some organics.	auger refusal at 0.5 m	G18-SS23-08-01	0.25-0.5	15	431
	Chemistry	0.05-0.5	Silty Clay: dark grey, moist, firm, some sand, trace gravel.	-				
G18-SS23-09	Remote Sump	0.0-0.5	Peat: black, moist, loose.	auger refusal at 0.5 m	G18-SS23-09-01	0.0-0.25	<5	105.1
					G18-SS23-09-02	0.25-0.5	<5	63.5
G18-SS23-10	Remote Sump	0.0-0.5	Silty Clay: dark gray/black, moist, firm, some sand, trace organics,	auger refusal at 0.5 m	G18-SS23-10-01	0.0-0.25	260	1088
			trace gravel		G18-SS23-10-02	0.25-0.5	80	411
G18-SS23-11	Remote Sump	0.0-0.05	Topsoil: black, moist, friable, some organics.	auger refusal at 0.5 m	G18-SS23-11-01	0.05-0.25	<5	66.1
		0.05-0.5	Silty Clay: brown, moist, firm, some sand, trace gravel.		G18-SS23-11-02	0.25-0.5	<5	643
G18-SS23-12	Remote Sump	0.0-0.05	Topsoil: black, moist, friable, some organics.	auger refusal at 0.5 m	G18-SS23-12-01	0.05-0.25	<5	570
		0.05-0.5	Silty Clay: brown, moist, firm, some sand, trace gravel.		G18-SS23-12-02	0.25-0.5	<5	670
G18-SS23-13	Remote Sump	0.0-0.5	Peaty Clay: black, moist, moderately firm, some sand, trace gravel	auger refusal at 0.5 m	G18-SS23-13-01	0.0-0.25	270	1466
					G18-SS23-13-02	0.25-0.5	560	834
G18-SS23-14	Remote Sump	0.0-0.6	Peat: black, moist, loose	auger refusal at 0.6 m	G18-SS23-14-01	0.0-0.25	45	1367
					G18-SS23-14-02	0.25-0.5	110	1256
G18-SS23-15	Remote Sump	0.0-0.6	Peat: black, moist, loose	auger refusal at 0.6 m	G18-SS23-15-01	0.0-0.25	<5	1410
					G18-SS23-15-02	0.25-0.5	<5	605
G18-SS23-16	Remote Sump	0.0-0.6	Peat: black, moist, loose	auger refusal at 0.6 m	G18-SS23-16-01	0.0-0.25	90	216
					G18-SS23-16-02	0.25-0.5	150	226
G18-SS23-17	Background, Organic Soil	0.0-0.6	Peat: black, moist, loose	auger refusal at 0.6 m	G18-SS23-17-01	0.25-0.5	15	55.1

Table D.1 - Soil Descriptions and Field Screening Results Site Inspection and Soil Sampling AEC WEST ET AL TATE G-18 Ovintiv Canada ULC

Page 1 of 1

Table D.2 – Summary of 2023 Soil Analytical Results Site Inspection and Soil Sampling AEC WEST ET AL TATE G-18 Ovintiv Canada ULC

Area of Internet					Background			and to a		and Ama					Romoto Sumo				
Sample Location				019 0022 07	0.10 0022 00	010 0022 17	018.1	1923-01	6	18.8823.06		018.5	823.09	018-8	823.10		018-8823-11		
Sample Date				20.900.22	20 840 22	20 Sep 22	20 San 22	20 900 22	10 Sep 22	20.940.22	1	20 Sec 22	20 Sep 22	20.940.22	30 Rep 22	20 Sep 22	10 Sec 12	20.940.22	
Sample Date				019 9922 07 01	019 0022 09 01	010 0012 17 01	019 9922 01 02	010 0022 01 01	010 0012 00 02	0.10.00.9932.01		010 0012 00 01	010 0022 00 02	019 9922 10 01	019 0012 10 02	010 0012 11 01	010 0022 11 02	0.19.00.9933.03	
Sample Denth				0.05 - 0.25 m	0.25 - 0.5 m	0.25 - 0.5 m	0.25 - 0.5 m	0.05 - 0.25 m	03-06m	03-06m		0.025m	0.25.0.5 m	0.025m	0.25 - 0.5 m	0.05 - 0.25 m	0.25.0.5 m	0.25 - 0.5 m	
Samoling Company				K'ALO STANTEC	K'ALO STANTEC	K'ALO STANTEC	K'ALO STANTEC	K'ALO STANTEC	K'ALO STANTEC	K'ALO STANTEC		K'ALO STANTEC	K'ALO STANTEC	K'ALO STANTEC	K'ALO STANTEC	K'ALO STANTEC	K'ALO STANTEC	K'ALO STANTEC	
Laboratory				BV	RV	BV	BV	BV	RV	BV		BV	RV	BV	RV	BV	RV	RV	
Laboratory Work Order				C376773	C376773	C376773	C376773	C376773	C376773	C376773		C376773	C376773	C376773	C376773	C376773	C376773	C376773	
Laboratory Sample ID				CAB734	CAB735	CAB752	CAB727	CAB726	CAB733	CAB753	RPD	CAB736	CAB737	CAB738	CAB739	CAB740	CAB741	CAB754	RPD
Sample Type	Units	NWT	CCME							Field Duplicate	(%)							Field Duplicate	(%)
Physical Descention																			_
Sime #10/v2.00mm)	64	alu.	oly	20		6.0	67				_								
Sieve - #10 (-2.00mm) Sieve - #200 (>0.075mm)	- 2	nlv	n/v n/v	28		59	26												
Sieve - Pan	46	nh	nlv.	72		41	74												
Grain Size	none	n/v	n/v	FINE		COARSE	FINE						-	-		-	-		
Moisture Content	%	n/v	n/v	14	24	68	13	13	85	87	2%			31		-	22		
Percent Saturation	%	nlv	n/v		51	490		73	980	960	nc	330	420	80	49	78	61	53	nc
Salinity																			
Soluble (CaCl2) pH	S.U.	6-8^	6-8 <sup>CD</sup>	-	6.43	5.15 <sup>ACD</sup>	-	6.05	4.16 <sup>ACD</sup>	4.01 <sup>ACD</sup>	nc	4.38 <sup>ACD</sup>	4.19 <sup>ACD</sup>	6.54	6.60	6.28	6.39	6.29	nc
Soluble Conductivity	dS/m	2 <sup>^</sup>	2 <sup>CD</sup>	-	0.17	0.14	-	0.29	0.089	0.093	nc	0.28	0.25	2.3 <sup>ACD</sup>	3.2 <sup>ACD</sup>	0.63	0.49	0.51	4%
Sodium Adsorption Ratio (SAR)	none	5.0*	5 <sup>CD</sup>		0.87	0.44		0.22	0.47	0.40	nc	1.1	0.93	4.5	9.1 <sup>ACD</sup>	1.3	1.5	1.2	22%
Theoretical Gypsum Requirement	tons/ha	n/v	n/v		<0.20	<0.20		<0.20	<0.20	<0.20	nc	<0.20	<0.20	0.40	4.0	<0.20	<0.20	<0.20	nc
Chloride	mg/kg	n/v	n/v		<5.1	<49		<7.3	<98	<96	nc	<33	61	390	330	84	47	47	0%
Chloride	mg/L	n/v	n/v	-	<10	<10		<10	<10	<10	nc	<10	14	490	670	110	77	88	13%
Sulfate	mg/kg	n/v	n/v	-	5.7	63		11	120	54	nc	170	180	230	260	75	46	37	22%
Sulfate	mg/L	n/v	niv	-	11	13		15	12	5.6	nc	52	42	290	530	96	75	68	10%
Anion Sum	meq/L	niv	n/v	-	0.23	0.27		0.31	0.26	0.12	nc	1.1	1.3	20	30	5.0	3.7	3.9	no
Cabon Sum	meq/L	nv	nv	-	2.3	2.1		3.5	0.86	0.85	nc	3.3	3.7	23	34	7.0	5.2	5.8	nc
Cation/EC Ratio	none	niv	niv	-	13	15		12	9.7	9.1	6%	12	15	9.8	11	11	11	11	0%
Calcium	mg/kg	nv	nv	-	11	120		30	73	82	nc	97	1/0	120	80	53	28	30	7%
Calcium	mgt	nv	nv	-	22	24		41	7.4	8.5	nc	29	39	160	160	69	46	5/	21%
Magnesium	mgwg	niv.	nv	-	2.4	20		10	21	14	nc	22	20	39	40	14	12	1.1	170
Patrasium	mgi	niv niv	nv	-	4.7	5.4		1.0	21 c19	1.5	nc nc	20	22	49	43	2.0	14	14	15%
Potassium	mol	nly	n/v		22	20		22	<13	<13	00	61	55	6.8	47	2.6	18	26	00
Sodium	maka	nly	n/v		88	45		47	58	48	00	83	100	200	250	36	27	22	20%
Sodium	mgL	n/v	n/v		17	9.2		6.4	5.7	4.8	nc	25	24	250	510	47	44	40	10%
Metals																			-
Antimony	mg/kg	20^	20 <sup>CD</sup>	-	0.75	<1.0	-	0.58	<2.0	<1.0	nc	-		0.88	-	-			-
Arsenic	mg/kg	12*	12 <sup>CD</sup>	-	10	<2.0		9.0	<4.0	<2.0	nc	-	-	8.3	-	-	-	-	
Barium	mg/kg	750*	750 <sup>00</sup>	-	520	380		370	140	150	7%		-	360		-	-	-	
Beryllium	mg/kg	4 <sup>^</sup>	4 <sup>CD</sup>	-	0.85	<0.80		0.74	<1.6	<0.80	nc	-	-	0.60	-	-	-	-	
Boron (Available)	mg/kg	2 <sup>A</sup>	2 <sup>CD</sup>	-	0.14	1.0		0.48	0.65	1.2	nc		-	0.60		-	-	-	
Cadmium	mg/kg	1.4"	1.400	-	0.97	0.36		0.28	0.22	0.21	nc		-	0.38		-	-	-	
Chromium	mgikg	64	6400	-	24	<2.0		20	<4.0	<2.0	nc		-	29		-	-		
Chromium (Hexavalent)	mgikg	0.4	0.4	-	<0.080	<0.25 HN		<0.080	<0.53 HN	<0.59 HN	nc		-	<0.080		-	-		
Cobat	mgikg	40.	40-50	-	9.8	<1.0		8.8	<2.0	<1.0	nc		-	6.5		-	-		
Copper	mgalg	63	63 705P	-	29	5.0		12	-0.0	21	nc	-		10		-			
Marcuny	marka	70 0.0 <sup>4</sup>	70	-	<0.050	<0.10		<0.050	<2.0	<0.10	nc oo	-		9.7		-			
Mohtdenum	maka	0.6 c^	0.0 E <sup>CD</sup>		-0.050	-0.10	1 1	-0.050	<1.6	<0.80	00		1 1	18			1 1		1.1
Nickel	malka	50^	45 <sup>CD</sup>	-	34	5.0		18	<4.0	2.9	00			26					- I.
Selenium	malka	1^	1 <sup>CD</sup>	-	17400	<1.0		<0.50	<2.0	<1.0	00			<0.50					- I.
Silver	maka	20^	2000		\$0.20	<0.40		<0.20	1.80	<0.40	00			<0.20					
Thallium	malka	1^	100		0.17	<0.20		0.19	<0.40	<0.20	00			0.19					11
Tin	maka	5^	500	-	<1.0	<2.0	-	<1.0	<4.0	<2.0	nc			<1.0		-			
Uranium	maka	n/v	23 <sup>CD</sup>	-	2.8	0.56	-	1.1	<0.80	<0.40	nc			0.81		-			
Vanadium	maka	130^	130 <sup>CD</sup>	-	38	2.4	-	41	<4.0	2.6	nc	-	-	30		-	-		
Zinc	maka	200^	250 <sup>CD</sup>		71	<20	-	59	<40	<20	nc			66					

Notes: NWT \* E CCME c E 
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6.5<sup>4</sup> 15.2 <0.50 <0.03 n/v . HN WSA RPD <u>61%</u> nc

#### Stantec s/123514555 - OvintivEncana 2023 NWT SSA/EDD/20231122 - revised tables/20231122-123514555 - Table D.2, 2023 Soil Analytical Results-ISREV3.vize 0012\_data\_base\_mgmfiData

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# Table D.2 – Summary of 2023 Soil Analytical Results Site Inspection and Soil Sampling AEC WEST ET AL TATE G-18 Ovintiv Canada ULC

Area of Interest						Background		Can	npsite	ci	leared Area	1				Remote Sump				
Sample Location					G18-SS23-07	G18-SS23-08	G18-SS23-17	G18-5	823-01	G	18-8823-06		G18-S	823-09	G18-S	823-10		G18-SS23-11		
Sample Date					20-Sep-23	20-Sep-23	20-Sep-23	20-Sep-23	20-Sep-23	20-Sep-23	20-Sep-23		20-Sep-23	20-Sep-23	20-Sep-23	20-Sep-23	20-Sep-23	20-Sep-23	20-Sep-23	
Sample ID					G18-SS23-07-01	G18-SS23-08-01	G18-SS23-17-01	G18-SS23-01-02	G18-SS23-01-01	G18-SS23-06-02	G-18-QC-8823-01		G18-SS23-09-01	G18-SS23-09-02	G18-SS23-10-01	G18-SS23-10-02	G18-SS23-11-01	G18-SS23-11-02	G-18-QC-SS23-02	
Sample Depth Sampling Compare	her .				VALOSTANTEC	VALO STANTEC	VALO STANTEC	VALO STANTEC	VIALO STANTEC	KALO STANTEC	KALO STANTEC		VALO STANTEC	VALO STANTEC	VALO STANTEC	U.25 - U.5 M	VIO STANTEC	VIALO STANTEC	VIO STANTEC	
Laboratory	<i>,</i>				BV	BV	BV	BV	BV	BV	BV		BV	BV	BV	BV	BV	BV	BV	
Laboratory Work 0	Drder				C376773	C376773	C376773	C376773	C376773	C376773	C376773		C376773	C376773	C376773	C376773	C376773	C376773	C376773	
Laboratory Sample	e ID				CAB734	CAB735	CAB752	CAB727	CAB726	CAB733	CAB753	RPD	CAB736	CAB737	CAB738	CAB739	CAB740	CAB741	CAB754	RPD
Sample Type		Units	NWT	CCME							Field Duplicate	(%)							Field Duplicate	(%)
BTEX and Pet	roleum Hydrocarbons																			
Benzene		mgikg	0.05 <sup>A</sup>	0.0068 <sup>to</sup>	-	-	-	-	<0.0050	<0.048	<0.055	nc	-		<0.0050		-	<0.0050		-
Toluene		mg/kg	0.1*	0.08 <sup>D</sup>	-	-	-	-	<0.050	0.79 WSA <sup>AD</sup>	1.0 WSA <sup>AD</sup>	nc	-		0.11 <sup>AD</sup>		-	<0.050	-	-
Ethylbenzene		mg/kg	0.1*	0.018 <sup>0</sup>		-	-	-	<0.010	<0.073	<0.081	nc			<0.010		-	<0.010		-
Xylene, m & p-		mg/kg	n/v	nlv		-	-	-	<0.040	<0.43 WSA	<0.49 WSA	nc			<0.040		-	<0.040		-
Xylene, o-		mg/kg	niv	n/v	-	-	-	-	<0.020	<0.21 WSA	<0.24 WSA	nc	-		<0.020	-	-	<0.020	-	-
Aytenes, Total		mgakg	0.1	2.4	-		-	-	×0.045	<0.48	<0.54	nc	-		×0.045		-	<0.045		
PHC E1 (C6 C10 #	ange) minus BTEY	maka	1208	205			-		<10	152	<59	00			<10		-	<10		
PHC F2 (>C10-C16	range)	malka	1508	15089			-		<10	120	170055	00			<10		-	<10		
PHC F3 (>C16-C34	range)	malka	4008	300			-		51	2 100	2 700 55	25%			130		-	<50		
PHC F4 (>C34-C50	(range)	malka	2.800 <sup>a</sup>	2.800 <sup>8</sup>			-		<50	990	1.300	00			69		-	<50		
Chromatogram to b	paseline at C50	none	nlv	nV					YES	YES	YES	nc			YES			YES		
NOUN: NWT A B CCME C C B CCME C C C C C C C C C C C C C	NMT Environmental Calutation 5 Table AS, Tarri 1 Levels (mplg) canadian Control of Ministers at Canadian Environmental Durity Canada Wide Stimulation 5 PH Concentration acrosses the Inde Canada Wide Stimulations for PH Concentration acrosses the Inde Maximum Concentration acrosses the Maximum Concentration of And Laboratory reporting limit wasg Analyla was not detected at a co No standardby/distine value. No beckcom limit raised based on Raitable Percent Difference.	or Contami for other Cr soil) for PH f the Envice y Guideline ( Guideline C in Soil - J C in Soil - J C in Soil - J C in Soil - J ated stand exceed the veater than sincentration allable. h moisture + sample wither of 60%	inated Site F antaminants Cs for Coar nment s, Canadian s, Canadian s, Canadian s, Canadian Agricultural - ard. indicated s the applical the applical the applical s greater the content, sar eight used fo	temediation, in Soil - Agri se-Grained S Soil Quality : Coarse-grai Fine-grainer tandard. Jie standard. Jie standard. Jie standard. ni the labora nple contains or analysis.	November 2003 outural lariface Sols – Agriculta Guidelines for the Prote ned, Burface Sol, Tier 1 (; Surface Sol, Tier 1 (; Surface Sol, Tier 1 (; Surface Sol, Tier 1 tory reporting limit.	nal Eston of Environmental and Eston of Environmental and Reviseda Jan 2008, Table 2;	Human Heath, on-line s Human Heath, on-line s J. J. owerd guideline I owerd guideline	ummary table, for agricu ummary table, for agricu	ftural land use and coars	s grained soil almed soil										
nc	RPD is not calculated if one or n	nore values	a is non dete	ct or if one o	r more values is less that	an five times the reportable	detection limit.													

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Table D.2 – Summary of 2023 Soil Analytical Results Site Inspection and Soil Sampling AEC WEST ET AL TATE G-18 Ovintiv Canada ULC

Area of Internet	i .	1		L					Reports Sumo							Wei	Site
Samola Location				018-5	823.12	018-8	823.13	1	G18-SS23-14		1	018-9	823.15	018-8	\$23,16	010 0012 02	010 0022 04
Sample Date				20-Sen-23	20-Sep-23	20-Sep.23	20-Sen-23	20-Sen-23	20.Sen.23	20.Sep.23	1	20-Sep-23	20.Sep.23	20.Sep.23	20-Sen-23	20-Sen-23	20-Sen-23
Samola ID				019 9922 12 01	018 9922 12 02	019 9922 12 01	019 9922 12 02	019 9932 14 01	019 9932 14 03	0.18.00.9912.02		019 9922 15 01	019 9922 15 02	019 9922 16 01	019 9933 16 03	019 9932 02 01	019 9922 04 01
Sample Denth				0.05 - 0.25 m	0.25 - 0.5 m	0.025m	0.25 - 0.5 m	0.025m	0.25 - 0.5 m	0.25 - 0.5 m		0.025m	0.25.0.5 m	0.025m	0.25 - 0.5 m	0.05 - 0.25 m	0.05 - 0.25 m
Sampling Company				KALO STANTEC	K'ALO STANTEC	K'ALO STANTEC	K'ALO STANTEC	K'ALO STANTEC	K'ALO STANTEC	K'ALO STANTEC		K'ALO STANTEC	K'ALO STANTEC	K'ALO STANTEC	KALO STANTEC	K'ALO STANTEC	K'ALO STANTEC
Laboratory				RV	RV	BV	RV	BV	BV	RV		BV	BV	BV	BV	BV	RV
Laboratory Work Order				C376773	C376773	C376773	C376773	C376773	C376773	C376773		C376773	C376773	C376773	C376773	C376773	C376773
Laboratory Sample ID				C48742	C48743	C48744	C48745	C48746	C48747	CAB755	RPD	C48748	C48749	C48750	C48751	CAB729	C48730
Sample Type	Units	NWT	CCME							Field Duplicate	(%)						
Physical Properties																	
Sieve - #10 (>2.00mm)	%	n/v	niv	-	-	-	-		-	-		-	-	-	-	-	-
Sieve - #200 (>0.075mm)	%	nv	n/v	-	-	-	-					-		-		-	-
Sieve - Pan	%	n/v	niv	-	-	-	-		-	-		-	-	-	-	-	-
Grain Size	none	nv	n/v	-	-	-	-					-		-		-	-
Moisture Content	%	nv	niv		19	31		76				78	75		79	11	12
Percent Saturation	75	nv	nv	68	46	140	160	370	450	460	nc	560	310	340	480	43	46
Salinity																	
Soluble (CaCl2) pH	S.U.	6-8 <sup>A</sup>	6-8 <sup>CD</sup>	6.40	7.07	6.85	6.95	4.90 <sup>ACD</sup>	4.82 <sup>ACD</sup>	4.82 <sup>ACD</sup>	nc	5.19 <sup>ACD</sup>	4.32 <sup>4CD</sup>	5.45 <sup>ACD</sup>	5.35 <sup>ACD</sup>	6.74	6.49
Soluble Conductivity	dS/m	2 <sup>^</sup>	2 <sup>CD</sup>	0.25	0.32	5.8 <sup>ACD</sup>	3.3 <sup>ACD</sup>	8.7 <sup>ACD</sup>	2.6 <sup>ACD</sup>	2.4 <sup>ACD</sup>	8%	0.90	1.2	0.31	0.31	0.27	0.20
Sodium Adsorption Ratio (SAR)	none	5.0^	5 <sup>CD</sup>	0.46	0.46	6.0 <sup>ACD</sup>	6.5 <sup>ACO</sup>	11 <sup>ACD</sup>	11^00	11 <sup>ACD</sup>	0%	2.0	3.4	1.4	1.5	0.66	0.97
Theoretical Gynsum Requirement	tonsha	n/v	niv	<0.20	s0.20	10	6.8	110	29	24	19%	<0.20	s0 20	s0.20	<0.20	<0.20	s0.20
Chloride	maka	nlv	nly	<6.8	<4.6	2 100	1 100	7.600	2 900	3 100	7%	1 200	760	130	180	<4.3	<4.6
Chloride	mol	n/v	nly	<10	<10	1.500	720	2 100	630	670	6%	220	250	39	37	<10	<10
Sulfate	maka	nh	nly	26	12	640	550	180	180	140	25%	230	140	98	170	5.6	7.1
Sulfate	mg/L	nly	nly	38	26	440	350	50	39	31	23%	41	44	29	36	13	15
Anion Sum	ment	nlv	nly	0.78	0.54	51	28	60	19	20	0.0	7.1	7.9	17	18	0.27	0.32
Cation Sum	meg/L	nly	nly	3.6	4.0	59	34	72	25	22	nc	7.9	12	4.6	3.6	3.9	3.2
Cation/EC Ratio	2000	nlv	nly	14	13	10	11	8.4	9.7	95	2%	8.8	11	15	12	15	16
Calcium	malka	nly	nly	27	21	760	390	1.500	420	360	15%	310	270	140	150	18	13
Calcium	mol	nlv	nly	39	46	530	250	420	93	78	18%	58	86	41	32	42	28
Magnesium	maka	nly	n/v	8.4	5.7	130	63	410	93	73	24%	130	65	34	32	5.0	4.0
Magnesium	mal	nly	n/v	12	13	91	40	110	21	16	27%	24	21	10	6.6	12	8.6
Potassium	maka	n/v	n/v	1.3	1.1	17	15	71	27	21	nc	19	15	5.7	<6.2	0.98	1.0
Potassium	mgL	nlv	n/v	1.9	2.5	12	9.2	19	5.9	4.5	nc	3.4	5.0	1.7	<1.3	2.3	2.2
Sodium	mg/kg	nlv	n/v	8.8	6.3	820	660	3,500	2,000	1,800	11%	390	420	130	170	8.1	11
Sodium	mgL	n/v	n/v	13	14	570	420	960	430	390	10%	71	140	39	35	19	23
Metals																	
Antimony	mg/kg	20^	20 <sup>CD</sup>	-	0.68			<1.0		-	-	-	<1.0	-	-	0.99	0.98
Arsenio	maka	12 <sup>*</sup>	12 <sup>CD</sup>	-	9.2	-	-	<2.0		-		-	<2.0	-		9.9	10
Barium	mg/kg	750^	750 <sup>CD</sup>	-	410			380				-	320	-		410	570
Berylium	mg/kg	4^	4 <sup>CD</sup>	-	0.77			<0.80				-	<0.80	-		0.67	0.73
Boron (Available)	mg/kg	2 <sup>^</sup>	2 <sup>CD</sup>	-	0.10	-	-	1.1	-	-	-	-	0.75	-	-	<0.10	<0.10
Cadmium	mg/kg	1.4*	1.4 <sup>CD</sup>	-	0.22			0.93				-	0.67	-		0.39	0.42
Chromium	mg/kg	64*	64 <sup>CD</sup>	-	28 MSE	-	-	3.4	-	-	-	-	2.9	-	-	14	15
Chromium (Hexavalent)	mg/kg	0.4*	0.400	-	<0.080	-	-	<0.33 HN	-	-	-	-	<0.32 HN	-	-	<0.080	<0.080
Cobalt	mg/kg	40*	40 <sup>CD</sup>	-	9.1			2.5				-	1.3	-		6.7	7.6
Copper	mg/kg	63	63 <sup>CD</sup>	-	20	-	-	7.1	-	-	-	-	4.6	-	-	17	19
Lead	mg/kg	70*	70 <sup>CD</sup>	-	11			2.0				-	1.3			11	12
Mercury	mg/kg	6.6	6.6	-	<0.050	-	-	<0.10	-	-	-	-	<0.10	-	-	0.062	0.066
Molybdenum	mg/kg	5 <sup>^</sup>	5 <sup>CD</sup>	-	1.2	-		1.6	· ·			-	1.2		· ·	1.5	1.4
Nickel	mgikg	50*	45 <sup>CD</sup>	-	31	-	-	8.6	-	-		-	5.5	-	-	21	24
Selenium	mg/kg	1^	1 <sup>CD</sup>	-	<0.50	-	-	<1.0	-	-	-	-	<1.0	-	-	<0.50	<0.50
Silver	maka	20*	20 <sup>CD</sup>	-	<0.20	-		<0.40	-			-	<0.40	-	-	<0.20	0.21
Thallium	mg/kg	1^	1 <sup>CD</sup>	-	0.20	-		<0.20	-	-	-	-	<0.20	-	-	0.22	0.25
Tin	mg/kg	5^	5 <sup>CD</sup>	-	<1.0			<2.0				-	<2.0			<1.0	<1.0
Uranium	mg/kg	n/v	23 <sup>CD</sup>	-	0.88	-		0.92	-	-	-	-	0.50	-	-	0.83	0.95
Vanadium	mg/kg	130^	130 <sup>CD</sup>	-	33 MSE	-	-	6.2	-	-	-	-	4.0	-	-	32	31
Zinc	maka	2005	260/00		71			37					<20			72	78

Notes: NWT A B CCME C D E F

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6.5<sup>A</sup> 15.2 <0.50 <0.03 n/v . HN WSA RPD <u>61%</u> nc

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# Table D.2 – Summary of 2023 Soil Analytical Results Site Inspection and Soil Sampling AEC WEST ET AL TATE G-18

Ovintiv	Canada	ULC	

Area of Interest	1 1								Remote Sump							Wel	Site
Sample Location				G18-S	823-12	G18-S	823-13		G18-SS23-14			G18-S	823-15	G18-S	823-16	G18-SS23-03	G18-SS23-04
Sample Date				20-Sep-23	20-Sep-23	20-Sep-23	20-Sep-23	20-Sep-23	20-Sep-23	20-Sep-23		20-Sep-23	20-Sep-23	20-Sep-23	20-Sep-23	20-Sep-23	20-Sep-23
Sample ID				G18-SS23-12-01	G18-8823-12-02	G18-SS23-13-01	G18-SS23-13-02	G18-SS23-14-01	G18-8823-14-02	G-18-QC-8823-03		G18-8823-15-01	G18-SS23-15-02	G18-SS23-16-01	G18-SS23-16-02	G18-SS23-03-01	G18-SS23-04-01
Sample Depth				0.05 - 0.25 m	0.25 - 0.5 m	0-0.25 m	0.25 - 0.5 m	0-0.25 m	0.25 - 0.5 m	0.25 - 0.5 m		U-0.25 m	U.25 - U.5 m	0 - 0.25 m	0.25 - 0.5 m	0.05 - 0.25 m	0.05 - 0.25 m
Laboratory				RV	RV	R ALU STANTEC	R ALO STANTEC	RV	R ALO STANTEG	RV		RV RV	RV	R ALO STANTEC	RV RV	RALUSTANTEC	R ALU STANTEC
Laboratory Work Order				C376773	C376773	C376773	C376773	C376773	C376773	C376773		C376773	C376773	C376773	C376773	C376773	C376773
Laboratory Sample ID				CAB742	CAB743	CAB744	CAB745	CAB746	CAB747	CAB755	RPD	CAB748	CAB749	CAB750	CAB751	CAB729	CAB730
Sample Type	Units	NWT	CCME							Field Duplicate	(%)						
BTEX and Petroleum Hydrocarbons																	
Benzene	mg/kg	0.05*	0.0068°	-	<0.0050	<0.0050	-	<0.031 WSA	-	-	-	<0.035 WSA	-	-	<0.036 WSA	<0.0050	<0.0050
Toluene	mg/kg	0.1*	0.08 <sup>D</sup>	-	<0.050	<0.050	-	0.31 WSA <sup>AD</sup>	-	-	-	<0.12		-	<0.12	<0.050	<0.050
Ethylberzene	mg/kg	0.1*	0.018 <sup>0</sup>	-	<0.010	<0.010	-	<0.062 WSA	-	-	-	<0.069 WSA	-	-	<0.071 WSA	<0.010	<0.010
Xylene, m & p-	mg/kg	n/v	niv	-	<0.040	<0.040	-	<0.25 WSA	-	-	-	<0.28 WSA	-	-	<0.29 WSA	<0.040	<0.040
Xylene, o-	mg/kg	n/v	nlv	-	<0.020	<0.020		<0.12 WSA		-		<0.14 WSA		-	<0.14 WSA	<0.020	<0.020
Xytenes, Lotal	manka	0.1^	2.4	-	<0.045	<0.045		<0.28				<0.31		-	<0.32	<0.045	<0.045
PHC F1 (C6-C10 range)	mgkg	nv 4008	nv		<10	<10	-	<30		-		<34		-	<35	<10	<10
PHC F1 (C6-C10 lange) minus BTEX	mgalig	130	30	-	<10	<10		<30 -11				-34		-	43.0	<10	10
PHC P2 (PC 10-C 16 range)	mgaig	150"	150**	-	< 10	<10		941 HN				<190 HN		-	547 HN	<10	<10 
PHC F3 (>C16-C34 range)	mgikg	400*	300"	-	<50	100	-	690 HN		-		1,600 HN***		-	430 HN-	61	100
PHC F4 (>C34-C50 range) Chromotogram to baceline at CE0	mgikg	2,800*	2,800*	-	<50 VE0	<50 VE0	-	320 HN		-		<930 HN		-	<230 HN	<50 VE0	/1 VE9
Concentration to contract at COD	***116	-49	- 4V		120	100		,20			1.1	631			(20	100	120

Notes: NWT \* CCM c 0 5 7 6.5<sup>4</sup> 15.2 **6.5<sup>4</sup>** 15.2 **6.5<sup>4</sup>** 15.2 **0.0**3 n/V -HN WSA RPD **615** inc

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# Table D.3 – Summary of 2019 Soil Analytical Results Site Inspection and Soil Sampling AEC WEST ET AL TATE G-18 Ovintiv Canada ULC

Sample Location Sample Date Sample ID Sampling Company Laboratory Laboratory Work Order Laboratory Sample ID	Units	NWT	CCME	1363877-1 9-Jul-19 190506001 Government of the Northwest Territories ELEMENT 1363877 1363877-1	1363877-2 9-Jul-19 190506002 Government of the Northwest Territories ELEMENT 1363877 1363877-2	1363877-3 9-Jul-19 190506003 Government of the Northwest Territories ELEMENT 1363877 1363877-3	1363877-4 9-Jul-19 190506004 Government of the Northwest Territories ELEMENT 1363877 1363877-4	1363877-5 9-Jul-19 190506005 Government of the Northwest Territories ELEMENT 1363877 1363877-5	1363877-6 9-Jul-19 190506006 Government of the Northwest Territories ELEMENT 1363877-6	1363877-7 9-Jul-19 190506007 Government of the Northwest Territories ELEMENT 1363877 1363877-7	1363877-8 9-Jul-19 190506008 Government of the Northwest Territories ELEMENT 1363877 1363877-8	1363877-9 9-Jul-19 190506009 Government of the Northwest Territories ELEMENT 1363877 1363877-9
Physical Properties												
Percent Saturation	%	n/v	n/v	443	292	288	243	350	68	176	302	259
Salinity												
pH, lab	S.U.	6-8 <sup>A</sup>	6-8 <sup>BC</sup>	6.7	7.1	6.3	5.3 <sup>ABC</sup>	5.6 <sup>ABC</sup>	7.0	6.8	6.2	6.4
Electrical Conductivity, Lab	dS/m	2 <sup>A</sup>	2 <sup>8C</sup>	0.40	0.42	0.31	0.11	0.21	0.70	0.98	1.45	2.39 <sup>ABC</sup>
Sodium Adsorption Ratio (SAR)	none	5.0 <sup>A</sup>	5 <sup>8C</sup>	0.5	0.3	1.1	<0.1	1.1	0.5	1.2	16.0 <sup>ABC</sup>	12 <sup>ABC</sup>
Theoretical Gypsum Requirement	tonnes/acre	n/v	n/v	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	0.5
Chloride	mg/kg	n/v	n/v	154	73	125	26	52	35	368	1,130	1,940
Chloride	mg/L	n/v	n/v	34.7	24.8	43.6	10.6	14.8	51.0	209	375	747
Sulfate	mg/kg	n/v	n/v	94	83	63	30	170	20	91.4	149	120
Sulfate	mg/L	n/v	n/v	21.1	28.3	22.1	12.5	48.5	28.8	51.9	49.5	47.1
Sulfate as S	mg/kg	n/v	n/v	31	28	21	10	56.8	6.5	30.5	49.8	41
Sulfate as S	mg/L	n/v	n/v	7.04	9.44	7.36	4.16	16.2	9.6	17.3	16.5	15.7
Calcium	mg/kg	n/v	n/v	180	164	76.4	67.5	104	60.3	184	64.7	170
Calcium	mg/L	n/v	n/v	40.7	56.3	26.7	27.9	29.9	89.4	105.0	21.4	68.1
Magnesium	mg/kg	n/v	n/v	53.2	48.5	25	15	19	18.0	50.0	8.3	46
Magnesium	mg/L	n/v	n/v	12.0	16.6	8.75	6.20	5.35	26.9	28.6	2.79	18
Potassium	mg/kg	n/v	n/v	80	10	15	6	7	2	6	7	34
Potassium	mg/L	n/v	n/v	17.9	3.52	5.08	2.35	1.96	2.74	3.52	2.35	12.91
Sodium	mg/kg	n/v	n/v	58	28	71	3	89	16	92	895	1,140
Sodium	mg/L	n/v	n/v	13.1	9.66	24.83	1.38	25.3	22.99	52.4	296	441

NWT Environmental Guideline for Contaminated Site Remediation, November 2003 Table A7. Remediation Criteria for other Contaminants in Sol - Agricultural Canadian Environmental Cuality Guidelines, Canadian Sol Cuality Guidelines for the Protection of Environmental and Human Health, on-line summary table, for agricultural land use and coarse grained soil Canadian Environmental Cuality Guidelines, Canadian Sol Cuality Guidelines for the Protection of Environmental and Human Health, on-line summary table, for agricultural land use and fine grained soil Canadian Environmental Cuality Guidelines, Canadian Sol Cuality Guidelines for the Protection of Environmental and Human Health, on-line summary table, for agricultural land use and fine grained soil Concentration exceeds the indicated standard. Laboratory inporting limit was greater than the applicable standard. Analyte was not detected at a concentration greater than the laboratory reporting limit. No standardiguideline value.

Notes: NWT A CCME B C **6.5<sup>A</sup>** 15.2 **6.50** <0.03 n/v

- 104-101/01221/lactive/l22140012\_data\_base\_mgmtDatabases/123514555 - OvintivEncana 2023 NWT SSAIEDD/20231122 - revised tables/20231122-123514555 - Table D.3, 2019 Soil Analytical Results-ISREV3.xisx

Appendix E Laboratory Analytical Reports November 27, 2023

# Appendix E Laboratory Analytical Reports





#### **Attention: James Hymers**

STANTEC CONSULTING LTD #200, 325- 25TH ST. SE CALGARY, AB CANADA T2A 7H8

> Report Date: 2023/11/15 Report #: R3426622 Version: 4 - Revision

### **CERTIFICATE OF ANALYSIS – REVISED REPORT**

#### BUREAU VERITAS JOB #: C376773 Received: 2023/09/22, 15:15

Sample Matrix: Soil # Samples Received: 27

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Analytical Method
Boron (Hot Water Soluble)	5	2023/09/29	2023/09/30	AB SOP-00034 / AB SOP- 00042	EPA 6010d R5 m
Boron (Hot Water Soluble)	4	2023/10/02	2023/10/03	AB SOP-00034 / AB SOP- 00042	EPA 6010d R5 m
Boron (Hot Water Soluble)	1	2023/10/06	2023/10/07	AB SOP-00034 / AB SOP- 00042	EPA 6010d R5 m
Boron (Hot Water Soluble)	1	2023/10/08	2023/10/10	AB SOP-00034 / AB SOP- 00042	EPA 6010d R5 m
BTEX/F1 by HS GC/MS/FID (MeOH extract) (1)	12	N/A	2023/10/10	AB SOP-00039	CCME CWS/EPA 8260d m
F1-BTEX	12	N/A	2023/10/11		Auto Calc
Cation/EC Ratio	7	N/A	2023/10/03		Auto Calc
Cation/EC Ratio	12	N/A	2023/10/05		Auto Calc
Cation/EC Ratio	1	N/A	2023/10/09		Auto Calc
Cation/EC Ratio	4	N/A	2023/10/10		Auto Calc
Cation/EC Ratio	1	N/A	2023/10/11		Auto Calc
Chloride (Soluble)	9	2023/10/01	2023/10/02	AB SOP-00033 / AB SOP- 00020	SM 24-4500-Cl-E m
Chloride (Soluble)	2	2023/10/02	2023/10/03	AB SOP-00033 / AB SOP- 00020	SM 24-4500-Cl-E m
Chloride (Soluble)	12	2023/10/03	2023/10/04	AB SOP-00033 / AB SOP- 00020	SM 24-4500-Cl-E m
Chloride (Soluble)	1	2023/10/06	2023/10/07	AB SOP-00033 / AB SOP- 00020	SM 24-4500-Cl-E m
Chloride (Soluble)	1	2023/10/08	2023/10/10	AB SOP-00033 / AB SOP- 00020	SM 24-4500-Cl-E m
Hexavalent Chromium (2)	10	2023/10/02	2023/10/02	AB SOP-00063	SM 24 3500-Cr B m
Hexavalent Chromium (2)	1	2023/10/05	2023/10/05	AB SOP-00063	SM 24 3500-Cr B m
Conductivity @25C (Soluble)	3	2023/10/01	2023/10/02	AB SOP-00033 / AB SOP- 00004	SM 23 2510 B m
Conductivity @25C (Soluble)	6	2023/10/02	2023/10/02	AB SOP-00033 / AB SOP- 00004	SM 23 2510 B m
Conductivity @25C (Soluble)	1	2023/10/03	2023/10/03	AB SOP-00033 / AB SOP- 00004	SM 23 2510 B m



#### **Attention: James Hymers**

STANTEC CONSULTING LTD #200, 325- 25TH ST. SE CALGARY, AB CANADA T2A 7H8

> Report Date: 2023/11/15 Report #: R3426622 Version: 4 - Revision

### **CERTIFICATE OF ANALYSIS – REVISED REPORT**

#### BUREAU VERITAS JOB #: C376773 Received: 2023/09/22, 15:15

Sample Matrix: Soil # Samples Received: 27

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Analytical Method
Conductivity @25C (Soluble)	12	2023/10/04	2023/10/04	AB SOP-00033 / AB SOP- 00004	SM 23 2510 B m
Conductivity @25C (Soluble)	1	2023/10/08	2023/10/08	AB SOP-00033 / AB SOP- 00004	SM 23 2510 B m
Conductivity @25C (Soluble)	1	2023/10/09	2023/10/10	AB SOP-00033 / AB SOP- 00004	SM 23 2510 B m
Conductivity @25C (Soluble)	1	2023/10/10	2023/10/10	AB SOP-00033 / AB SOP- 00004	SM 23 2510 B m
CCME Hydrocarbons (F2-F4 in soil) (3)	5	2023/10/02	2023/10/04	AB SOP-00036	CCME PHC-CWS m
CCME Hydrocarbons (F2-F4 in soil) (3)	7	2023/10/04	2023/10/07	AB SOP-00036	CCME PHC-CWS m
Elements by ICPMS - Soils	5	2023/09/29	2023/09/29	AB SOP-00001 / AB SOP- 00043	EPA 6020b R2 m
Elements by ICPMS - Soils	4	2023/10/01	2023/10/01	AB SOP-00001 / AB SOP- 00043	EPA 6020b R2 m
Elements by ICPMS - Soils	1	2023/10/06	2023/10/06	AB SOP-00001 / AB SOP- 00043	EPA 6020b R2 m
Elements by ICPMS - Soils	1	2023/10/08	2023/10/09	AB SOP-00001 / AB SOP- 00043	EPA 6020b R2 m
Sum of Cations, Anions	3	N/A	2023/10/02		Auto Calc
Sum of Cations, Anions	7	N/A	2023/10/03		Auto Calc
Sum of Cations, Anions	12	N/A	2023/10/05		Auto Calc
Sum of Cations, Anions	1	N/A	2023/10/09		Auto Calc
Sum of Cations, Anions	1	N/A	2023/10/10		Auto Calc
Sum of Cations, Anions	1	N/A	2023/10/11		Auto Calc
Moisture	8	N/A	2023/10/03	AB SOP-00002	CCME PHC-CWS m
Moisture	7	N/A	2023/10/04	AB SOP-00002	CCME PHC-CWS m
Moisture	2	N/A	2023/11/10	AB SOP-00002	CCME PHC-CWS m
pH @25C (1:2 Calcium Chloride Extract)	12	2023/09/29	2023/09/29	AB SOP-00033 / AB SOP- 00006	SM 24 4500 H+B m
pH @25C (1:2 Calcium Chloride Extract)	3	2023/09/30	2023/09/30	AB SOP-00033 / AB SOP- 00006	SM 24 4500 H+B m
pH @25C (1:2 Calcium Chloride Extract)	8	2023/10/02	2023/10/02	AB SOP-00033 / AB SOP- 00006	SM 24 4500 H+B m



#### **Attention: James Hymers**

STANTEC CONSULTING LTD #200, 325- 25TH ST. SE CALGARY, AB CANADA T2A 7H8

> Report Date: 2023/11/15 Report #: R3426622 Version: 4 - Revision

## **CERTIFICATE OF ANALYSIS – REVISED REPORT**

#### BUREAU VERITAS JOB #: C376773 Received: 2023/09/22, 15:15

Sample Matrix: Soil # Samples Received: 27

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Analytical Method
pH @25C (1:2 Calcium Chloride Extract)	1	2023/10/06	2023/10/06	AB SOP-00033 / AB SOP- 00006	SM 24 4500 H+B m
pH @25C (1:2 Calcium Chloride Extract)	1	2023/10/08	2023/10/08	AB SOP-00033 / AB SOP- 00006	SM 24 4500 H+B m
Particle Size by Sieve (75 micron)	3	N/A	2023/11/10		Auto Calc
Particle Size by Sieve	3	N/A	2023/11/10	AB SOP-00022	ASTM D6913-17 m
Sodium Adsorption Ratio	3	N/A	2023/10/02		Auto Calc
Sodium Adsorption Ratio	7	N/A	2023/10/03		Auto Calc
Sodium Adsorption Ratio	12	N/A	2023/10/05		Auto Calc
Sodium Adsorption Ratio	1	N/A	2023/10/09		Auto Calc
Sodium Adsorption Ratio	1	N/A	2023/10/10		Auto Calc
Sodium Adsorption Ratio	1	N/A	2023/10/11		Auto Calc
Soluble Ions	9	2023/10/01	2023/10/02	AB SOP-00033 / AB SOP- 00042	EPA 6010d R5 m
Soluble lons	1	2023/10/02	2023/10/02	AB SOP-00033 / AB SOP- 00042	EPA 6010d R5 m
Soluble lons	1	2023/10/02	2023/10/11	AB SOP-00033 / AB SOP- 00042	EPA 6010d R5 m
Soluble lons	12	2023/10/03	2023/10/04	AB SOP-00033 / AB SOP- 00042	EPA 6010d R5 m
Soluble lons	1	2023/10/06	2023/10/08	AB SOP-00033 / AB SOP- 00042	EPA 6010d R5 m
Soluble lons	1	2023/10/08	2023/10/10	AB SOP-00033 / AB SOP- 00042	EPA 6010d R5 m
Soluble Paste	3	2023/10/01	2023/10/01	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Paste	6	2023/10/01	2023/10/02	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Paste	2	2023/10/02	2023/10/02	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Paste	12	2023/10/03	2023/10/03	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Paste	1	2023/10/06	2023/10/06	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Paste	1	2023/10/08	2023/10/09	AB SOP-00033	Carter 2nd ed 15.2 m
Soluble Ions Calculation	12	N/A	2023/09/30		Auto Calc
Soluble Ions Calculation	7	N/A	2023/10/01		Auto Calc
Soluble Ions Calculation	4	N/A	2023/10/02		Auto Calc



#### **Attention: James Hymers**

STANTEC CONSULTING LTD #200, 325- 25TH ST. SE CALGARY, AB CANADA T2A 7H8

> **Report Date: 2023/11/15** Report #: R3426622 Version: 4 - Revision

#### **CERTIFICATE OF ANALYSIS – REVISED REPORT**

#### BUREAU VERITAS JOB #: C376773 Received: 2023/09/22, 15:15

Sample Matrix: Soil # Samples Received: 27

		Date	Date		
Analyses	Quantity	Extracted	Analyzed	Laboratory Method	Analytical Method
Soluble Ions Calculation	1	N/A	2023/10/03		Auto Calc
Soluble Ions Calculation	1	N/A	2023/10/04		Auto Calc
Theoretical Gypsum Requirement (4)	3	N/A	2023/10/02		Auto Calc
Theoretical Gypsum Requirement (4)	7	N/A	2023/10/03		Auto Calc
Theoretical Gypsum Requirement (4)	12	N/A	2023/10/05		Auto Calc
Theoretical Gypsum Requirement (4)	1	N/A	2023/10/09		Auto Calc
Theoretical Gypsum Requirement (4)	1	N/A	2023/10/10		Auto Calc
Theoretical Gypsum Requirement (4)	1	N/A	2023/10/11		Auto Calc

#### Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) No lab extraction date is given for F1BTEX & VOC samples that are field preserved with methanol. Extraction date is date sampled unless otherwise stated.

(2) Some soil samples may react with the Cr(VI) spike reducing it to Cr(III). These samples are highly unlikely to contain native hexavalent chromium. Thus a failed spike recovery does not invalidate a negative result on the native sample.

(3) All CCME results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas conform to all prescribed elements of the

Page 4 of 49



#### **Attention: James Hymers**

STANTEC CONSULTING LTD #200, 325- 25TH ST. SE CALGARY, AB CANADA T2A 7H8

> Report Date: 2023/11/15 Report #: R3426622 Version: 4 - Revision

#### CERTIFICATE OF ANALYSIS – REVISED REPORT

#### BUREAU VERITAS JOB #: C376773 Received: 2023/09/22. 15:15

reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil, Validation of Performance-Based Alternative Methods September 2003. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

(4) TGR calculation is based on a theoretical SAR of 4. Salt Contamination and Assessment and remediation guideline 2001 recommended SAR is ranging 4-8. TGR is reported in tonnes/ha.

**Encryption Key** 

Please direct all questions regarding this Certificate of Analysis to: Geraldlyn Gouthro, Key Account Specialist Email: geraldlyn.gouthro@bureauveritas.com Phone# (780)577-7173

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Scott Cantwell, General Manager responsible for Alberta Environmental laboratory operations.



# AT1 BTEX AND F1-F4 IN SOIL (VIALS)

Bureau Veritas ID		CAB726		CAB729	CAB729	CAB730		
Sampling Date		2023/09/20		2023/09/20	2023/09/20	2023/09/20		
COC Number		71052		71052	71052	71052		
	UNITS	G18-SS23-01-01	QC Batch	G18-SS23-03-01	G18-SS23-03-01 Lab-Dup	G18-SS23-04-01	RDL	QC Batch
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	B133954	<10	N/A	<10	10	B138170
F3 (C16-C34 Hydrocarbons)	mg/kg	51	B133954	61	N/A	100	50	B138170
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	B133954	<50	N/A	71	50	B138170
Reached Baseline at C50	mg/kg	Yes	B133954	Yes	N/A	Yes	N/A	B138170
Volatiles						-		
Xylenes (Total)	mg/kg	<0.045	B125016	<0.045	N/A	<0.045	0.045	B125016
F1 (C6-C10) - BTEX	mg/kg	<10	B125016	<10	N/A	<10	10	B125016
Field Preserved Volatiles								
Benzene	mg/kg	<0.0050	B135455	<0.0050	<0.0050	<0.0050	0.0050	B135455
Toluene	mg/kg	<0.050	B135455	<0.050	<0.050	<0.050	0.050	B135455
Ethylbenzene	mg/kg	<0.010	B135455	<0.010	<0.010	<0.010	0.010	B135455
m & p-Xylene	mg/kg	<0.040	B135455	<0.040	<0.040	<0.040	0.040	B135455
o-Xylene	mg/kg	<0.020	B135455	<0.020	<0.020	<0.020	0.020	B135455
F1 (C6-C10)	mg/kg	<10	B135455	<10	<10	<10	10	B135455
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	98	B135455	100	98	98	N/A	B135455
4-Bromofluorobenzene (sur.)	%	100	B135455	100	99	100	N/A	B135455
D10-o-Xylene (sur.)	%	113	B135455	111	108	111	N/A	B135455
D4-1,2-Dichloroethane (sur.)	%	100	B135455	99	101	101	N/A	B135455
O-TERPHENYL (sur.)	%	101	B133954	111	N/A	102	N/A	B138170
RDL = Reportable Detection Lir	nit							

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable



#### AT1 BTEX AND F1-F4 IN SOIL (VIALS)

Bureau Veritas ID		CAB733		CAB738		CAB741		
Sampling Date		2023/09/20		2023/09/20		2023/09/20		
COC Number		71052		71052		71052		
	UNITS	G18-SS23-06-02	RDL	G18-SS23-10-01	QC Batch	G18-SS23-11-02	RDL	QC Batch
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	120 (1)	53	<10	B138170	<10	10	B133954
F3 (C16-C34 Hydrocarbons)	mg/kg	2100 (1)	220	130	B138170	<50	50	B133954
F4 (C34-C50 Hydrocarbons)	mg/kg	990 (1)	200	69	B138170	<50	50	B133954
Reached Baseline at C50	mg/kg	Yes	N/A	Yes	B138170	Yes	N/A	B133954
Volatiles		•	•					
Xylenes (Total)	mg/kg	<0.48	0.48	<0.045	B125016	<0.045	0.045	B125016
F1 (C6-C10) - BTEX	mg/kg	<52	52	<10	B125016	<10	10	B125016
Field Preserved Volatiles								
Benzene	mg/kg	<0.048 (2)	0.048	<0.0050	B135455	<0.0050	0.0050	B135455
Toluene	mg/kg	0.79 (3)	0.54	0.11	B135455	<0.050	0.050	B135455
Ethylbenzene	mg/kg	<0.073 (2)	0.073	<0.010	B135455	<0.010	0.010	B135455
m & p-Xylene	mg/kg	<0.43 (3)	0.43	<0.040	B135455	<0.040	0.040	B135455
o-Xylene	mg/kg	<0.21 (3)	0.21	<0.020	B135455	<0.020	0.020	B135455
F1 (C6-C10)	mg/kg	<52 (2)	52	<10	B135455	<10	10	B135455
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	98	N/A	98	B135455	99	N/A	B135455
4-Bromofluorobenzene (sur.)	%	98	N/A	98	B135455	99	N/A	B135455
D10-o-Xylene (sur.)	%	93	N/A	94	B135455	101	N/A	B135455
D4-1,2-Dichloroethane (sur.)	%	96	N/A	97	B135455	98	N/A	B135455
O-TERPHENYL (sur.)	%	108	N/A	101	B138170	105	N/A	B133954
RDL = Reportable Detection Lir	nit							

N/A = Not Applicable

(1) Detection limits calculated based on method detection limits (MDLs) due to high moisture content, sample contains => 50% moisture. Uncertainty of values may be increased.

(2) Detection limit reported based on MDL and sample weight used for analysis.

(3) Detection limits raised based on sample weight used for analysis.



#### AT1 BTEX AND F1-F4 IN SOIL (VIALS)

Bureau Veritas ID		CAB743		CAB744		CAB746		
Sampling Date		2023/09/20		2023/09/20		2023/09/20		
COC Number		71052		71052		71052		
	UNITS	G18-SS23-12-02	QC Batch	G18-SS23-13-01	RDL	G18-SS23-14-01	RDL	QC Batch
Ext. Pet. Hydrocarbon								
F2 (C10-C16 Hydrocarbons)	mg/kg	<10	B138170	<10	10	<41 (1)	41	B134767
F3 (C16-C34 Hydrocarbons)	mg/kg	<50	B138170	100	50	690 (1)	210	B134767
F4 (C34-C50 Hydrocarbons)	mg/kg	<50	B138170	<50	50	320 (1)	210	B134767
Reached Baseline at C50	mg/kg	Yes	B138170	Yes	N/A	Yes	N/A	B134767
Volatiles	-						-	
Xylenes (Total)	mg/kg	<0.045	B125016	<0.045	0.045	<0.28	0.28	B125016
F1 (C6-C10) - BTEX	mg/kg	<10	B125016	<10	10	<30	30	B125016
Field Preserved Volatiles							-	
Benzene	mg/kg	<0.0050	B135455	<0.0050	0.0050	<0.031 (2)	0.031	B135455
Toluene	mg/kg	<0.050	B135455	<0.050	0.050	0.31 (2)	0.31	B135455
Ethylbenzene	mg/kg	<0.010	B135455	<0.010	0.010	<0.062 (2)	0.062	B135455
m & p-Xylene	mg/kg	<0.040	B135455	<0.040	0.040	<0.25 (2)	0.25	B135455
o-Xylene	mg/kg	<0.020	B135455	<0.020	0.020	<0.12 (2)	0.12	B135455
F1 (C6-C10)	mg/kg	<10	B135455	<10	10	<30 (3)	30	B135455
Surrogate Recovery (%)		-						
1,4-Difluorobenzene (sur.)	%	98	B135455	99	N/A	99	N/A	B135455
4-Bromofluorobenzene (sur.)	%	98	B135455	99	N/A	100	N/A	B135455
D10-o-Xylene (sur.)	%	101	B135455	99	N/A	93	N/A	B135455
D4-1,2-Dichloroethane (sur.)	%	98	B135455	97	N/A	98	N/A	B135455
O-TERPHENYL (sur.)	%	98	B138170	100	N/A	107	N/A	B134767
RDL = Reportable Detection Lin	nit							

N/A = Not Applicable

(1) Detection limits raised due to high moisture content, sample contains => 50% moisture.

(2) Detection limits raised based on sample weight used for analysis.

(3) Detection limit reported based on MDL and sample weight used for analysis.



#### AT1 BTEX AND F1-F4 IN SOIL (VIALS)

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<b>└──</b> ′	CAB748	<u> </u>	<u>ا</u>	CAB751			CAB753	ļ'	
L'	2023/09/20		ļ	2023/09/20			2023/09/20		
L'	71052		<u>ا</u>	71052			71052		
UNITS	G18-SS23-15-01	RDL	QC Batch	G18-SS23-16-02	RDL	QC Batch	G-18-QC-SS23-01	RDL	QC Batch
mg/kg	<190 (1)	190	B138170	<47 (1)	47	B133954	170 (2)	60	B138170
mg/kg	1600 (1)	930	B138170	430 (1)	230	B133954	2700 (2)	250	B138170
mg/kg	<930 (1)	930	B138170	<230 (1)	230	B133954	1300 (2)	210	B138170
mg/kg	Yes	N/A	B138170	Yes	N/A	B133954	Yes	N/A	B138170
mg/kg	<0.31	0.31	B125016	<0.32	0.32	B125016	<0.54	0.54	B125016
mg/kg	<34	34	B125016	<35	35	B125016	<59	59	B125016
mg/kg	<0.035 (3)	0.035	B135455	<0.036 (3)	0.036	B135455	<0.055 (4)	0.055	B135455
mg/kg	<0.12 (4)	0.12	B135455	<0.12 (4)	0.12	B135455	1.0 (3)	0.61	B135455
mg/kg	<0.069 (3)	0.069	B135455	<0.071 (3)	0.071	B135455	<0.081 (4)	0.081	B135455
mg/kg	<0.28 (3)	0.28	B135455	<0.29 (3)	0.29	B135455	<0.49 (3)	0.49	B135455
mg/kg	<0.14 (3)	0.14	B135455	<0.14 (3)	0.14	B135455	<0.24 (3)	0.24	B135455
mg/kg	<34 (4)	34	B135455	<35 (4)	35	B135455	<59 (4)	59	B135455
%	98	N/A	B135455	97	N/A	B135455	99	N/A	B135455
%	99	N/A	B135455	99	N/A	B135455	97	N/A	B135455
%	91	N/A	B135455	99	N/A	B135455	99	N/A	B135455
%	96	N/A	B135455	95	N/A	B135455	96	N/A	B135455
%	104	N/A	B138170	105	N/A	B133954	113	N/A	B138170
	UNITS mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg % % % % %	CAB748           2023/09/20           71052           UNITS           G18-SS23-15-01           mg/kg           1600 (1)           mg/kg           930 (1)           mg/kg           Yes           mg/kg           0.31           mg/kg           0.12 (4)           mg/kg           0.069 (3)           mg/kg           0.28 (3)           mg/kg           34 (4)           %           98           %           99           %           91           %           96           %           96           %	CAB748         CAB748           2023/09/20         71052           UNITS         G18-SS23-15-01         RDL           mg/kg         <190 (1)	CAB748         Image: Cabrage state stat	CAB748         CAB751           2023/09/20         2023/09/20           71052         71052           UNITS         G18-SS23-15-01         RDL         QC Batch         G18-SS23-16-02           mg/kg         <190 (1)	CAB748         CAB751           2023/09/20         2023/09/20           71052         71052           UNITS         G18-SS23-15-01         RDL         QC Batch         G18-SS23-16-02         RDL           mg/kg         <190 (1)	CAB748         CAB751         Image: Cabrage state stat	CAB748         CAB751         CAB753           2023/09/20         2023/09/20         2023/09/20         2023/09/20           71052         71052         71052         71052           UNITS         G18-SS23-15-01         RDL         QC Batch         G18-SS23-16-02         RDL         QC Batch         G-18-QC-SS23-01           mg/kg          1600 (1)         930         B138170         <47 (1)         47         B133954         170 (2)           mg/kg          930         B138170         <47 (1)         47         B133954         170 (2)           mg/kg          930         B138170         <430 (1)         230         B133954         1300 (2)           mg/kg          930         B138170         <230 (1)         230         B133954         Yes           mg/kg          N/A         B138170         Yes         N/A         B133954         Yes           mg/kg          0.31         B125016         <0.32         0.32         B125016         <0.54           mg/kg          0.035         B135455         <0.036 (3)         0.036         B135455         <0.055 (4)           mg/kg         <	CAB748         CAB751         CAB753         CAB753           2023/09/20         2023/09/20         2023/09/20         2023/09/20           71052         71052         71052         71052           UNITS         G18-SS23-15-01         RDL         QC Batch         G18-SS23-16-02         RDL         QC Batch         G-18-QC-SS23-01         RDL           mg/kg         <190 (1)

RDL = Reportable Detection Limit

N/A = Not Applicable

(1) Detection limits raised due to high moisture content, sample contains => 50% moisture.

(2) Detection limits calculated based on method detection limits (MDLs) due to high moisture content, sample contains => 50% moisture.

Uncertainty of values may be increased.

(3) Detection limits raised based on sample weight used for analysis.

(4) Detection limit reported based on MDL and sample weight used for analysis.



# PARTICLE SIZE BY SIEVE (75 UM)

Bureau Veritas ID		CAB727	CAB734	CAB752		
Sampling Date		2023/09/20	2023/09/20	2023/09/20		
COC Number		71052	71052	71052		
	UNITS	G18-SS23-01-02	G18-SS23-07-01	G18-SS23-17-01	RDL	QC Batch
Physical Properties						
Grain Size	N/A	FINE	FINE	COARSE	N/A	B190623
Sieve - #10 (>2.00mm)	%	6.7	3.9	6.8	0.20	B194240
Sieve - #200 (>0.075mm)	%	26	28	59	0.20	B194240
Sieve - Pan	%	74	72	41	0.20	B194240
RDL = Reportable Detection	Limit					
N/A = Not Applicable						



# SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		CAB726			CAB729		CAB730		
Sampling Date		2023/09/20			2023/09/20		2023/09/20		
COC Number		71052			71052		71052		
	UNITS	G18-SS23-01-01	RDL	QC Batch	G18-SS23-03-01	RDL	G18-SS23-04-01	RDL	QC Batch
Calculated Parameters									
Anion Sum	meq/L	0.31	N/A	B124904	0.27	N/A	0.32	N/A	B124904
Cation Sum	meq/L	3.5	N/A	B124904	3.9	N/A	3.2	N/A	B124904
Cation/EC Ratio	N/A	12	0.10	B124900	15	0.10	16	0.10	B124900
Calculated Calcium (Ca)	mg/kg	30	1.1	B124916	18	0.65	13	0.70	B124916
Calculated Magnesium (Mg)	mg/kg	10	0.73	B124916	5.0	0.43	4.0	0.46	B124916
Calculated Sodium (Na)	mg/kg	4.7	1.8	B124916	8.1	1.1	11	1.2	B124916
Calculated Potassium (K)	mg/kg	1.6	0.95	B124916	0.98	0.56	1.0	0.60	B124916
Calculated Chloride (Cl)	mg/kg	<7.3	7.3	B124916	<4.3	4.3	<4.6	4.6	B124916
Calculated Sulphate (SO4)	mg/kg	11	3.6	B124916	5.6	2.2	7.1	2.3	B124916
Soluble Parameters									
Soluble Chloride (Cl)	mg/L	<10	10	B146066	<10	10	<10	10	B137734
Soluble Conductivity	dS/m	0.29	0.020	B146351	0.27	0.020	0.20	0.020	B137906
Soluble (CaCl2) pH	рН	6.05	N/A	B144524	6.74	N/A	6.49	N/A	B129739
Sodium Adsorption Ratio	N/A	0.22	0.10	B124909	0.66	0.10	0.97	0.10	B124909
Soluble Calcium (Ca)	mg/L	41	1.5	B146054	42	1.5	28	1.5	B137483
Soluble Magnesium (Mg)	mg/L	14	1.0	B146054	12	1.0	8.6	1.0	B137483
Soluble Sodium (Na)	mg/L	6.4	2.5	B146054	19	2.5	23	2.5	B137483
Soluble Potassium (K)	mg/L	2.2	1.3	B146054	2.3	1.3	2.2	1.3	B137483
Saturation %	%	73	N/A	B144523	43	N/A	46	N/A	B129735
Soluble Sulphate (SO4)	mg/L	15	5.0	B146054	13	5.0	15	5.0	B137483
Theoretical Gypsum Requirement	tonnes/ha	<0.20	0.20	B124919	<0.20	0.20	<0.20	0.20	B124919
RDL = Reportable Detection Limit					-				
N/A = Not Applicable									



#### SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		CAB733			CAB735			CAB736		
Sampling Date		2023/09/20			2023/09/20			2023/09/20		
COC Number		71052			71052			71052		
	UNITS	G18-SS23-06-02	RDL	QC Batch	G18-SS23-08-01	RDL	QC Batch	G18-SS23-09-01	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	0.26	N/A	B124904	0.23	N/A	B124904	1.1	N/A	B124904
Cation Sum	meq/L	0.86	N/A	B124904	2.3	N/A	B124904	3.3	N/A	B124904
Cation/EC Ratio	N/A	9.7	0.10	B124900	13	0.10	B124900	12	0.10	B124900
Calculated Calcium (Ca)	mg/kg	73	15	B124916	11	0.77	B124916	97	5.0	B124916
Calculated Magnesium (Mg)	mg/kg	21	9.8	B124916	2.4	0.51	B124916	22	3.3	B124916
Calculated Sodium (Na)	mg/kg	56	25	B124916	8.8	1.3	B124916	83	8.3	B124916
Calculated Potassium (K)	mg/kg	<13	13	B124916	1.1	0.67	B124916	20	4.3	B124916
Calculated Chloride (Cl)	mg/kg	<98	98	B124916	<5.1	5.1	B124916	<33	33	B124916
Calculated Sulphate (SO4)	mg/kg	120	49	B124916	5.7	2.6	B124916	170	17	B124916
Soluble Parameters	-							-		
Soluble Chloride (Cl)	mg/L	<10	10	B144073	<10	10	B137734	<10	10	B133975
Soluble Conductivity	dS/m	0.089	0.020	B144767	0.17	0.020	B137906	0.28	0.020	B133922
Soluble (CaCl2) pH	рН	4.16 (1)	N/A	B142455	6.43	N/A	B129739	4.38 (1)	N/A	B132544
Sodium Adsorption Ratio	N/A	0.47	0.10	B124909	0.87	0.10	B124909	1.1	0.10	B124909
Soluble Calcium (Ca)	mg/L	7.4	1.5	B144445	22	1.5	B137483	29	1.5	B133966
Soluble Magnesium (Mg)	mg/L	2.1	1.0	B144445	4.7	1.0	B137483	6.8	1.0	B133966
Soluble Sodium (Na)	mg/L	5.7	2.5	B144445	17	2.5	B137483	25	2.5	B133966
Soluble Potassium (K)	mg/L	<1.3	1.3	B144445	2.2	1.3	B137483	6.1	1.3	B133966
Saturation %	%	980	N/A	B142450	51	N/A	B129735	330	N/A	B132543
Soluble Sulphate (SO4)	mg/L	12	5.0	B144445	11	5.0	B137483	52	5.0	B133966
Theoretical Gypsum Requirement	tonnes/ha	<0.20	0.20	B124919	<0.20	0.20	B124919	<0.20	0.20	B124919
RDL = Reportable Detection Limit										

N/A = Not Applicable



# SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		CAB737			CAB738		CAB739		
Sampling Date		2023/09/20			2023/09/20		2023/09/20		
COC Number		71052			71052		71052		
	UNITS	G18-SS23-09-02	RDL	QC Batch	G18-SS23-10-01	RDL	G18-SS23-10-02	RDL	QC Batch
Calculated Parameters									
Anion Sum	meq/L	1.3	N/A	B124904	20	N/A	30	N/A	B124904
Cation Sum	meq/L	3.7	N/A	B124904	23	N/A	34	N/A	B124904
Cation/EC Ratio	N/A	15	0.10	B124900	9.8	0.10	11	0.10	B124900
Calculated Calcium (Ca)	mg/kg	170	6.3	B124916	120	1.2	80	0.74	B124916
Calculated Magnesium (Mg)	mg/kg	28	4.2	B124916	39	0.80	21	0.49	B124916
Calculated Sodium (Na)	mg/kg	100	11	B124916	200	2.0	250	1.2	B124916
Calculated Potassium (K)	mg/kg	23	5.5	B124916	5.4	1.0	2.3	0.64	B124916
Calculated Chloride (Cl)	mg/kg	61	42	B124916	390	8.0	330	4.9	B124916
Calculated Sulphate (SO4)	mg/kg	180	21	B124916	230	4.0	260	2.5	B124916
Soluble Parameters									
Soluble Chloride (Cl)	mg/L	14	10	B134499	490	10	670	10	B137734
Soluble Conductivity	dS/m	0.25	0.020	B134594	2.3	0.020	3.2	0.020	B137906
Soluble (CaCl2) pH	рН	4.19 (1)	N/A	B132808	6.54	N/A	6.60	N/A	B129739
Sodium Adsorption Ratio	N/A	0.93	0.10	B124909	4.5	0.10	9.1	0.10	B124909
Soluble Calcium (Ca)	mg/L	39	1.5	B134464	160	1.5	160	1.5	B137483
Soluble Magnesium (Mg)	mg/L	6.6	1.0	B134464	49	1.0	43	1.0	B137483
Soluble Sodium (Na)	mg/L	24	2.5	B134464	250	2.5	510	2.5	B137483
Soluble Potassium (K)	mg/L	5.5	1.3	B134464	6.8	1.3	4.7	1.3	B137483
Saturation %	%	420	N/A	B132806	80	N/A	49	N/A	B129735
Soluble Sulphate (SO4)	mg/L	42	5.0	B134464	290	5.0	530	5.0	B137483
Theoretical Gypsum Requirement	tonnes/ha	<0.20	0.20	B124919	0.40	0.20	4.0	0.20	B124919
RDL = Reportable Detection Limit									<u></u>

N/A = Not Applicable



# SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		CAB740		CAB741			CAB742		
Sampling Date		2023/09/20		2023/09/20			2023/09/20		
COC Number		71052		71052			71052		
	UNITS	G18-SS23-11-01	RDL	G18-SS23-11-02	RDL	QC Batch	G18-SS23-12-01	RDL	QC Batch
Calculated Parameters									
Anion Sum	meq/L	5.0	N/A	3.7	N/A	B124904	0.78	N/A	B124904
Cation Sum	meq/L	7.0	N/A	5.2	N/A	B124904	3.6	N/A	B124904
Cation/EC Ratio	N/A	11	0.10	11	0.10	B124900	14	0.10	B124900
Calculated Calcium (Ca)	mg/kg	53	1.2	28	0.91	B124916	27	1.0	B124916
Calculated Magnesium (Mg)	mg/kg	14	0.78	7.2	0.61	B124916	8.4	0.68	B124916
Calculated Sodium (Na)	mg/kg	36	1.9	27	1.5	B124916	8.8	1.7	B124916
Calculated Potassium (K)	mg/kg	2.0	1.0	1.1	0.79	B124916	1.3	0.89	B124916
Calculated Chloride (Cl)	mg/kg	84	7.8	47	6.1	B124916	<6.8	6.8	B124916
Calculated Sulphate (SO4)	mg/kg	75	3.9	46	3.0	B124916	26	3.4	B124916
Soluble Parameters									
Soluble Chloride (Cl)	mg/L	110	10	77	10	B137734	<10	10	B135177
Soluble Conductivity	dS/m	0.63	0.020	0.49	0.020	B137906	0.25	0.020	B135407
Soluble (CaCl2) pH	рН	6.28	N/A	6.39	N/A	B129739	6.40	N/A	B133857
Sodium Adsorption Ratio	N/A	1.3	0.10	1.5	0.10	B124909	0.46	0.10	B124909
Soluble Calcium (Ca)	mg/L	69	1.5	46	1.5	B137483	39	1.5	B134742
Soluble Magnesium (Mg)	mg/L	18	1.0	12	1.0	B137483	12	1.0	B134742
Soluble Sodium (Na)	mg/L	47	2.5	44	2.5	B137483	13	2.5	B134742
Soluble Potassium (K)	mg/L	2.6	1.3	1.8	1.3	B137483	1.9	1.3	B134742
Saturation %	%	78	N/A	61	N/A	B129735	68	N/A	B133855
Soluble Sulphate (SO4)	mg/L	96	5.0	75	5.0	B137483	38	5.0	B134742
Theoretical Gypsum Requirement	tonnes/ha	<0.20	0.20	<0.20	0.20	B124919	<0.20	0.20	B124919
RDL = Reportable Detection Limit									
N/A = Not Applicable									

N/A = Not Applicable



# SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		CAB742			CAB743	CAB743		
Sampling Date		2023/09/20			2023/09/20	2023/09/20		
COC Number		71052			71052	71052		
	UNITS	G18-SS23-12-01 Lab-Dup	RDL	QC Batch	G18-SS23-12-02	G18-SS23-12-02 Lab-Dup	RDL	QC Batch
Calculated Parameters								
Anion Sum	meq/L	N/A	N/A	B124904	0.54	N/A	N/A	B124904
Cation Sum	meq/L	N/A	N/A	B124904	4.0	N/A	N/A	B124904
Cation/EC Ratio	N/A	N/A	0.10	B124900	13	N/A	0.10	B124900
Calculated Calcium (Ca)	mg/kg	N/A	1.0	B124916	21	N/A	0.68	B124916
Calculated Magnesium (Mg)	mg/kg	N/A	0.68	B124916	5.7	N/A	0.46	B124916
Calculated Sodium (Na)	mg/kg	N/A	1.7	B124916	6.3	N/A	1.1	B124916
Calculated Potassium (K)	mg/kg	N/A	0.89	B124916	1.1	N/A	0.59	B124916
Calculated Chloride (Cl)	mg/kg	N/A	6.8	B124916	<4.6	N/A	4.6	B124916
Calculated Sulphate (SO4)	mg/kg	N/A	3.4	B124916	12	N/A	2.3	B124916
Soluble Parameters								
Soluble Chloride (Cl)	mg/L	<10	10	B135177	<10	<10	10	B137734
Soluble Conductivity	dS/m	0.28	0.020	B135407	0.32	0.33	0.020	B137906
Soluble (CaCl2) pH	рН	6.41	N/A	B133857	7.07	7.03	N/A	B129739
Sodium Adsorption Ratio	N/A	N/A	0.10	B124909	0.46	N/A	0.10	B124909
Soluble Calcium (Ca)	mg/L	41	1.5	B134742	46	47	1.5	B137483
Soluble Magnesium (Mg)	mg/L	13	1.0	B134742	13	12	1.0	B137483
Soluble Sodium (Na)	mg/L	12	2.5	B134742	14	16	2.5	B137483
Soluble Potassium (K)	mg/L	2.4	1.3	B134742	2.5	2.5	1.3	B137483
Saturation %	%	67	N/A	B133855	46	44	N/A	B129735
Soluble Sulphate (SO4)	mg/L	38	5.0	B134742	26	24	5.0	B137483
Theoretical Gypsum Requirement	tonnes/ha	N/A	0.20	B124919	<0.20	N/A	0.20	B124919
RDL = Reportable Detection Limit							-	

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable



# SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		CAB744		CAB745			CAB746		
Sampling Date		2023/09/20		2023/09/20			2023/09/20		
COC Number		71052		71052			71052		
	UNITS	G18-SS23-13-01	RDL	G18-SS23-13-02	RDL	QC Batch	G18-SS23-14-01	RDL	QC Batch
Calculated Parameters									
Anion Sum	meq/L	51	N/A	28	N/A	B124904	60	N/A	B124904
Cation Sum	meq/L	59	N/A	34	N/A	B124904	72	N/A	B124904
Cation/EC Ratio	N/A	10	0.10	11	0.10	B124900	8.4	0.10	B124900
Calculated Calcium (Ca)	mg/kg	760	2.1	390	2.4	B124916	1500	5.5	B124916
Calculated Magnesium (Mg)	mg/kg	130	1.4	63	1.6	B124916	410	3.7	B124916
Calculated Sodium (Na)	mg/kg	820	3.6	660	3.9	B124916	3500	9.1	B124916
Calculated Potassium (K)	mg/kg	17	1.9	15	2.0	B124916	71	4.8	B124916
Calculated Chloride (Cl)	mg/kg	2100	71	1100	16	B124916	7600	180	B124916
Calculated Sulphate (SO4)	mg/kg	640	7.1	550	7.9	B124916	180	18	B124916
Soluble Parameters			-					-	
Soluble Chloride (Cl)	mg/L	1500	50	720	10	B137734	2100	50	B134499
Soluble Conductivity	dS/m	5.8	0.020	3.3	0.020	B137906	8.7	0.020	B134594
Soluble (CaCl2) pH	рН	6.85	N/A	6.95	N/A	B129739	4.90 (1)	N/A	B132808
Sodium Adsorption Ratio	N/A	6.0	0.10	6.5	0.10	B124909	11	0.10	B124909
Soluble Calcium (Ca)	mg/L	530	1.5	250	1.5	B137483	420	1.5	B134464
Soluble Magnesium (Mg)	mg/L	91	1.0	40	1.0	B137483	110	1.0	B134464
Soluble Sodium (Na)	mg/L	570	2.5	420	2.5	B137483	960	2.5	B134464
Soluble Potassium (K)	mg/L	12	1.3	9.2	1.3	B137483	19	1.3	B134464
Saturation %	%	140	N/A	160	N/A	B129735	370	N/A	B132806
Soluble Sulphate (SO4)	mg/L	440	5.0	350	5.0	B137483	50	5.0	B134464
Theoretical Gypsum Requirement	tonnes/ha	10	0.20	6.8	0.20	B124919	110	0.20	B124919
RDL = Reportable Detection Limit									

N/A = Not Applicable



#### SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		CAB747			CAB748			CAB749		
Sampling Date		2023/09/20			2023/09/20			2023/09/20		
COC Number		71052			71052			71052		
	UNITS	G18-SS23-14-02	RDL	QC Batch	G18-SS23-15-01	RDL	QC Batch	G18-SS23-15-02	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	19	N/A	B124904	7.1	N/A	B124904	7.9	N/A	B124904
Cation Sum	meq/L	25	N/A	B124904	7.9	N/A	B124904	12	N/A	B124904
Cation/EC Ratio	N/A	9.7	0.10	B124900	8.8	0.10	B124900	11	0.10	B124900
Calculated Calcium (Ca)	mg/kg	420	6.8	B124916	310	8.4	B124916	270	4.6	B125129
Calculated Magnesium (Mg)	mg/kg	93	4.5	B124916	130	5.6	B124916	65	3.1	B125129
Calculated Sodium (Na)	mg/kg	2000	11	B124916	390	14	B124916	420	7.7	B125129
Calculated Potassium (K)	mg/kg	27	5.9	B124916	19	7.3	B124916	15	4.0	B125129
Calculated Chloride (Cl)	mg/kg	2900	45	B124916	1200	56	B124916	760	31	B125129
Calculated Sulphate (SO4)	mg/kg	180	23	B124916	230	28	B124916	140	15	B125129
Soluble Parameters	-							-		
Soluble Chloride (Cl)	mg/L	630	10	B134499	220	10	B133975	250	10	B134499
Soluble Conductivity	dS/m	2.6	0.020	B134594	0.90	0.020	B133922	1.2	0.020	B134594
Soluble (CaCl2) pH	рН	4.82 (1)	N/A	B132808	5.19 (1)	N/A	B132544	4.32 (1)	N/A	B132808
Sodium Adsorption Ratio	N/A	11	0.10	B125124	2.0	0.10	B124909	3.4	0.10	B125124
Soluble Calcium (Ca)	mg/L	93	1.5	B134464	56	1.5	B133966	86	1.5	B134464
Soluble Magnesium (Mg)	mg/L	21	1.0	B134464	24	1.0	B133966	21	1.0	B134464
Soluble Sodium (Na)	mg/L	430	2.5	B134464	71	2.5	B133966	140	2.5	B134464
Soluble Potassium (K)	mg/L	5.9	1.3	B134464	3.4	1.3	B133966	5.0	1.3	B134464
Saturation %	%	450	N/A	B132806	560	N/A	B132543	310	N/A	B132806
Soluble Sulphate (SO4)	mg/L	39	5.0	B134464	41	5.0	B133966	44	5.0	B134464
Theoretical Gypsum Requirement	tonnes/ha	29	0.20	B124919	<0.20	0.20	B124919	<0.20	0.20	B124919
RDL = Reportable Detection Limit										

N/A = Not Applicable



#### SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		CAB750			CAB751			CAB752		
Sampling Date		2023/09/20			2023/09/20			2023/09/20		
COC Number		71052			71052			71052		
	UNITS	G18-SS23-16-01	RDL	QC Batch	G18-SS23-16-02	RDL	QC Batch	G18-SS23-17-01	RDL	QC Batch
Calculated Parameters										
Anion Sum	meq/L	1.7	N/A	B124904	1.8	N/A	B124904	0.27	N/A	B125114
Cation Sum	meq/L	4.6	N/A	B124904	3.6	N/A	B124904	2.1	N/A	B125114
Cation/EC Ratio	N/A	15	0.10	B124900	12	0.10	B124900	15	0.10	B125104
Calculated Calcium (Ca)	mg/kg	140	5.0	B125129	150	7.2	B124916	120	7.4	B125129
Calculated Magnesium (Mg)	mg/kg	34	3.4	B125129	32	4.8	B124916	26	4.9	B125129
Calculated Sodium (Na)	mg/kg	130	8.4	B125129	170	12	B124916	45	12	B125129
Calculated Potassium (K)	mg/kg	5.7	4.4	B125129	<6.2	6.2	B124916	10	6.4	B125129
Calculated Chloride (Cl)	mg/kg	130	34	B125129	180	48	B124916	<49	49	B125129
Calculated Sulphate (SO4)	mg/kg	98	17	B125129	170	24	B124916	63	25	B125129
Soluble Parameters	-							-		
Soluble Chloride (Cl)	mg/L	39	10	B134499	37	10	B133975	<10	10	B134499
Soluble Conductivity	dS/m	0.31	0.020	B134594	0.31	0.020	B133922	0.14	0.020	B134594
Soluble (CaCl2) pH	рН	5.45 (1)	N/A	B132808	5.35 (1)	N/A	B132544	5.15 (1)	N/A	B132808
Sodium Adsorption Ratio	N/A	1.4	0.10	B125124	1.5	0.10	B124909	0.44	0.10	B125124
Soluble Calcium (Ca)	mg/L	41	1.5	B134464	32	1.5	B133966	24	1.5	B134464
Soluble Magnesium (Mg)	mg/L	10	1.0	B134464	6.6	1.0	B133966	5.4	1.0	B134464
Soluble Sodium (Na)	mg/L	39	2.5	B134464	35	2.5	B133966	9.2	2.5	B134464
Soluble Potassium (K)	mg/L	1.7	1.3	B134464	<1.3	1.3	B133966	2.0	1.3	B134464
Saturation %	%	340	N/A	B132806	480	N/A	B132543	490	N/A	B132806
Soluble Sulphate (SO4)	mg/L	29	5.0	B134464	36	5.0	B133966	13	5.0	B134464
Theoretical Gypsum Requirement	tonnes/ha	<0.20	0.20	B124919	<0.20	0.20	B124919	<0.20	0.20	B125132
RDL = Reportable Detection Limit										

N/A = Not Applicable



#### SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		CAB753			CAB754		
Sampling Date		2023/09/20			2023/09/20		
COC Number		71052			71052		
	UNITS	G-18-QC-SS23-01	RDL	QC Batch	G-18-QC-SS23-02	RDL	QC Batch
Calculated Parameters							
Anion Sum	meq/L	0.12	N/A	B124904	3.9	N/A	B125119
Cation Sum	meq/L	0.85	N/A	B124904	5.8	N/A	B125119
Cation/EC Ratio	N/A	9.1	0.10	B124900	11	0.10	B125105
Calculated Calcium (Ca)	mg/kg	82	14	B124916	30	0.80	B125129
Calculated Magnesium (Mg)	mg/kg	14	9.6	B124916	7.7	0.53	B125129
Calculated Sodium (Na)	mg/kg	46	24	B124916	22	1.3	B125129
Calculated Potassium (K)	mg/kg	<13	13	B124916	1.4	0.69	B125129
Calculated Chloride (Cl)	mg/kg	<96	96	B124916	47	5.3	B125129
Calculated Sulphate (SO4)	mg/kg	54	48	B124916	37	2.7	B125129
Soluble Parameters							
Soluble Chloride (Cl)	mg/L	<10	10	B135596	88	10	B137734
Soluble Conductivity	dS/m	0.093	0.020	B146105	0.51	0.020	B137906
Soluble (CaCl2) pH	рН	4.01 (1)	N/A	B132808	6.29	N/A	B129739
Sodium Adsorption Ratio	N/A	0.40	0.10	B124909	1.2	0.10	B125124
Soluble Calcium (Ca)	mg/L	8.5	1.5	B146047	57	1.5	B137483
Soluble Magnesium (Mg)	mg/L	1.5	1.0	B146047	14	1.0	B137483
Soluble Sodium (Na)	mg/L	4.8	2.5	B146047	40	2.5	B137483
Soluble Potassium (K)	mg/L	<1.3	1.3	B146047	2.6	1.3	B137483
Saturation %	%	960	N/A	B133056	53	N/A	B129735
Soluble Sulphate (SO4)	mg/L	5.6	5.0	B146047	68	5.0	B137483
Theoretical Gypsum Requirement	tonnes/ha	<0.20	0.20	B124919	<0.20	0.20	B125132
RDL = Reportable Detection Limit							

N/A = Not Applicable



# SOIL SALINITY 4 (SOIL)

Bureau Veritas ID		CAB755		
Sampling Date		2023/09/20		
COC Number		71052		
	UNITS	G-18-QC-SS23-03	RDL	QC Batch
Calculated Parameters				
Anion Sum	meq/L	20	N/A	B125119
Cation Sum	meq/L	22	N/A	B125119
Cation/EC Ratio	N/A	9.5	0.10	B125104
Calculated Calcium (Ca)	mg/kg	360	6.9	B125129
Calculated Magnesium (Mg)	mg/kg	73	4.6	B125129
Calculated Sodium (Na)	mg/kg	1800	11	B125129
Calculated Potassium (K)	mg/kg	21	6.0	B125129
Calculated Chloride (Cl)	mg/kg	3100	46	B125129
Calculated Sulphate (SO4)	mg/kg	140	23	B125129
Soluble Parameters				
Soluble Chloride (Cl)	mg/L	670	10	B137734
Soluble Conductivity	dS/m	2.4	0.020	B137906
Soluble (CaCl2) pH	рН	4.82 (1)	N/A	B129739
Sodium Adsorption Ratio	N/A	11	0.10	B125124
Soluble Calcium (Ca)	mg/L	78	1.5	B137483
Soluble Magnesium (Mg)	mg/L	16	1.0	B137483
Soluble Sodium (Na)	mg/L	390	2.5	B137483
Soluble Potassium (K)	mg/L	4.5	1.3	B137483
Saturation %	%	460	N/A	B129735
Soluble Sulphate (SO4)	mg/L	31	5.0	B137483
Theoretical Gypsum Requirement	tonnes/ha	24	0.20	B125132
RDL = Reportable Detection Limit				

N/A = Not Applicable



# **CCME REGULATED METALS - SOILS (SOIL)**

Bureau Veritas ID		CAB726			CAB729		CAB730		
Sampling Date		2023/09/20			2023/09/20		2023/09/20		
COC Number		71052			71052		71052		
	UNITS	G18-SS23-01-01	RDL	QC Batch	G18-SS23-03-01	QC Batch	G18-SS23-04-01	RDL	QC Batch
Elements									
Soluble (Hot water) Boron (B)	mg/kg	0.48	0.20	B144900	<0.10	B130675	<0.10	0.10	B130675
Hex. Chromium (Cr 6+)	mg/kg	<0.080	0.080	B141175	<0.080	B134770	<0.080	0.080	B134624
Total Antimony (Sb)	mg/kg	0.58	0.50	B144906	0.99	B130506	0.98	0.50	B130506
Total Arsenic (As)	mg/kg	9.0	1.0	B144906	9.9	B130506	10	1.0	B130506
Total Barium (Ba)	mg/kg	370	1.0	B144906	410	B130506	570	1.0	B130506
Total Beryllium (Be)	mg/kg	0.74	0.40	B144906	0.67	B130506	0.73	0.40	B130506
Total Cadmium (Cd)	mg/kg	0.28	0.050	B144906	0.39	B130506	0.42	0.050	B130506
Total Chromium (Cr)	mg/kg	20	1.0	B144906	14	B130506	15	1.0	B130506
Total Cobalt (Co)	mg/kg	8.8	0.50	B144906	6.7	B130506	7.6	0.50	B130506
Total Copper (Cu)	mg/kg	12	1.0	B144906	17	B130506	19	1.0	B130506
Total Lead (Pb)	mg/kg	12	0.50	B144906	11	B130506	12	0.50	B130506
Total Mercury (Hg)	mg/kg	<0.050	0.050	B144906	0.062	B130506	0.066	0.050	B130506
Total Molybdenum (Mo)	mg/kg	1.1	0.40	B144906	1.5	B130506	1.4	0.40	B130506
Total Nickel (Ni)	mg/kg	18	1.0	B144906	21	B130506	24	1.0	B130506
Total Selenium (Se)	mg/kg	<0.50	0.50	B144906	<0.50	B130506	<0.50	0.50	B130506
Total Silver (Ag)	mg/kg	<0.20	0.20	B144906	<0.20	B130506	0.21	0.20	B130506
Total Thallium (Tl)	mg/kg	0.19	0.10	B144906	0.22	B130506	0.25	0.10	B130506
Total Tin (Sn)	mg/kg	<1.0	1.0	B144906	<1.0	B130506	<1.0	1.0	B130506
Total Uranium (U)	mg/kg	1.1	0.20	B144906	0.83	B130506	0.95	0.20	B130506
Total Vanadium (V)	mg/kg	41	1.0	B144906	32	B130506	31	1.0	B130506
Total Zinc (Zn)	mg/kg	59	10	B144906	72	B130506	78	10	B130506
RDL = Reportable Detection Lin	nit								

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 Bureau Veritas Calgary: 2021 - 41st Avenue N.E. T2E 6P2
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# **CCME REGULATED METALS - SOILS (SOIL)**

Bureau Veritas ID		CAB733			CAB735		CAB738		
Sampling Date		2023/09/20			2023/09/20		2023/09/20		
COC Number		71052			71052		71052		
	UNITS	G18-SS23-06-02	RDL	QC Batch	G18-SS23-08-01	QC Batch	G18-SS23-10-01	RDL	QC Batch
Elements									
Soluble (Hot water) Boron (B)	mg/kg	0.65	0.60	B142749	0.14	B130675	0.60	0.10	B130675
Hex. Chromium (Cr 6+)	mg/kg	<0.53 (1)	0.53	B134624	<0.080	B134624	<0.080	0.080	B134770
Total Antimony (Sb)	mg/kg	<2.0	2.0	B142853	0.75	B130506	0.88	0.50	B130506
Total Arsenic (As)	mg/kg	<4.0	4.0	B142853	10	B130506	8.3	1.0	B130506
Total Barium (Ba)	mg/kg	140	4.0	B142853	520	B130506	360	1.0	B130506
Total Beryllium (Be)	mg/kg	<1.6	1.6	B142853	0.85	B130506	0.60	0.40	B130506
Total Cadmium (Cd)	mg/kg	0.22	0.20	B142853	0.97	B130506	0.36	0.050	B130506
Total Chromium (Cr)	mg/kg	<4.0	4.0	B142853	24	B130506	29	1.0	B130506
Total Cobalt (Co)	mg/kg	<2.0	2.0	B142853	9.8	B130506	6.5	0.50	B130506
Total Copper (Cu)	mg/kg	<4.0	4.0	B142853	24	B130506	16	1.0	B130506
Total Lead (Pb)	mg/kg	<2.0	2.0	B142853	12	B130506	9.7	0.50	B130506
Total Mercury (Hg)	mg/kg	<0.20	0.20	B142853	<0.050	B130506	0.057	0.050	B130506
Total Molybdenum (Mo)	mg/kg	<1.6	1.6	B142853	1.6	B130506	1.8	0.40	B130506
Total Nickel (Ni)	mg/kg	<4.0	4.0	B142853	34	B130506	26	1.0	B130506
Total Selenium (Se)	mg/kg	<2.0	2.0	B142853	1.7	B130506	<0.50	0.50	B130506
Total Silver (Ag)	mg/kg	<0.80	0.80	B142853	<0.20	B130506	<0.20	0.20	B130506
Total Thallium (Tl)	mg/kg	<0.40	0.40	B142853	0.17	B130506	0.19	0.10	B130506
Total Tin (Sn)	mg/kg	<4.0	4.0	B142853	<1.0	B130506	<1.0	1.0	B130506
Total Uranium (U)	mg/kg	<0.80	0.80	B142853	2.8	B130506	0.81	0.20	B130506
Total Vanadium (V)	mg/kg	<4.0	4.0	B142853	38	B130506	30	1.0	B130506
Total Zinc (Zn)	mg/kg	<40	40	B142853	71	B130506	66	10	B130506
RDL = Reportable Detection Lin	nit								

(1) Detection limits raised due to high moisture content, samples contain => 50% moisture.



#### **CCME REGULATED METALS - SOILS (SOIL)**

Bureau Veritas ID		CAB743	CAB743			CAB746		CAB749		
Sampling Date		2023/09/20	2023/09/20			2023/09/20		2023/09/20		
COC Number		71052	71052			71052		71052		
	UNITS	G18-SS23-12-02	G18-SS23-12-02 Lab-Dup	RDL	QC Batch	G18-SS23-14-01	RDL	G18-SS23-15-02	RDL	QC Batch
Elements										
Soluble (Hot water) Boron (B)	mg/kg	0.10	N/A	0.10	B130675	1.1	0.40	0.75	0.40	B131285
Hex. Chromium (Cr 6+)	mg/kg	<0.080	N/A	0.080	B134624	<0.33 (1)	0.33	<0.32 (1)	0.32	B134624
Total Antimony (Sb)	mg/kg	0.68	0.71	0.50	B130720	<1.0	1.0	<1.0	1.0	B133039
Total Arsenic (As)	mg/kg	9.2	9.4	1.0	B130720	<2.0	2.0	<2.0	2.0	B133039
Total Barium (Ba)	mg/kg	410	420	1.0	B130720	380	2.0	320	2.0	B133039
Total Beryllium (Be)	mg/kg	0.77	0.77	0.40	B130720	<0.80	0.80	<0.80	0.80	B133039
Total Cadmium (Cd)	mg/kg	0.22	0.23	0.050	B130720	0.93	0.10	0.67	0.10	B133039
Total Chromium (Cr)	mg/kg	28 (2)	27	1.0	B130720	3.4	2.0	2.9	2.0	B133039
Total Cobalt (Co)	mg/kg	9.1	9.7	0.50	B130720	2.5	1.0	1.3	1.0	B133039
Total Copper (Cu)	mg/kg	20	21	1.0	B130720	7.1	2.0	4.6	2.0	B133039
Total Lead (Pb)	mg/kg	11	12	0.50	B130720	2.0	1.0	1.3	1.0	B133039
Total Mercury (Hg)	mg/kg	<0.050	<0.050	0.050	B130720	<0.10	0.10	<0.10	0.10	B133039
Total Molybdenum (Mo)	mg/kg	1.2	1.2	0.40	B130720	1.6	0.80	1.2	0.80	B133039
Total Nickel (Ni)	mg/kg	31	31	1.0	B130720	8.6	2.0	5.5	2.0	B133039
Total Selenium (Se)	mg/kg	<0.50	<0.50	0.50	B130720	<1.0	1.0	<1.0	1.0	B133039
Total Silver (Ag)	mg/kg	<0.20	<0.20	0.20	B130720	<0.40	0.40	<0.40	0.40	B133039
Total Thallium (Tl)	mg/kg	0.20	0.20	0.10	B130720	<0.20	0.20	<0.20	0.20	B133039
Total Tin (Sn)	mg/kg	<1.0	<1.0	1.0	B130720	<2.0	2.0	<2.0	2.0	B133039
Total Uranium (U)	mg/kg	0.88	0.91	0.20	B130720	0.92	0.40	0.50	0.40	B133039
Total Vanadium (V)	mg/kg	33 (2)	34	1.0	B130720	6.2	2.0	4.0	2.0	B133039
Total Zinc (Zn)	mg/kg	71	73	10	B130720	37	20	<20	20	B133039

RDL = Reportable Detection Limit

Lab-Dup = Laboratory Initiated Duplicate

N/A = Not Applicable

(1) Detection limits raised due to high moisture content, samples contain => 50% moisture.

(2) Matrix spike exceeds acceptance limits due to probable matrix interference.



# **CCME REGULATED METALS - SOILS (SOIL)**

Bureau Veritas ID		CAB752			CAB753					
Sampling Date		2023/09/20			2023/09/20					
COC Number		71052			71052					
	UNITS	G18-SS23-17-01	RDL	QC Batch	G-18-QC-SS23-01	RDL	QC Batch			
Elements										
Soluble (Hot water) Boron (B)	mg/kg	1.0	0.40	B131285	1.2	0.50	B131285			
Hex. Chromium (Cr 6+)	mg/kg	<0.25 (1)	0.25	B134770	<0.59 (1)	0.59	B134624			
Total Antimony (Sb)	mg/kg	<1.0	1.0	B133039	<1.0	1.0	B133039			
Total Arsenic (As)	mg/kg	<2.0	2.0	B133039	<2.0	2.0	B133039			
Total Barium (Ba)	mg/kg	380	2.0	B133039	150	2.0	B133039			
Total Beryllium (Be)	mg/kg	<0.80	0.80	B133039	<0.80	0.80	B133039			
Total Cadmium (Cd)	mg/kg	0.36	0.10	B133039	0.21	0.10	B133039			
Total Chromium (Cr)	mg/kg	<2.0	2.0	B133039	<2.0	2.0	B133039			
Total Cobalt (Co)	mg/kg	<1.0	1.0	B133039	<1.0	1.0	B133039			
Total Copper (Cu)	mg/kg	5.0	2.0	B133039	2.7	2.0	B133039			
Total Lead (Pb)	mg/kg	<1.0	1.0	B133039	<1.0	1.0	B133039			
Total Mercury (Hg)	mg/kg	<0.10	0.10	B133039	<0.10	0.10	B133039			
Total Molybdenum (Mo)	mg/kg	2.8	0.80	B133039	<0.80	0.80	B133039			
Total Nickel (Ni)	mg/kg	5.0	2.0	B133039	2.9	2.0	B133039			
Total Selenium (Se)	mg/kg	<1.0	1.0	B133039	<1.0	1.0	B133039			
Total Silver (Ag)	mg/kg	<0.40	0.40	B133039	<0.40	0.40	B133039			
Total Thallium (Tl)	mg/kg	<0.20	0.20	B133039	<0.20	0.20	B133039			
Total Tin (Sn)	mg/kg	<2.0	2.0	B133039	<2.0	2.0	B133039			
Total Uranium (U)	mg/kg	0.56	0.40	B133039	<0.40	0.40	B133039			
Total Vanadium (V)	mg/kg	2.4	2.0	B133039	2.6	2.0	B133039			
Total Zinc (Zn)	mg/kg	<20	20	B133039	<20	20	B133039			
RDL = Reportable Detection Lin	RDL = Reportable Detection Limit									
1) Detection limits raised due to high moisture content, samples contain => 50% moisture.										



# PHYSICAL TESTING (SOIL)

Bureau V	/eritas ID		CAI	3726		CA	B727		CA	B729	CAB	730		
Sampling	g Date		2023	/09/20		2023	3/09/20		2023	3/09/20	2023/	09/20		
COC Nun	nber		71	052		7:	1052		7:	1052	710	)52		
		UNITS	G18-SS	23-01-01	QC Bate	ch G18-S9	523-01-02	QC Batc	h G18-SS	523-03-01	G18-SS2	3-04-0	1 RDL	QC Batch
Physical	Properties													
Moisture	2	%	:	13	B13391	.9	13	B19367	2	11	1	2	0.30	B138107
RDL = Re	portable Detection L	imit											•	
Bureau V	/eritas ID		CA	3730	CA	3733		CAE	734		CAB	735		
Sampling	g Date		2023,	/09/20	2023,	/09/20		2023/	09/20		2023/	09/20		
COC Nun	nber		71	052	71	052		71	)52		710	)52		
		UNITS	G18-SS Lab	23-04-01 -Dup	G18-SS	23-06-02	QC Batch	G18-SS2	3-07-01	QC Batch	G18-SS2	3-08-0	1 RDL	QC Batch
Physical	Properties										•		•	•
Moisture		%		12	8	35	B138107	1	4	B193672	2	4	0.30	B134875
RDL = Re	portable Detection L	imit												
Lab-Dup	= Laboratory Initiate	d Duplic	ate											
[	Bureau Veritas ID			CAE	3738		CAE	3741		CAE	3743			
	Sampling Date			2023/	′09/20		2023/	′09/20		2023/	/09/20			
	COC Number	C Number 71052			71	71052		71	052					
ļ			UNITS	G18-SS2	23-10-01	QC Batch	n G18-SS2	23-11-02	QC Batch	n G18-SS2	23-12-02	RDL	QC Bato	:h
	Physical Properties													
	Moisture		%	3	1	B138107	2 2	2	B133919	) 1	.9	0.30	B13810	7
	RDL = Reportable De	tection	Limit											
Bureau V	/eritas ID		CA	3744	CA	3746		CAF	748		CAB	749	1	1
Sampling	z Date		2023	/09/20	2023	/09/20		2023/	09/20		2023/	09/20		
COC Nun	nber		71	052	71	052		71	)52		710	)52		
		UNITS	G18-SS	23-13-01	G18-SS	23-14-01	QC Batch	G18-SS2	3-15-01	QC Batch	G18-SS2	3-15-0	2 RDL	QC Batch
Physical	Properties				•	·		-	· · ·		·			•
Moisture	2	%	3	31	-	76	B134861	7	8	B138107	7	5	0.30	B134875
RDL = Re	portable Detection L	imit						-					·	•
F	Bureau Veritas ID			CAB	751		CAB	752		CAF	3753			
9	Sampling Date			2023/0	09/20		2023/	09/20		2023/	/09/20			
C	COC Number			710	, 152		710	, 152		71	052			
			UNITS	G18-SS2	3-16-02	QC Batch	G18-SS2	3-17-01	QC Batch	G-18-Q0	-\$\$23-01	RDL	QC Bat	ch
1	Physical Properties						•	ļ		•		••		
٢	Moisture		%	79	9	B133919	6	8	B134875	8	37	0.30	B1381	)7



#### **GENERAL COMMENTS**

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	16.3°C
Package 2	3.3°C

#### HYDROCARBON RESEMBLANCE

The reported hydrocarbon resemblance was obtained by visual comparison of the sample chromatogram with a library of reference product chromatograms. Since variables such as the degree and type of weathering and the presence of non-petrogenic hydrocarbons cannot be duplicated in reference spectra, the resemblance information must be regarded as approximate and qualitative and as such, Bureau Veritas Laboratories can assume no liability for any conclusions drawn from these data.

Version 2: Resemble added

Version #3: Report reissued to include results for Particle Size on below samples as per client request received 2023/11/08. G18-SS01-02 G18-SS07-01 G18-SS17-01

Version 4: Biogenic Toluene Report included.

Sample CAB727 [G18-SS23-01-02] : Sample was analyzed past method specified hold time for Particle Size by Sieve. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample CAB733 [G18-SS23-06-02] : The CCME F2-F4 chromatographic peak profile is consistent with biogenic organic material (e.g. peat). Chromatograms of biogenic organic material may contain peak patterns spanning the C10 to C50 range, but they are most commonly characterized by a profile of unevenly distributed sharp peaks between C28 and C34. The impacts are not consistent with a petroleum product or crude oil.

Sample CAB734 [G18-SS23-07-01] : Sample was analyzed past method specified hold time for Particle Size by Sieve. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

Sample CAB746 [G18-SS23-14-01] : The CCME F2-F4 chromatographic peak profile is consistent with biogenic organic material (e.g. peat). Chromatograms of biogenic organic material may contain peak patterns spanning the C10 to C50 range, but they are most commonly characterized by a profile of unevenly distributed sharp peaks between C28 and C34. The impacts are not consistent with a petroleum product or crude oil.

Sample CAB748 [G18-SS23-15-01] : The CCME F2-F4 chromatographic peak profile is consistent with biogenic organic material (e.g. peat). Chromatograms of biogenic organic material may contain peak patterns spanning the C10 to C50 range, but they are most commonly characterized by a profile of unevenly distributed sharp peaks between C28 and C34. The impacts are not consistent with a petroleum product or crude oil.

Sample CAB751 [G18-SS23-16-02] : The CCME F2-F4 chromatographic peak profile is consistent with biogenic organic material (e.g. peat). Chromatograms of biogenic organic material may contain peak patterns spanning the C10 to C50 range, but they are most commonly characterized by a profile of unevenly distributed sharp peaks between C28 and C34. The impacts are not consistent with a petroleum product or crude oil.

Sample CAB752 [G18-SS23-17-01] : Sample was analyzed past method specified hold time for Particle Size by Sieve. Exceedance of hold time increases the uncertainty of test results but does not necessarily imply that results are compromised.

#### AT1 BTEX AND F1-F4 IN SOIL (VIALS) Comments

Sample CAB733 [G18-SS23-06-02] CCME Hydrocarbons (F2-F4 in soil): Detection limits raised based on sample weight used for analysis. Sample CAB748 [G18-SS23-15-01] CCME Hydrocarbons (F2-F4 in soil): Detection limits raised based on sample weight used for analysis. Sample CAB753 [G-18-QC-SS23-01] CCME Hydrocarbons (F2-F4 in soil): Detection limits raised based on sample weight used for analysis.



#### CCME REGULATED METALS - SOILS (SOIL) Comments

Sample CAB726 [G18-SS23-01-01] Boron (Hot Water Soluble): Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample CAB733 [G18-SS23-06-02] Boron (Hot Water Soluble): Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample CAB733 [G18-SS23-06-02] Elements by ICPMS - Soils: Detection limits raised due to sample matrix.

Sample CAB746 [G18-SS23-14-01] Boron (Hot Water Soluble): Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample CAB746 [G18-SS23-14-01] Elements by ICPMS - Soils: Detection limits raised due to sample matrix.

Sample CAB749 [G18-SS23-15-02] Boron (Hot Water Soluble): Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample CAB749 [G18-SS23-15-02] Elements by ICPMS - Soils: Detection limits raised due to sample matrix.

Sample CAB752 [G18-SS23-17-01] Boron (Hot Water Soluble): Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample CAB752 [G18-SS23-17-01] Elements by ICPMS - Soils: Detection limits raised due to sample matrix.

Sample CAB753 [G-18-QC-SS23-01] Boron (Hot Water Soluble): Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample CAB753 [G-18-QC-SS23-01] Elements by ICPMS - Soils: Detection limits raised due to sample matrix.

#### Results relate only to the items tested.


#### QUALITY ASSURANCE REPORT

STANTEC CONSULTING LTD Client Project #: 123514555 Site Location: G-18

			Matrix	Spike	Spiked	Blank	Method	Blank	RP	D	QC Sta	indard
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
B133954	O-TERPHENYL (sur.)	2023/10/03	105	60 - 140	107	60 - 140	116	%				
B134767	O-TERPHENYL (sur.)	2023/10/04	90	60 - 140	92	60 - 140	103	%				
B135455	1,4-Difluorobenzene (sur.)	2023/10/10	97	50 - 140	97	50 - 140	97	%				
B135455	4-Bromofluorobenzene (sur.)	2023/10/10	101	50 - 140	100	50 - 140	100	%				
B135455	D10-o-Xylene (sur.)	2023/10/10	111	50 - 140	112	50 - 140	106	%				
B135455	D4-1,2-Dichloroethane (sur.)	2023/10/10	99	50 - 140	100	50 - 140	99	%				
B138170	O-TERPHENYL (sur.)	2023/10/06	93	60 - 140	102	60 - 140	107	%				
B129735	Saturation %	2023/10/03							2.9	12	100	75 - 125
B129739	Soluble (CaCl2) pH	2023/09/29			101	97 - 103			0.68	N/A	99	97 - 103
B130506	Total Antimony (Sb)	2023/09/29	108	75 - 125	104	80 - 120	<0.50	mg/kg	NC	30	113	14 - 183
B130506	Total Arsenic (As)	2023/09/29	112	75 - 125	106	80 - 120	<1.0	mg/kg	8.2	30	109	53 - 147
B130506	Total Barium (Ba)	2023/09/29	NC	75 - 125	104	80 - 120	<1.0	mg/kg	4.7	35	102	80 - 119
B130506	Total Beryllium (Be)	2023/09/29	111	75 - 125	106	80 - 120	<0.40	mg/kg	7.2	30		
B130506	Total Cadmium (Cd)	2023/09/29	113	75 - 125	103	80 - 120	<0.050	mg/kg	1.2	30	102	71 - 129
B130506	Total Chromium (Cr)	2023/09/29	120	75 - 125	104	80 - 120	<1.0	mg/kg	13	30	95	59 - 141
B130506	Total Cobalt (Co)	2023/09/29	104	75 - 125	101	80 - 120	<0.50	mg/kg	2.6	30	94	58 - 142
B130506	Total Copper (Cu)	2023/09/29	106	75 - 125	104	80 - 120	<1.0	mg/kg	1.6	30	98	83 - 117
B130506	Total Lead (Pb)	2023/09/29	108	75 - 125	103	80 - 120	<0.50	mg/kg	2.5	35	107	79 - 121
B130506	Total Mercury (Hg)	2023/09/29	113	75 - 125	113	80 - 120	<0.050	mg/kg	NC	35		
B130506	Total Molybdenum (Mo)	2023/09/29	119	75 - 125	106	80 - 120	<0.40	mg/kg	3.1	35	100	67 - 134
B130506	Total Nickel (Ni)	2023/09/29	109	75 - 125	102	80 - 120	<1.0	mg/kg	5.8	30	103	78 - 122
B130506	Total Selenium (Se)	2023/09/29	113	75 - 125	108	80 - 120	<0.50	mg/kg	NC	30		
B130506	Total Silver (Ag)	2023/09/29	110	75 - 125	101	80 - 120	<0.20	mg/kg	NC	35	131	46 - 154
B130506	Total Thallium (Tl)	2023/09/29	109	75 - 125	104	80 - 120	<0.10	mg/kg	6.1	30		
B130506	Total Tin (Sn)	2023/09/29	115	75 - 125	102	80 - 120	<1.0	mg/kg	NC	35	102	67 - 133
B130506	Total Uranium (U)	2023/09/29	104	75 - 125	104	80 - 120	<0.20	mg/kg	8.7	30	86	77 - 123
B130506	Total Vanadium (V)	2023/09/29	134 (1)	75 - 125	104	80 - 120	<1.0	mg/kg	0.86	30	101	79 - 121
B130506	Total Zinc (Zn)	2023/09/29	NC	75 - 125	114	80 - 120	<10	mg/kg	3.1	30	105	79 - 122
B130675	Soluble (Hot water) Boron (B)	2023/09/30	105	75 - 125	100	80 - 120	<0.10	mg/kg	116 (1)	35		
B130720	Total Antimony (Sb)	2023/09/29	94	75 - 125	106	80 - 120	<0.50	mg/kg	4.7	30	106	14 - 183
B130720	Total Arsenic (As)	2023/09/29	102	75 - 125	105	80 - 120	<1.0	mg/kg	1.5	30	112	53 - 147
B130720	Total Barium (Ba)	2023/09/29	NC	75 - 125	104	80 - 120	<1.0	mg/kg	4.5	35	99	80 - 119

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STANTEC CONSULTING LTD Client Project #: 123514555 Site Location: G-18

			Matrix	Spike	Spiked	Blank	Method	Blank	RP	D	QC Sta	ndard
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
B130720	Total Beryllium (Be)	2023/09/29	100	75 - 125	101	80 - 120	<0.40	mg/kg	0.030	30		
B130720	Total Cadmium (Cd)	2023/09/29	99	75 - 125	101	80 - 120	<0.050	mg/kg	3.5	30	103	71 - 129
B130720	Total Chromium (Cr)	2023/09/29	126 (1)	75 - 125	104	80 - 120	<1.0	mg/kg	3.0	30	94	59 - 141
B130720	Total Cobalt (Co)	2023/09/29	99	75 - 125	101	80 - 120	<0.50	mg/kg	6.0	30	96	58 - 142
B130720	Total Copper (Cu)	2023/09/29	100	75 - 125	106	80 - 120	<1.0	mg/kg	3.1	30	106	83 - 117
B130720	Total Lead (Pb)	2023/09/29	102	75 - 125	107	80 - 120	<0.50	mg/kg	1.9	35	108	79 - 121
B130720	Total Mercury (Hg)	2023/09/29	99	75 - 125	114	80 - 120	<0.050	mg/kg	NC	35		
B130720	Total Molybdenum (Mo)	2023/09/29	104	75 - 125	104	80 - 120	<0.40	mg/kg	1.9	35	102	67 - 134
B130720	Total Nickel (Ni)	2023/09/29	104	75 - 125	104	80 - 120	<1.0	mg/kg	1.7	30	105	78 - 122
B130720	Total Selenium (Se)	2023/09/29	102	75 - 125	107	80 - 120	<0.50	mg/kg	NC	30		
B130720	Total Silver (Ag)	2023/09/29	97	75 - 125	101	80 - 120	<0.20	mg/kg	NC	35	118	46 - 154
B130720	Total Thallium (Tl)	2023/09/29	100	75 - 125	109	80 - 120	<0.10	mg/kg	2.0	30		
B130720	Total Tin (Sn)	2023/09/29	101	75 - 125	100	80 - 120	<1.0	mg/kg	NC	35	102	67 - 133
B130720	Total Uranium (U)	2023/09/29	94	75 - 125	106	80 - 120	<0.20	mg/kg	2.5	30	84	77 - 123
B130720	Total Vanadium (V)	2023/09/29	159 (1)	75 - 125	104	80 - 120	<1.0	mg/kg	2.6	30	101	79 - 121
B130720	Total Zinc (Zn)	2023/09/29	NC	75 - 125	104	80 - 120	<10	mg/kg	2.6	30	104	79 - 122
B131285	Soluble (Hot water) Boron (B)	2023/10/03	99	75 - 125	111	80 - 120	<0.10	mg/kg	8.3	35		
B132543	Saturation %	2023/10/01							6.3	12	99	75 - 125
B132544	Soluble (CaCl2) pH	2023/09/30			101	97 - 103			1.7	N/A	97	97 - 103
B132806	Saturation %	2023/10/02							5.9	12	104	75 - 125
B132808	Soluble (CaCl2) pH	2023/10/02			101	97 - 103			0.022	N/A	99	97 - 103
B133039	Total Antimony (Sb)	2023/10/01	99	75 - 125	113	80 - 120	<0.50	mg/kg	8.1	30	121	14 - 183
B133039	Total Arsenic (As)	2023/10/01	102	75 - 125	112	80 - 120	<1.0	mg/kg	14	30	125	53 - 147
B133039	Total Barium (Ba)	2023/10/01	NC	75 - 125	107	80 - 120	<1.0	mg/kg	5.1	35	112	80 - 119
B133039	Total Beryllium (Be)	2023/10/01	98	75 - 125	104	80 - 120	<0.40	mg/kg	12	30		
B133039	Total Cadmium (Cd)	2023/10/01	101	75 - 125	106	80 - 120	<0.050	mg/kg	13	30	113	71 - 129
B133039	Total Chromium (Cr)	2023/10/01	NC	75 - 125	108	80 - 120	<1.0	mg/kg	66 (1)	30	104	59 - 141
B133039	Total Cobalt (Co)	2023/10/01	100	75 - 125	108	80 - 120	<0.50	mg/kg	3.4	30	110	58 - 142
B133039	Total Copper (Cu)	2023/10/01	100	75 - 125	108	80 - 120	<1.0	mg/kg	5.3	30	92	83 - 117
B133039	Total Lead (Pb)	2023/10/01	94	75 - 125	104	80 - 120	<0.50	mg/kg	4.3	35	118	79 - 121
B133039	Total Mercury (Hg)	2023/10/01	100	75 - 125	115	80 - 120	<0.050	mg/kg	NC	35		
B133039	Total Molybdenum (Mo)	2023/10/01	104	75 - 125	107	80 - 120	<0.40	mg/kg	8.5	35	110	67 - 134

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STANTEC CONSULTING LTD Client Project #: 123514555 Site Location: G-18

			Matrix	Spike	Spiked	Blank	Method	Blank	RP	D	QC Sta	ndard
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
B133039	Total Nickel (Ni)	2023/10/01	97	75 - 125	108	80 - 120	<1.0	mg/kg	32 (1)	30	116	78 - 122
B133039	Total Selenium (Se)	2023/10/01	102	75 - 125	109	80 - 120	<0.50	mg/kg	NC	30		
B133039	Total Silver (Ag)	2023/10/01	100	75 - 125	105	80 - 120	<0.20	mg/kg	NC	35	84	46 - 154
B133039	Total Thallium (TI)	2023/10/01	92	75 - 125	106	80 - 120	<0.10	mg/kg	NC	30		
B133039	Total Tin (Sn)	2023/10/01	104	75 - 125	106	80 - 120	<1.0	mg/kg	NC	35	110	67 - 133
B133039	Total Uranium (U)	2023/10/01	97	75 - 125	107	80 - 120	<0.20	mg/kg	6.8	30	93	77 - 123
B133039	Total Vanadium (V)	2023/10/01	128 (1)	75 - 125	107	80 - 120	<1.0	mg/kg	3.5	30	111	79 - 121
B133039	Total Zinc (Zn)	2023/10/01	100	75 - 125	108	80 - 120	<10	mg/kg	8.8	30	116	79 - 122
B133056	Saturation %	2023/10/03							0.11	12	99	75 - 125
B133855	Saturation %	2023/10/02							1.2	12	101	75 - 125
B133857	Soluble (CaCl2) pH	2023/10/02			101	97 - 103			0.052	N/A	100	97 - 103
B133919	Moisture	2023/10/03					<0.30	%	8.6	20		
B133922	Soluble Conductivity	2023/10/02			100	90 - 110	<0.020	dS/m	8.4	20	116	75 - 125
B133954	F2 (C10-C16 Hydrocarbons)	2023/10/03	101	60 - 140	105	60 - 140	<10	mg/kg	NC	40		
B133954	F3 (C16-C34 Hydrocarbons)	2023/10/03	104	60 - 140	109	60 - 140	<50	mg/kg	NC	40		
B133954	F4 (C34-C50 Hydrocarbons)	2023/10/03	102	60 - 140	105	60 - 140	<50	mg/kg	NC	40		
B133966	Soluble Calcium (Ca)	2023/10/02	97	75 - 125	99	80 - 120	<1.5	mg/L	1.7	30	95	75 - 125
B133966	Soluble Magnesium (Mg)	2023/10/02	100	75 - 125	101	80 - 120	<1.0	mg/L	2.0	30	103	75 - 125
B133966	Soluble Potassium (K)	2023/10/02	97	75 - 125	97	80 - 120	<1.3	mg/L	0.85	30	112	75 - 125
B133966	Soluble Sodium (Na)	2023/10/02	89	75 - 125	94	80 - 120	<2.5	mg/L	2.8	30	102	75 - 125
B133966	Soluble Sulphate (SO4)	2023/10/02					<5.0	mg/L	2.4	30	100	75 - 125
B133975	Soluble Chloride (Cl)	2023/10/02	102	75 - 125	104	80 - 120	<10	mg/L	NC	30	83	75 - 125
B134464	Soluble Calcium (Ca)	2023/10/02	89	75 - 125	103	80 - 120	<1.5	mg/L	17	30	96	75 - 125
B134464	Soluble Magnesium (Mg)	2023/10/02	79	75 - 125	106	80 - 120	<1.0	mg/L	16	30	100	75 - 125
B134464	Soluble Potassium (K)	2023/10/02	100	75 - 125	103	80 - 120	<1.3	mg/L	12	30	110	75 - 125
B134464	Soluble Sodium (Na)	2023/10/02	NC	75 - 125	103	80 - 120	<2.5	mg/L	14	30	106	75 - 125
B134464	Soluble Sulphate (SO4)	2023/10/02					<5.0	mg/L	4.0	30	112	75 - 125
B134499	Soluble Chloride (Cl)	2023/10/02	100	75 - 125	96	80 - 120	<10	mg/L	15	30	86	75 - 125
B134594	Soluble Conductivity	2023/10/02			99	90 - 110	<0.020	dS/m	6.7	20	108	75 - 125
B134624	Hex. Chromium (Cr 6+)	2023/10/02	89	75 - 125	90	80 - 120	<0.080	mg/kg	NC	35		
B134742	Soluble Calcium (Ca)	2023/10/02	104	75 - 125	106	80 - 120	<1.5	mg/L	3.8	30	87	75 - 125
B134742	Soluble Magnesium (Mg)	2023/10/02	106	75 - 125	106	80 - 120	<1.0	mg/L	3.4	30	93	75 - 125

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STANTEC CONSULTING LTD Client Project #: 123514555 Site Location: G-18

			Matrix	Spike	Spiked	Blank	Method	Blank	RP	D	QC Sta	ndard
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
B134742	Soluble Potassium (K)	2023/10/02	101	75 - 125	102	80 - 120	<1.3	mg/L	24	30	110	75 - 125
B134742	Soluble Sodium (Na)	2023/10/02	100	75 - 125	100	80 - 120	<2.5	mg/L	9.1	30	94	75 - 125
B134742	Soluble Sulphate (SO4)	2023/10/02					<5.0	mg/L	2.3	30	88	75 - 125
B134767	F2 (C10-C16 Hydrocarbons)	2023/10/04	94	60 - 140	97	60 - 140	<10	mg/kg	NC	40		
B134767	F3 (C16-C34 Hydrocarbons)	2023/10/04	93	60 - 140	96	60 - 140	<50	mg/kg	NC	40		
B134767	F4 (C34-C50 Hydrocarbons)	2023/10/04	91	60 - 140	95	60 - 140	<50	mg/kg	NC	40		
B134770	Hex. Chromium (Cr 6+)	2023/10/02	87	75 - 125	102	80 - 120	<0.080	mg/kg	NC	35		
B134861	Moisture	2023/10/03					<0.30	%	6.1	20		
B134875	Moisture	2023/10/03					<0.30	%	7.4	20		
B135177	Soluble Chloride (Cl)	2023/10/03	107	75 - 125	98	80 - 120	<10	mg/L	NC	30	95	75 - 125
B135407	Soluble Conductivity	2023/10/03			101	90 - 110	<0.020	dS/m	8.6	20	98	75 - 125
B135455	Benzene	2023/10/10	107	50 - 140	106	60 - 130	<0.0050	mg/kg	NC	50		
B135455	Ethylbenzene	2023/10/10	107	50 - 140	110	60 - 130	<0.010	mg/kg	NC	50		
B135455	F1 (C6-C10)	2023/10/10	98	60 - 140	90	60 - 140	<10	mg/kg	NC	30		
B135455	m & p-Xylene	2023/10/10	109	50 - 140	111	60 - 130	<0.040	mg/kg	NC	50		
B135455	o-Xylene	2023/10/10	111	50 - 140	113	60 - 130	<0.020	mg/kg	NC	50		
B135455	Toluene	2023/10/10	105	50 - 140	106	60 - 130	<0.050	mg/kg	NC	50		
B135596	Soluble Chloride (Cl)	2023/10/03	112	75 - 125	110	80 - 120	<10	mg/L	NC	30	84	75 - 125
B137483	Soluble Calcium (Ca)	2023/10/04	105	75 - 125	104	80 - 120	<1.5	mg/L	0.24	30	91	75 - 125
B137483	Soluble Magnesium (Mg)	2023/10/04	102	75 - 125	102	80 - 120	<1.0	mg/L	0.80	30	91	75 - 125
B137483	Soluble Potassium (K)	2023/10/04	103	75 - 125	102	80 - 120	<1.3	mg/L	1.7	30	111	75 - 125
B137483	Soluble Sodium (Na)	2023/10/04	107	75 - 125	100	80 - 120	<2.5	mg/L	16	30	103	75 - 125
B137483	Soluble Sulphate (SO4)	2023/10/04					<5.0	mg/L	9.0	30	86	75 - 125
B137734	Soluble Chloride (Cl)	2023/10/04	101	75 - 125	96	80 - 120	<10	mg/L	NC	30	89	75 - 125
B137906	Soluble Conductivity	2023/10/04			99	90 - 110	<0.020	dS/m	3.6	20	101	75 - 125
B138107	Moisture	2023/10/04					<0.30	%	2.5	20		
B138170	F2 (C10-C16 Hydrocarbons)	2023/10/07	62	60 - 140	106	60 - 140	<10	mg/kg	61 (1)	40		
B138170	F3 (C16-C34 Hydrocarbons)	2023/10/07	88	60 - 140	103	60 - 140	<50	mg/kg	55 (1)	40		
B138170	F4 (C34-C50 Hydrocarbons)	2023/10/07	87	60 - 140	93	60 - 140	<50	mg/kg	NC	40		
B141175	Hex. Chromium (Cr 6+)	2023/10/05	89	75 - 125	96	80 - 120	<0.080	mg/kg	NC	35		
B142450	Saturation %	2023/10/06							5.3	12	98	75 - 125
B142455	Soluble (CaCl2) pH	2023/10/06			101	97 - 103			0.51	N/A	99	97 - 103

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STANTEC CONSULTING LTD Client Project #: 123514555 Site Location: G-18

			Matrix	Spike	Spiked	Blank	Method	Blank	RP	D	QC Sta	indard
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
B142749	Soluble (Hot water) Boron (B)	2023/10/07	101	75 - 125	103	80 - 120	<0.10	mg/kg	0.91	35		
B142853	Total Antimony (Sb)	2023/10/06	98	75 - 125	110	80 - 120	<0.50	mg/kg	NC	30	104	14 - 183
B142853	Total Arsenic (As)	2023/10/06	94	75 - 125	100	80 - 120	<1.0	mg/kg	5.4	30	97	53 - 147
B142853	Total Barium (Ba)	2023/10/06	NC	75 - 125	105	80 - 120	<1.0	mg/kg	1.9	35	93	80 - 119
B142853	Total Beryllium (Be)	2023/10/06	107	75 - 125	114	80 - 120	<0.40	mg/kg	NC	30		
B142853	Total Cadmium (Cd)	2023/10/06	108	75 - 125	115	80 - 120	<0.050	mg/kg	3.2	30	99	71 - 129
B142853	Total Chromium (Cr)	2023/10/06	101	75 - 125	93	80 - 120	<1.0	mg/kg	3.1	30	80	59 - 141
B142853	Total Cobalt (Co)	2023/10/06	89	75 - 125	95	80 - 120	<0.50	mg/kg	2.5	30	82	58 - 142
B142853	Total Copper (Cu)	2023/10/06	92	75 - 125	96	80 - 120	<1.0	mg/kg	4.8	30	87	83 - 117
B142853	Total Lead (Pb)	2023/10/06	107	75 - 125	115	80 - 120	<0.50	mg/kg	1.8	35	112	79 - 121
B142853	Total Mercury (Hg)	2023/10/06	106	75 - 125	120	80 - 120	<0.050	mg/kg	NC	35		
B142853	Total Molybdenum (Mo)	2023/10/06	111	75 - 125	111	80 - 120	<0.40	mg/kg	4.2	35	100	67 - 134
B142853	Total Nickel (Ni)	2023/10/06	92	75 - 125	95	80 - 120	<1.0	mg/kg	2.6	30	88	78 - 122
B142853	Total Selenium (Se)	2023/10/06	98	75 - 125	105	80 - 120	<0.50	mg/kg	NC	30		
B142853	Total Silver (Ag)	2023/10/06	105	75 - 125	110	80 - 120	<0.20	mg/kg	NC	35	113	46 - 154
B142853	Total Thallium (Tl)	2023/10/06	108	75 - 125	120	80 - 120	<0.10	mg/kg	NC	30		
B142853	Total Tin (Sn)	2023/10/06	105	75 - 125	106	80 - 120	<1.0	mg/kg	NC	35	94	67 - 133
B142853	Total Uranium (U)	2023/10/06	107	75 - 125	113	80 - 120	<0.20	mg/kg	11	30	86	77 - 123
B142853	Total Vanadium (V)	2023/10/06	116	75 - 125	92	80 - 120	<1.0	mg/kg	5.3	30	83	79 - 121
B142853	Total Zinc (Zn)	2023/10/06	92	75 - 125	104	80 - 120	<10	mg/kg	2.9	30	94	79 - 122
B144073	Soluble Chloride (Cl)	2023/10/07	100	75 - 125	96	80 - 120	<10	mg/L	NC	30	102	75 - 125
B144445	Soluble Calcium (Ca)	2023/10/08	100	75 - 125	101	80 - 120	<1.5	mg/L	7.7	30	98	75 - 125
B144445	Soluble Magnesium (Mg)	2023/10/08	104	75 - 125	106	80 - 120	<1.0	mg/L	8.2	30	103	75 - 125
B144445	Soluble Potassium (K)	2023/10/08	103	75 - 125	104	80 - 120	<1.3	mg/L	24	30	118	75 - 125
B144445	Soluble Sodium (Na)	2023/10/08	102	75 - 125	102	80 - 120	<2.5	mg/L	17	30	111	75 - 125
B144445	Soluble Sulphate (SO4)	2023/10/08					<5.0	mg/L	1.8	30	90	75 - 125
B144523	Saturation %	2023/10/09							3.2	12	94	75 - 125
B144524	Soluble (CaCl2) pH	2023/10/08			101	97 - 103			0.56	N/A	101	97 - 103
B144767	Soluble Conductivity	2023/10/08			99	90 - 110	<0.020	dS/m	2.3	20	106	75 - 125
B144900	Soluble (Hot water) Boron (B)	2023/10/10	103	75 - 125	96	80 - 120	<0.10	mg/kg	27	35		
B144906	Total Antimony (Sb)	2023/10/09	94	75 - 125	106	80 - 120	<0.50	mg/kg	NC	30	117	14 - 183
B144906	Total Arsenic (As)	2023/10/09	95	75 - 125	97	80 - 120	<1.0	mg/kg	2.9	30	110	53 - 147

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STANTEC CONSULTING LTD Client Project #: 123514555 Site Location: G-18

			Matrix	Spike	Spiked	Blank	Method	Blank	RP	D	QC Sta	ndard
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
B144906	Total Barium (Ba)	2023/10/09	NC	75 - 125	101	80 - 120	<1.0	mg/kg	0.70	35	101	80 - 119
B144906	Total Beryllium (Be)	2023/10/09	109	75 - 125	107	80 - 120	<0.40	mg/kg	2.3	30		
B144906	Total Cadmium (Cd)	2023/10/09	97	75 - 125	94	80 - 120	<0.050	mg/kg	0.35	30	97	71 - 129
B144906	Total Chromium (Cr)	2023/10/09	123	75 - 125	104	80 - 120	<1.0	mg/kg	0.31	30	106	59 - 141
B144906	Total Cobalt (Co)	2023/10/09	108	75 - 125	105	80 - 120	<0.50	mg/kg	2.5	30	100	58 - 142
B144906	Total Copper (Cu)	2023/10/09	103	75 - 125	106	80 - 120	<1.0	mg/kg	2.3	30	111	83 - 117
B144906	Total Lead (Pb)	2023/10/09	105	75 - 125	105	80 - 120	<0.50	mg/kg	0.46	35	109	79 - 121
B144906	Total Mercury (Hg)	2023/10/09	93	75 - 125	102	80 - 120	<0.050	mg/kg	NC	35		
B144906	Total Molybdenum (Mo)	2023/10/09	105	75 - 125	101	80 - 120	<0.40	mg/kg	6.9	35	104	67 - 134
B144906	Total Nickel (Ni)	2023/10/09	104	75 - 125	104	80 - 120	<1.0	mg/kg	1.4	30	105	78 - 122
B144906	Total Selenium (Se)	2023/10/09	90	75 - 125	92	80 - 120	<0.50	mg/kg	2.1	30		
B144906	Total Silver (Ag)	2023/10/09	104	75 - 125	104	80 - 120	<0.20	mg/kg	1.2	35	103	46 - 154
B144906	Total Thallium (TI)	2023/10/09	103	75 - 125	106	80 - 120	<0.10	mg/kg	1.5	30		
B144906	Total Tin (Sn)	2023/10/09	105	75 - 125	100	80 - 120	<1.0	mg/kg	NC	35	110	67 - 133
B144906	Total Uranium (U)	2023/10/09	101	75 - 125	109	80 - 120	<0.20	mg/kg	2.0	30	96	77 - 123
B144906	Total Vanadium (V)	2023/10/09	143 (1)	75 - 125	103	80 - 120	<1.0	mg/kg	2.8	30	106	79 - 121
B144906	Total Zinc (Zn)	2023/10/09	NC	75 - 125	91	80 - 120	<10	mg/kg	0.029	30	91	79 - 122
B146047	Soluble Calcium (Ca)	2023/10/10	103	75 - 125	103	80 - 120	<1.5	mg/L	0.27	30	87	75 - 125
B146047	Soluble Magnesium (Mg)	2023/10/10	104	75 - 125	105	80 - 120	<1.0	mg/L	1.0	30	91	75 - 125
B146047	Soluble Potassium (K)	2023/10/10	99	75 - 125	101	80 - 120	<1.3	mg/L	2.2	30	96	75 - 125
B146047	Soluble Sodium (Na)	2023/10/10	98	75 - 125	99	80 - 120	<2.5	mg/L	2.2	30	96	75 - 125
B146047	Soluble Sulphate (SO4)	2023/10/10					<5.0	mg/L	9.4	30	88	75 - 125
B146054	Soluble Calcium (Ca)	2023/10/10	100	75 - 125	105	80 - 120	<1.5	mg/L	0.23	30	91	75 - 125
B146054	Soluble Magnesium (Mg)	2023/10/10	102	75 - 125	107	80 - 120	<1.0	mg/L	0.24	30	95	75 - 125
B146054	Soluble Potassium (K)	2023/10/10	101	75 - 125	101	80 - 120	<1.3	mg/L	0.15	30	97	75 - 125
B146054	Soluble Sodium (Na)	2023/10/10	93	75 - 125	100	80 - 120	<2.5	mg/L	0.78	30	100	75 - 125
B146054	Soluble Sulphate (SO4)	2023/10/10					<5.0	mg/L	0.95	30	89	75 - 125
B146066	Soluble Chloride (Cl)	2023/10/10	84	75 - 125	100	80 - 120	<10	mg/L	5.8	30	95	75 - 125
B146105	Soluble Conductivity	2023/10/10			101	90 - 110	<0.020	dS/m	0.91	20	100	75 - 125
B146351	Soluble Conductivity	2023/10/10			101	90 - 110	<0.020	dS/m	5.3	20	103	75 - 125
B193672	Moisture	2023/11/10					<0.30	%	11	20		
B194240	Sieve - #10 (>2.00mm)	2023/11/10							NC	30		

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STANTEC CONSULTING LTD Client Project #: 123514555 Site Location: G-18

			Matrix	Spike	Spiked	Blank	Method E	Blank	RP	D	QC Sta	ndard
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
B194240	Sieve - #200 (>0.075mm)	2023/11/10							28	30	102	75 - 125
B194240	Sieve - Pan	2023/11/10							1.3	30	99	75 - 125
N/A = Not A	pplicable											

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.



STANTEC CONSULTING LTD Client Project #: 123514555 Site Location: G-18

## VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

ayout -sh

Ghayasuddin Khan, M.Sc., P.Chem., QP, Scientific Specialist, Inorganics

-1-

Gita Pokhrel, Laboratory Supervisor

L'Shyueushouse

Luba Shymushovska, B.Sc., QP, Senior Analyst, Organics

Rahul Suryawanshi, Senior Analyst

ling yuan ' noul

Jingyuan Song, QP, Organics – Senior Analyst

Sandy Yuan, M.Sc., QP, Scientific Specialist

Suwan (Sze Yeung) Fock, B.Sc., Scientific Specialist



STANTEC CONSULTING LTD Client Project #: 123514555 Site Location: G-18

## VALIDATION SIGNATURE PAGE(CONT'D)

The analytical data and all QC contained in this report were reviewed and validated by:

1/ennicatelk

Veronica Falk, B.Sc., P.Chem., QP, Scientific Specialist, Organics



Automated Statchk

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Scott Cantwell, General Manager responsible for Alberta Environmental laboratory operations.



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STANTEC CONSULTING LTD Client Project #: 123514555 Site Reference: G-18 Client ID: G18-SS23-01-01

#### CCME Hydrocarbons (F2-F4 in soil) Chromatogram



STANTEC CONSULTING LTD Client Project #: 123514555 Site Reference: G-18 Client ID: G18-SS23-03-01

#### CCME Hydrocarbons (F2-F4 in soil) Chromatogram



STANTEC CONSULTING LTD Client Project #: 123514555 Site Reference: G-18 Client ID: G18-SS23-04-01

#### CCME Hydrocarbons (F2-F4 in soil) Chromatogram



#### CCME Hydrocarbons (F2-F4 in soil) Chromatogram



STANTEC CONSULTING LTD Client Project #: 123514555 Site Reference: G-18 Client ID: G18-SS23-10-01

#### CCME Hydrocarbons (F2-F4 in soil) Chromatogram



STANTEC CONSULTING LTD Client Project #: 123514555 Site Reference: G-18 Client ID: G18-SS23-11-02

#### CCME Hydrocarbons (F2-F4 in soil) Chromatogram



#### CCME Hydrocarbons (F2-F4 in soil) Chromatogram



STANTEC CONSULTING LTD Client Project #: 123514555 Site Reference: G-18 Client ID: G18-SS23-13-01

#### CCME Hydrocarbons (F2-F4 in soil) Chromatogram



STANTEC CONSULTING LTD Client Project #: 123514555 Site Reference: G-18 Client ID: G18-SS23-14-01

#### CCME Hydrocarbons (F2-F4 in soil) Chromatogram



STANTEC CONSULTING LTD Client Project #: 123514555 Site Reference: G-18 Client ID: G18-SS23-15-01

#### CCME Hydrocarbons (F2-F4 in soil) Chromatogram



#### CCME Hydrocarbons (F2-F4 in soil) Chromatogram



STANTEC CONSULTING LTD Client Project #: 123514555 Site Reference: G-18 Client ID: G-18-QC-SS23-01

#### CCME Hydrocarbons (F2-F4 in soil) Chromatogram







Project Information:C376773Job Received:2023/09/Expected TAT:StandardExpected Arrival:2023/09/Submitted By:James HySubmitted To:Edmonto

C376773 2023/09/22 15:15 Standard TAT 2023/09/22 08:24 James Hymers Edmonton ENV:4326 76 Avenue NW

## **Invoice Information**

Attn: James Hymers STANTEC CONSULTING LTD #200, 325- 25TH ST. SE CALGARY , AB , T2A 7H8 Email to: james.hymers@stantec.com

## **Analytical Summary**

Report Information Attn: James Hymers STANTEC CONSULTING LTD #200, 325-25TH ST. SE CALGARY , AB , T2A 7H8 Email to:

james.hymers@stantec.com

Project Information								
Quote #:	C30475							
PO/AFE#:								
Project #:	123514555							
Site Location:	G-18							

A: Standard TAT M: Manually added tes	TEX and F1-F4 in Soil	Regulated Metals - Soils	ALINITY 4		umber				
Client Sample ID	Cint Ref	Sampling Date/Time	Matrix	#Cont	AT1 B	CCME	SOIL S	ЫоН	Set NL
								1	
G18-SS23-01-01	1	2023/09/20	SOIL	4	А	A	A		1
G18-SS23-01-02	2	2023/09/20	SOIL	4				Μ	
G18-SS23-02-01	3	2023/09/20	SOIL	1				Μ	
G18-SS23-03-01	4	2023/09/20	SOIL	4	А	A	A		1
G18-SS23-04-01	5	2023/09/20	SOIL	4	А	A	A		1
G18-SS23-05-01	6	2023/09/20	SOIL	4				Μ	
G18-SS23-06-01	7	2023/09/20	SOIL	4				Μ	
G18-SS23-06-02	8	2023/09/20	SOIL	4	А	A	A		1
G18-SS23-07-01	9	2023/09/20	SOIL	1				Μ	
G18-SS23-08-01	10	2023/09/20	SOIL	1		A	A		2
G18-SS23-09-01	11	2023/09/20	SOIL	4			Α		3
G18-SS23-09-02	12	2023/09/20	SOIL	4			A		3
G18-SS23-10-01	13	2023/09/20	SOIL	4	А	Α	Α		1
G18-SS23-10-02	14	2023/09/20	SOIL	4			Α		3
G18-SS23-11-01	15	2023/09/20	SOIL	4			Α		3
G18-SS23-11-02	16	2023/09/20	SOIL	4	А		Α		4
G18-SS23-12-01	17	2023/09/20	SOIL	4			Α		3
G18-SS23-12-02	18	2023/09/20	SOIL	4	А	А	А		1
G18-SS23-13-01	19	2023/09/20	SOIL	4	А		Α		4
G18-SS23-13-02	20	2023/09/20	SOIL	4			А		3
G18-SS23-14-01	21	2023/09/20	SOIL	4	А	Α	Α		1
G18-SS23-14-02	22	2023/09/20	SOIL	4			А		3
G18-SS23-15-01	23	2023/09/20	SOIL	4	А		А		4
G18-SS23-15-02	24	2023/09/20	SOIL	4		А	А		2
G18-SS23-16-01	25	2023/09/20	SOIL	4			А		3
G18-SS23-16-02	26	2023/09/20	SOIL	4	А		A		4
G18-SS23-17-01	27	2023/09/20	SOIL	1		А	А		2
G-18-QC-SS23-01	28	2023/09/20	SOIL	4	А	А	А		1
G-18-QC-SS23-02	29	2023/09/20	SOIL	4			А		3
G-18-QC-SS23-03	30	2023/09/20	SOIL	4			Α		3





Project Information:C376773Job Received:2023/09/22 15:15Expected TAT:Standard TATExpected Arrival:2023/09/22 08:24Submitted By:James HymersSubmitted To:Edmonton ENV:4326 76<br/>Avenue NW

Deadlines are estimates only and are subject to change. Please refer to your Job Confirmation report for final due dates.

# Submission Information # of Samples: 30

## eCOC Change Log

Modified By	Date Modified	Changes	Comments
James Hymers	22 Sep 23 10:29:05	Tests Requested, Sample Information	

## Sample Set Listing

Set 1 (8 samples)	Set 2 (3 samples)	Set 3 (10 samples)	Set 4 (4 samples)
G18-SS23-01-01	G18-SS23-08-01	G18-SS23-09-01	G18-SS23-11-02
G18-SS23-03-01	G18-SS23-15-02	G18-SS23-09-02	G18-SS23-13-01
G18-SS23-04-01	G18-SS23-17-01	G18-SS23-10-02	G18-SS23-15-01
G18-SS23-06-02		G18-SS23-11-01	G18-SS23-16-02
G18-SS23-10-01		G18-SS23-12-01	
G18-SS23-12-02		G18-SS23-13-02	
G18-SS23-14-01		G18-SS23-14-02	
G-18-QC-SS23-01		G18-SS23-16-01	
		G-18-QC-SS23-02	
		G-18-QC-SS23-03	

CIT Alert - Invoice over \$10000 Sent false	Is this a Client # Change?	Original Invoice Paid? Credit Reason	Client Communication Credit Reason Code
	3rd Party Approval Obtained?	Reason for no 3rd Party Approval	Original Invoice Amt Internal/External
Credit Full/Partial Offset Required ?	Corrective Action	Action for Credit Credit Amount	Action for Rebill Rebill Invoice #
Rebill Amount LIMS Client ID	Credit Approver FlexID	Credit Status Fault	Original Invoice # Invoice Approval Breakdown
Admin Fee	Reason for no Admin Fee	Est Difference in Price	Credit Summary
CheckPoint-Company Added Yes	Department for Fault Cloned Ticket Check	Fault Reason Praise Escalation Sent	Fault Reason Other

# by Hymers, James on Wed, 8 Nov at 10:05 AM via Email

RE: Final Report-Prj: 123514555 Site: G-18 ATT: James Hymers Job#: C376773,

# Be careful with this message: it is coming from an external sender

Do not open attachments nor click on links, unless you are sure that the content is safe

Hi Geraldlyn,

I just checked the confirmation receipt, and it looks like the samples will be disposed of in December.

Could we please run Particle Size +\- 75 um on samples G18-SS01-02, G18-SS07-01 and G18-SS17-01 on a 2 day rush TAT?

Thanks for your time.

Regards,

James Hymers B.Sc., P. Geo.

Environmental Geoscientist - Remediation and Revitalization

11/8/23, 11:47 AM

Direct: 403-716-8204

Mobile: 587-216-2957

james.hymers@stantec.com

Stantec 200-325 25 Street SE Calgary AB T2A 7H8

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# Comments

by Geraldlyn Gouthro on Wed, 8 Nov at 10:07 AM as Outbound email

Hi James,

I'll have the analysis added. Its past the 30 day recommended holdtime, would you like to proceed?

Thanks,

Geraldlyn Gouthro Key Account Specialist - Western Canada Environmental Laboratories & Specialty Services Bureau Veritas

Mobile: 403 831 9380 geraldlyn.gouthro@bureauveritas.com <u>www.BVNA.com/environmental-laboratories</u>

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November 15, 2023



STANTEC CONSULTING LTD

#200, 325- 25TH ST. SE CALGARY, AB, T2A 7H8

Attention: James Hymers

# Re: Biogenic Toluene Assessment of Location: G-18; Project: 123514555 Bureau Veritas Job No.: C376773

Bureau Veritas Environmental & Specialty Services Laboratories (BV Labs) was retained by Stantec Consulting Ltd. to provide an interpretation concerning the likely origin of toluene quantified within CCME Fraction 1 (nC6-nC10).

# **Analytical Method**

Petroleum hydrocarbon analyses at BV Labs are conducted in accordance with the analytical specifications required by the prescriptive and performance-based (where appropriate) elements of the CCME Tier I protocols for hydrocarbon determination<sup>1</sup> in soil samples.

# **Biogenic Toluene**

The sample extract is analyzed by volatile organic compound (VOC) analysis in selected ion monitoring (SIM) mode to determine the origin of the quantified toluene. The presence of specific marker compounds, both biogenic and petrogenic, along with a series of associated parameters are reviewed as part of this evaluation. Diagnostic parameters of primary interest and the ranges typically associated with biogenic toluene samples are listed below<sup>2</sup>:

- Moisture: typically ≥70%
- Absence of an Unresolved Complex Mixture (UCM) within CCME Fractions F2 or F3.
- Presence of a "Biogenic Cluster" within CCME Fraction 3 (F3Bc); specifically F3B, nC32-nC34
- Presence of biogenic monoterpene compound(s)<sup>3</sup>
- Toluene ratio (T<sub>ratio</sub>): Ratio between Toluene and sum of all BTEX compounds; typically >0.7
- Cymene ratio ( $C_{ratio}$ ): Ratio between p-Cymene and the sum of all three isomers; typically >0.8
- Additional diagnostic parameters may be included in the assessment if deemed beneficial (examples include: Carbon Preference Index (CPI), isoprenoid ratios, BIC, etc.)

<sup>&</sup>lt;sup>1</sup> Canadian Council of Ministers of the Environment: "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil – Tier I Method" 2001

<sup>&</sup>lt;sup>2</sup> Bureau Veritas Laboratories Canada: threshold values derived internally (assessment of long-term data set)

<sup>&</sup>lt;sup>3</sup> Target compounds:  $\alpha/\beta$ -Pinene, Camphene, (+)-3-Carene, α-Terpinene, Limonene, o/m/p-Cymene, γ-Terpinene and α-Terpinolene (list may be amended from time-to-time without notice)



# **Data Interpretation**

Lab ID	Sample ID	Diagnostic Parameters <sup>4</sup>						Conclusion
		Moist	UCM	F3B <sub>c</sub>	Mono	T <sub>ratio</sub>	Cratio	Conclusion
CAB733	G18-SS23-06-02	Н	No	Yes	Yes	1.0	0.70	Biogenic Toluene
CAB738	G18-SS23-10-01	М	No	Yes	Yes	1.0	0.97	Biogenic Toluene
CAB746	G18-SS23-14-01	Н	No	Yes	Yes	1.0	0.96	Biogenic Toluene

Table 1. Data Summary - Biogenic Toluene Evaluation

If you have any questions or require additional information, please do not hesitate to contact the undersigned.

# Sincerely, Bureau Veritas Environmental & Specialty Services Laboratories



Michael Sheppare, B.SC., P.Bio, QP Consulting Scientist Environmental Services

Scott Cantwell, CET, B.Sc., P.Chem. Director and General Manager – Western Canada Environmental Services

## Disclaimer

## **Biogenic Toluene**

A detailed assessment of Selective Ion Monitoring (SIM) GC-MS, and associated project data was completed to provide further information relating to the biogenic and/or petrogenic origin of compounds or fractions quantified as part of the CCME Tier I protocol. All statements must be regarded as approximate and qualitative.

<sup>4</sup> Diagnostic Parameters

Moist: Moisture; H (≥70%), M (<70 & ≥20%), L (<20%) UCM: Presence/Position of Unresolved Complex Mixture F3Bc: Presence of a biogenic cluster within F3B Mono: Biogenic monoterpenes (excluding cymenes)  $T_{ratio}$ : Toluene Ratio (T/ $\Sigma$ BTEX)  $C_{ratio}$ : Cymene Ratio (p-Cymene/ $\Sigma$ Cymene isomers)

## <sup>5</sup> Conclusions

Biogenic Toluene: Quantified toluene likely of biogenic origin Petrogenic Toluene: Quantified toluene likely of petrogenic origin Inconclusive (both): Presence of both biogenic and petrogenic diagnostic parameters (CSIA recommended) Inconclusive (neither): Insufficient evidence to support Biogenic or Petrogenic origin (CSIA recommended) Appendix F Methodology November 27, 2023

# Appendix F Methodology



Appendix F Methodology November 27, 2023

# F.1 Methods

# F.1.1 Soil Sampling

A dutch hand auger was used to collect soil samples. Cuttings remaining after sample collection were placed back into the same sample location. A handheld GPS was used to mark the location of each borehole.

# F.1.2 Field Screening

To assess the presence or absence of industrial impacts, soil samples were field screened for combustible headspace vapors (CHV) using an RKI Eagle 2<sup>™</sup> calibrated to hexane (CHV) and set to methane elimination mode or for soil bulk electrical conductivity (EC) using an FieldScout direct soil EC meter calibrated to an EC standard. Physical indicators of potential soil impact such as colour, altered structure and consistency, and odours, were also evaluated in the field to assess for contaminants.

# F.1.3 Soil Sample Management

Samples collected were placed in containers appropriate for the specific analysis as supplied by Bureau Veritas (BV). Soil samples for inorganic analysis were placed in plastic bags while soil samples for analysis of organic volatile parameters such as benzene, toluene, ethylbenzene, xylene (collectively referred to as BTEX) and petroleum hydrocarbon fraction 1 (F1) were obtained using Terra Core sampling kits and placed into vials containing methanol. Soil samples for analysis of non-volatile organic parameters were placed with no headspace in certified sterile glass jars with Teflon<sup>™</sup>-lined lids. Each sample was uniquely labeled (i.e., G18-SS23-01).

Soil samples placed into vials containing methanol, as well as jars, were stored in insulated coolers packed with ice. A sample chain of custody (CoC) was maintained by K'Alo-Stantec's Field Team Lead using BV provided CoCs.

# F.1.4 Quality Assurance and Quality Control

The purpose of the quality assurance and quality control (QA/QC) program was to assess the reliability and reproducibility of the data for the purposes of the assessment. The review consisted of evaluating sample collection and handling methods, sample hold times, general laboratory comments, blind field duplicate results, and laboratory duplicate results. Samples collected in 2023 were submitted to a laboratory certified through the Standards Council of Canada (SCC). Samples were collected following K'Alo-Stantec's sampling procedures which are consistent with industry standards. Appropriate sampling QA/QC procedures were adhered to.



Appendix F Methodology November 27, 2023

# F.1.5 Laboratory QA/QC

The QA/QC methods employed by BV, including matrix spikes, method blanks, replicates, reference criteria, and surrogate recoveries, were reviewed to assess the reliability of the samples. A description of laboratory QAQC procedures is provided in the laboratory certificate of analysis (COA) in **Appendix E**.

# F.1.6 Field Operations

Soil assessment was completed in compliance with applicable regulatory requirements and K'Alo-Stantec Standard Operating Procedures (consistent with industry standards) for soil logging, sampling, sample screening, and management.

- New nitrile gloves were used for collection of each soil sample.
- New Terra Core samplers were used for each sample increment.
- Clean, certified laboratory-supplied jars and bags were used for sample collection.

