PHASE I ENVIRONMENTAL SITE ASSESSMENT AND SURFICIAL SOIL SAMPLING FOR 28 MACKENZIE DRIVE TULITA, NORTHWEST TERRITORIES

Submitted to:

Public Services and Procurement Canada
Environmental Services
100-167 Lombard Avenue
Winnipeg, MB R3C 2Z1

Prepared by:

BluMetric Environmental Inc.
4916 49th Street, Second Floor
Yellowknife, NT X1A 2P3

Project Number: 170529

September 2017

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P.O. Box 11086	4916 49th Street, Second Floor
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EXECUTIVE SUMMARY

BluMetric Environmental Inc. (BluMetric™) has been retained by Public Services and Procurement Canada (PSPC) – Environmental Services to conduct a Phase I Environmental Site Assessment (ESA) including surficial soil sampling for the property located at 28 Mackenzie Drive in Tulita, Northwest Territories (NT) (the "Site"). The Phase I Property is 900.1 square metres and is developed with a 101-square metre residential building (**Figure 1** in **Appendix A**). The building is a single-storey structure with a full basement and was constructed in 1968. The Phase I Property has reportedly been utilized as a residential home since construction in 1968 through the present, and also as a bed and breakfast since 2013.

Based on the age of the building, there is the potential for asbestos and lead-based paint to be present within some of the building materials. As such, a building materials survey should be completed prior to any renovation or demolition activities to ensure proper identification of any hazardous materials and establishment of adequate health and safety procedures and disposal requirements.

No spills have ever been reported for the Phase I Property and no obvious signs of environmental impact were observed on the property; however, BluMetric determined that the heating oil AST to the north of the building is an Area of Potential Environmental Concern (APEC). The location of the AST is an APEC because the building has been supplied with heating oil from an AST in this location since 1968, and it is likely that incidental spillage has occurred over the years. As such, BluMetric determined that the soil underneath the fuel oil AST needed to be investigated intrusively. Please see **Table 1** below for the summary of the APEC.

BluMetric subsequently assessed the area of the heating oil AST APEC through the advancement of one test pit and the collection of one soil sample from underneath the valve of the AST. The soil sample was submitted for laboratory analysis for benzene, toluene, ethylbenzene, and total xylenes (collectively, BTEX), and petroleum hydrocarbon (PHC) fractions one through four (F1-F4). The laboratory results were compared to their applicable Canadian Council of Ministers of the Environment (CCME) Tier 1 levels Canada-Wide Standards (CWS) for PHCs and Environmental Quality Guidelines (EQGs) for BTEX, and were not detected at a concentration greater than any of their applicable regulatory criteria for any land use category.

Based on this assessment of the Phase I Property and surrounding properties, BluMetric does not recommend further work regarding the Phase I Property at this time.

Table 1: Area of Potential Environmental Concern (APEC) Summary

APEC	APEC Location	APEC Description	Recommendations
APEC 1	Area of Heating Oil AST	The location of the AST is an APEC because the building has been supplied with heating oil from an AST in this location since 1968, and it is likely that incidental spillage has occurred over the years. As such, BluMetric determined that the soil underneath the fuel oil AST needed to be investigated intrusively.	No further work is recommended at this time in regards to this APEC.

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1. INTRODUCTION

1.1 TERMS OF REFERENCE

BluMetric was retained by PSPC – Environmental Services to prepare a Phase I ESA including surficial soil sampling for the property located at 28 Mackenzie Drive (herein referred to as the 'Phase I Property' or 'subject property') in the Hamlet of Tulita, Northwest Territories. The Phase I Property is currently occupied by Wendy and Ron Oe.

This Phase I ESA and surficial soil sampling were performed in accordance with the substance and intent of the Phase I and II ESA documents produced by the Canadian Standards Association (*CSA Z768-01 and Update No. 1*, and *Z769-00 Phase II Environmental Site Assessment)*.

In general terms, the purpose of a Phase I ESA is to determine if a property is subject to actual or potential contamination. The tasks of a Phase I ESA typically include:

- Reviewing historical information regarding the Phase I Property;
- Inspecting the Phase I Property for activities, conditions, or features that could result in contaminants being released into the natural environment or into on-site structures;
- Noting activities, conditions, or features on neighbouring lands that could alter environmental conditions at the Phase I Property;
- Interviewing site personnel or neighbours or other knowledgeable parties about past and present operations and activities;
- Reviewing environmental documentation that the property owner, operator, or client can provide;
- Making inquiries to federal, territorial, and municipal agencies about environmental records on file; and,
- Using the assembled information to prepare a report.

Due to the relatively remote nature of this Phase I Property, the scope of this assignment also included the collection and analysis of a limited number of soil samples during the site inspection and visit.

1.2 General Description of the Phase I Property

Municipal and Legal Address, and Property Description

The Phase I Property is addressed at 28 Mackenzie Road in Tulita, Northwest Territories. It is comprised of approximately 900.1 square metres (m²) of residential land (see **Figure 1** in **Appendix A**). The legal description of the Phase I Property is Lot 198, Land Titles Office (LTO) Plan 3554. The subject property has approximately 30 metres (m) of frontage along Mackenzie Road (see **Figure 2**).

Name, Address, and Other Contact Information for the Property Owner

The Phase I Property, including the building and land, has been owned by Ron and Wendy Oe since 2013. The Phase I Property was formerly owned by Jody Snortland until 2013. In July 2017, BluMetric was retained by PSPC Environmental Services to complete a Phase I ESA including soil sampling of the property. The principal contact for PSPC Environmental Services is:

Mr. Matthew Irvine
Environmental Specialist
Public Services and Procurement Canada
Matthew.irvine@pwgsc.gc.ca
204-294-2170

Phase I Study Area

The Phase I Study Area consists of lands that extend 250 metres from the boundaries of the Phase I Property. A figure of the Phase I Area can be found in **Appendix A, Figure 2**.

1.3 Scope of Work

The following tasks were undertaken in July 2017:

- The Phase I Property and surrounding areas were inspected, and surficial soil samples were collected, on July 24 and 25, 2017, by Mr. Daniel Tucholski of BluMetric;
- A Certificate of Title search was conducted by the Land Titles Office within the Department of Justice of the Government of the Northwest Territories (GNWT);
- Aerial photographs were obtained from Environmental Risk Information Services (ERIS) and the GNWT Department of Municipal and Community Affairs (MACA) Administration of the Territorial Lands Acts System (ATLAS), and were reviewed directly by BluMetric;

- A search of the Hazardous Materials Spills Database, curated by the GNWT Department of Environment and Natural Resources (ENR), was performed;
- Inquiries were made to several private sector, territorial, and federal agencies / departments for relevant environmental information, including the following:
  - Mr. Ron Oe, the current co-owner of the Phase I Property;
  - Ms. Wendy Oe, the current co-owner of the Phase I Property;
  - Mr. Doug Carr, the Environmental Health Officer for the GNWT;
  - Mr. Travis Wright, the Assistant Fire Marshal for the Deh Cho Regional Office of MACA for the GNWT;
- A search of Environment Canada's Environmental Offenders Registry was performed; and,
- An environmental multi-database search was performed by ERIS.
- The collection of shallow soil samples if an APEC or APECs are observed during the site visit to determine the presence/absence of any limited surficial contamination.

2. PHYSICAL SETTING

2.1 TOPOGRAPHY

The topography of the Phase I Property is generally flat, with a slight slope down toward the offsite drainage ditch to the west. The average elevation of the Phase I Property is approximately 71 metres above sea level (masl).

2.2 SOIL AND GEOLOGY

The area in which the Phase I Property is located consists of glaciolacustrine and lacustrine deposits consisting of sediments deposited in a glacial lake during deglaciation and subsequent lake drainage. Further, the surficial soil consists of fine-grained silt, clay, and locally containing stones deposited as quiet water sediments (Fulton, 1995). Tulita is within an area of extensive discontinuous permafrost (50-90% of the land area is underlain by permafrost) (Heginbottom, 1995).

2.3 SURFACE WATER

No permanent streams, rivers, or similar watercourses, ponds, or lakes were observed on the Phase I Property. There is a drainage ditch running in a north to south direction on the west adjoining property. The closest permanent body of water is the Mackenzie River which is found approximately 165 metres south-southwest of the Phase I Property (see **Figure 1** in **Appendix A**). Surface drainage on the western portion of the Phase I Property is anticipated to be toward the

drainage ditch on the west adjoining property, which drains toward the Mackenzie River. The remainder of the Phase I Property is anticipated to drain southward toward forested land and the Mackenzie River.

2.4 HYDROGEOLOGY

During BluMetric's site visit, no groundwater monitoring wells were observed on the Phase I Property or on any of the surrounding properties. Local groundwater flow at the Phase I Property is expected to flow in a south-southwesterly direction towards the Mackenzie River. Regional groundwater flow is expected to flow toward the Mackenzie River and ultimately into the Beaufort Delta and Sea.

2.5 DISCUSSION OF FINDINGS

The topography of the Phase I Property is generally flat, with a slight slope down toward the offsite drainage ditch to the west. The closest permanent body of water is the Mackenzie River which is found approximately 165 metres south-southwest of the Phase I Property. At the time of the site visit, the risk of surface contaminants reaching the offsite drainage ditch or the Mackenzie River was determined to be low. As such, the risk of any surface contamination impacting groundwater is low.

3. HISTORICAL REVIEW

3.1 INFORMATION SOURCES

As per the CSA requirements, BluMetric determined the first property use to be the current residential building that was constructed in 1968. This information was provided to BluMetric by the property owners and was confirmed through aerial photograph analysis. As such, a historic land title search was not deemed necessary as the Phase I Property was undeveloped land prior to the current development. A recent history of land uses and activities on the Phase I Property, and their respective neighbouring lands, was prepared by reviewing information from the following sources:

- Certificate of Title provided by the Land Titles Office in the City of Yellowknife (see **Appendix B**);
- Environmental records provided by the Ecolog ERIS database (see **Appendix B**);
- Environment Canada Environmental Offenders Registry search results (see **Appendix B**);
- Hazardous Materials Spills Database search results (see **Appendix B**); and,

- Aerial photographs taken in 1945, 1961, 1969, 1980, and 1993 provided by Ecolog ERIS, and aerial photographs taken in 2004 and 2011, acquired through the Municipal and Community Affairs (MACA) Administration of the Territorial Land Acts System (ATLAS) Community Mapping resource, were also examined (see **Figures 3** through **9** in **Appendix A**).

3.2 THE PHASE I PROPERTY

The Phase I Property appears to have been first developed in 1968 with the current building. Prior to construction of the building, the Phase I Property appears to have been undeveloped. The building found on the Phase I Property has reportedly always been utilized for residential purposes. The use of the building as a residence and a bed and breakfast operation reportedly began after the current owners purchased the Phase I Property in January 2013.

3.3 NEIGHBOURING LANDS

During the site inspection, BluMetric noted the following uses on the neighbouring lands adjacent to the Phase I Property.

East: Cemetery.
South: Steep hill with a wooded area and one residence at the bottom.
West: The off-site driveway used as part of the Phase I Property and the Harriet Gladue Health Centre.
North: Mackenzie Road and residential buildings.

3.4 GNWT LAND TITLES OFFICE

BluMetric acquired the Certificate of Title for the Phase I Property from the Land Titles Office of the GNWT located in Yellowknife, NT. The Certificate of Title indicates that Ronald Glen Oe and Wendy Dianne Oe became the owners of Lot 198, Plan 3554 (the Phase I Property) in Tulita on January 17, 2013.

3.5 PREVIOUS ENVIRONMENTAL REPORTS

BluMetric was informed by the client and the current owners of the Phase I Property that no previous environmental reports exist or have ever been generated for the property.

3.6 ENVIRONMENTAL SOURCE INFORMATION

3.6.1 ERIS Database Records

A search of federal government, provincial government, and private source databases was undertaken by Environmental Risk Information Service Ltd. (ERIS) in July 2017. A list of databases that were searched and their associated acronyms is found in **Appendix B**.

Records have been assessed based on activity type, site conditions, local geology and hydrogeology, and information gathered during site interviews to determine if they are of potential environmental concern to the Phase I Property.

No records were listed for the Phase I Property or for the neighbouring properties within 250 metres of the Phase I Property. However, a listing in the Unplottable Report portion of the ERIS report is addressed at 53 Mackenzie Road and is within 250 metres of the property. This listing is in regards to a spill of an unknown quantity of sewage from a sewage tank on September 28, 2015. This listing is not considered to be a potential concern to the Phase I Property because it is cross-gradient to the property.

3.6.2 Environment Canada

A search of the Environment Canada Environmental Offenders Registry (Environment Canada, 2017) was completed. This registry identifies offenders of 11 Environment Canada and Parks Canada Acts including:

- Environment Canada – Antarctic Environmental Protection Act
- Environment Canada – Canada Wildlife Act
- Environment Canada – Canadian Environmental Protection Act, 1999
- Environment Canada – International River Improvements Act
- Environment Canada – Migratory Birds Convention Act, 1994
- Environment Canada – Pollution Prevention Provisions of Fisheries Act
- Environment Canada – Species at Risk Act
- Environment Canada – Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act
- Parks Canada – Canada National Marine Conservation Areas Act
- Parks Canada – Canada National Parks Act
- Parks Canada – Saguenay-St. Lawrence Marine Park Act

This search did not identify any registered environmental offenders. The results of this search are included in **Appendix B**.

3.6.3 GNWT Hazardous Materials Spills Database

A search of the GNWT's Hazardous Materials Spills Database was completed in July 2017 for the entire community of Tulita. Through that search, BluMetric did not identify any spills that may be related to, or be a concern for, the Phase I Property. The same sewage spill that was identified in the ERIS report was listed on this database. As indicated in **Section 3.6.1** above, this spill is not considered to be a potential concern to the Phase I Property. The results of this search are included in **Appendix B**.

3.6.4 Aerial Photographs

Aerial photographs for the years 1945, 1961, 1969, 1980, 1993, 2004, and 2011 were reviewed as follows:

1945: The Phase I Property and surrounding properties do not appear to contain any development (**Figure 3** in **Appendix A**).

1961: The Phase I Property appears to be undeveloped but cleared of trees. Surrounding properties appear to include wooded land to the east and south, a possible residential building to the west, and Mackenzie Drive and wooded land to the north (**Figure 4** in **Appendix A**).

1969: The Phase I Property is developed with the current residential building. Surrounding properties appear to include partially wooded land and likely the current cemetery to the east, wooded and cleared land to the south, cleared land and a likely residential building to the west, and Mackenzie Drive and residential buildings to the north (**Figure 5** in **Appendix A**).

1980: The Phase I Property appears as it did in 1969. Surrounding properties appear to include partially wooded land and likely the current cemetery to the east, wooded land to the south, likely residential buildings and health centre-related buildings to the west, and Mackenzie Drive and residential buildings to the north (**Figure 6** in **Appendix A**).

1993: The Phase I Property appears as it did in 1969 with the additional presence of an apparent boat parked on the property. Surrounding properties appear to include partially wooded land and likely the current cemetery to the east, wooded land and a residential building to the south, likely residential buildings and health centre-related buildings to the west, and Mackenzie Drive and residential buildings to the north (**Figure 7** in **Appendix A**).

2004: The Phase I Property appears as it did in 1969 with the additional presence of an apparent pickup truck parked on the property. Surrounding properties appear to include partially wooded land and likely the current cemetery to the east, wooded land and a residential building to the south, the driveway for the Phase I Property and health centre-related buildings to the west, and Mackenzie Drive and residential buildings to the north (**Figure 8** in **Appendix A**).

2011: The Phase I Property appears as it did in 1969. Surrounding properties appear to include partially wooded land and the current cemetery to the east, wooded land and a residential building to the south, the driveway for the Phase I Property and health centre-related buildings to the west, and Mackenzie Drive and residential buildings to the north (**Figure 9** in **Appendix A**).

Aerial photographs are provided as **Figure 3** through **Figure 9** in **Appendix A**.

3.6 Discussion and Findings

Based on the documentation reviewed by BluMetric, the Phase I Property appears to have been undeveloped prior to 1968. The current structure was constructed on the Phase I Property in 1968 according to information provided by the property owners and aerial photographs. The Phase I Property appears to have been utilized residentially since construction, and additionally as a bed and breakfast since 2013. No spills or other types of listings were identified for the Phase I Property through a search of the GNWT spills database or the ERIS database report. An adjacent property was identified within the spills and ERIS database report; however, this listing is cross-gradient to the Phase I Property and does not appear to be of concern to the Phase I Property.

4. INTERVIEWS

4.1 GNWT Environmental Health Officer

BluMetric contacted Mr. Doug Carr, the Environmental Health Officer with the GNWT, who indicated that there are no environmental complaints or documents on file with his office associated with the Phase I Property. Please see **Appendix C** for the questions posed to Mr. Carr and his respective answers.

4.2 GNWT Assistant Fire Marshal

BluMetric contacted Mr. Travis Wright, an Assistant Fire Marshal with the GNWT, who indicated that there is no documentation on-file with his office regarding the Phase I Property. Please see **Appendix C** for the questions posed to Mr. Wright and his respective answers.

4.3 CURRENT OWNERS OF THE PHASE I PROPERTY

BluMetric spoke with Ron and Wendy Oe, the current owners of the Phase I Property, during the site visit. The information gleaned from their answers to the questions posed during the site visit is included throughout this report in the relevant sections. Additionally, the questionnaire containing the questions posed to the property owners, and their respective answers, is available for review in **Appendix C**.

5. CURRENT SITE USES AND OPERATIONS

5.1 ON-SITE BUILDINGS AND SERVICES

The Phase I Property is developed with an approximately 101-square metre, single-storey structure with a full basement. The building is currently utilized as a residential home and bed and breakfast. The interior of the first floor consists of a kitchen, living space, bedrooms, and washrooms. The basement contains the mechanical components of the building, such as the fuel oil-fired furnace, wood stove, hot water tank, potable water tank, as well as two additional sleeping spaces for bed and breakfast patrons, a small workbench, and a storage area.

The building is heated by a fuel oil-fired furnace that is supplied by a steel double-walled, 910-litre aboveground storage tank (AST) located on the northern side of the building. Several household-type cleaning supplies were observed in the building, sized four-litres or less. The foundation of the building is a full concrete basement. No floor or trench drains were observed within the building, though a sump is located in the basement which discharges to the on-site septic tank.

The exterior walls of the building consist of vinyl siding on DuraFoam insulation over plywood. The interior walls of the first floor consist of primarily drywall and some wood paneling. The ceiling of the first floor consists of 0.6 metre-wide fiberboard panels that stretch across the entire ceiling of each room. Flooring on the first floor consists of vinyl floor tiles in the common areas and carpeting in the bedrooms over pressboard.

The interior walls of the basement consist of drywall and plywood. The ceiling in the basement consists of primarily bare wood framing and some fiberboard paneling. The basement floor consists of bare concrete. During the site inspection completed by BluMetric, photographs were taken of the exterior of the Phase I Property and the interior of the building (see **Appendix A** for the photographic log).

There is a potable water tank in the basement that supplies the building, and the washrooms discharge to a septic tank located on the exterior of the property, adjoining the western side of the building. Wells, pits, or lagoons were not observed on the property, though there is a sump in the basement as previously indicated.

On the exterior of the property is a storage trailer utilized to haul goods and supplies over the winter road, and for storage the remainder of the year. At the time of the site inspection, ten 25-litre full gasoline cans were present in the storage trailer. Additionally, a sea-can is present on the property which is used to store a dirt bike, a weed whacker, a chainsaw, two 25-litre full gasoline cans, nine tires, a vehicle battery, a compressed gas cylinder, and several containers of antifreeze, lubricants, and other automotive fluids within four-litre or less-sized containers. Some minor staining was noted on the floor of the sea-can, and a moderate-to-strong odour of petroleum products was observed within the sea-can. The odour is attributed to the gasoline and various automotive fluids off-gassing within the sea-can with little ventilation and not to the staining on the floor. The sea-can was raised slightly and there was no evidence of staining on the ground surface underneath it.

On the eastern side of the property are four snowmobiles, two ATVs, one partially-built motorcycle, and one ATV that is used for spare parts. A lawnmower and several miscellaneous items are stored under the raised wooden deck located off of the south side of the building. A tire and a wood pile are also present on the southern portion of the property. No staining was noted on the ground surface underneath any of the above-mentioned stored vehicles.

5.2 Processes and Operations

The Phase I Property has reportedly been utilized as a residential home since construction in 1968 through the present, and also as a bed and breakfast since 2013. The property is also utilized for the storage of vehicles and equipment, only; reportedly no vehicle maintenance is completed on-site. No manufacturing processes occur on the property.

5.3 Raw Materials

No raw materials are stored or consumed on the Phase I Property.

5.4 Waste Management Practices

5.4.1 Air Emissions

No air emission concerns are associated with the Phase I Property.

5.4.2 Liquid Effluents

All liquid effluents on the property discharge to the septic tank, which are then trucked off-site as-needed for their proper disposal. Potable water is trucked to the building as-needed and stored in the potable water tank within the basement. Waste oil is not generated on-site.

5.4.3 Solid Waste

Household solid waste is generated on the Phase I Property and picked up by the Hamlet for proper off-site disposal.

5.4.4 Recycled Waste

There is no formal recycling program within Tulita, but the property owners save their recyclable materials for various organizations that recycle materials to raise funds for social programs within the community.

5.5 Other Conditions of Concern

5.5.1 Hazardous Substances

BluMetric completed a cursory search for hazardous substances, including asbestos-containing materials (ACMs), lead-based paint (LBP), mould, etc. at the Phase I Property. No obvious visual evidence of hazardous materials or mould was observed within the building.

As the building was constructed prior to 1980, there is the potential for ACMs and/or LBP to be present within the building. Therefore, before any demolition or renovation work is undertaken, an asbestos and LBP survey should be completed to establish proper safe handling procedures and disposal for any demolition waste.

5.5.2 Housekeeping

Current housekeeping practices appear to be in good order on the Phase I Property. Stored materials are organized within the building, and the exterior of the property is relatively tidy.

5.5.3 Odours, Staining, and Stressed Vegetation

During the site visit, BluMetric did observe some minor staining to the floor of the sea-can stored on the exterior of the property; no staining was observed under the sea-can or on the remainder of the property. Additionally, a moderate-to-strong odour of petroleum products was observed within the sea-can.

The odour is attributed to the gasoline and various automotive fluids off-gassing within the sea-can with little ventilation. No stressed vegetation was observed on the Phase I Property.

5.5.4 Imported Fill

Fill was potentially brought onto the Phase I Property during construction of the building and would have been used around the building and property for grading purposes. No information was available about the quantity, source, or quality of this potential imported fill. However, this potential fill is not considered a concern.

5.5.5 Polychlorinated Biphenyls (PCBs)

No pole- or pad-mounted transformers were observed on the Phase I Property. Fluorescent light fixtures potentially containing PCBs in ballasts were noted in the building. Depending on the age of the light ballasts, PCBs may be present.

5.5.6 Aboveground Storage Tanks (ASTs)

One double-walled, 900-litre, fuel oil, steel AST that was installed in 2009 is located on the northern side of the building, the septic tank is located on the western side of the building, and the potable water tank is located in the basement.

5.5.7 Underground Storage Tanks (ASTs)

No underground storage tanks were identified on the property.

5.5.8 Additional Records Review

BluMetric attempted to acquire any available records listed below which are listed within Section 7.1.6.5 of the CSA Standard:

- Site plans: none were provided or known to exist by any of the individuals listed in Section 1.3 above.
- Building plans: none were provided or known to exist by any of the individuals listed in Section 1.3 above.
- Permit records: none were provided or known to exist by any of the individuals listed in Section 1.3 above.
- Production and maintenance records: none were provided or known to exist by any of the individuals listed in Section 1.3 above.

- Asbestos surveys: none were provided or known to exist by any of the individuals listed in Section 1.3 above.
- Site utility drawings: none were provided or known to exist by any of the individuals listed in Section 1.3 above.
- Emergency response and contingency plans: individualized fire escape routes are posted within the rooms of the building.
- Spill reporting plans and records: none were provided or known to exist by any of the individuals listed in Section 1.3 above.
- Inventories of chemicals and their usage (i.e., WHMIS): none were provided or known to exist by any of the individuals listed in Section 1.3 above.
- Material Safety Data Sheets (MSDSs): none were provided or known to exist by any of the individuals listed in Section 1.3 above.
- Environmental monitoring data: none were provided or known to exist by any of the individuals listed in Section 1.3 above.
- Waste management records: none were provided or known to exist by any of the individuals listed in Section 1.3 above.
- Inventory of USTs and ASTs: this information is included within Sections 5.5.6 and 5.5.7 above.
- Environmental audit reports: none were provided or known to exist by any of the individuals listed in Section 1.3 above.
- Prior relevant report and studies: none were provided or known to exist by any of the individuals listed in Section 1.3 above.

As requested, BluMetric reviewed the information that was reasonably ascertainable back to the first property use to the extent that historical information allowed, per Section 7.1.3 of the CSA Standard. Through the historical information and documentation acquired by BluMetric, it appears that the first property use is the current residential building that was constructed in 1968. It does not appear as though the Phase I Property was utilized prior to construction of the current building.

BluMetric attempted to acquire any available records listed below which are listed within Section 7.1.7 of the CSA Standard:

- Geological and Soil Maps: please see the information included within **Section 2.2** above.
- Topographic Maps: please see the information included within **Section 2.1** above and **Figure 1** within **Appendix A**.
- Agreement of Purchase and Sale: please see the information included within Section 3.4 above and **Appendix B**.

- Land Use Documents: none were provided or known to exist by any of the individuals listed in Section 1.3 above.
- Public Health Concerns: please see **Section 4.1** and **Appendix C**.
- Utility Company Records: none were readily available for review.
- Local Information Sources: information from interviews with the property owners are included throughout this report and within **Appendix C**

5.5.9 Additional Site Visit Considerations

During the site visit BluMetric considered the following according to section 7.2.1 of the CSA Standard:

- Safety of the Assessor: The Assessor took all necessary safety precautions during the site visit to ensure the appropriate regard for their health and safety.
- Timing: Prior to the site visit, the aerial photographs, ERIS environmental database, and spill database results were acquired and reviewed. Fire insurance maps and city directories reportedly do not exist for the Hamlet of Tulita.
- Methodology: The Assessor directly observed the Phase I Property and adjoining and adjacent properties on July 24 and 25, 2017.
- Limitations: Observations on the Phase I Property were limited by stored materials in some locations that were not able to be reasonably moved in a timely fashion.
- Property Use: The Phase I Property is utilized residentially and as a bed and breakfast. To the extent possible, it does not appear that adjoining or surrounding properties use, treat, store, dispose, or generate hazardous materials.
- Hazardous Materials: There is the potential for hazardous building materials to be present within the building in the form of ACMs, LBP, PCB-containing light fixtures, and ozone-depleting substances. Mould may also be present within inaccessible portions of the building (i.e., behind walls). Hazardous materials in the form of petroleum products were observed on the Phase I Property within the heating oil AST, the containers of automotive fluids, and the various vehicles stored on the property.
- Unidentified Substances: No unidentified substances were identified on the Phase I Property.
- Storage Tanks: please see **Sections 5.5.6** and **5.5.7** above.
- Storage Containers: Several household-type cleaning supplies were observed in the building, sized four-litres or less. Ten, 25-litre full gasoline cans were present in the storage trailer. In the sea-can, two 25-litre full gasoline cans and several containers of antifreeze, lubricants, and other automotive fluids were present within four-litre-or-less-sized containers.
- Odours: please see **Section 5.5.3**.

- Potable Water Supply: The Phase I Property is supplied with potable water via the Hamlet's trucked service.

5.6 Discussion of Phase I ESA Records Review, Interviews, and Site Visit Findings

No manufacturing processes occur or have occurred on the Phase I Property. Water and sewer services are provided to the property via trucked service by the Hamlet. Current housekeeping appears to be good at the property. No vehicle or equipment repair or maintenance occurs on the property.

During the site visit, BluMetric did observe some minor staining to the floor of the sea-can stored on the exterior of the property; no staining was observed under the sea-can or on the remainder of the property. Additionally, a moderate-to-strong odour of petroleum products was observed within the sea-can. The odour is attributed to the gasoline and various automotive fluids off-gassing within the sea-can with little ventilation. No stressed vegetation was observed on the Phase I Property.

Through the completion of the records review, interviews, and site visit, BluMetric determined that although no spills have been reported for the property, and no obvious signs of impact were observed underneath or in the vicinity of the heating oil AST to the north of the building, this AST is an APEC (please see **Figure 2** in **Appendix A**) The location of the AST is an APEC because the building has been supplied with heating oil from an AST in this location since 1968, and it is possible that incidental spillage has occurred over the years. As such, BluMetric determined that surface soil sampling and analysis was warranted for the soil underneath the fuel oil AST.

The area of the sea-can was not determined to be an APEC as the staining to the floor of the sea-can is minor, no stressed vegetation or evidence of impact was observed under the sea-can, the sea-can has only been present on the property for a few years, and the sea-can is only used for storage of gasoline and automotive fluids, not for oil changes or repair work. The moderate-to-strong odour of petroleum products observed within the sea-can was attributed to the gasoline and various automotive fluids off-gassing within the sea-can with little ventilation.

6. HEATING OIL AST APEC INVESTIGATION

A member of BluMetric's staff completed the intrusive assessment of the heating oil AST located on the north side of the building on July 24, 2017. APEC 1 was assessed through the advancement of one test pit and the collection of one soil sample. The test pit and soil sample were field screened and submitted for laboratory analysis. The location of the APEC and the soil

sample location are presented on **Figure 2** in **Appendix A**. The following section details the findings of the intrusive assessment.

6.1 Health and Safety Plan, Quality Assurance/Quality Control, and Sample Integrity

The Health and Safety Plan (HASP) for this Phase I ESA and surficial soil sampling program was submitted and approved by the client prior to the initiation of the field portion of this project. The HASP is included within **Appendix D**.

The BluMetric Quality Assurance/Quality Control (QA/QC) program involved the collection of the soil sample into a sterile sample jar and the use of a Terra Core® sampler. The portion of the soil sample collected with the Terra Core® sampler was preserved with methanol as provided by the laboratory, and the soil sample was clearly labeled with a unique identification number. Once the sample was collected, it was stored in a cooler and kept chilled, then hand-delivered to the laboratory as soon as possible. Rigorous chain of custody documentation was completed and accompanied the shipment.

The sampling materials that were used were either new (Ziploc® bags, nitrile gloves, jars, vials) or cleaned before their respective use (stainless steel shovel and stainless steel trowel). Sampling equipment was cleaned using detergent (Alconox) mixed with tap water, and was thoroughly rinsed prior to the sampling event.

BluMetric utilized ALS Environmental (ALS) to analyze the soil sample collected and submitted for analysis from the Phase I Property. ALS is a Canadian Association for Laboratory Accreditation Inc. (CALA) –accredited laboratory. The CALA certification and the description of the QA/QC program for ALS are provided within **Appendix E**.

6.2 Intrusive Assessment of Heating Oil AST APEC

APEC 1 includes the area in the vicinity of the heating oil AST to the north of the building. The heating oil AST and piping was observed to be in good to excellent condition with no obvious leaks. No obvious signs of impact were observed to the ground surface underneath the AST either.

6.3 Field Screening

Field screening was completed using visual and olfactory means, as well as with a MiniRAE 3000 photoionization detector (PID). At the time of sample collection, the sample was split in the field with a portion placed in a new Ziploc® bag and allowed to sit for several minutes. BluMetric then measured the headspace of the Ziploc bag with the PID which resulted in the very low

detection of 2.9 parts per million (ppm). The soil from the test pits were examined visually for evidence of staining on the soil and for odours. No staining or odours were observed.

6.4 TEST PIT

As there were no obvious areas of impact in the vicinity of the heating oil AST, a test pit was dug by hand on the western side of the AST, underneath the valve. The test pit was advanced to a depth of 0.4 metres below the ground surface (mbgs). From the surface to 0.2 mbgs, the soil consisted of sandy silt, and from 0.2 to 0.4 mbgs, a clayey silt layer was present. As mentioned above, BluMetric did not observe odours or staining in the test pit, but did collect a soil sample (TU-A1-SS1) from the top of the clayey silt layer at 0.2 mbgs for laboratory analysis of BTEX and PHCs F1-F4. Upon completion, the test pit was backfilled with the excavated material.

6.5 LABORATORY RESULTS AND DISCUSSION

Laboratory results for PHCs were compared to the Canadian Council of Ministers of the Environment (CCME) Canada-Wide Standard (CWS) for PHCs (Tier 1 levels) and laboratory results for BTEX and PHCs were compared to the CCME Soil Quality Guidelines (SQGs). The guidelines applicable to residential/parkland land use, coarse grained soil texture, and surface soil were selected because:

- The Phase I Property and surrounding area are primarily residential in nature;
- Based on the field observations made during soil sampling, the predominate soil conditions are considered coarse textured; and,
- Soil samples are representative of depths less than 1.5 mbgs; the depth at which the CCME defines as surface soil (for PHCs BTEX only).

There were no regulatory guideline exceedances detected within the soil sample (TU-A1-SS1) collected from the Phase I Property. There was a slight detection of both PHC fractions F3 and F4, and the remainders of analytes were not detected at a concentration above the laboratory's method detection limits. These laboratory results corroborate the field observations and screening results [no odours or staining observed, and a slight detection (2.9 ppm) with the PID]. Laboratory analytical results in comparison to applicable Canadian Council of Ministers of the Environment (CCME) regulatory guidelines are presented in **Table 2,** and the Certificate of Analysis is provided within **Appendix E**.

Table 2: Analytical Results – Soil Sample (July 24, 2017)

Sample ID	Depth (mbg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	F1 PHCs (C6-C10) (mg/kg)	F2 PHCs (C10-C16) (mg/kg)	F3 PHCs (C16-C34) (mg/kg)	F4 PHCs (C34-C50) (mg/kg)
TU-A1-SS1	0.2	<0.005	<0.05	<0.01	<0.1	<10	<20	173	42
Reported Detection Limit (RDL)[1]		0.005	0.05	0.01	0.1	10	20	20	20
Regulation: Agricultural/Residential/Parkland (CCME)		**0.03**	**0.37**	**0.082**	**11**	**30**	**150**	**300**	**2800**
Regulation: Commercial/Industrial (CCME)		**0.03**	**0.37**	**0.082**	**11**	**320**	**260**	**1700**	**3300**

Notes:

= Concentration exceeds either the coarse-grained, Tier 1 levels, Canada Wide Standards (CWS) for PHCs in surface soil as established by the CCME, or the Soil Quality Guidelines (SQGs) for BTEX as established by the CCME.

[1] = The respective Reported Detection Limits of the laboratory are less than their respective applicable environmental quality criteria or standards, on which the numerical comparisons are based.

7. PHASE I ESA AND SURFICIAL SOIL SAMPLING CONCLUSIONS AND RECOMMENDATIONS

The Phase I Property was developed with the current residential building in 1968. The building has been utilized residentially since construction, and additionally as a bed and breakfast since 2013. Prior to construction of the building, the property appears to have been undeveloped. No vehicle or equipment repair or maintenance takes place on the Phase I Property. No documented spills were found for the Phase I Property.

During the site visit, BluMetric did observe some minor staining to the floor of the sea-can stored on the exterior of the property; no other staining was observed on the remainder of the property. Additionally, a moderate-to-strong odour of petroleum products was observed within the sea-can. The odour is attributed to the gasoline and various automotive fluids off-gassing within the sea-can with little ventilation. No stressed vegetation was observed on the Phase I Property.

Based on the age of the building, there is the potential for asbestos and lead-based paint to be present within some of the building materials. As such, a building materials survey should be completed prior to any renovation or demolition activities to ensure proper identification of any hazardous materials and establishment of adequate health and safety procedures and disposal requirements.

BluMetric assessed the area of the heating oil AST APEC through the advancement of one test pit and the collection of one soil sample. The soil sample was submitted for laboratory analysis for BTEX and PHCs F1-F4. The laboratory results were compared to their applicable CCME Tier 1 levels for PHCs and Environmental Quality Guidelines (EQGs) for BTEX, and were not detected at a concentration greater than any of their applicable regulatory criteria for any land use category.

Based on this assessment of the Phase I Property and surrounding properties, BluMetric does not recommend further work regarding the Phase I Property at this time.

8. CLOSURE AND LIMITING CONDITIONS

This Phase I ESA report was performed in accordance with the substance and intent of the Phase I ESA document produced by the Canadian Standards Association (*CSA Z768-01 and Update No. 1*).

The conclusions presented in this report represent our professional opinion and are based on the conditions observed on the dates set out in the report, the information available at the time this report was prepared, the scope of work, and any limiting conditions noted herein.

BluMetric provides no assurances regarding changes to conditions subsequent to the time of the assessment. BluMetric makes no warranty as to the accuracy or completeness of the information provided by others or of the conclusions and recommendations predicated on the accuracy of that information.

This report has been prepared for Public Services and Procurement Canada. Any use a third party makes of this report, any reliance on the report, or decisions based upon the report, are the responsibility of those third parties unless authorization is received from BluMetric in writing. BluMetric accepts no responsibility for any loss or damages suffered by any unauthorized third party as a result of decisions made or actions taken based on this report.

This report was written by Daniel Tucholski and reviewed by Paul Bandler of BluMetric Environmental Inc.

Respectfully submitted,
BluMetric Environmental Inc.

Daniel Tucholski, B.A.
Intermediate Environmental Scientist

Paul Bandler, M.Sc.
Senior Environmental Scientist

9. REFERENCES

Canada-wide Standards for Petroleum Hydrocarbons (PHC) in Soil. Canadian Council of Ministers of the Environment, 2008.

Canadian Environmental Quality Guidelines. Canadian Council of Ministers of the Environment, 2004.

Fulton, R.J., compiler, 1995: Surficial materials of Canada, Geological Survey of Canada, Map 1880A, Scale 1:5,000,000.

Heginbottom, J.A., 1995: Canada Permafrost, The National Atlas of Canada 5th Edition, Geological Survey of Canada, Scale 1:7,500,000.

APPENDIX A

Figures and Site Photographs

Photo 1: View of the northern side of the residence. Heating oil AST and APEC 1 to the left of the view.

Photo 2: View of the eastern side of the residence.

Photo 3: View of the southern side of the residence.

Photo 4: View of the western side of the residence and location of septic tank.

Photo 5: View of the sea-can.

Photo 6: View of the storage trailer and residence.

Photo 7: View of Mackenzie Drive and the north adjacent residential properties.

Photo 8: View of the east adjacent cemetery.

Photo 9: View of the south adjacent property.

Photo 10: View of the west adjacent property (includes the driveway used by the Phase I Property and a drainage ditch).

Photo 11: View of the master bedroom.

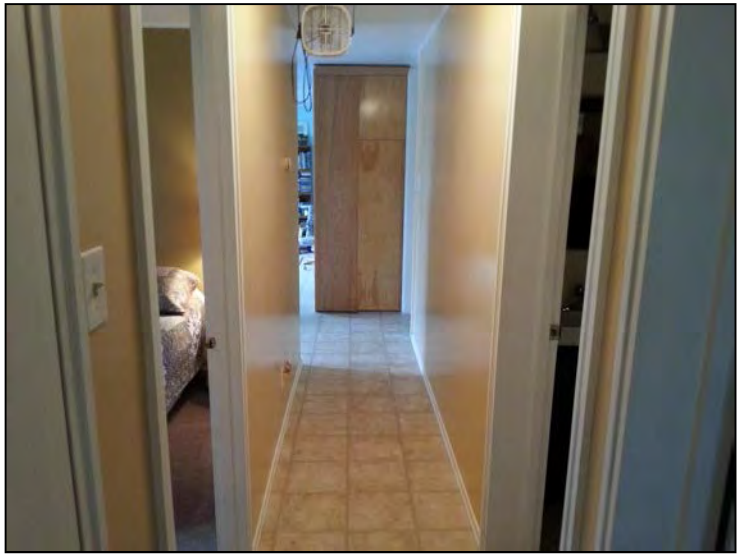

Photo 12: View of the hallway off the bedrooms, leading to the kitchen and living room area.

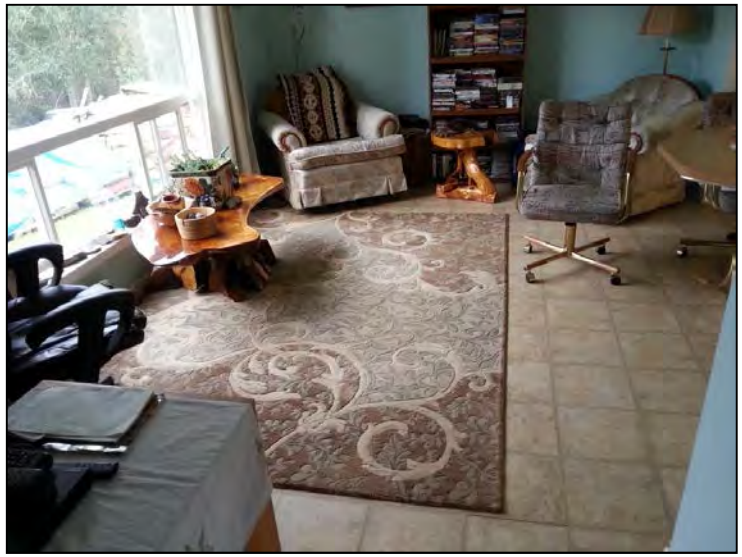

Photo 13: View of the living room.

Photo 14: View of the kitchen and dining area.

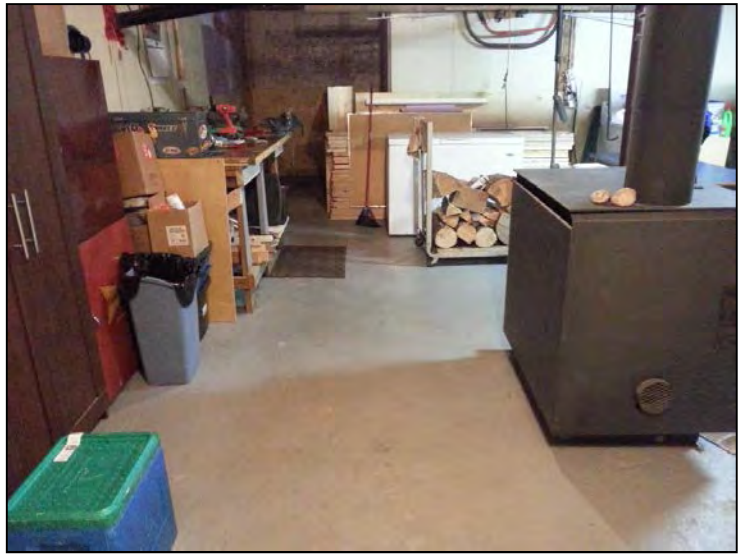

Photo 15: View of a portion of the basement with the wood stove, storage, and small work bench.

Photo 16: View of the potable water tank in the basement.

Photo 17: View of one of the two sleeping areas in the basement.

Photo 18: View of the heating oil-fueled furnace in the basement.

Photo 19: View of the stored materials and interior of the sea-can.

Photo 20: View of the stored materials and interior of the storage trailer.

Photo 21: View of an ATV, a portion of an ATV, and a portion of a motorcyle near the sea-can.

Photo 22: View of the three stored snowmobiles and an ATV .

Photo 23: View of the lawnmower and stored materials under the deck off of the southern side of the building.

Photo 24: View of the minor staining to the floor of the sea-can.

Photo 25: View of the western side of the heating oil AST, piping, and area underneath.

Photo 26: View of the location of the test pit dug underneath the valve of the heating oil AST.

Photo 27: View of the test pit and piping.

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
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REFERENCES

DO NOT SCALE DRAWING.
THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS.

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CLIENT

PUBLIC SERVICES AND PROCUREMENT CANADA – ENVIRONMENTAL SERVICES

PROJECT

PHASE I ENVIRONMENTAL SITE ASSESSMENT AND SURFICIAL SAMPLING

TITLE

SITE LOCATION

BluMetric™ Environmental

4916 49th Street,
PO Box 11086
Yellowknife, NT, X1A 1P3
TEL: (867) 873-3500
FAX: (867) 873-3499
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE		
170529	August 23, 2017		
DRAWN	CHECKED	FIG NO.	REV
IB	DT	01	0

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LEGEND

- Soil Sample
- 250m Buffer
- Phase I Property Boundary

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1				

REFERENCES

DO NOT SCALE DRAWING.
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CLIENT

PUBLIC SERVICES AND PROCUREMENT CANADA – ENVIRONMENTAL SERVICES

PROJECT

PHASE I ENVIRONMENTAL SITE ASSESSMENT AND SURFICIAL SAMPLING

TITLE

SITE PLAN

BluMetric™ Environmental
4916 49th Street,
PO Box 11086
Yellowknife, NT, X1A 1P3
TEL: (867) 873-3500
FAX: (867) 873-3499
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE		
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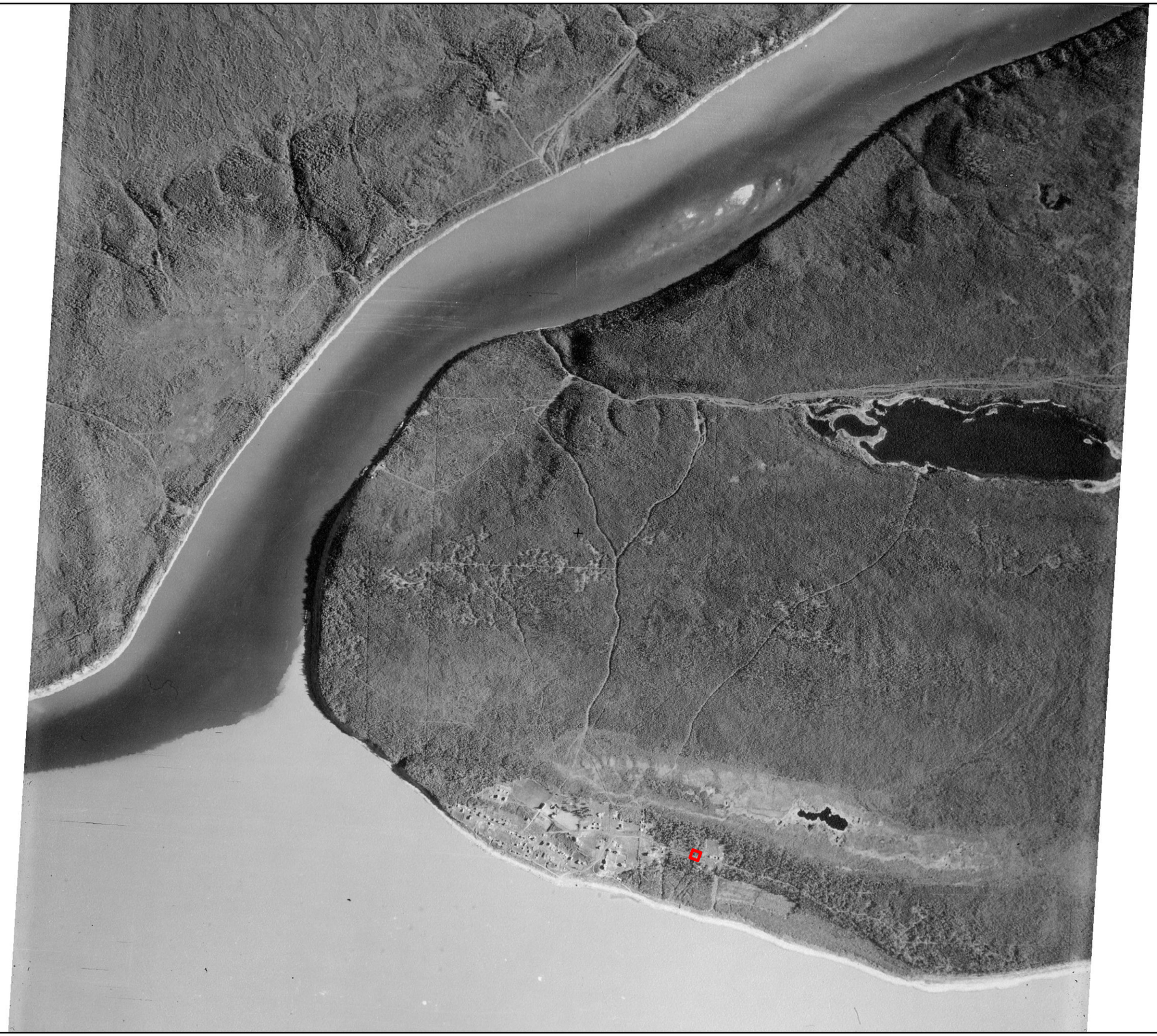

LEGEND

Phase I Property Boundary

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REFERENCES

DO NOT SCALE DRAWING.
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CLIENT

PUBLIC SERVICES AND PROCUREMENT CANADA – ENVIRONMENTAL SERVICES

PROJECT

PHASE I ENVIRONMENTAL SITE ASSESSMENT AND SURFICIAL SAMPLING

TITLE

1945 AERIAL PHOTOGRAPH

BluMetric™ Environmental
4916 49th Street,
PO Box 11086
Yellowknife, NT, X1A 1P3
TEL: (867) 873-3500
FAX: (867) 873-3499
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE
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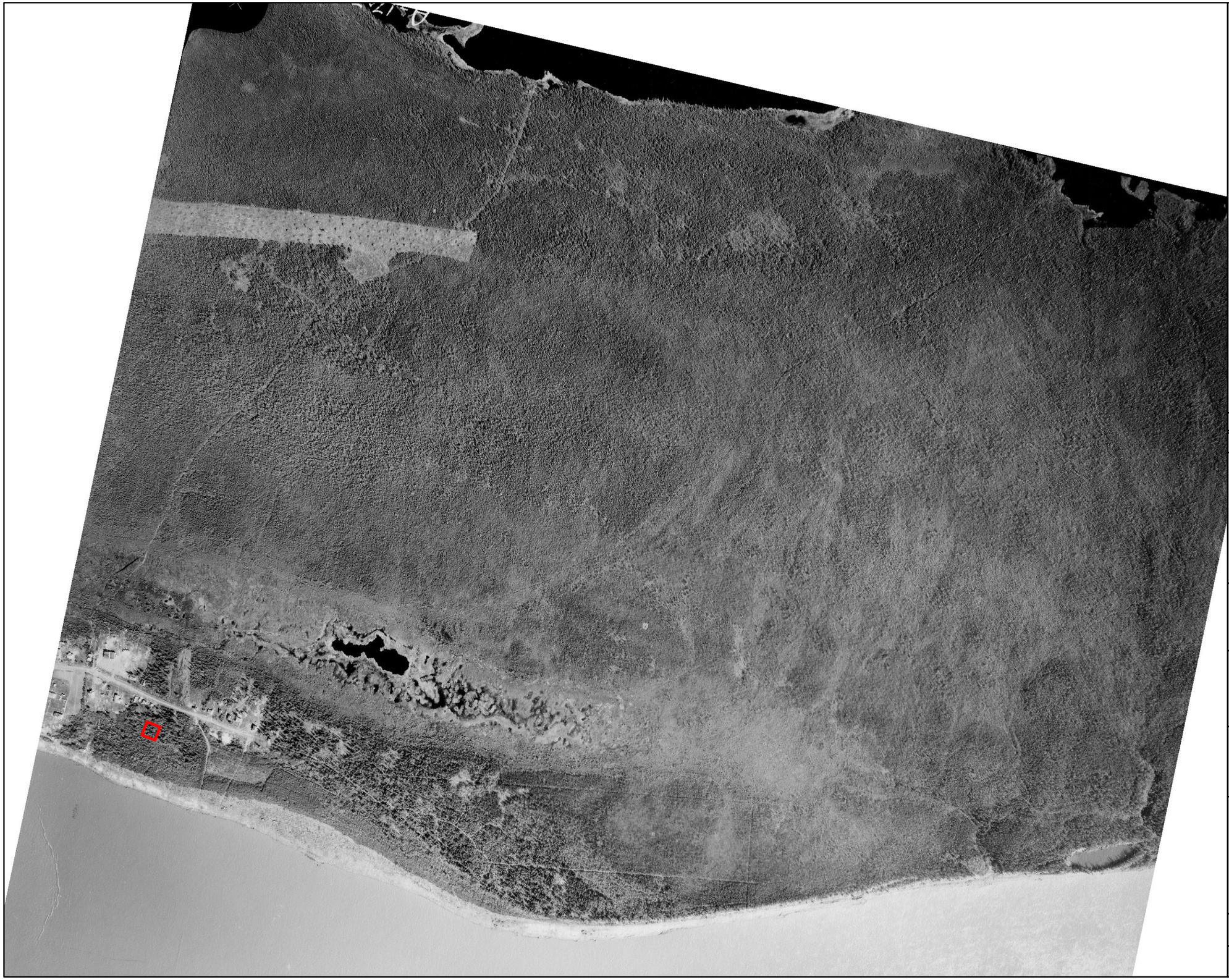

LEGEND

Phase I Property Boundary

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REFERENCES

DO NOT SCALE DRAWING.
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CLIENT

PUBLIC SERVICES AND PROCUREMENT CANADA – ENVIRONMENTAL SERVICES

PROJECT

PHASE I ENVIRONMENTAL SITE ASSESSMENT AND SURFICIAL SAMPLING

TITLE

1961 AERIAL PHOTOGRAPH

BluMetric™ Environmental

4916 49th Street,
PO Box 11086
Yellowknife, NT, X1A 1P3
TEL: (867) 873-3500
FAX: (867) 873-3499
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE		
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LEGEND

Phase I Property Boundary

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CLIENT

PUBLIC SERVICES AND PROCUREMENT CANADA – ENVIRONMENTAL SERVICES

PROJECT

PHASE I ENVIRONMENTAL SITE ASSESSMENT AND SURFICIAL SAMPLING

TITLE

1969 AERIAL PHOTOGRAPH

BluMetric™ Environmental
4916 49th Street,
PO Box 11086
Yellowknife, NT, X1A 1P3
TEL: (867) 873-3500
FAX: (867) 873-3499
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE		
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LEGEND

Phase I Property Boundary

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REFERENCES

DO NOT SCALE DRAWING.
THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS.

N W E S

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CLIENT

PUBLIC SERVICES AND PROCUREMENT CANADA – ENVIRONMENTAL SERVICES

PROJECT

PHASE I ENVIRONMENTAL SITE ASSESSMENT AND SURFICIAL SAMPLING

TITLE

1980 AERIAL PHOTOGRAPH

BluMetric™ Environmental

4916 49th Street,
PO Box 11086
Yellowknife, NT, X1A 1P3
TEL: (867) 873-3500
FAX: (867) 873-3499
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE
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DRAWN	CHECKED	FIG NO.	REV
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LEGEND

Phase I Property Boundary

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REFERENCES

DO NOT SCALE DRAWING.
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CLIENT

PUBLIC SERVICES AND PROCUREMENT CANADA – ENVIRONMENTAL SERVICES

PROJECT

PHASE I ENVIRONMENTAL SITE ASSESSMENT AND SURFICIAL SAMPLING

TITLE

1993 AERIAL PHOTOGRAPH

BluMetric™ Environmental
4916 49th Street,
PO Box 11086
Yellowknife, NT, X1A 1P3
TEL: (867) 873-3500
FAX: (867) 873-3499
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE
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DRAWN	CHECKED	FIG NO.	REV
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LEGEND

Phase I Property Boundary

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
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REFERENCES

THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS.

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CLIENT

PUBLIC SERVICES AND PROCUREMENT CANADA – ENVIRONMENTAL SERVICES

PROJECT

PHASE I ENVIRONMENTAL SITE ASSESSMENT AND SURFICIAL SAMPLING

TITLE

2004 AERIAL PHOTOGRAPH

BluMetric™ Environmental
4916 49th Street,
PO Box 11086
Yellowknife, NT, X1A 1P3
TEL: (867) 873-3500
FAX: (867) 873-3499
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE
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DRAWN	CHECKED	FIG NO.	REV
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LEGEND

Phase I Property Boundary

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
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REFERENCES

DO NOT SCALE DRAWING.
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CLIENT

PUBLIC SERVICES AND PROCUREMENT CANADA – ENVIRONMENTAL SERVICES

PROJECT

PHASE I ENVIRONMENTAL SITE ASSESSMENT AND SURFICIAL SAMPLING

TITLE

2011 AERIAL PHOTOGRAPH

BluMetric™ Environmental
4916 49th Street,
PO Box 11086
Yellowknife, NT, X1A 1P3
TEL: (867) 873-3500
FAX: (867) 873-3499
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE
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APPENDIX B

Records Review Documentation

Implied Reservations

The title to land mentioned in this certificate is, unless otherwise indicated on the certificate of title, subject to the following reservations, which are more particularly set out in section 69 of the *Land Titles Act*:

- subsisting reservations or exceptions in the original grant of the land;
- unpaid taxes, unregistered tax sale transfers and claims of lien for property tax arrears;
- public highways, rights-of-way and other public easements;
- certain leases or agreements to lease for a term not exceeding three years;
- decrees, orders or writs filed and in force;
- rights of expropriation.

Conditions implicates

Le titre de bien-fonds mentionné dans le présent certificat de titre est, à moins d'indications contraires prévues au certificat, assujetti aux conditions suivantes, lesquelles sont précisées à l'article 69 de la Loi sur les titres de biens-fonds:

- *toutes reserves ou exceptions existantes contenues dans la concession primitive du biens-fonds;*
- *toutes taxes non payées, tout acte de vente pour défault de paiement de l'impôt foncier non enregistré et toutes revendications de privilége quant au paiement d'arriérés d'impôt foncier;*
- *tout chemin public, droit de passage ou servitude publique;*
- *certains baux ou conventions de bail pour une période maximale de trois ans;*
- *tous décrets, ordonnances ou brefs déposés et maintenus en vigueur;*
- *tous droits d'expropriation.*

Crown Grant Concession de la Couronne	91 & 161,805
Pursuant To *En vertu de*	180,251
Previous Title *Titre précédent*	67320
Value (optional) *Valeur (optionnel)*	$93,000.00

CERTIFICATE No. – *CERTIFICAT N°*

73267

Land Titles Act

Certificate of Title (General)

NORTHWEST TERRITORIES
REGISTRATION DISTRICT

Northwest Territories

Loi sur les titres de biens-fonds

Certificat de titre (Général)

CIRCONSCRIPTION D'ENREGISTREMENT DES TERRITOIRES DU NORD-OUEST

This is to Certify that

***Les présentes attestent** que*

RONALD GLEN OE and WENDY DIANNE OE, both of the City of Grande Prairie in the Province of Alberta,

as joint tenants and not as tenants-in-common,

is (are) now the owner (s) of an estate in fee simple of and in

est (sont) actuellement le(s) propriétaire(s) d'un domaine en fief simple sur le(s) bien(s)-fonds suivant(s)

LOT 198

PLAN 3554

TULITA

reserving to Her Majesty the Queen in Right of Canada all mines and minerals, whether solid, liquid or gaseous, and the right to work the same and reserving unto the Commissioner of the Northwest Territories the reservations and exceptions contained in the *Commissioner's Land Act* and the Commissioner's Land Regulations as set forth in Notification registered under daybook number 161,805, and,

subject to the provisions of the *Land Titles Act*, and the encumbrances and interests listed on this certificate.

sous réserve de la Loi sur les titres de biens-fonds, et des charges et intérêts énoncés au présent certificat.

Postal Address of owner
Adresse postale du propriétaire

P.O. Box 23131
RPO Prairie Mall
Grande Prairie AB T8V 7G7

Signed and sealed
Signé et scellé

2013-01-17

REGISTRAR
REGISTRATEUR

Northwest Territories Registration District
circonscription d'enregistrement des Territoires du Nord-Ouest

CERTIFICATE OF TITLE NO.: / *CERTIFICAT DE TITRE N°* : **73267**

NAME / *NOM* RONALD GLEN OE and WENDY DIANNE OE

LAND / *BIENS-FONDS* LOT 198, PLAN 3554, TULITA

ABBREVIATIONS – *ABRÉVIATIONS*

C - CAVEAT / *OPPOSITION*
D - DECLARATION / *DÉCLARATION*
Tr - TRANSMISSION / *TRANSMISSION*
B - BYLAWS / *RÈGLEMENT ADMINISTRATIF*
Tfr - TRANSFER / *TRANSPORT*
CL - CLAIM OF LIEN / *REVENDIC. DE PRIVILÈGE*
Mtge - MORTGAGE / *HYPOTHÈQUE*
E - EASEMENT / *SERVITUDE*
O-I-C - ORDER IN COUNCIL / *DÉCRET DU GOUVERNEUR EN CONSEIL*
URW - UTILITY RIGHT OF WAY / *SERVITUDE D'UTILITÉ PUBLIQUE*

ABBREVIATIONS – *ABRÉVIATIONS*

L - LEASE / *BAIL*
MC - MINISTER'S CAVEAT / *OPPOSITION DU MINISTRE*
WE - WRIT OF EXECUTION / *BREF DE SAISIE EXÉCUTION*
A of B – AMENDMENT OF BYLAWS / *MODIFICATION DES REGLEMENTS ADMINISTRATIFS*
LP - CERTIFICATE OF LIS PENDENS / *CERTIF D'AFFAIRE EN INSTANCE*
NSI – NOTICE OF SECURITY INTEREST / *AVIS DE SÛRETÉ*

ENCUMBRANCES AND INTERESTS – *CHARGES ET INTÉRÊTS*

NATURE – *GENRE* OF *DE* DOCUMENT	REGISTRATION – *ENREGISTREMENT* NO. - *N°*	DATE Y-A	M-M	D-J	AMOUNT–*MONTANT* $	PARTICULARS - *PRÉCISIONS*	SIGNATURE OF REGISTRAR *DU REGISTRATEUR*	DISCHARGES & WITHDRAWALS – *MAINLEVÉES & RETRAITS* REGISTRATION - *ENREGISTREMENT* NO. - *N°*	DATE Y-A	M-M	D-J	SIGNATURE OF REGISTRAR *DU REGISTRATEUR*
MTGE	162,039	2008	11	13	$89,964.00	to CIBC MORTGAGES INC.	"KR"	180,700	2013	03	07	
MTGE	180,252	2013	01	17	$113,473.00	to THE TORONTO-DOMINION BANK						

ENVIRONMENTAL RISK INFORMATION SERVICES

DATABASE REPORT

Project Property:	*Tulita Phase I ESA* *28 Mackenzie Dr* *Tulita NT X0E0K0*
Project No:	*170529*
Report Type:	*Standard Report NT,NU*
Order No:	*20170710366*
Requested by:	*BluMetric Environmental Inc.*
Date Completed:	*July 17, 2017*

Environmental Risk Information Services
A division of Glacier Media Inc.
P: 1.866.517.5204
E: info@erisinfo.com

www.erisinfo.com

Table of Contents

Executive Summary

Property Information:

Project Property:	*Tulita Phase I ESA* *28 Mackenzie Dr Tulita NT X0E0K0*
Project No:	*170529*

Coordinates:

Latitude:	*64.900263*
Longitude:	*-125.569448*
UTM Northing:	*7,199,808.68*
UTM Easting:	*378,407.92*
UTM Zone:	*UTM Zone 10W*

Elevation:	*34 FT* *10.50 M*

Order Information:

Order No:	*20170710366*
Date Requested:	*July 10, 2017*
Requested by:	*BluMetric Environmental Inc.*
Report Type:	*Standard Report NT,NU*

Historical/Products:

Aerial Photographs	*National Collection - Digital (PDF)*

Executive Summary: Report Summary

Database	Name	Searched	Project Property	Within 0.25 km	Total
AUWR	Automobile Wrecking & Supplies	Y	0	0	0
CFST	Crown Land Fuel Storage Tanks	Y	0	0	0
CHEM	Chemical Register	Y	0	0	0
CNG	Compressed Natural Gas Stations	Y	0	0	0
EHS	ERIS Historical Searches	Y	0	0	0
EIIS	Environmental Issues Inventory System	Y	0	0	0
FCON	Federal Convictions	Y	0	0	0
FCS	Contaminated Sites on Federal Land	Y	0	0	0
GHG	Greenhouse Gas Emissions from Large Facilities	Y	0	0	0
IAFT	Indian & Northern Affairs Fuel Tanks	Y	0	0	0
MINE	Canadian Mine Locations	Y	0	0	0
MNR	Mineral Occurrences	Y	0	0	0
NATE	National Analysis of Trends in Emergencies System (NATES)	Y	0	0	0
NDFT	National Defense & Canadian Forces Fuel Tanks	Y	0	0	0
NDSP	National Defense & Canadian Forces Spills	Y	0	0	0
NDWD	National Defence & Canadian Forces Waste Disposal Sites	Y	0	0	0
NEBI	National Energy Board Pipeline Incidents	Y	0	0	0
NEBW	National Energy Board Wells	Y	0	0	0
NEES	National Environmental Emergencies System (NEES)	Y	0	0	0
NOGW	Northwest Territories Oil and Gas Wells	Y	0	0	0
NPCB	National PCB Inventory	Y	0	0	0
NPRI	National Pollutant Release Inventory	Y	0	0	0
OGW	Oil and Gas Wells	Y	0	0	0
PCFT	Parks Canada Fuel Storage Tanks	Y	0	0	0
RST	Retail Fuel Storage Tanks	Y	0	0	0
SCT	Scott's Manufacturing Directory	Y	0	0	0
SPL	Spills	Y	0	0	0
WWIS	Water Well Information System	Y	0	0	0
		Total:	0	0	0

Executive Summary: Site Report Summary - Project Property

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev diff (m)	Page Number

No records found in the selected databases for the project property.

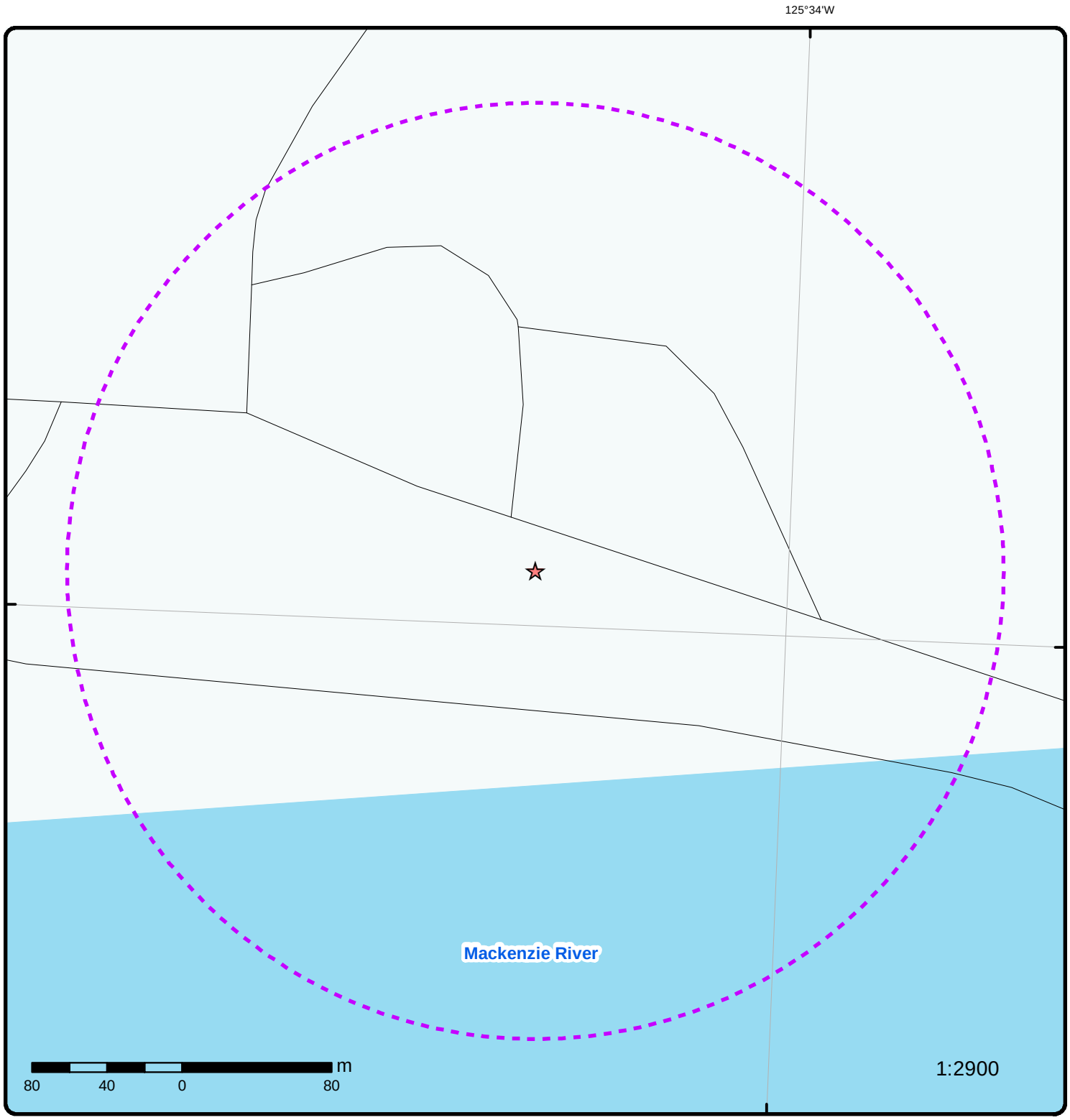
Executive Summary: Site Report Summary - Surrounding Properties

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number

No records found in the selected databases for the surrounding properties.

Executive Summary: Summary By Data Source

No records found in the selected databases for the project property or surrounding properties.



Map : 0.25 Kilometer Radius

Order No: 20170710366

Address: 28 Mackenzie Dr, Tulita, NT, X0E0K0

ENVIRONMENTAL RISK INFORMATION SERVICES

- Project Property
- Buffer Outline
- Eris Sites with Higher Elevation
- Eris Sites with Same Elevation
- Eris Sites with Lower Elevation
- Eris Sites with Unknown Elevation

- Expressway
- Principal Highway
- Secondary Highway
- Major Road
- Local road
- Trail
- Proposed Road
- Ferry Route/Ice Road

- Industrial and Resource - Regions
- Main Line
- Sidetrack
- Transit Line
- Abandoned Line

- National Park
- Provincial or Territorial Park
- Other Park
- Golf Course or Driving Range
- Park or Sports Field
- Other Recreation Area

Source: © 2015 DMTI Spatial Inc.

125°34'30"W

125°33'W

64°54'N

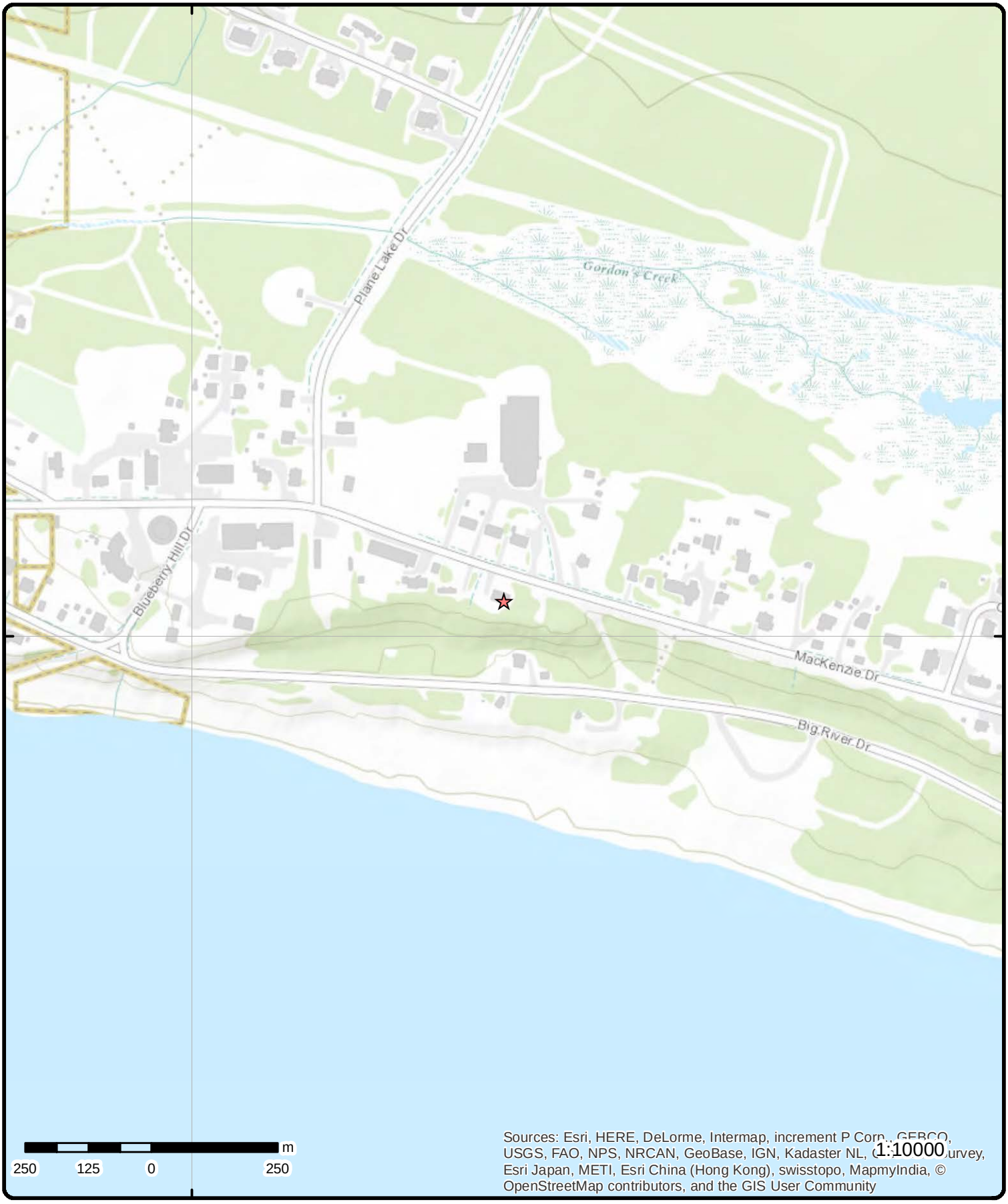
64°54'N

Aerial

Order No: 20170710366

Address: 28 Mackenzie Dr, Tulita, NT, X0E0K0

Source: ESRI World Imagery



Topographic Map

Address: 28 Mackenzie Dr, Tulita, NT, X0E0K0

Source: ESRI World Topographic Map

Order No: 20170710366

ERIS ENVIRONMENTAL RISK INFORMATION SERVICES

Detail Report

Map Key	Number of Records	Direction/ Distance (m)	Elevation (m)	Site	DB

No records found in the selected databases for the project property or surrounding properties.

Unplottable Summary

Total: 18 Unplottable sites

DB	Company Name/Site Name	Address	City	Postal
IAFT		Lot 31, Blk 28	Inuvik NT	
SPL	Canadian Helicopters	3 Nautical Miles NW of Tulita	Tulita NT	
SPL	Hansen Petroleum	Bonnet Plume Rd, Centennial St & Inuit Rd	Inuvik NT	
SPL		Tulita, NT	Tulita NT	
SPL		Residents of 3B Tulita Street	Tulita NT	
SPL		Duplex Trailer Unit #13 Lot 21644 - SK-359 Mackenziedr., Tulita, NT	Tulita NT	
SPL		NWT Power Corp Tulita - inside plate	Tulita NT	
SPL		PO Box 90 Tulita NWT X0E 0K0, 53 Mackenzie Drive	Tulita NT	
SPL		Little Bear Staging Area - 13 Km south of Tulita	- NT	
SPL		KP 123, approx 43 Km South of Tulita	- NT	
SPL		Tulita Airport	Tulita NT	
SPL	Della	Unit #60 Tulita	Tulita NT	
SPL	RCMP	Tulita RCMP Detachment	Tulita NT	
SPL	NWTPC	310 Tulita Power Plant	Tulita NT	
SPL	Great Slave Helicopters	Tulita Airport Apron	Tulita NT	
SPL	Unknown	Tulita Airport	Tulita NT	
SPL	Hamlet of Tulita	North side of Hamlet Shop	Tulita NT	
SPL	Formula Transport	Mackenzie River Ice Crossing near Tulita	- NT	

Unplottable Report

Site:
Lot 31, Blk 28 Inuvik NT

Database:
IAFT

Owner/Operator:
Reserve Name:
Site No.: 21089
Facility Type:: Office
Installed Date:
Tank Type:: Exterior / Above Ground
Tank Desc::
Tank No::
Tank Material::
Contents::
Capacity:: 500 Gallons
Current Status::

Site: ***Canadian Helicopters***
3 Nautical Miles NW of Tulita Tulita NT

Database:
SPL

Spill No: 1999139
Commodity: Jet B
Quantity(L/KG): 410 L
Source: Drum or Barrel
Spill Date: 1999-10-15

Agency: Indian and Northern Affairs Canada
Region: Sahtu
Location: Tulita
Description: 3 Nautical Miles NW of Tulita

Site: ***Hansen Petroleum***
Bonnet Plume Rd, Centennial St & Inuit Rd Inuvik NT

Database:
SPL

Spill No: 1995125
Commodity: Heating Oil
Quantity(L/KG): 100 L
Source: Truck
Spill Date: 1995-08-02

Agency: Government of Northwest Territories
Region: Inuvik
Location: Inuvik
Description: Bonnet Plume Rd, Centennial St & Inuit Rd

Site:
Tulita, NT Tulita NT

Database:
SPL

Spill No: 2016222
Commodity: Heating Fuel (Diesel)
Quantity(L/KG): 0 L
Source: Storage Tank <4000 litres
Spill Date: 2016-06-14

Agency: Government of Northwest Territories
Region: Sahtu
Location: Tulita
Description: Tulita, NT

Site:
Residents of 3B Tulita Street Tulita NT

Database:
SPL

Spill No: 2016298
Commodity: Greywater/Wastewater
Quantity(L/KG): 100 L
Source: Pipe or Line
Spill Date: 2016-08-19

Agency: Government of Northwest Territories
Region: Sahtu
Location: Tulita
Description: Residents of 3B Tulita Street

Site:
Duplex Trailer Unit #13 Lot 21644 - SK-359 Mackenziedr., Tulita, NT Tulita NT

Database: ***SPL***

Spill No:	2016006	***Agency:***	Government of Northwest Territories
Commodity:	Fuel	***Region:***	Sahtu
Quantity(L/KG):	20 L	***Location:***	Tulita
Source:	Unkown	***Description:***	Duplex Trailer Unit #13 Lot 21644 - SK-359 Mackenziedr., Tulita, NT
Spill Date:	2016-01-07		

Site:
NWT Power Corp Tulita - inside plate Tulita NT

Database: ***SPL***

Spill No:	2015469	***Agency:***	Government of Northwest Territories
Commodity:	Glycol	***Region:***	Sahtu
Quantity(L/KG):	208 L	***Location:***	Tulita
Source:	INST	***Description:***	NWT Power Corp Tulita - inside plate
Spill Date:	2015-11-19		

Site:
PO Box 90 Tulita NWT X0E 0K0, 53 Mackenzie Drive Tulita NT

Database: ***SPL***

Spill No:	2015408	***Agency:***	Government of Northwest Territories
Commodity:	Sewage	***Region:***	Sahtu
Quantity(L/KG):	0 L	***Location:***	Tulita
Source:	Storage Tank <4000 litres	***Description:***	PO Box 90 Tulita NWT X0E 0K0, 53 Mackenzie Drive
Spill Date:	2015-09-28		

Site:
Little Bear Staging Area - 13 Km south of Tulita - NT

Database: ***SPL***

Spill No:	2012447	***Agency:***	Indian and Northern Affairs Canada
Commodity:	Treated Sewage Effluent	***Region:***	Sahtu
Quantity(L/KG):	175 L	***Location:***	-
Source:	Storage Tank <4000 litres	***Description:***	Little Bear Staging Area - 13 Km south of Tulita
Spill Date:	2012-11-23		

Site:
KP 123, approx 43 Km South of Tulita - NT

Database: ***SPL***

Spill No:	2011399	***Agency:***	National Energy Board
Commodity:	Propane	***Region:***	Sahtu
Quantity(L/KG):	0 m3	***Location:***	-
Source:	Storage Tank <4000 litres	***Description:***	KP 123, approx 43 Km South of Tulita
Spill Date:	2011-10-13		

Site:
Tulita Airport Tulita NT

Database: ***SPL***

Spill No:	2013387	***Agency:***	Government of Northwest Territories
Commodity:	Waste Oil	***Region:***	Sahtu
Quantity(L/KG):	0 L	***Location:***	Tulita
Source:	Drum or Barrel	***Description:***	Tulita Airport
Spill Date:	2013-11-22		

Site: ***Della***
Unit #60 Tulita Tulita NT

Database: ***SPL***

Spill No:	2010163	***Agency:***	Government of Northwest Territories
Commodity:	Heating Fuel	***Region:***	Sahtu

Quantity(L/KG): 250 L
Source: Storage Tank <4000 litres
Spill Date: 2010-05-15

Location: Tulita
Description: Unit #60 Tulita

Site: ***RCMP***
Tulita RCMP Detachment Tulita NT

Database: ***SPL***

Spill No: 2010149
Commodity: Heating Oil
Quantity(L/KG): 100 L
Source: Storage Tank <4000 litres
Spill Date: 2010-05-06

Agency: Environmental Protection Service
Region: Sahtu
Location: Tulita
Description: Tulita RCMP Detachment

Site: ***NWTPC***
310 Tulita Power Plant Tulita NT

Database: ***SPL***

Spill No: 2006443
Commodity: XD3 15W40
Quantity(L/KG): 120 L
Source: Other Transportation
Spill Date: 2006-12-20

Agency: Government of Northwest Territories
Region: Sahtu
Location: Tulita
Description: 310 Tulita Power Plant

Site: ***Great Slave Helicopters***
Tulita Airport Apron Tulita NT

Database: ***SPL***

Spill No: 2005552
Commodity: Jet B
Quantity(L/KG): 5 L
Source: Aircraft
Spill Date: 2005-12-15

Agency: Government of Northwest Territories
Region: Sahtu
Location: Tulita
Description: Tulita Airport Apron

Site: ***Unknown***
Tulita Airport Tulita NT

Database: ***SPL***

Spill No: 2005224
Commodity: Diesel Fuel
Quantity(L/KG): 205 L
Source: Drum or Barrel
Spill Date: 2005-05-06

Agency: Government of Northwest Territories
Region: Sahtu
Location: Tulita
Description: Tulita Airport

Site: ***Hamlet of Tulita***
North side of Hamlet Shop Tulita NT

Database: ***SPL***

Spill No: 2004617
Commodity: Stove Oil
Quantity(L/KG): 60 L
Source: Storage Tank <4000 litres
Spill Date: 2004-10-06

Agency: Government of Northwest Territories
Region: Sahtu
Location: Tulita
Description: North side of Hamlet Shop

Site: ***Formula Transport***
Mackenzie River Ice Crossing near Tulita - NT

Database: ***SPL***

Spill No: 2004107
Commodity: Hydraulic Oil
Quantity(L/KG): 45 L
Source: Truck
Spill Date: 2004-02-21

Agency: Indian and Northern Affairs Canada
Region: Sahtu
Location: -
Description: Mackenzie River Ice Crossing near Tulita

Appendix: Database Descriptions

Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update. ***Note:*** *Databases denoted with " * " indicates that the database will no longer be updated. See the individual database description for more information.*

Automobile Wrecking & Supplies: Private AUWR

This database provides an inventory of known locations that are involved in the scrap metal, automobile wrecking/recycling, and automobile parts & supplies industry. Information is provided on the company name, location and business type.

Government Publication Date: 1999 - Oct 2016

Crown Land Fuel Storage Tanks: Territorial CFST

The Department of Indian and Northern Affairs Canada mandates that all fuel storage tanks on Crown Land be recorded, when an individual applies for a land use permit or surface lease. Please note that there are numerous records in the database where the "Commencement Date" is previous to 1997. However, since INAC only began registering tank locations in 1997, any tanks installed previous to that may or may not be in the database, due to lack of regulations. Note the following descriptions: Commencement Date is the original file date, Fuel Application Date is the date an application was submitted for a tank, and the Fuel Confirmation Date is the date the department accepted the application and confirmed the information submitted.

Government Publication Date: Oct 1997-Jun 2009

Chemical Register: Private CHEM

This database includes a listing of locations of facilities within the Province or Territory that either manufacture and/or distributes chemicals.

Government Publication Date: 1999 - Oct 2016

Compressed Natural Gas Stations: Private CNG

Canada has a network of public access compressed natural gas (CNG) refuelling stations. These stations dispense natural gas in compressed form at 3,000 pounds per square inch (psi), the pressure which is allowed within the current Canadian codes and standards. The majority of natural gas refuelling is located at existing retail gasoline that have a separate refuelling island for natural gas. This list of stations is made available by the Canadian Natural Gas Vehicle Alliance.

Government Publication Date: Dec 31, 2012

ERIS Historical Searches: Private EHS

ERIS has compiled a database of all environmental risk reports completed since March 1999. Available fields for this database include: site location, date of report, type of report, and search radius. As per all other databases, the ERIS database can be referenced on both the map and "Statistical Profile" page.

Government Publication Date: 1999-Aug 2016

Environmental Issues Inventory System: Federal EIIS

The Environmental Issues Inventory System was developed through the implementation of the Environmental Issues and Remediation Plan. This plan was established to determine the location and severity of contaminated sites on inhabited First Nation reserves, and where necessary, to remediate those that posed a risk to health and safety; and to prevent future environmental problems. The EIIS provides information on the reserve under investigation, inventory number, name of site, environmental issue, site action (Remediation, Site Assessment), and date investigation completed.

Government Publication Date: 1992-2001*

Federal Convictions: Federal FCON

Environment Canada maintains a database referred to as the "Environmental Registry" that details prosecutions under the Canadian Environmental Protection Act (CEPA) and the Fisheries Act (FA). Information is provided on the company name, location, charge date, offence and penalty.

Government Publication Date: 1988-Jun 2007*

Contaminated Sites on Federal Land: Federal FCS

The Federal Contaminated Sites Inventory includes information on known federal contaminated sites under the custodianship of departments, agencies and consolidated Crown corporations as well as those that are being or have been investigated to determine whether they have contamination arising from past use that could pose a risk to human health or the environment. The inventory also includes non-federal contaminated sites for which the Government of Canada has accepted some or all financial responsibility. It does not include sites where contamination has been caused by, and which are under the control of, enterprise Crown corporations, private individuals, firms or other levels of government.

Government Publication Date: Jun 2000-Mar 2017

Greenhouse Gas Emissions from Large Facilities: Federal GHG

List of greenhouse gas emissions from large facilities made available by Environment Canada. Greenhouse gas emissions in kilotonnes of carbon dioxide equivalents (kt CO2 eq).

Government Publication Date: 2013-Dec 2015

Indian & Northern Affairs Fuel Tanks: Federal IAFT

The Department of Indian & Northern Affairs Canada (INAC) maintains an inventory of aboveground & underground fuel storage tanks located on both federal and crown land. Our inventory provides information on the reserve name, location, facility type, site/facility name, tank type, material & ID number, tank contents & capacity, and date of tank installation.

Government Publication Date: 1950-Aug 2003*

Canadian Mine Locations: Private MINE

This information is collected from the Canadian & American Mines Handbook. The Mines database is a national database that provides over 290 listings on mines (listed as public companies) dealing primarily with precious metals and hard rocks. Listed are mines that are currently in operation, closed, suspended, or are still being developed (advanced projects). Their locations are provided as geographic coordinates (x, y and/or longitude, latitude). As of 2002, data pertaining to Canadian smelters and refineries has been appended to this database.

Government Publication Date: 1998-2009*

Mineral Occurrences: Territorial MNR

The C.S. Lord Northern Geoscience Centre maintains a database of mineral showings (commodity occurrences) for both the Northwest Territories and Nunavut. The database provides Showing ID, latitude, longitude, Showing Name, commodity type, current development stage, and general comments on lithology, mineralization and geological settings.

Government Publication Date: Mar 31, 2017

National Analysis of Trends in Emergencies System (NATES): Federal NATE

In 1974 Environment Canada established the National Analysis of Trends in Emergencies System (NATES) database, for the voluntary reporting of significant spill incidents. The data was to be used to assist in directing the work of the emergencies program. NATES ran from 1974 to 1994. Extensive information is available within this database including company names, place where the spill occurred, date of spill, cause, reason and source of spill, damage incurred, and amount, concentration, and volume of materials released.

Government Publication Date: 1974-1994*

National Defense & Canadian Forces Fuel Tanks: Federal NDFT

The Department of National Defense and the Canadian Forces maintains an inventory of all aboveground & underground fuel storage tanks located on DND lands. Our inventory provides information on the base name, location, tank type & capacity, tank contents, tank class, date of tank installation, date tank last used, and status of tank as of May 2001. This database will no longer be updated due to the new National Security protocols which have prohibited any release of this database.

Government Publication Date: Up to May 2001*

National Defense & Canadian Forces Spills: Federal NDSP

The Department of National Defense and the Canadian Forces maintains an inventory of spills to land and water. All spill sites have been classified under the "Transportation of Dangerous Goods Act - 1992". Our inventory provides information on the facility name, location, spill ID #, spill date, type of spill, as well as the quantity of substance spilled & recovered.

Government Publication Date: Mar 1999-Aug 2010

National Defence & Canadian Forces Waste Disposal Sites: Federal NDWD

The Department of National Defence and the Canadian Forces maintains an inventory of waste disposal sites located on DND lands. Where available, our inventory provides information on the base name, location, type of waste received, area of site, depth of site, year site opened/closed and status.

Government Publication Date: 2001-Apr 2007*

National Energy Board Pipeline Incidents: Federal NEBI

Locations of pipeline incidents from 2008 to present, made available by the National Energy Board (NEB). Includes incidents reported under the Onshore Pipeline Regulations and the Processing Plant Regulations related to pipelines under federal jurisdiction, does not include incident data related to pipelines under provincial or territorial jurisdiction.

Government Publication Date: 2008 - Dec 2016

National Energy Board Wells: Federal NEBW

The NEBW database contains information on onshore & offshore oil and gas wells that are outside provincial jurisdiction(s) and are thereby regulated by the National Energy Board. Data is provided regarding the operator, well name, well ID No./UWI, status, classification, well depth, spud and release date.

Government Publication Date: 1920-Feb 2003*

National Environmental Emergencies System (NEES): Federal NEES

In 2000, the Emergencies program implemented NEES, a reporting system for spills of hazardous substances. For the most part, this system only captured data from the Atlantic Provinces, some from Quebec and Ontario and a portion from British Columbia. Data for Alberta, Saskatchewan, Manitoba and the Territories was not captured. However, NEES is also a repository for previous Environment Canada spill datasets. NEES is composed of the historic datasets ' or Trends ' which dates from approximately 1974 to present. NEES Trends is a compilation of historic databases, which were merged and includes data from NATES (National Analysis of Trends in Emergencies System), ARTS (Atlantic Regional Trends System), and NEES. In 2001, the Emergencies Program determined that variations in reporting regimes and requirements between federal and provincial agencies made national spill reporting and trend analysis difficult to achieve. As a consequence, the department has focused efforts on capturing data on spills of substances which fall under its legislative authority only (CEPA and FA). As such, the NEES database will be decommissioned in December 2004.

Government Publication Date: 1974-2003*

Northwest Territories Oil and Gas Wells: Territorial NOGW

The NWT Oil and Gas Wells database is a comprehensive database that includes information regarding location of well, well name, spud date, current status and purpose. Please note that this database will not be updated, information on wells drilled after 2002 can be found in the Oil and Gas Wells (OGW) database under the `Private Source Database' section.

Government Publication Date: 1939-2002*

National PCB Inventory: Federal NPCB

Environment Canada's National PCB inventory includes information on in-use PCB containing equipment in Canada including federal, provincial and private facilities. Federal out-of-service PCB containing equipment and PCB waste owned by the federal government or by federally regulated industries such as airlines, railway companies, broadcasting companies, telephone and telecommunications companies, pipeline companies, etc. are also listed. Although it is not Environment Canada's mandate to collect data on non-federal PCB waste, the National PCB inventory includes some information on provincial and private PCB waste and storage sites. Some addresses provided may be Head Office addresses and are not necessarily the location of where the waste is being used or stored.

Government Publication Date: 1988-2008*

National Pollutant Release Inventory: Federal NPRI

Environment Canada has defined the National Pollutant Release Inventory ("NPRI") as a federal government initiative designed to collect comprehensive national data regarding releases to air, water, or land, and waste transfers for recycling for more than 300 listed substances.

Government Publication Date: 1993-2014

Oil and Gas Wells: Private OGW

The Nickle's Energy Group (publisher of the Daily Oil Bulletin) collects information on drilling activity including operator and well statistics. The well information database includes name, location, class, status and depth. The main Nickle's database is updated on a daily basis, however, this database is updated on a monthly basis. More information is available at www.nickles.com.

Government Publication Date: 1988-May 2017

Parks Canada Fuel Storage Tanks: Federal PCFT

Canadian Heritage maintains an inventory of known fuel storage tanks operated by Parks Canada, in both National Parks and at National Historic Sites. The database details information on site name, location, tank install/removal date, capacity, fuel type, facility type, tank design and owner/operator.

Government Publication Date: 1920-Jan 2005*

Retail Fuel Storage Tanks: Private RST

This database includes an inventory of retail fuel outlet locations (including marinas) that have on their property gasoline, oil, waste oil, natural gas and / or propane storage tanks.

Government Publication Date: 1999 - Oct 2016

Scott's Manufacturing Directory: Private SCT

Scott's Directories is a data bank containing information on over 200,000 manufacturers across Canada. Even though Scott's listings are voluntary, it is the most comprehensive database of Canadian manufacturers available. Information concerning a company's address, plant size, and main products are included in this database.

Government Publication Date: 1992-Mar 2011*

Spills: Territorial SPL

The Department of Resources, Wildlife & Economic Development (RWED), in Yellowknife, maintains an inventory of spill locations through the "Hazardous Materials Spills Database". Information is provided on the spill number, date, location, spill description, quantity & commodity spilled and all applicable parties involved.

Government Publication Date: Mar 31, 2017

Water Well Information System: Territorial WWIS

This database was collected from the Water and Sanitation Department of Northwest Territories Public Works and Services and provides information on seven wells drilled in the territory. Information is provided on the well depth, year drilled, and location of well by city name. No geographic coordinates are available.

Government Publication Date: 1974-Jun 2009

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Elevation: The elevation value is taken from the location at which the records for the site address have been plotted. All values are an approximation. Source: Google Elevation API.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

Unplottables: These are records that could not be mapped due to various reasons, including limited geographic information. These records may or may not be in your study area, and are included as reference.

Environmental Offenders Registry

The Environmental Offenders Registry contains information on convictions of corporations obtained under certain federal environmental laws. The registry contains convictions obtained for offences committed since June 18, 2009 - when the Environmental Enforcement Act received Royal Assent. For more information on the types of convictions included in the registry and other enforcement measures that are taken against suspected violators, please refer to About the Registry (default.asp?lang=En&n=1DF1D241-1).

This tool allows the media and the public to search for corporate convictions using the name of the corporation, its home province, the province where the offence occurred, or the legislation under which the conviction was obtained. Keywords can also be used to search the registry.

Please note that use of the registry is subject to the notices described in About the Registry (default.asp?lang=En&n=1DF1D241-1). The registry information is provided subject to the terms and conditions described on the Terms and conditions (http://www.ec.gc.ca/default.asp?lang=En&n=12345678-1&xsl=mainhomeitem&xml=5830C36B-1773-4E3E-AF8C-B21F54633E0A) page.

Name of Corporation

Province of Corporation

Offence Province

Acts

- [x] Environment Canada - Antarctic Environmental Protection Act
- [x] Environment Canada - Canada Wildlife Act
- [x] Environment Canada - Canadian Environmental Protection Act, 1999
- [x] Environment Canada - International River Improvements Act
- [x] Environment Canada - Migratory Birds Convention Act, 1994
- [x] Environment Canada - Pollution Prevention Provisions of Fisheries Act
- [x] Environment Canada - Species at Risk Act
- [x] Environment Canada - Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act
- [x] Parks Canada - Canada National Marine Conservation Areas Act
- [x] Parks Canada - Canada National Parks Act
- [x] Parks Canada - Saguenay-St. Lawrence Marine Park Act

Keywords for search: Tulita

Search

No documents matching your criteria were found.

Corporation Name	City	Province	Act	Conviction Date	Offence Province

Other formats

Excel version of all registry records (default.asp?lang=En&xml=021F9092-C94C-431B-A0F4-E6772CB404D7).

Date modified:
2016-09-20

Hazardous Materials Spill Database

Environment Division of ENR
Scotia 6, 5102-50th Avenue; Yellowknife, NT X1A 3S8
Phone: (867) 873-7654 Fax: (867) 873-0221

Sorted By: SpillNo for the year(s): 2017

Spill No.	Date	Ter	Region	Location	Site Description	Commodity	Quantity	Source	Agency
1975024	1975-06-17	NT	SAH	Tulita	North Side of Settlement Office	Fuel Oil P-40	3873 L	PL	-
1977061	1977-06-22	NT	SAH	Tulita	-	Fuel Oil P-40	455 L	PL	GNWT
1981049	1981-08-12	NT	SAH	Tulita	NCPC Tank Farm	Diesel P-50	0 L	ST>	EPS
1983057	1983-07-26	NT	SAH	Tulita	Gravel Ramp To Dock	Diesel P-50	200 L	PL	INAC
1983082	1983-12-20	NT	SAH	Tulita	-	Gasoline	346 L	PL	GNWT
1984096	1984-08-26	NT	SAH	Tulita	Plane Lake 0.5 Km North of Airport	Aviation Gasoline	66 L	AIR	INAC
1984106	1984-10-07	NT	SAH	Tulita	Ditch on Narrow Road passing School	Diesel P-50	250 L	TRU	GNWT
1987072	1987-07-02	NT	SAH	Tulita	-	Gasoline	400 L	AIR	GNWT
1987115	1987-10-28	NT	SAH	Tulita	Tank Farm	Diesel P-50	1000 L	TRU	GNWT
1990192	1990-10-19	NT	SAH	Tulita	Under a House Under Construction (No Lot #)	Diesel Fuel	160 L	TRU	GNWT
1990208	1990-12-10	NT	SAH	Tulita	Tank Farm at Gasoline Dispenser	Gasoline	100 L	PL	GNWT
1991067	1991-05-16	NT	SAH	Tulita	Lot 39	Hazardous Waste - Mixed	0 L	OTH	GNWT
1991075	1991-05-23	NT	SAH	Tulita	Tank Farm Resupply Line	Gasoline	204 L	PL	GNWT
1992095	1992-05-26	NT	SAH	Tulita	Arena	Diesel P-50	200 L	ST<	GNWT
1992131	1992-06-18	NT	SAH	Tulita	Renewable Resources Heliport Facility	Jet B	1000 L	ST<	GNWT
1993116	1993-07-21	NT	SAH	Tulita	Hamlet Office	Diesel Fuel	227 L	ST<	GNWT
1999139	1999-10-15	NT	SAH	Tulita	3 Nautical Miles NW of Tulita	Jet B	410 L	DRUM	INAC
2001146	2001-05-09	NT	SAH	Tulita	Behind Northern Store	Heating Fuel P-50	946 L	ST<	GNWT
2001260	2001-08-09	NT	SAH	Tulita	NWTPC Yard	Nalcool Corrosion Inhibitor	0 L	DRUM	GNWT
2002309	2002-05-10	NT	SAH	Tulita	Airport Terminal	Fuel	0 L	PL	GNWT
2004279	2004-05-12	NT	SAH	Tulita	RCMP Detachment	Heating Fuel P-50	0 L	ST<	INAC
2004609	2004-09-28	NT	SAH	Tulita	Chief Wright School	Fuel Oil	0 L	ST<	GNWT
2004617	2004-10-06	NT	SAH	Tulita	North side of Hamlet Shop	Stove Oil	60 L	ST<	GNWT
2005224	2005-05-06	NT	SAH	Tulita	Tulita Airport	Diesel Fuel	205 L	DRUM	GNWT
2005552	2005-12-15	NT	SAH	Tulita	Tulita Airport Apron	Jet B	5 L	AIR	GNWT
2006443	2006-12-20	NT	SAH	Tulita	310 Tulita Power Plant	XD3 15W40	120 L	OTH	GNWT
2008513	2008-10-23	NT	SAH	Tulita	Lot 69	Furnace Oil	0 L	ST<	GNWT
2009142	2009-04-14	NT	SAH	Tulita	Unit 3 RCMP Compound	Heating Oil	2000 L	ST<	EPS
2009397	2009-08-17	NT	SAH	Tulita	NTPC Plant Building	Oil/Antifreeze	100 L	OTH	GNWT
2010090	2010-03-31	NT	SAH	Tulita	Airport Ramp Area	Hydraulic Fluid	4 L	AIR	GNWT
2010149	2010-05-06	NT	SAH	Tulita	Tulita RCMP Detachment	Heating Oil	100 L	ST<	EPS
2010163	2010-05-15	NT	SAH	Tulita	Unit #60 Tulita	Heating Fuel	250 L	ST<	GNWT
2012399	2012-10-06	NT	SAH	Tulita	By the NTCL Barges	Oil/Fuel	0 L	MV	CCG
2012431	2012-11-02	NT	SAH	Tulita	Plant Room Engine DD45	Glycol	20 L	OTH	INAC
2012432	2012-11-02	NT	SAH	Tulita	Power Plant	Glycol	0 L	TRU	INAC
2013387	2013-11-22	NT	SAH	Tulita	Tulita Airport	Waste Oil	0 L	DRUM	GNWT
2014023	2014-01-27	NT	SAH	Tulita	Gas Station Truck Re-fill Spot	P-50 Diesel	150 L	TRU	GNWT
2015408	2015-09-28	NT	SAH	Tulita	PO Box 90 Tulita NWT X0E 0K0, 53 Mackenzie Drive	Sewage	0 L	ST<	GNWT
2015469	2015-11-19	NT	SAH	Tulita	NWT Power Corp Tulita - inside plate	Glycol	208 L	INST	GNWT
2016006	2016-01-07	NT	SAH	Tulita	Duplex Trailer Unit #13 Lot 21644 - SK-359 Mackenziedr., Tulita, NT	Fuel	20 L	UK	GNWT
2016017	2016-01-16	NT	SAH	Tulita	Steep Creek bridge crossing (south of Tulita) 64 10 59N 124 23 24W	Transmission Fluid Coolant	18 L	TRU	GNWTL
2016124	2016-04-19	NT	SAH	Tulita	Celeste Street, Tulita, Red House	Heating Fuel	0 L	ST<	GNWT
2016135	2016-04-21	NT	SAH	Tulita	Tulita, NT	Heating Fuel	0 L	ST<	GNWT
2016206	2016-06-03	NT	SAH	Tulita	On airport road	Unknown	0 L	PL	GNWT
2016222	2016-06-14	NT	SAH	Tulita	Tulita, NT	Heating Fuel (Diesel)	0 L	ST<	GNWT
2016298	2016-08-19	NT	SAH	Tulita	Residents of 3B Tulita Street	Greywater/Wastewater	100 L	PL	GNWT
2016373	2016-10-08	NT	SAH	Tulita	PH #5 Lat 191, Plan 3520, Tulita, NT	Heating fuel	50 L	ST<	GNWT

Total Spills on this Report: 47

This report contains information regarding spills that were reported to the NWT 24-Hour Spill Line. The absence of information on any particular location in no way guarantees that contamination has not occurred at that location.

LEGEND

Region:
BAF - Baffin
DEH - Deh Cho
INU - Inuvik
KEE - Keewatin
KIT - Kitikmeot
NSL - North Slave
SAH - Sahtu
SSL - South Slave

Source:
AIR - Aircraft
DRUM - Drum or Barrel
MV - Marine Vessel
NS - Natural Seepage
OTH - Other Transportation
PL - Pipe or Line
RT - Rail Train
SL - Sewage Lagoon
ST< - Storage Tank <4000 litres
ST> - Storage Tank >4000 litres
TP - Tailings Pond
TRU - Truck
UK - Unkown
WELL - Wet Wells, Flaring Boom

Agency:
CCG - Canadian Coast Guard
EP - Environment Canada
GN - Government of Nunavut
GNWT - Government of Northwest Territories
ILA - Inuvialiut Land Administration
INAC - Indian and Northern Affairs Canada
NEB - National Energy Board

APPENDIX C

Documentation of Interviews

1. INTERVIEWS

1.1 GNWT Environmental Health Officer

BluMetric contacted Mr. Doug Carr, the Environmental Health Officer with the GNWT, and asked the following:

- Are there any environmental complaints, records of spills, permits, permit violations, environmental reports, remediation reports, or any other documents of an environmental nature associated with the property on file?
    - Mr. Carr indicated that his office did not have any of the documents requested, or any documentation at all, on file within his department for the Phase I Property.

1.2 GNWT Assistant Fire Marshal

BluMetric contacted Mr. Travis Wright, an Assistant Fire Marshal with the GNWT, and asked the following questions:

- Are there any tank records, records of tank spills or any other type of spill, permits, permit violations, fire insurance maps, violations, inspections, reports, or any other documents of any kind associated with the property on file?
    - Mr. Wright indicated that his office did not have any of the documents requested, or any documentation at all, on file within his department for the Phase I Property.

1.3 Current Owners of the Phase I Property

BluMetric spoke with Ron and Wendy Oe, the current owners of the Phase I Property, during the site visit. The information gleaned from their answers to the questions posed during the site visit is peppered throughout this report. Additionally, the questionnaire containing the questions posed to the property owners, and their respective answers, is available for review below.

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Project Number :	Project Name:
170529	Tuktia Phase I ESA + Soil Sampling

Site Address(es) (does the site correspond to legal property boundary if no specify on Site plan)
28 Mackenzie Drive, Tuktia, NT

Legal Description
Lot 198, Plan 3554

Does the Owner/Client have a chain of title and or a legal survey? OBTAIN COPY IF YES
No

Site Representative	Position / Affiliation/ Years at Site?
Ron and Wendy Oe	4.5 years owned
BluMetric Site Assessor	**BluMetric Office Location**
Dan Tuholski	Yellowknife
Date of Inspection	**Full Access Obtained? (Yes / No)**
July 24/2017	If no please state reason:
Time (On-site & Off-site)	
1830-1930	
Ground Conditions / Weather (note where conditions obscure observations)	**Client and/or Owner**
Hazy + overcast ~ 65°F/18C	Owners present

BASIC SITE INFORMATION **(***Take representative photos of the Site and Site building***)**

Existing Land Use Type: Residential, Parkland, Agricultural, Community, Commercial, Institutional, Industrial, OTHER: Residential + B+B since they owned — Primary on-site Activity: Residence

Tenants? Y/(N) Number of Tenants: 0

Names of Tenants (get tenant list if available)	Location of Tenants and Activity Type:
N/A	N/A
Date Site First Developed / What was it Developed for (get Site plan from Site rep.)	**Site Area (acres / hectares)**
1968	900.1 square meters
Number of Buildings	**Building(s) Footprint Area (m^2 / ft^2)**
1	1,070 ft
Building Names and Locations on-site	
N/A	
Number of Stories	**Total Building(s) Area (m^2 / ft^2)**
1	1,070 ft2
Date Buildings Constructed	**Date Buildings Renovated**
1968	~~None Known~~ 2013
Basements / U/G Parking? Yes / No	**Number of Levels (above and underground)**
Full basement	2
% Site Covered by Buildings	**% Site Covered by Basements**
~40%	~40%

Building built off-site + shipped here

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ON-SITE ISSUES	(***Take photos of all potential issues***)
Current ASTs? (Yes) / No 910 liters in 2009	Former ASTs? Yes / No Yes but in same spot as far as they Know
Location, volume, contents, age, material N side of house - heating oil	(Location, volume, contents, age, material date removed if applicable)
Current USTs? Yes / (No)	Former USTs? Yes / (No)
Location, volume, contents, age, material N/A	(Location, volume, contents, age, material date removed if applicable) N/A
Floor drains or sump pits? Yes / No No floor drains Yes to sump (1) in basement	Liquid discharge points (water, French drains, etc) No
How many? Type of influent? Where does effluent go? One sump	How many? Type of Influent? Where does effluent go? Discharge to sewer tank
Catch Basins? No	Surface water run off direction South toward Mackenzie
Location? N/A	Location? N/A
Unusual odours/staining within floor drains or sump pits? No	
Waterbody on site or within 30 m of Site? No	
Known / Suspected Soil Fill? Yes / No Location Estimated Depths No	Was there any analytical testing performed? Y/N (Obtain records if yes) No
Vehicle Maintenance on the property? (fluid storage, waste storage) Locations How it is stored? No	Waste Hauler?
Ground cover (grass, gravel, paved) Grass	Rail lines or spurs? Easements? Yes / No Location No
Known / Suspected Soil Impact or Stressed Vegetation? Visual? Yes / No No	Known / Suspected Groundwater Impact? Yes / No Location No
Evidence/Records of Spills or Release? Yes / No No	Type of Spill or Release? Ask for records No
Known / Suspected PCBs? Maybe in light ballasts	Locations Light ballasts in light fixtures
Any leaking light ballasts? Yes / (No) No	
Known / Suspected Pesticides / Herbicides Use onsite? Are they stored on-Site? No	Registered User/Contractor Information N/A
Known / Suspected Radioactive Materials? (Dentist / Doctors office) None	
Is it licensed? Yes / No N/A	
ECA/CoA for Air, water, land? Yes/No (Are there fume hoods, a spray booth etc?) DETAILS N/A	
Permit to Take water? Yes/No DETAILS N/A	
Description of processes - processing/manufacturing (from what raw materials are used to the finished products, as detailed as possible), finished Products: N/A	Equipment Onsite and What kind of oils/lubricates are used? See next page.

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Attic : Fibreglass

Construction of Building(s) (walls, ceilings, floors, foundation, roof, etc...):	
Interior Walls	Drywall except for stairwell to basement
Floors	Vinyl floor tiles w/ press board
Ceiling	ACM? 2 foot wide strips across entire ceiling
Exterior Walls	plywood duraform vinyl siding
Roof	Asphalt shingles
Foundation	Concrete basement
Support Structure	Wood Framing
Lighting (has lighting been updated?)	Fluorescent light tubes

Heating Equipment (Date Installed / Maintenance contractor?) Wood stove in Feb 2013 Heating oil already here	Cooling Equipment (date installed) Maintenance contractor? No A/C
Heating / Cooling Source? Fuel oil/wood → Forced Air	Natural Gas / Electricity / Propane / Other (specify) Heating oil + wood
When was natural gas connected at the Site? Provider? N/A	Was there a previous source of fuel for the heating equipment (i.e., heating oil)? No, always heating oil
Transformer(s) or hydro vault Yes / (No) onSite? Y/(N) AGE	Where is/are the transformer(s) located? Any Known PCB? If owned has it been tested for PCB? (ask for copies of records) N/A
Was there evidence of leaking near the transformer(s)? N/A	Owner of the transformer(s)? N/A
Electrical Provider (i.e., Ottawa Hydro)? NTPC	Electrical Generator onSite? Historical Generator? Yes / No No, never as far as they know
Overhead / underground cables connected to the Site? Overhead	Type of generator (gas/diesel)?Location? ~~Diesel - E side of town~~ None
Water source? Trucked Wells on property? Y/(N) Well Location	Municipal Sewers/Septic Tanks? Location? Septic tank on W side of bldg

No visible staining around furnace in basement

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Chemical Storage	
Types, Locations and Quanity of Chemicals Stored onsite: Sea can + trailer. See details below.	Potential Pathways and receptors (ie Surface water drainage, floor drains, sump areas, catch basins, grassed areas, gravel areas etc) Grassy area under/around trailer + sea-can
How are the chemicals handled? Loading/Unloading? Where? How? Handled within trailer + sea-can	
Secondary Containment? Yes/No DETAILS (Type)	Spill Procedures, Spill Plans? Y/N REVIEW No
MSDS Binder reviewed? Yes/No No	
List of Hazardous Wastes Used or Generated No	OWS? Location(s), date installed, source of incoming, location of effluent No
Any hydraulic equipment onsite? Type? (elevators, in-ground hoists and loading docks etc)Maintenance Contractor? Where is oil reservoir located? No	
Has toping-up of the hydraulic oil been required? N/A	
Any evidence of leaks or spills? Yes / No N/A	

~10 jerry cans 25 Liters each in trailer

Sea-can - dirt bike, weed whacker, chainsaw, 2 jerry cans, 4 tires

Various + many oils, [redacted] antifreeze, 1 battery

- take batteries, used motor oil [redacted] off-site for disposal

E side of house → 4 snowmobiles, 2 quads, 1 fat tire bike + 1 quad for parts

N side: 1 quad, heating oil tank

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For Reg 153 Phase One Reports	
Number, Locations, Size and Chemical Type for Totes N/A	
Number,Locations, Size and Chemical Type for Drums N/A	
Number, Locations, Size and Chemical Type for Bins N/A	
Number, Locations, Size and Chemical Type for Cans, Jugs, containers, buckets etc. Several 4-liter or less in Seacan; 5-gallon gasoline jerry cans in storage trailer	
Raw materials Storage: Location? How? Loading/Unloading? N/A	
By-Products: Y/NLocation? How? Loading/Unloading? N/A	
Please refer to Table 2 (attached) for Potentially Contaminating Activities (PCA) as defined by Ontario Regulation 153/04	
For CSA Standard Phase One Reports	
Known / Suspected Urea Formaldehyde Foam Insulation (UFFI)?Yes / (No) Fibre glass	
Known / Suspected Mould? No	
Location and cause of Mould N/A	Has a mould survey been done / when?(can you obtain a copy of the report) No
Known / Suspected Asbestos Containing Materials (ACMs)?Yes / No Not that they know of but due to age of bldg, it is assumed that some ACMs are present.	Location and condition of ACMs?
Has an ACM survey been done / when?(can you obtain a copy of the report) Not that they know of	
Known / Suspected Lead Based Products (LBPs)? Yes / No Not that they know of - Expected	Location and condition of LBPs?
Known / Suspected Methane? Yes / No No	Known / Suspected Oxygen Depleting Substances (ODSs)? Maybe Fridge
Does a contractor handle the ODSs? N/A	Known or Suspected Radon? Yes/No Not that they know of
Are any ODSs stored on-Site? Yes / (No)	Location

Septic size ~ 500 gallons

Water size 450 gallons

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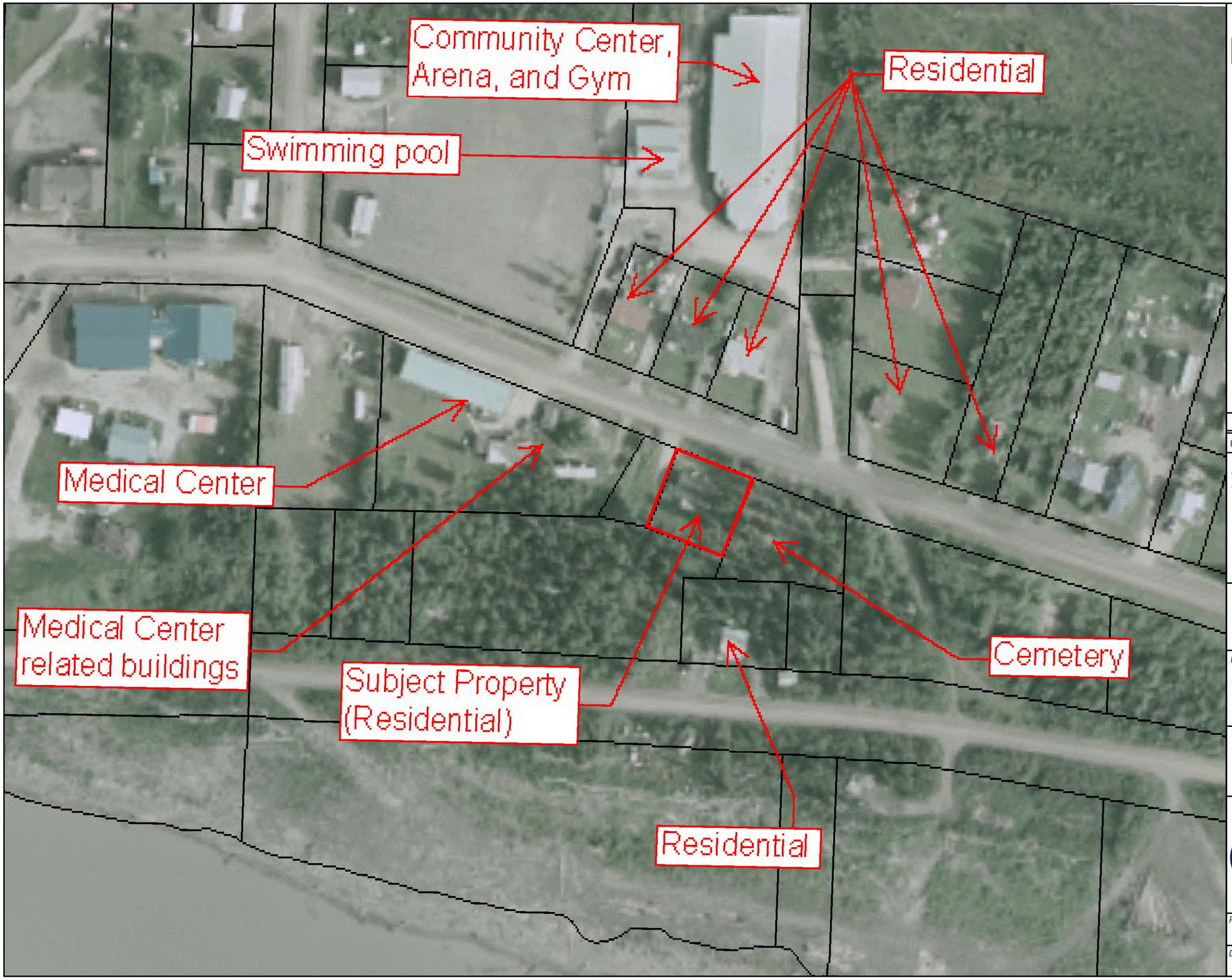
Site Operating Records		
Ask for copies, if available/existing of the following records: • Historical Phase I and II reports, Incident reports pertaining to spills and clean up, any regulatory correspondence pertaining to air, water and land discharges Not that they Knew of • Regulatory permits and records related to areas of potential environmental concern; No • Underground utility drawings No • Inventories of chemicals, chemical usage and chemical storage areas No • Inventories of above ground storage tanks and underground storage tanks No • Environmental monitoring data, including data created in response to an order or request of the Ministry No • Waste management records and historical waste storage locations and waste generator and waste receiver information maintained pursuant to Reg 347, waste manifests No • Process, production and maintenance documents related to areas of potential environmental concern No • Records of spills and records of discharges of contaminants, including records of spills under Reg 675/98 No • Emergency response and contingency plans, including the spill prevention and contingency plans prepared pursuant to section 91.1 of the act and Reg 224/07 No • Environmental audit reports No • Site plan of facility showing areas of production and manufacturing No LIST OF DOCUMENT NAMES/DATES REVIEWED		
Surrounding Properties		
Ask interviewee if they have ANY knowledge of the surround properties current/historical uses, activities, or ANYTHING of an Environmental Nature More or less the same		
Areas of Natural Significance (ANSI) in study area. YAN (ie wetlands, ponds woodlands, parks conservation areas etc) No	Location and Distance from Phase One property	N/A
Nearest Body of Water (stream, creek, drainage swale, rivers, lakes etc.) Mackenzie River	Flow Direction	South
Summary of Potentially contaminating activities in the phase one study area, (note the distance and direction from the phase one property): None		
Current / Former ASTs? Yes, Standard heating oil tank size	Direction / Distance	North ~50 meters
Current / Former USTs? No	Direction / Distance	—
Current / Former Dry Cleaners? No	Direction / Distance	—
Current / Former Gas Station? Tank Farm at E end of town	Direction / Distance	E ~ 1-2 Km
Known Soil Impact? Not that they of	Known Groundwater Impact?	— Yes / No
Evidence of Spills or Releases? Not that they of	Type of Spill or Release?	—

Septic size ~ 500 gallon

Water size → 450 gallon



LEGEND

Phase I Property Boundary

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

DO NOT SCALE DRAWING.
THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS.

N W E S

0 10 20 40 Meters

CLIENT

PUBLIC SERVICES AND PROCUREMENT CANADA – ENVIRONMENTAL SERVICES

PROJECT

PHASE I ENVIRONMENTAL SITE ASSESSMENT AND SURFICIAL SAMPLING

TITLE

LAND USES AROUND THE SUBJECT PROPERTY

BluMetric™ Environmental
4916 49th Street,
PO Box 11086
Yellowknife, NT, X1A 1P3
TEL: (867) 873-3500
FAX: (867) 873-3499
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE
170529	September 05, 2017

DRAWN	CHECKED	FIG NO.	REV
IB	DT	C	0

N:\GIS_PROJECTS\170000\170199 - Sullivan Quarry\MXD\2017-09-05\170529-AppC_LandUse.mxd

APPENDIX D

Health and Safety Plan

Field Work Instruction

Project Number:	170529		
Project Manager:	Paul Bandler	**Telephone:**	613-531-2725 x 232
Client:	Public Works and Government Services Canada – Environmental Services		
Client Contact:	Matt Irvine	**Telephone:**	204-294-2170
Site Address:	28 Mackenzie Drive, Tulita, NT		
Property Occupier:	Riverview B&B/Private Residence		
Site Contact:	Wendy and Ron Oe	**Telephone:**	867-588-3511
Scope of Work:	Phase I ESA site visit with the potential for surficial soil sampling of up to eight soil samples for BTEX and PHCs.		
Time Allocation:	Up to three days, including travel		

Equipment Required:

Shovel, work gloves, pin flags, PPE (high vis vest, safety boots, safety glasses), cooler with lab supplies, camera, field sheets/notes, clipboard, pen, tape measure, packing tape, buckets, Alconox, scrub brush, sun screen

Special Instructions **(e.g. Sample naming convention, Previous reports. Site plans, etc.):**

None

Health & Safety Plan

Anticipated Hazards & Control

FIELD H&S HANDBOOK SECTION REF.	HAZARD/ FIELD H&S HANDBOOK SECTION	RELEVANT TO PROJECT? (Y/N)	ADDITIONAL CONTROLS SPECIFIC TO PROJECT
6.1	Physical	Y	
6.2	Heavy Equipment	N	
6.3	Electrical	N	
6.4	Power Tool	N	
6.5	Lifting	Y	Lifting and carrying field equipment, and a potentially heavy cooler containing soil samples
6.6	Noise	N	
6.7	Ambient Air Quality	N	
6.8	Open Pit and Confined Space	N	
6.9	Excavation and Trench	N	
6.10	Biological	N	
6.11	Work at Height	N	
6.12	Heat and UV Exposure	Y	Potential for extended sun exposure.
6.13	Cold Stress & Severe Weather	N	
6.14	Chemical Hazards	Y	Potential to come into contact with petroleum hydrocarbon-impacted soil.
6.15	Chemical Hazard Indicators	Y	Skin, eye, or respiratory system irritation; skin rashes/burns; headaches/dizziness; nausea/gastrointestinal tract problems.
6.16	Chemical Hazard Prevention	Y	Wear proper PPE and stay in well-ventilated areas.
6.17	Ladder Safety	N	
6.18	Working On or Near Roads – Traffic Control Persons	N	
6.19	Working Alone	Y	Will be working alone but the site is in town and the property owner will likely be on-site for some or all of the work. BLM remote site check-in procedures in effect (before and after field work; daily).
6.20	Violence	Y	Potentially violent situations may sometimes arise when working with the public, with clients, and with fellow employees.
6.21	Unforeseen	Y	Should staff find themselves in a potentially hazardous situation, they should immediately discontinue the hazardous

			procedure(s) and immediately notify site personnel and supervisors of the nature of the hazard.

ADDITIONAL HAZARDS / CONCERNS / CONTROLS

N/A

EMERGENCY CONTACT INFORMATION

Work:

Paul Bandler (project manager) – 613-453-5496

Wayne Ingham (PSPC SOA principle) – 613-329-5363

Personal:

Elizabeth Marsh – 867-446-4838

Nearest Health Centre

Harriet Gladue Health Centre –Tulita on Mackenzie Drive

Emergency Number: 867-588-3333

RCMP Detachment

Tulita RCMP –3 RCMP Way

Emergency Number: 867-588-1111

APPENDIX E

Laboratory Certification and Quality Management Summary, and Certificate of Analysis

ALS QUALITY MANAGEMENT SYSTEM SUMMARY

ALS is a global diversified testing services organization with a presence on every continent, offering a broad range of services to leading global companies.

The following report summarizes standard practices routinely employed by the ALS Environmental Division in Canada. Our practices exceed accreditation requirements and have been built to meet the needs of our customers and to give them confidence in the reliability of our test data.

Additional information is available on request from the Quality Department. Customers are invited to audit or tour ALS facilities at their convenience.

Documentation and Document Control
Test methods and support procedures are documented in detail to ensure consistency of application, repeatability of test results and traceability of analyses.

Test method requirements include but are not limited to sample handling, sample storage, minimizing interference, sample preparation, reagent and standard specifications, equipment, supplies, calibration requirements, instrumental measurement procedures, quality control requirements, data quality objectives and corrective actions, calculations, reporting requirements, reference information, hazards and their preventive measures.

Administrative support procedures are also documented where needed to ensure quality system procedures and customer services are provided in a controlled, approved manner consistent with ALS policies and client needs.

All procedures are authorized prior to use by the signing authority, ensuring adequate technical and quality oversight.

Distribution of documents is controlled to ensure only the most recent version is available for use. Authorized documents are reviewed periodically by the signing authority to ensure they continue to meet ALS requirements and customer needs.

Test methods and support procedures are available for client viewing on-site.

Internal Audits
Internal audits are scheduled and performed by qualified Quality and Technical staff for all routine analytical procedures and Quality System elements. Such audits ensure that procedures are implemented as intended, that test methods are scientifically defensible and technically sound, and that policies, procedures and records continue to meet the Quality System objectives.

Quality staff may periodically initiate unscheduled audits in response to proficiency testing program results, client feedback, requests from managers or any other circumstance that warrants investigation.

Quality Control (QC)

ALS has established QC procedures for monitoring the validity of tests performed by its laboratories. Individual test methods specify quality control requirements, frequency of use, and Data Quality Objectives (DQOs).

The type of quality control elements used for process monitoring is dependent on the test performed, but typically includes (as appropriate): Calibration Verification Standards, Continuing Calibration Verifications, Instrument Blanks, Method Blanks, Laboratory Control Samples, Reference Materials, Matrix Spikes, Surrogate Spikes, and Internal Standards.

DQOs are established for each QC sample, based on a combination of reference method objectives, customer requirements and historical test method performance. Where applicable, prescriptive elements of reference methods take precedence over internal DQOs.

ALS Environmental ensures that the number and frequency of quality control samples incorporated into an analytical batch are sufficient to demonstrate that the measurement system is maintained in statistical control. This, typically, is one blank, control standard and/or matrix spike, and replicate for every 10 to 20 samples, (NOTE: At minimum one blank, control standard and/or matrix spike is performed regardless of batch size.). Reference materials and surrogates are run with every batch, where available and applicable. We ensure all results meet our data quality objectives.

In a typical year at ALS Environmental, between 20% and 25% of all samples analysed are quality control samples and between 10% and 15% of all analytical results generated are related specifically to quality control. A typical quality control plan is described below. The following schedule represents a minimum degree of laboratory (internal) quality control (QC). (Note: These internal QC samples are in addition to instrument calibration standards and blanks for within-run and between-run calibration checks.)

Inorganic Parameters

20 Samples
1 Method Blank
2 Laboratory Replicates
1 Reference Material (if available) or Matrix Spike

$$\frac{\text{Total Number of QC Samples}}{\text{Total Number of Samples}} = \frac{4}{20} \times 100\% = 20\%\ \text{QC}$$

Organic Parameters

10 Samples
1 Method Blank
1 Laboratory Replicate
1 Reference Material (if available) or Matrix Spike

Total Number of QC Samples =	3	x 100% = 30% QC
Total Number of Samples	10	

Control Charts
Control charts are used to provide a graphical representation of QC results and test method performance over time. Control charts graphically display DQOs as well as the statistically derived mean and ± 2 and 3 standard deviations ("sigma") around the mean, calculated from recent historical QC results. ALS applies advanced trend monitoring algorithms to identify outliers and non-random data distributions (trends) that may indicate undesirable changes in test method performance. The trend monitoring process has been automated within our LIMS. Upon data entry, each QC result is checked against programmed limits and trends. If a trend is identified, a notification is e-mailed to the analyst and their supervisor, so that it can be investigated and corrected.

Data Validation
ALS analytical data proceeds through several reviews prior to the release of final reports. The ALS data validation process includes test result validation, inter-parameter validation and report validation. Test result validation involves an independent peer review of raw and calculated test results. Inter-parameter validation occurs when all department specific parameters for a sample are completed, and involves an overall review of test results within each sample for consistency among any related test parameters. Report validation occurs when all the requested test results for a work order are completed, and involves a review of the final report before it is sent to the customer.

ALS maintains laboratory records in a traceable manner for five years.

Method Validation
Customers rely on ALS to select test methods that are appropriate to meet their needs. Wherever possible, ALS references the latest versions of published standard methods developed by organizations such as American Public Health Association, United States Environmental Protection Agency, NIOSH, Environment Canada, and other international, regional or regulatory organizations, or equipment manufacturers.

Method validations are conducted to confirm that our test methods are fit for their intended use. The validations are as extensive as necessary to meet the needs of the given application. The extent depends on the source of the method. Test methods are revalidated periodically to ensure continued suitability and fitness for purpose.

Method Detection Limits and Limits of Reporting
ALS Limits of Reporting (LORs) are established using rigorous experimental and statistical procedures that begin with the determination of the Method Detection Limit (MDL) at 99% confidence. The MDL takes into account several factors, like long term Method Blanks, low level Sample Duplicates, and low level Spiked Samples. When detected at or above the MDL, ALS test results are considered to be qualitatively accurate, and a parameter can be reported with 99% confidence as being present in the sample.

$$MDL = (s_0 \times t_{n-1}) + |MBlk|$$

Where:
- s_0 = the standard deviation derived from the analysis of blank or low level samples, whichever gives a higher standard deviation,
- t_{n-1} = the Student's t-distribution with n-1 degrees of freedom for the one-sided 99% confidence interval.
- |MBlk|= the absolute value of the mean method blank.

ALS takes a conservative approach to detection limits. Our goal is to minimize false positives, because we recognize that any false positive results can be damaging for our clients. Where possible, we establish LORs at levels well-above the statistical MDL, and ideally at the LOQ_5. This improves the accuracy and precision of results near the detection limit, and reduces the chance of false positives due to sample-specific issues. At or above the LOQ_5, test results are considered to be quantitatively accurate. A reported parameter at the LOQ_5 is considered to be within 40% of the true value 95% of the time.

$$LOQ_5 = 5s_0 + |MBlk|$$

Where:
- s_0 = the standard deviation used in the MDL calculation,
- |MBlk| = the absolute value of the mean method blank.

The D. L. column on ALS analytical reports contains the LOR. The LOR may be the MDL as calculated above, or a higher value. ALS does not report LORs that are less than the calculated MDL.

Measurement Uncertainty (MU)

ALS procedures for calculating measurement uncertainty are based on accepted practices of identifying components contributing to uncertainty, compiling data that represents or includes these components, evaluating the data using appropriate statistical calculations, and reporting in a manner that prevents misunderstanding of the result. The Type A method of calculating measurement uncertainty is followed, however additional factors are considered to ensure the best and most complete information is derived from our evaluation of test method performance.

The ALS model describes the dependency of uncertainty on three factors. The first is a constant contribution to uncertainty attributable to s_0, the standard deviation of the method for concentrations that approach zero. The second is a constant relative uncertainty associated with higher parameter concentrations. The third is a constant contribution to uncertainty attributable to the mean long-term method blank value where it is significant. The following is the ALS equation for measurement uncertainty, using an expansion factor of k=2:

Expanded 95% Uncertainty as a Function of Concentration

$$U(c) = 2 * [\sqrt{ \{ s_0^2 + (\Theta c)^2 \} }] + |MBlk_{LT}|$$

Where:
- **U(c)** = The expanded uncertainty at concentration c. The range c ± U(c) represents approximately the 95% confidence interval (two standard deviations).
- **c** = Measured concentration of parameter in the sample.
- s_0 = A constant contribution to standard uncertainty represented by the standard deviation at zero concentration, which is related to the method detection limit.
- **Θ** = Combined relative standard uncertainty, excluding MDL and Method Blank contributions. Theta has no units.
- $|MBlk_{LT}|$ = Absolute value of the mean long-term Method Blank value, where significant (i.e. if > 1/5 s_0). [Note that the Method Blank term is not expanded because it represents a constant bias, not a variance.]

Uncertainty values obtained from this procedure must be regarded as estimates. Primarily, this is because all environmental samples are different, especially with regard to matrix effects and heterogeneity. It is our intent with this procedure to arrive at an estimate of a 95% confidence level uncertainty value that can be assumed to apply to 95% (or more) of the samples that a laboratory receives for a given test. It follows that for samples where undetected matrix effects or interferences occur, or for samples that are atypically heterogeneous, uncertainty estimates may be low.

Another aspect of reporting MU is the reporting of test method bias. Bias occurs in a small number of test methods that cannot recover 100% of a parameter from a sample. In these cases ALS reports bias along with the MU to aid with the interpretation of the test result.

Participation in Interlaboratory Proficiency Testing (PT) Programs
ALS locations participate in an extensive variety of proficiency testing programs. Where available, formal programs operated by outside agencies are used. When not available, ALS utilizes less formal proficiency testing studies. Root cause analysis is initiated and corrective action plans are developed when PT program results indicate a decline in test method performance.

Staff Training
Formal training procedures are in place to ensure all staff are trained in ALS polices and analytical procedures prior to performing analyses. A staff orientation program communicates ALS polices to newly hired staff. Task specific training is performed, and analyst proficiency is demonstrated and documented before staff are authorized to work independently. On-going analyst proficiency is monitored using proficiency testing programs. Records are maintained in training logs issued to staff upon hiring.

As well, ALS Canada promotes continuing education and learning by offering advanced courses covering technical and quality functions.

Employee Agreements
ALS protects its customers' confidential information and proprietary rights. We require all employees to review and sign a Code of Conduct policy that communicates the ALS

confidentiality policy. It is ALS practice to never disclose information about a client's analysis to a third party without prior consent of the client, or unless compelled to by law. If we are obligated by law to disclose such information, we will inform the client prior to doing so.

Our employees avoid involvement in activities that would diminish confidence in their competence, impartiality, judgment, or integrity by complying with the ALS Code of Conduct and Data Integrity Policy.

Sample Tracking

Procedures are in place to track samples from receipt at the lab through to final reporting. A data management system (LIMS - Laboratory Information Management System) is used to generate a work order number for each sample submission, and a unique identification number is generated for each sample within the work order. The system is then used to assign specific analyses for the samples, to identify methods to be used, and to assign due dates for the results. The system is used to manage analytical workloads and track the status of all samples in-house. LIMS is a secure system that can only be accessed using login passwords. Controlling the level of access according to staff needs provides additional security.

When requested by the client, legal sample protocols are implemented to ensure chain of custody defensibility in a court of law. Contact the lab for legal sampling and transportation instructions if this service is needed.

Equipment Calibration

Measuring and testing equipment used by ALS laboratories that can have a significant effect on the accuracy or validity of test results is calibrated using established procedures. The procedures ensure traceability through an unbroken chain of calibrations or comparisons to national measurement standards. Where traceability of measurements to SI units is not possible and/or not relevant, traceability is provided by the use of certified reference materials and/or consensus standards.

Management Reviews (MR)

Management conducts a review at least annually to ensure the management system is effective, and continues to be suitable for its operations, and to identify necessary changes or improvements. Senior management is included in the review process for all locations.

CALA
Canadian Association for
Laboratory Accreditation Inc.

CALA Directory of Laboratories

Membership Number: 1352
Laboratory Name: ALS Environmental (Edmonton)
Parent Institution: ALS Canada Ltd.
Address: 9936 - 67th Ave. NW Edmonton AB T6E 0P5
Contact: Ms. Sarah Stilson
Phone: (780) 413-5226
Fax: (780) 437-2311
Email: alsed.quality@alsglobal.com

Standard: Conforms with requirements of ISO/IEC 17025
Clients Served: All Interested Parties
Revised On: June 1, 2017
Valid To: January 12, 2019

Scope of Accreditation

Air (Inorganic)
Dustfall - Air (120)
ED-TM-1030; modified from AB ENVIRONMENT 32020
GRAVIMETRIC
Dustfall, Fixed
Dustfall, Total

Air (Inorganic)
Fluoride - Air (188)
ED-TM-1026, ED-TP-2011; modified from SM 4500-F C
SELECTIVE ION ELECTRODE
Fluoride

Air (Inorganic)
Fluoride - Air Filter (219)
ED-TM-1008, NA-TM-1001; modified from NIOSH 7906
ION CHROMATOGRAPHY
Hydrogen Fluoride (as F)

Air (Inorganic)
Mercury - Air Filter (190)
ED-TM-1033, ED-TP-2001; modified from NIOSH 6009 and EPA 245.1
COLD VAPOUR AA - DIGESTION
Mercury

Air (Inorganic)
Metals - Air Filter (016)
ED-TP-2001, NA-TM-1002; modified from EPA 6020A and NIOSH 7303
ICP/MS - DIGESTION
Aluminum

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Antimony
Arsenic
Barium
Beryllium
Bismuth
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Molybdenum
Nickel
Potassium
Selenium
Silver
Sodium
Strontium
Thallium
Tin
Tungsten
Uranium
Vanadium
Zinc
Zirconium

Air (Inorganic)
Particulates - Air (223)
ED-TM-1140; modified from nioSH 0500/NIOSH 0600
GRAVIMETRIC
Particulates

Air (Inorganic)
Total Solids - Impinger (205)
ED-TM-1157; modified from EPA5
GRAVIMETRIC
Total Solids

Air (Organic)
Formaldehyde - Air (221)
ED-TM-1151; modified from TO-11A/NIOSH 2016
HPLC/UV - EXTRACTION
Formaldehyde

Air (Organic)
Gas - Compressed breathing Air (218)
ED-TM-1144; modified from ASTM D1946
GC/TCD
Nitrogen
Oxygen

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Air (Organic)
Hydrocarbons - Compressed Breathigng Air (217)
ED-TM-1142, ED-TM-1144; modified from EPA 18
GC/FID
Carbon Dioxide
Carbon Monoxide
Ethane
Methane
Total Volatile Hydrocarbons (C1-C16)

Air (Organic)
Isocyanates - Air Filter (220)
ED-TM-1145; modified from OSHA 42/OSHA 47
HPLC - FLUORESCENCE
2,4/2,6-Toluene Diisocyanate (TDI)
bis (Phenyl)methylene diisocyanate (MDI)
Hexamethylene Diisocyanate (HDI)
Isophorone Diisocyanate (IPDI)

Air (Organic)
VOC - Air (Gas Bag) (216)
ED-TM-1142; modified from EPA 018 AND EPA 25C
GC/FID
Benzene
Ethylbenzene
Non-methane organic carbons
Toluene
Xylenes

Oil (Organic)
Polychlorinated Biphenyls (PCB) - Oil (002)
ED-TM-1104; modified from EPA 8082 and ASTM D4059
GC/ECD - EXTRACTION
Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260
Aroclor 1262
Aroclor 1268
Total PCB

Paint
Lead - Paint (153)
ED-TM-1021, ED-TP-2018, NA-TP-2004; modified from EPA 200.2 and EPA 200.7
ICP - DIGESTION
Lead

Solids (Inorganic)
Ammonia - Soil (177)
ED-TM-1016, ED-TP-2019; modified from CSSS 15.2.1/SM 4500-NH3
COLORIMETRIC (SATURATED PASTE)
Ammonia

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Solids (Inorganic)
Anions - Soil (176)
ED-TP-2019, NA-TM-1001; modified from CSSS 15.2.1, EPA 300.1
ION CHROMATOGRAPHY (SATURATED PASTE)
Nitrate
Nitrite
Sulfate

Solids (Inorganic)
Asbestos (Bulk) - Solids (222)
ED-TM-1152; modified from EPA 600/R-93/116 AND NIOSH 9002
POLARIZED LIGHT MICROSCOPY
Bulk Asbestos

Solids (Inorganic)
Barium - Soil (172)
ED-TM-1021, ED-TP-2018, ISOP 158; modified from SSSA PART 3, 1996, PG 202, EPA 200.7
ICP - FUSION
Barium

Solids (Inorganic)
Barium (Extractable) - Soil (182)
ED-TM-1021, ED-TM-1051, ED-TP-2018; modified from BARITE WASTE GUIDELINES
ICP - EXTRACTION
Barium

Solids (Inorganic)
Chloride - Saturated Paste, Soil (168)
ED-TM-1032, ED-TP-2019; modified from CSSS 15.2.1/SM 4500 - CL E
COLORIMETRIC
Chloride

Solids (Inorganic)
Conductivity - Soil (156)
ED-TM-1004, ED-TP-2019; modified from CARTER CSSS 15.2.1, 15.3
SATURATED PASTE, METER
Conductivity

Solids (Inorganic)
Conductivity - Soil (157)
ED-TM-1004; modified from CARTER CSSS 15.3
1:2 EXTRACTION, METER
Conductivity

Solids (Inorganic)
Density - Soil (170)
ED-TM-1025; modified from ASTM D5057
GRAVIMETRIC
Density

Solids (Inorganic)
Grain Size - Soil (028)
ED-TM-1014; modified from ASTM D422-63
SIEVING
Grain Size

Solids (Inorganic)
Hexavalent Chromium - Soil (148)
ED-TM-1023; modified from EPA 3060A
IC-ALKALINE DIGESTION
Chromium

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Solids (Inorganic)
Hot Water Soluble Boron - Soil (145)
ED-TM-1021, ED-TM-1040, ED-TP-2018; modified from KEREN 1996 METHODS OF SOIL ANALYSIS
ICP - EXTRACTION
Boron

Solids (Inorganic)
Mercury - Soil (164)
NA-TM-1005, NA-TP-2004; modified from EPA 200.2 and EPA 245.1
COLD VAPOUR AA - DIGESTION
Mercury

Solids (Inorganic)
Metals - Soil (023)
NA-TM-1002, NA-TP-2004; modified from EPA 200.2 and EPA6020
ICP/MS - DIGESTION
Aluminum
Antimony
Arsenic
Barium
Beryllium
Bismuth
Boron
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Molybdenum
Nickel
Phosphorus
Potassium
Selenium
Silver
Sodium
Strontium
Sulfur
Thallium
Tin
Titanium
Uranium
Vanadium
Zinc
Zirconium

Solids (Inorganic)
Oil and Grease - Soil (029)
ED-TM-1131; modified from SM 5520
GRAVIMETRIC - EXTRACTION
Oil and Grease

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Solids (Inorganic)
Particle Size - Soil (110)
ED-TM-1010; modified from CARTER CSSS 47.3
PARTICLE SIZE
% Clay
% Sand
% Silt

Solids (Inorganic)
Percent Moisture - Soil (179)
ED-TM-1200; modified from ASTM D2216-80
GRAVIMETRIC
% Moisture

Solids (Inorganic)
Percent Saturation - Soil (169)
ED-TP-2019; modified from CSSS 15.2.1
GRAVIMETRIC
% Saturation

Solids (Inorganic)
pH - Soil (099)
ED-TM-1003, ED-TP-2019; modified from CARTER CSSS 15.2.1,16.2
SATURATED PASTE, METER
pH

Solids (Inorganic)
pH - Soil (100)
ED-TM-1003; modified from CARTER CSSS 16.2
EXTRACTION, METER
pH 1:2
pH solids 1:1

Solids (Inorganic)
pH (1:2 CaCl2) - Soil (163)
ED-TM-1015; modified from CSSS 16.3
1:2 CaCl2 EXTRACTION - METER
pH (1:2 CaCl2)

Solids (Inorganic)
Salinity - Soil (160)
ED-TM-1021, ED-TP-2018, ED-TP-2019; modified from CARTER CSSS 15.2.1 and EPA 200.7
ICP (SATURATED PASTE)
Boron
Calcium
Magnesium
Potassium
Sodium
Sulfur SO4

Solids (Inorganic)
Sulfate - Solids (173)
ISOP 155, NA-TM-1001; modified from CSA A23.2
IC - DIGESTION
Sulfate

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Solids (Organic)
Alkanolamines - Soil (210)
ED-TM-1155; modified from "QUANTITATIVE ANALYSIS OF AMINO ACIDS" T. NASHOLM, G. SANDLBERG, AND A. ERICSSON. J. CHROMATOGRAM. 396:225-236 (1987)
HPLC - EXTRACTION
DEA (Diethanolamine)
DIPA (Diisopropanolamine)
MEA (Monoethanolamine)
MIPA (Monoisopropanolamine)

Solids (Organic)
Petroleum Hydrocarbons (PHC) - Soil (154)
NA-TM-1103, NA-TP-2102; CCME, EPA 8260
GC/MS - HEADSPACE
Benzene
Ethylbenzene
m/p-xylene
o-xylene
Toluene

Solids (Organic)
Petroleum Hydrocarbons (PHC) - Soil (155)
NA-TM-1103, NA-TP-2102; CCME, EPA 8260, EPA 5021
GC/FID - HEADSPACE
F1: C6-C10
VH: C6-C10

Solids (Organic)
Petroleum Hydrocarbons (PHC) - Soil (158)
NA-TM-1100, NA-TP-2100; CCME
GC/FID - EXTRACTION TUMBLER
F2: C10-C16
F3: C16-C34
F4: C34-C50

Solids (Organic)
Petroleum Hydrocarbons (PHC) - Soil (171)
NA-TM-1100, NA-TP-2100; CCME
GRAVIMETRIC - TUMBLER
F4: Gravimetric

Solids (Organic)
Phenols - Soil (077)
ED-TM-1113; modified from EPA 8270 and EPA 3540
GC/MS - EXTRACTION
2-Chlorophenol
2-Methylphenol (o-Cresol)
2-Nitrophenol
2,3-Dichlorophenol
2,3,4-Trichlorophenol
2,3,4,5-Tetrachlorophenol
2,3,4,6 Tetrachlorophenol
2,3,5-Trichlorophenol
2,3,5,6-Tetrachlorophenol
2,3,6-Trichlorophenol
2,4 & 2,5-Dichlorophenol
2,4-Dimethylphenol
2,4-Dinitrophenol

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2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
2,6-Dichlorophenol
3-Chlorophenol
3-Methylphenol (m-Cresol)
3,4-Dichlorophenol
3,4,5-Trichlorophenol
3,5-Dichlorophenol
4-Chloro-3-methylphenol
4-Chlorophenol
4-Methylphenol (p-Cresol)
4-Nitrophenol
4,6-Dinitro-2-methylphenol
Pentachlorophenol
Phenol

Solids (Organic)
Polychlorinated Biphenyls (PCB) - Soil (097)
ED-TM-1103; modified from EPA 3550 and EPA 8082
GC/ECD - EXTRACTION
Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260
Aroclor 1262
Aroclor 1268
Total PCB

Solids (Organic)
Sulfolane - Soil (204)
ED-TM-1115; modified from EPA 3540 AND EPA 1625
GC/MS - EXTRACTION
Sulfolane

Solids (Organic)
Volatile Organic Compounds (VOC) - Soil (167)
ED-TM-1111, NA-TM-1102; modified from EPA 5021 and EPA 8260
GC/MS - HEADSPACE/EXTRACTION
1,1-Dichloroethane
1,1-dichloroethylene
1,1-Dichloropropene
1,1,1-Trichloroethane
1,1,1,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1,2,2-Tetrachloroethane
1,2-Dibromo-3-chloropropane
1,2-Dibromoethane
1,2-dichlorobenzene
1,2-dichloroethane
1,2-Dichloropropane
1,2,3-Trichlorobenzene
1,2,3-Trichloropropane
1,2,4-Trichlorobenzene

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1,2,4-Trimethylbenzene
1,3-Dichlorobenzene
1,3-Dichloropropane
1,3,5-Trimethylbenzene
1,4-dichlorobenzene
2-Chlorotoluene
2-Hexanone
2,2-Dichloropropane
4-Chlorotoluene
Acetone (2-Propanone)
Acrylonitrile
Benzene
Bromobenzene
Bromochloromethane
Bromodichloromethane
Bromoform
Bromomethane
Carbon Disulphide
Carbon Tetrachloride
Chlorobenzene
Chlorodibromomethane
Chloroethane
Chloroform
Chloromethane
cis-1,2-Dichloroethylene
cis-1,3-Dichloropropene
cis-1,4-Dichloro-2-Butene
Dibromomethane
Dichlorodifluoromethane
Dichloromethane
Ethyl Alcohol
Ethyl Methacrylate
Ethylbenzene
Ethylene Dibromide
Hexachlorobutadiene
Isopropylbenzene
m/p-xylene
Methyl Ethyl Ketone
Methyl Iodide
Methyl isobutyl Ketone
n-butylbenzene
n-propylbenzene
Naphthalene
o-xylene
p-Isopropyltoluene
sec-butylbenzene
Styrene
tert-butylbenzene
Tetrachloroethylene
Toluene
trans-1,2-Dichloroethylene
trans-1,3-Dichloropropene
Trans-1,4-Dichloro-2-Butene

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Trichloroethylene
Trichlorofluoromethane
Vinyl Chloride

Swab (Inorganic)
Mercury - Swabs (211)
ED-TP-2004, NA-TM-1005; modified from EPA 3050 B AND EPA 245.1
COLD VAPOUR AA - DIGESTION
Mercury

Swab (Inorganic)
Metals - Swabs (201)
ED-TP-2004, NA-TM-1002; modified from EPA 200.2 & EPA 6020
ICP/MS - EXTRACTION
Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Magnesium
Manganese
Molybdenum
Nickel
Potassium
Selenium
Silver
Sodium
Strontium
Tin
Vanadium
Zinc

Swab (Organic)
Polychorinated Biphenyls (PCB) - Swabs (202)
ED-TM-1102; modified from EPA 3550 AND EPA 8082
GC/ECD - EXTRACTION
Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260
Aroclor 1262
Aroclor 1268
Total PCBs

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Tissue (Inorganic)
Mercury - Tissue (054)
NA-TM-1005, NA-TP-2006; modified from EPA 200.3 and EPA 245.1AND EPA 245.7
COLD VAPOR AA - DIGESTION
Mercury

Tissue (Inorganic)
Metals - Tissue (060)
NA-TM-1002, NA-TP-2006; modified from EPA 200.3 and EPA 6020
ICP/MS - DIGEST
Aluminum
Antimony
Arsenic
Barium
Beryllium
Bismuth
Boron
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Molybdenum
Nickel
Phosphorus
Potassium
Selenium
Silver
Sodium
Strontium
Sulphur
Thallium
Tin
Titanium
Uranium
Vanadium
Zinc
Zirconium

Waste (Inorganic)
Flashpoint - Waste (055)
ED-TM-1012; modified from ASTM 93-D
PENSKE-MARTEN CLOSED CUP
Flashpoint

Waste (Inorganic)
Mercury - TCLP - Waste (162)
ED-TM-1033, NA-TM-1700; EPA 1311 (LEACH) and modified from EPA 245.1 and EPA 245.7 (ANALYSIS)
COLD VAPOUR AA - DIGESTION - TCLP
Mercury

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Waste (Inorganic)
Metals - TCLP Leachate - Waste (141)
NA-TM-1002, NA-TM-1700; EPA 1311 (LEACH) and modified from EPA 6020 (ANALYSIS)
ICP/MS - TCLP
Antimony
Arsenic
Barium
Beryllium
Boron
Cadmium
Chromium
Cobalt
Copper
Iron
Lead
Nickel
Selenium
Silver
Thallium
Uranium
Vanadium
Zinc
Zirconium

Waste (Inorganic)
Specific Gravity - Waste (174)
ED-TM-1025; modified from ASTM D5057
GRAVIMETRIC
Specific Gravity

Waste (Organic)
BTEX - TCLP Leachate - Waste (135)
ED-TP-2005, NA-TM-1103; EPA 1311 (LEACH) and modified from EPA 8260B (ANALYSIS)
GC/MS - TCLP
Benzene
Ethylbenzene
m/p - xylene
o-xylene
Toluene

Water (Inorganic)
Acidity - Water (206)
ED-TM-1049; modified from APHA 2310
TITRATION
Acidity

Water (Inorganic)
Acidity - Water (212)
ED-TM-1049; modified from APHA 2310
TITRATION - POTENTIOMETRIC
Acidity

Water (Inorganic)
Alkalinity - Water (004)
ED-TM-1026; modified from SM 2320 B
TITRIMETRIC
Alkalinity (pH 4.5)
Alkalinity (pH 8.3)

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Water (Inorganic)
Ammonia - Water (178)
ED-TM-1016; modified from SM 4500 NH3
COLORIMETRIC
Ammonia

Water (Inorganic)
Ammonia - Water (213)
ED-TM-1024; modified from EPA METHOD 350.1
COLORIMETRIC
Ammonia

Water (Inorganic)
Anions - Water (005)
NA-TM-1001; modified from EPA 300.1
ION CHROMATOGRAPHY
Bromide
Chloride
Fluoride
Nitrate
Nitrite
Sulfate

Water (Inorganic)
Biochemical Oxygen Demand (BOD) - Water (013)
ED-TM-1007, ED-TM-1037; modified from SM 5210B
D.O. METER
BOD (5 day)
BODu (ultimate)
CBOD (5 day)

Water (Inorganic)
Carbon - Water (118)
ED-TM-1002; modified from SM 5310 B
IR - COMBUSTION
Inorganic Carbon
Organic Carbon
Total Carbon (TC)

Water (Inorganic)
Chemical Oxygen Demand (COD) - Water (051)
ED-TM-1009; modified from SM 5220 D
COLORIMETRIC - DIGESTION
COD

Water (Inorganic)
Chlorine - Water (123)
ISOP 134; modified from SM 4500 CL-A,F,G
COLORIMETRIC
Free Chlorine
Total Chlorine

Water (Inorganic)
Colour - Water (152)
ED-TM-1038; modified from SM 2120 A, C
SPECTROPHOTOMETRIC
True Colour

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Water (Inorganic)
Colour (Automated) - Water (199)
ED-TM-1052; modified from SM 2120 A, C
COLORIMETRIC
True Colour

Water (Inorganic)
Conductivity - Water (006)
ED-TM-1026; modified from SM 2510 B
CONDUCTIVITY METER
Conductivity (25°C)

Water (Inorganic)
Dissolved Metals - Water (007)
NA-TM-1002, NA-TP-2002; modified from EPA 6020
ICP/MS
Aluminum
Antimony
Arsenic
Barium
Beryllium
Bismuth
Boron
Cadmium
Calcium
Cesium
Chromium
Cobalt
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Molybdenum
Nickel
Phosphorus
Potassium
Rubidium
Selenium
Silicon
Silver
Sodium
Strontium
Sulphur
Tellurium
Thallium
Thorium
Tin
Titanium
Tungsten
Uranium
Vanadium
Zinc
Zirconium

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Water (Inorganic)
Dissolved Oxygen - Water (214)
ED-TM-1054; modified from SM 4500-0
TITRATION
Dissolved Oxygen

Water (Inorganic)
Hexavalent Chromium - Water (035)
ED-TM-1023; modified from SM 3500-CR,C
ION CHROMATOGRAPHY
Hexavalent Chromium

Water (Inorganic)
Mercury - Water (149)
NA-TM-1005; modified from EPA 245.7 and EPA 245.1
COLD VAPOUR AA, COLD OXIDATION
Mercury

Water (Inorganic)
Microtox - Water (161)
NA-TM-1400; modified from AER ERCB Directive 050
BIOLUMINESCENCE
Microtox IC50 (15 min)

Water (Inorganic)
Oil and Grease - Water (038)
ED-TM-1132; modified from SM 5520 A,B,F
GRAVIMETRIC
Total Oil and Grease

Water (Inorganic)
Oil and Grease - Water (159)
ED-TM-1133; modified from SM 5520 C, F
INFRA-RED
Hydrocarbon Oil and Grease
Total Oil and Grease

Water (Inorganic)
pH - Water (015)
ED-TM-1026; modified from SM 4500-A,B
pH METER
pH

Water (Inorganic)
Phenols - Water (146)
ED-TM-1044; modified from ALBERTA ENVIRONMENT 154
COLORIMETRIC
Total Phenolics

Water (Inorganic)
Phosphate - Water (084)
ED-TM-1031; modified from SM 4500-P
COLORIMETRIC
Phosphate

Water (Inorganic)
Phosphates (Low) - Water (183)
ED-TM-1018; modified from SM 4500-P
COLORIMETRIC - TECHNICON
Phosphate

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Water (Inorganic)
Phosphorus - Water (011)
ED-TM-1031; modified from SM 4500-P,B,E
COLORIMETRIC - DIGESTION
Total Dissolved Phosphorus
Total Phosphorus

Water (Inorganic)
Phosphorus - Water (119)
ED-TM-1031, ED-TP-2006; modified from SM 4500-A B, E
COLORIMETRIC
Inorganic Phosphorus

Water (Inorganic)
Phosphorus - Water (184)
ED-TM-1019; modified from SM 4500, P, B, E
COLORIMETRIC - TECHNICON
Total Dissolved Phosphorus
Total Phosphorus

Water (Inorganic)
Phosphorus - Water (224)
ED-TM-1034; 4500 P
COLORIMETRIC - TECHNICON
Inorganic Phosphorus

Water (Inorganic)
Reactive Silica - Water (200)
ED-TM-1053; modified from SM 4500-SIO2 A, E
COLORIMETRIC
Reactive Silica

Water (Inorganic)
Solids - Water (012)
ED-TM-1005; modified from SM 2540 A, B, C, D, E
GRAVIMETRIC
Fixed Suspended Solids
Total Dissolved Solids
Total Suspended Solids
Volatile Suspended Solids

Water (Inorganic)
Sulfide - Water (033)
ED-TM-1001; modified from SM 4500-S2 A, D,E
COLORIMETRIC
Sulfide

Water (Inorganic)
Total Kjeldahl Nitrogen (TKN) - Water (010)
ED-TM-1017, ED-TP-2021; modified from EPA 351.2
COLORIMETRIC - DIGESTION
Dissolved Kjeldahl Nitrogen
Total Kjeldahl Nitrogen

Water (Inorganic)
Total Metals - Water (082)
NA-TM-1002, NA-TP-2001; modified from EPA 6020 and SM 3030 E
ICP/MS - DIGESTION
Aluminum
Antimony

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Arsenic
Barium
Beryllium
Bismuth
Boron
Cadmium
Calcium
Cesium
Chromium
Cobalt
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Molybdenum
Nickel
Phosphorus
Potassium
Rubidium
Selenium
Silicon
Silver
Sodium
Strontium
Sulphur
Tellurium
Thallium
Thorium
Tin
Titanium
Tungsten
Uranium
Vanadium
Zinc
Zirconium

Water (Inorganic)
Turbidity - Water (078)
ED-TM-1011; modified from SM 2130 A, B
TURBIDIMETRIC
Turbidity

Water (Microbiology)
Coliforms - Water (196)
NA-TM-1300; modified from SM 9223 B
MOST PROBABLE NUMBER (QUANTI-TRAY)
Escherichia coli (E. coli)
Total Coliforms

Water (Microbiology)
Fecal (Thermotelrant) Coliforms - Water (197)
NA-TM-1300; modified from SM 9223 B
MOST PROBABLE NUMBER (QUANTI-TRAY)
Fecal (Thermotolerant) Coliforms

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Water (Microbiology)
Heterotrophic Plate Count (HPC) - Water (198)
NA-TM-1300; modified from SM 9215 E
MOST PROBABLE NUMBER (QUANTI-TRAY)
Heterotrophic Plate Count (HPC)

Water (Organic)
Alkanolamines - Water (209)
ED-TM-1155; modified from "QUANTITATIVE ANALYSIS OF AMINO ACIDS" T. NASHOLM, G. SANDLBERG, AND A. ERICSSON. J. CHROMATOGRAM. 396:225-236 (1987)
HPLC - EXTRACTION
DEA (Diethanolamine)
DIPA (Diisopropanolamine)
MEA (Monoethanolamine)
MIPA (Monoisopropanolamine)

Water (Organic)
Base Neutral Extractables - Water (117)
ED-TM-1124; modified from EPA 3510 and EPA 8270
GC/MS - EXTRACTION
1,2,3-Trichlorobenzene
1,2,4-Trichlorobenzene
2-Chloronaphthalene
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Pentachlorobenzene

Water (Organic)
Petroleum Hydrocarbons (PHC) - Water (075)
NA-TM-1110; modified from EPA 3511
GC/FID - EXTRACTION
F2: C10-C16
F3: C16-C34
F4: C34-C50
TEH (C11-C30)

Water (Organic)
Petroleum Hydrocarbons (PHC) - Water (165)
NA-TM-1103; modified from EPA 5021 and EPA 8260
GC/FID - HEADSPACE
F1: C6-C10
VH: C6-C10

Water (Organic)
Phenols - Water (076)
ED-TM-1114; modified from EPA 8270 and EPA 3510
GC/MS - EXTRACTION
2-Chlorophenol
2-Methylphenol (o-Cresol)
2-Nitrophenol
2,3-Dichlorophenol
2,3,4-Trichlorophenol
2,3,4,5-Tetrachlorophenol
2,3,4,6-tetrachlorophenol

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2,3,5-Trichlorophenol
2,3,5,6-Tetrachlorophenol
2,3,6-Trichlorophenol
2,4 & 2,5-Dichlorophenol
2,4-Dimethylphenol
2,4-Dinitrophenol
2,4,5-Trichlorophenol
2,4,6-trichlorophenol
2,6-Dichlorophenol
3-Chlorophenol
3-Methylphenol (m-Cresol)
3,4-Dichlorophenol
3,4,5-Trichlorophenol
3,5-Dichlorophenol
4-Chloro-3-methylphenol
4-Chlorophenol
4-Methylphenol (p-Cresol)
4-Nitrophenol
4,6-Dinitro-2-methylphenol
Pentachlorophenol
Phenol

Water (Organic)
Polychlorinated Biphenyls (PCB) - Water (096)
ED-TM-1136; modified from EPA 3510 and EPA 8082
GC/ECD - EXTRACTION
Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260
Aroclor 1262
Aroclor 1268
Total PCB

Water (Organic)
Resin and Fatty Acids - Water (020)
ED-TM-1106; modified from ALBERTA ENVIRONMENT 129.0
GC/MS - EXTRACTION
12-Chlorodehydroabietic Acid
12,14-Dichlorodehydroabietic Acid
14-Chlorodehydroabietic Acid
9,10-Dichlorostearic Acid
Abietic Acid
Arachidic Acid
Dehydroabietic Acid
Isopimaric Acid
Levopimaric Acid
Linoleic Acid
Linolenic Acid
Myristic Acid
Neoabietic Acid
Oleic Acid

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Palmitic Acid
Palustric Acid
Pimaric Acid
Sandaracopimaric Acid
Stearic Acid

Water (Organic)
Resin and Fatty Acids - Water (132)
ED-TM-1106; modified from ALBERTA ENVIRONMENT 129.0
GC/MS - EXTRACTION (RFA-Low ED)
12-Chlorodehydroabietic acid
12,14-Dichlorodehydroabietic acid
14-Chlorodehydroabietic acid
9,10-Dichlorostearic acid
Abietic acid
Arachidic acid
Dehydroabietic Acid
Isopimaric acid
Levopimaric acid
Linoleic Acid
Linolenic Acid
Myristic acid
Neoabietic acid
Oleic Acid
Palmitic Acid
Palustric acid
Pimaric acid
Sandaracopimaric acid
Stearic Acid

Water (Organic)
Sulfolane - Water (203)
ED-TM-1115; modified from EPA 3510 AND EPA 1625
GC/MS - EXTRACTION
Sulfolane

Water (Organic)
Volatile Organic Compounds (VOC) - Water (166)
NA-TM-1102; modified from EPA 5021 and EPA 8260
GC/MS - HEADSPACE
1,1-Dichloroethane
1,1-dichloroethylene
1,1-dichloropropene
1,1,1-Trichloroethane
1,1,1,2-tetrachloroethane
1,1,2-Trichloroethane
1,1,2,2-Tetrachloroethane
1,2-dibromo-3-chloropropane
1,2-dichlorobenzene
1,2-dichloroethane
1,2-Dichloropropane
1,2,3-trichlorobenzene
1,2,3-Trichloropropane
1,2,4-trichlorobenzene
1,2,4-trimethylbenzene
1,3-Dichlorobenzene

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1,3-dichloropropane
1,3,5-trimethylbenzene
1,4-dichlorobenzene
2-chlorotoluene
2-Hexanone
2,2-dichloropropane
4-chlorotoluene
Acetone (2-Propanone)
Acrylonitrile
Benzene
Bromobenzene
Bromochloromethane
Bromodichloromethane
Bromoform
Bromomethane
Carbon Disulphide
Carbon Tetrachloride
Chlorobenzene
Chlorodibromomethane
Chloroethane
Chloroform
Chloromethane
cis-1,2-Dichloroethylene
cis-1,3-Dichloropropene
cis-1,4-Dichloro-2-Butene
Dibromomethane
Dichlorodifluoromethane
Dichloromethane
Ethyl Alcohol
Ethyl Methacrylate
Ethylbenzene
Ethylene Dibromide
hexachlorobutadiene
Isopropylbenzene
m/p-xylene
Methyl Ethyl Ketone
Methyl Iodide
Methyl isobutyl Ketone
n-butylbenzene
n-propylbenzene
naphthalene
o-xylene
p-isopropyltoluene
Sec-butylbenzene
Styrene
Tert-butylbenzene
Tetrachloroethylene
Toluene
trans-1,2-Dichloroethylene
trans-1,3-Dichloropropene
Trans-1,4-Dichloro-2-Butene
Trichloroethylene
Trichlorofluoromethane

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BluMetric Environmental Inc.
ATTN: Daniel Tucholski
4901-48 St. Ground Floor
Yellowknife NT X1A 2P9

Date Received: 25-JUL-17
Report Date: 31-JUL-17 09:40 (MT)
Version: FINAL

Client Phone: 867-446-2346

Certificate of Analysis

Lab Work Order #: L1964334

Project P.O. #: NOT SUBMITTED
Job Reference: 170529
C of C Numbers: 10-185713
Legal Site Desc:

Rick Zolkiewski
General Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1964334-1 TU-A1-SS1							
Sampled By: DT on 24-JUL-17 @ 21:45							
Matrix: soil							
CCME BTEX, F1 TO F4							
CCME Total Extractable Hydrocarbons							
Surrogate: 2-Bromobenzotrifluoride	93.6		70-130	%	27-JUL-17	27-JUL-17	R3784436
Chrom. to baseline at nC50	YES				27-JUL-17	27-JUL-17	R3784436
Prep/Analysis Dates					27-JUL-17	27-JUL-17	R3784436
CCME Total Hydrocarbons							
F1 (C6-C10)	<10		10	mg/kg		31-JUL-17	
F1-BTEX	<10		10	mg/kg		31-JUL-17	
F2 (C10-C16)	<20		20	mg/kg		31-JUL-17	
F3 (C16-C34)	173		20	mg/kg		31-JUL-17	
F4 (C34-C50)	42		20	mg/kg		31-JUL-17	
Total Hydrocarbons (C6-C50)	215		20	mg/kg		31-JUL-17	
Miscellaneous Parameters							
% Moisture	15.5		0.50	%		27-JUL-17	R3784671
BTEX and F1							
Benzene	<0.0050		0.0050	mg/kg	24-JUL-17	27-JUL-17	R3784186
Toluene	<0.050		0.050	mg/kg	24-JUL-17	27-JUL-17	R3784186
Ethylbenzene	<0.010		0.010	mg/kg	24-JUL-17	27-JUL-17	R3784186
m+p-Xylene	<0.050		0.050	mg/kg	24-JUL-17	27-JUL-17	R3784186
o-Xylene	<0.050		0.050	mg/kg	24-JUL-17	27-JUL-17	R3784186
Styrene	<0.050		0.050	mg/kg	24-JUL-17	27-JUL-17	R3784186
Xylenes	<0.10		0.10	mg/kg	24-JUL-17	27-JUL-17	R3784186
Surrogate: 1,4-Difluorobenzene (SS)	100.8		70-130	%	24-JUL-17	27-JUL-17	R3784186
Surrogate: 4-Bromofluorobenzene (SS)	94.0		70-130	%	24-JUL-17	27-JUL-17	R3784186
Surrogate: 3,4-Dichlorotoluene (SS)	104.3		70-130	%	24-JUL-17	27-JUL-17	R3784186

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTXS,F1-MEOH-ED	Soil	BTEX and F1	EPA 8260C/5021A and CWS PHC Tier 1

This analysis involves the extraction of a subsample of the sediment/soil with methanol added in the field at the time of subsampling. The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. BTX Target compound concentrations are measured using mass spectrometry detection. The instrumental portion of F1 analysis is carried out in accordance with the Canada Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method (2001).

ETL-TVH,TEH-CCME-ED	Soil	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

Hydrocarbon results are expressed on a dry weight basis.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F2-4-TMB-ED	Soil	CCME Total Extractable Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment" For C10 to C50 hydrocarbons (F2, F3, F4) and gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds. F2, F3 & F4 are analyzed by on-column GC/FID, and F4G-sg is analyzed gravimetrically.

Notes:
1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
7. The gravimetric heavy hydrocarbon results (F4G-sg), cannot be added to the C6 to C50 hydrocarbon results.
8. This method is validated for use.
9. Data from analysis of quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram.

PREP-MOISTURE-ED	Soil	% Moisture	Oven dry 105C-Gravimetric

The weighed portion of soil is placed in a 105°C oven to dry to a constant weight; the drying time will vary based on the moisture content of the soil. The dried soil weight is then used to calculate % moisture.

Reference: ASTM D2974-00.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA

Chain of Custody Numbers:

10-185713

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: BluMetric Environmental Inc.
4901-48 St. Ground Floor
Yellowknife NT X1A 2P9
Contact: Daniel Tucholski

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTXS,F1-MEOH-ED	**Soil**							
Batch R3784186								
WG2579375-2 LCS								
Benzene			86.5		%		70-130	28-JUL-17
Toluene			96.3		%		70-130	28-JUL-17
Ethylbenzene			73.4		%		70-130	28-JUL-17
m+p-Xylene			79.7		%		70-130	28-JUL-17
o-Xylene			74.1		%		70-130	28-JUL-17
Styrene			70.9		%		70-130	28-JUL-17
WG2579375-1 MB								
Benzene			<0.0050		mg/kg		0.005	28-JUL-17
Toluene			<0.050		mg/kg		0.05	28-JUL-17
Ethylbenzene			<0.010		mg/kg		0.01	28-JUL-17
m+p-Xylene			<0.050		mg/kg		0.05	28-JUL-17
o-Xylene			<0.050		mg/kg		0.05	28-JUL-17
Styrene			<0.050		mg/kg		0.05	28-JUL-17
Surrogate: 1,4-Difluorobenzene (SS)			82.9		%		70-130	28-JUL-17
Surrogate: 4-Bromofluorobenzene (SS)			76.0		%		70-130	28-JUL-17
Surrogate: 3,4-Dichlorotoluene (SS)			97.7		%		70-130	28-JUL-17
F2-4-TMB-ED	**Soil**							
Batch R3784436								
WG2579354-3 IRM		**ALS PHC2 RM**						
F2 (C10-C16)			90.5		%		70-130	27-JUL-17
F3 (C16-C34)			102.8		%		70-130	27-JUL-17
F4 (C34-C50)			107.3		%		70-130	27-JUL-17
WG2579354-2 LCS		**DIESEL / MOTOR OIL**						
F2 (C10-C16)			105.6		%		70-130	27-JUL-17
F3 (C16-C34)			102.9		%		70-130	27-JUL-17
F4 (C34-C50)			101.6		%		70-130	27-JUL-17
WG2579354-1 MB								
F2 (C10-C16)			<20		mg/kg		20	27-JUL-17
F3 (C16-C34)			<20		mg/kg		20	27-JUL-17
F4 (C34-C50)			<20		mg/kg		20	27-JUL-17
Surrogate: 2-Bromobenzotrifluoride			86.8		%		70-130	27-JUL-17
PREP-MOISTURE-ED	**Soil**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PREP-MOISTURE-ED	**Soil**							
Batch R3784671								
WG2579523-3 DUP		**L1964334-1**						
% Moisture		15.5	15.8		%	2.1	20	27-JUL-17
WG2579523-2 LCS								
% Moisture			99.1		%		90-110	27-JUL-17
WG2579523-1 MB								
% Moisture			<0.50		%		0.5	27-JUL-17

Quality Control Report

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

10 - 185713

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Page 1 of 1

Report To		Report Format / Distribution		Service Request (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	BluMetric Environmental Inc.	Standard: X Other (specify):		X	Regular (Standard Turnaround Times - Business Days)
Contact:	Dan Tucholski	Select: PDF X Excel X Digital Fax			Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	4916 49th Street, Yellowknife, NT X1A 1E4	Email 1: dtucholski@blumetric.ca			Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
		Email 2: pbandler@blumetric.ca			Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	867-873-3500 Fax: 867-873-3499			Analysis Request	
Invoice To	Same as Report ? (circle) Yes or (No) (if No, provide details)	**Client / Project Information**		(Indicate Filtered or Preserved, F/P)	
	Copy of Invoice with Report? (circle) Yes or (No)	Job #: 170529			
Company:	BluMetric Environmental Inc.	PO / AFE:			
Contact:	Tara Douris	LSD:			
Address:	4-41, rue de Valcourt, Gatineau J8T 8G9				
Phone:	819-243-7555 Fax: 819-243-0167	Quote #:			
Lab Work Order # (lab use only)	L1964334	ALS Contact: Rick Zolkiewski	Sampler: Daniel Tucholski		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX	PHCs F1-F4	Number of Containers
	TU-A1-SS1	24-Jul-17	2145	Soil	X	X	3

L1964334-COFC

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Daniel Tucholski, Dan Tucholski	7/25/17	1530	AB	July 25/17	~~1345~~ 1545	9.3 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY GENF 18.01 Front

GENERAL TERMS AND CONDITIONS:

These terms and conditions are incorporated in and form part of the Agreement between ALS Laboratory Group – Environmental Division ("ALS") and the party named in the Offer (the "Client").

1. Definitions. Capitalized Terms not defined in these Terms and Conditions have the definitions set out in the other Agreement documents.
2. The Services. ALS will provide the Services to the Client as described in the Offer and in any change of custody form provided with any sample.
3. Prices. ALS may review and change all prices, fees, surcharges or other charges set out in the Agreement if there are changes to ALS's cost beyond ALS's control, including changes in legislative requirements, Client variations of sample numbers and Client requests for changes to standard reporting requirements. Notwithstanding Condition 3, all quotations are reviewed and updated on a yearly basis.
4. Payment Terms. The Client shall pay ALS within 30 days of the invoice date OAC. ALS may, for reasonable business reasons, require the Client to arrange for payment in advance.
5. Quotation Numbers. The Client shall provide the quotation number to ALS (where applicable) to ensure correct pricing.
6. Taxes. Applicable taxes are not included in prices, surcharges and additional fees and will be added at the time of invoicing.
7. Quality Control. ALS has an extensive QA/QC program and all analytical data reported is analyzed using approved, referenced procedures followed by checks and reviews of senior managers and quality assurance personnel.
8. No Guarantee of Results. Results are obtained from chemical measurements. The Client is responsible for informing itself on the limitation of the results and acknowledges that the results are not guaranteed.
9. Standard of Care. ALS will use reasonable care and diligence as required by the laws of the province or territory where the sample is tested.
10. Storage. Where possible, ALS will store samples for 30 days from the date a final report is issued to the Client, after which ALS may discard the sample.
11. Holds. If the Client requests a sample be placed on hold, ALS will store the sample for 60 days for the quoted price, after which ALS will invoice the Client and discard the sample.
12. Archives. If the Client requests a sample be archived, ALS will store the sample for 6 months for the quoted price, after which ALS will invoice the Client and discard the sample.
13. Handling Protocol. Legal sample handling protocol must be arranged before samples are collected. ALS may charge a 20% surcharge on the list price plus the hourly technologist or chemist rates for legal sample protocol. Samples processed under legal protocol are stored indefinitely (storage charges may apply).
14. Samples. The quality, condition, content and source of samples stored and tested are not known to ALS except as declared and described on the chain of custody form completed and submitted by the Client and accompanying the sample.
15. Risk of Loss. ALS will use reasonable care to protect samples during storage, however all samples are stored at the Client's risk and the Client is responsible for obtaining appropriate insurance, if desired. The Client acknowledges that during the performance of the Services samples may be altered, lost, damaged or destroyed and the Client releases ALS from any claim the Client may have for any loss or damage to the sample.
16. Environmental. The Client must comply with all applicable environment legislation, including labeling all hazardous samples to comply with WHMIS and TDG regulations, and must provide appropriate material safety data sheets that include the nature of the hazard and a contact name and phone number to call for information. The Client will indemnify ALS for all loss or damages, including any fine or cost of complying with an order of any government authority, resulting from the Client's breach of this paragraph.
17. Hazardous Materials Disposal. ALS may return, at the Client's cost, hazardous material to the Client for disposal.
18. Hazardous Materials Surcharge. ALS may apply an additional surcharge for handling of hazardous samples or samples with Naturally Occuring Radioactive Materials (NORM), H2S, CN, etc.
19. Sample Containers. ALS may ship sample containers to the Client's location by the most cost effective means using ALS preferred courier suppliers, within the specified project timeline.
20. Additional Charges. ALS may charge the Client (a) its cost for emergency bottle shipments and shipments to and from a remote site, and (b) where pick up and delivery services are provided, subject in each instance to a minimum charge of $25.00.
21. Large Bottle Orders. The Client shall provide ALS with 24 hours notice for large bottle orders.
22. Re-Tests. ALS reserves the right to re-test any samples that remains in its possession. Re-tests requested by the Client may be charged.
23. Waiver. The Client is responsible for making any assessment regarding the suitability of the Services and the intended results for the Client's purposes and waives any claims against ALS it may have as a result of the interpretation of the results. The Client shall indemnify ALS for all claims made by any third party against ALS in respect of all losses however arising from the performance of the Services or the use of any report provided in the performance of the Services.
24. Limitation of Liability. In no event shall ALS be liable for any consequential, indirect, incidental, special, exemplary or punitive damages, whether foreseeable of unforeseeable, (including claims for loss of profits or revenue or losses caused by stoppage of other work or impairment of other assets) incurred by the Client arising out of breach or failure of express of implied warranty, breach of contract, breach of warranty, misrepresentation, negligence, strict liability in tort or otherwise. In any event, the liability of ALS to the Client shall be limited to the cost of testing the sample as requested in the chain of custody form under which the sample was originally deposited. For the purposes of this paragraph and paragraphs 8, 15, 16, 23 and 25, as the applicable, "ALS" includes without limitations its directors, officers, employees and affiliates and the "Client" includes without limitation any third party that may have a claim against ALS through the Client.
25. Notice of Liability. Notwithstanding paragraph 24, ALS shall not be liable to the Client unless the Client provides notice in writing to ALS of such loss or damage, together with full particulars thereof, within 30 days of the Client's receipt of the report of the analysis of the sample giving rise to such liability. The provisions of this paragraph allocate the risk under the Agreement between the Client and ALS, and the fees to be paid by the Client to ALS reflect this allocation of risks and the limitations of liability in this Agreement.
26. Entire Agreement. The Agreement is the entire agreement between the parties and supercedes and takes precedence over any terms and conditions contained in any documentation provided by the Client. ALS's execution of any subsequent documentation from the Client only acknowledges receipt and not acceptance of any terms or conditions therein. If there is e conflict between these terms and conditions and any other Agreement document, these terms and conditions prevail.

GENF 19.00 Terms

BluMetric Environmental Inc.

BluMetric Offices

4-41 de Valcourt Street
Gatineau, Québec
Canada J8T 8G9
Téléphone: 819 243.7555
Télécopieur: 819 243.0167
gatineau@blumetric.ca

3108 Carp Road
PO Box 430
Ottawa, Ontario
Canada K0A 1L0
Tel: 613.839.3053
Fax: 613.839.5376
ottawa@blumetric.ca

825 Milner Avenue
Toronto, Ontario
Canada M1B 3C3
Tel: 416.383.0957
Fax: 416.383.0956
toronto@blumetric.ca

740, rue Notre-Dame Ouest
bureau 900
Montréal, Québec
Canada H3C 3X6
Téléphone: 514 844.7199
Télécopieur: 514 841.9111
montreal@blumetric.ca

4 Cataraqui Street
The Tower, The Woolen Mill
Kingston, Ontario
Canada K7K 1Z7
Tel: 613.531.2725
Fax: 613.531.1852
kingston@blumetric.ca

4916 – 49th Street
Yellowknife, NT
Canada X1A 1P3
Tel: 867.873.3500
Fax: 867.873.3499
yellowknife@blumetric.ca

171 Victoria Street North
Kitchener, Ontario
Canada N2H 5C5
Tel: 519.742.6685
Fax: 519.742.9810
kitchener@blumetric.ca

102-957 Cambrian Heights Drive
Sudbury, Ontario
Canada P3C 5S5
Tel: 705.525.6075
Fax: 705.525.6077
sudbury@blumetric.ca

7° Calle Poniente Bis
Pasaje 9, casa No.7,
Colonia Escalon
San Salvador, El Salvador
Teléfono: 011.503.2564.7728
Fax: 613.839.5376
sansalvador@blumetric.ca

www.blumetric.ca