



Contaminants and Remediation Division  
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## ***Great Bear Lake Sites – 2017 Annual Water Licence Report (Licence #S17L8-002)***

**Prepared for: Sahtu Land and Water Board**

**Date: March 29, 2018**

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Indigenous and Northern Affairs Canada (INAC) – Northwest Territories Region – Contaminants and Remediation Division (CARD) received a Water Licence renewal from the Sahtu Land and Water Board effective July 25, 2017 for the Great Bear Lake Sites Remediation Project. This Water Licence was subsequently amended on September 11, 2017 and again on October 30, 2017 to reflect minor administrative changes and carries Licence # S17L8-002. The Water Licence entitles the use of water and waste deposition in support of remediation and restoration activities at the Great Bear Lake Sites, including the Silver Bear Mines, Contact Lake Mine, El Bonanza/Bonanza Mine and the Sawmill Bay site. Table 1 outlines the most current Water Licence details.

**Table 1: Licence Information**

Licensee	Department of Indian Affairs and Northern Development Canada * – Contaminants and Remediation Division
Licensee Mailing Address	Box 1500, Yellowknife, NT X1A 2R3
Licence Number	S17L8-002 – Admin Amend
Licence Type	B
Location	Great Bear Lake Mine Sites: Sawmill Bay, Silver Bear Mines, El Bonanza/Bonanza Mines and Contact Lake Mine
Purpose	Water use and Waste Disposal to support remediation works
Effective Date of Licence	October 30, 2017
Expiry Date of Licence	July 24, 2024

\*Legal name of Indigenous and Northern Affairs Canada

In accordance with the requirements of the Water Licence, INAC-CARD has produced the following 2017 Annual Water Licence Report. During the first half of 2017, the project was governed under the previous Water Licence S15L8-001. This report follows the format as presented in the updated Water Licence S17L8-002 *Schedule 1, Part B: General Conditions*, in which more robust requirements of the Annual Water Licence Report are outlined. Where necessary, additional information has been added which may be of interest to the Sahtu Land and Water Board.

It is important to note that the Water Licence was issued in support of upcoming remediation activities at the project sites. **However, during the 2017 period the sites remained in pre-remediation status and no site remediation occurred.** The sole on-site work activities were conducted during a field program implemented September 6th-15th, 2017 which included the following tasks:

- Water Quality Monitoring per the *2017 Great Bear Lake Sites Water Quality Monitoring*



Plan as submitted to the Sahtu Land and Water Board (including Surveillance Network Program (SNP) stations);

- Disposal of discarded blasting caps identified on the ground surface at the Silver Bear Mines (controlled burn conducted by a contract Blasting Specialist);
- Construction of improved drum fuel storage facilities at Terra Mine to meet requirements of the renewed Land Use Permit (S17D-003);
- Addressed deficiencies as described below in the July 2017 INAC Inspector's Report; and
- Completed soil excavation, testing and backfilling at a discrete petroleum hydrocarbon (PHC) spill area at Sawmill Bay, per an Inspector's Order.

### **Schedule 1 Part B: General Conditions**

1. The **Annual Water Licence Report** referred to in Part B, Item 15 shall include, but not be limited to the following information:

a) *A summary of the calibration and status of meters and devices referred to in Part B, Item 14 of this Licence;*

Water Licence Part B, Item 14 states "The Licensee shall install, operate, and maintain meters, devices or other such methods used for measuring the volumes of Water and Waste discharged to the satisfaction of an Inspector". During the 2017 period there were no remedial activities and consequently no water or waste discharges requiring the use of devices/meters.

b) *The monthly and annual quantities in cubic metres of fresh water obtained from all sources;*

Fresh water use in 2017 was limited to the supply of camp water during implementation of the ten-day field program in September. Water was pumped from the Camsell River near the dock and used for kitchen and ablution facilities. Potable water was mobilized to site. No other sources were used in 2017.

A log was used to document each water withdrawal and included the water source, water volume, cumulative uptake, date of uptake, contractor and employee identification (INAC has maintained an archive of the log which is available for Inspector review, if required). The water volumes used were calculated from the known water holding tank sizes. A summary of water volumes is presented below.

**Table 2: 2017 Water Volumes**

Water Source	Camsell River – Near Dock (coordinates on file)
Monthly Water Volume - September	24 m <sup>3</sup>
TOTAL WATER VOLUME 2017	24 m <sup>3</sup>



c) A summary of *engagement* activities conducted in accordance with the approved **Engagement Plan**, in Part B of this Licence, undertaken during the previous calendar year and shall include a brief description of activities planned for the forthcoming year;

The following engagement activities were conducted during the 2017 period:

- A community and leadership engagement meeting on the project was held on February 16<sup>th</sup> and 17<sup>th</sup> in Délı̨nę. This meeting provided an update from the contractor on the summer barrel program and an update on the remediation project moving forward.
- A community and leadership engagement meeting on the project was held on June 14<sup>th</sup> and 15<sup>th</sup> in Délı̨nę. This meeting was focused on reviewing the remedial action plan for the project and clarified that the remaining Phase II and III of the project would be consolidated into one program. The meeting included a discussion of the environmental risks of the project and how those risks would be mitigated. An overview of the regulatory applications associated with the project, an update on project progress and the structure and means of engagement as documented in the Engagement Plan was provided at the meeting.
- Funding was provided for a part-time Community Liaison Coordinator based in Délı̨nę through a contribution agreement to assist in planning engagement meetings and communicating with community members about the project.
- A general project update was provided to the Waste Sites Management Committee on November 15<sup>th</sup>.
- On May 31<sup>st</sup> a letter was sent to the Tłı̨chǫ Government to provide notification that the Denison Winter Road application would be withdrawn and renewal applications for the Water Licence and Land Use Permit were submitted to the Sahtu Land and Water Board.

Engagement will continue in 2018 and is currently anticipated to include the following:

- Bi-annual engagement meetings with the community and leadership will take place again; March 26<sup>th</sup>-27<sup>th</sup> in Délı̨nę and the next date is to be determined with community input, likely occurring after the field season.
- The Community Liaison Coordinator position will continue to be funded in Délı̨nę through a contribution agreement that assists in planning engagement meetings and communicating with community members about the project.
- Project updates will continue being provided to the Waste Sites Management Committee when they meet.
- Project updates will be provided to the Tłı̨chǫ Government according to the approved Engagement Plan.

d) A summary of **Construction** activities conducted in accordance with Part F of this Licence, undertaken during the previous calendar year;

No construction activities were conducted during the 2017 period.



*e) An updated schedule of activities for the undertaking;*

There are no confirmed revisions to the project schedule submitted to the Board in the May 2017 Water Licence renewal. It is anticipated that schedule refinements will occur in the future and will be promptly provided to the Sahtu Land and Water Board.

*f) A summary of **Modification** activities and major maintenance work conducted in accordance with Part E of this Licence, undertaken during the previous calendar year;*

No modification activities or major maintenance work was conducted during the 2017 period.

*g) A summary of activities conducted in accordance with the approved **Waste Management Plan**, required in Part D, Item 3 of this Licence, undertaken during the previous calendar year, including:*  
*i. A summary of updates or changes to the process or facilities required for the management of Waste;*

No updates or changes were required to waste management processes or facilities.

*ii. The monthly and annual quantities in cubic metres of non-hazardous and hazardous Waste(s) generated and managed during Remediation Activities;*

The project is in the pre-remediation phase and no remediation activities were conducted. During the ten-day field program in September 2017, a small volume of non-hazardous waste was generated during the operation of camp facilities and in conducting water quality monitoring. Approved materials were incinerated in on-site facilities, and non-approved material (e.g. recyclables, aluminum foil) were backhauled to Yellowknife for proper disposal. Hazardous waste generation was limited to the containerization of contaminated soil excavated at a discrete spill at Sawmill Bay and left in sealed overpacks for management during future site remediation. A small volume of blasting caps identified during site inspections were managed by a Blasting Specialist and destroyed using a controlled burn. The 2017 quantities of these materials are presented in Table 3 below.

**Table 3: 2017 Non-Hazardous and Hazardous Waste Generated**

NON-HAZARDOUS WASTE	
Volume Incinerated – September and TOTAL	3 m <sup>3</sup>
Volume Backhauled – September and TOTAL	0.5 m <sup>3</sup> plus 10 empty drums
HAZARDOUS WASTE	
Volume Contaminated Soil Containerized at Sawmill Bay – September and TOTAL	1.6 m <sup>3</sup>
Volume Blasting Caps Destroyed – September and TOTAL	<0.03 m <sup>3</sup>



*iii. The monthly and annual quantities in cubic metres of all Waste deposited, identified by location;*

No waste was deposited during the 2017 period.

*iv. Monthly and annual quantities in cubic metres of all liquid Waste deposited, identified by location;*

No liquid waste was deposited during the 2017 period.

*v. Monthly and annual quantities and geochemical characteristics of all PAG and Metal Leaching Waste Rock, Tailings, soils and any other Mineral Materials deposited/managed, identified by location;*

No PAG or Metal Leaching Waste Rock, Tailings, soils or any other Mineral Materials were deposited or managed during the 2017 period.

*vi. The estimated monthly and annual quantities in cubic meters of Sewage deposited into the Sewage Disposal Facilities;*

In the absence of active site remediation and an associated seasonal camp, no new Sewage Disposal Facility was activated, and the 2017 field program utilized pre-existing facilities. As with previous field campaigns, during the 2017 field program the sewage and grey water was discharged into the septic tank, so monthly quantities of waste discharges are difficult to quantify. Based on water use, a maximum volume of 24 m<sup>3</sup> of wastewater was discharged to the tank over the field program.

*vii. Monthly and annual quantities in cubic metres of Sewage Discharged from the Sewage Disposal Facilities, identified by disposal location;*

In 2016 the underground sewage holding tank was identified to likely have a leak and was discussed with the Inspector. The septic tank is estimated to be 200 m from the nearest waterbody (Ho-Hum Tailings Containment Area (TCA)). The Inspector recommended that this be investigated and addressed before any large scale on-site operation.



*viii. Monthly and annual quantities in cubic metres of Wastewater Discharged from the Process Water Treatment Facilities, identified by disposal location; and*

In the absence of active remediation, no process water was generated during the 2017 period.

*ix. Any other item as directed by the Board.*

No further requests have been received.

- h) A summary of activities conducted in accordance with the approved **Sediment and Erosion Control Plan**, as required in Part D, Item 5 of this Licence, including;*
- i. A description of any erosion susceptible areas encountered, and a summary of activities undertaken to prevent or mitigate erosion;*
  - ii. A report of the performance of erosion mitigations applied in previous years, if applicable; and*
  - iii. Any other item as directed by the Board.*

As indicated in the Water Licence, the Sediment and Erosion Control Plan is not required to be submitted to the Sahtu Land and Water Board until “60 days prior to the commencement of Remediation activities”. Consequently, this Plan has not yet been developed and this requirement does not yet apply. However, there were no areas of increased erosion or changing ground conditions noted during the 2017 field program. Similarly, no previous erosion mitigations have been applied which would require performance monitoring.

- i) A summary of activities conducted in accordance with the approved **Landfarm Management Plan**, required in Part D, Item 7 of this Licence, undertaken during the previous calendar year, including:*
- i. A summary of updates or changes to the process or facilities required for the treatment of PHC contaminated soil and rock;*
  - ii. The monthly and annual quantities in cubic metres of PHC contaminated soil and rock placed in the Landfarms;*
  - iii. The monthly and annual quantities in cubic metres of PHC contaminated Groundwater and free-phase product removed and a description of how this material was managed; and*
  - iv. Any other item as directed by the Board.*

As indicated in the Water Licence, the Landfarm Management Plan is not required to be submitted to the Sahtu Land and Water Board until “60 days prior to Landfarm Construction”. These facilities have not been constructed, the Landfarm Management Plan not yet developed, and there were no soil treatment activities during the 2017 period.





- j) *A summary of activities conducted in accordance with the approved **Sediment and Erosion Control Plan**, as required in Part D, Item 5 of this Licence, including;*
- i. *A description of any erosion susceptible areas encountered, and a summary of activities undertaken to prevent or mitigate erosion;*
  - ii. *A report of the performance of erosion mitigations applied in previous years, if applicable; and*
  - iii. *Any other item as directed by the Board.*

This requirement is a duplicate of Schedule 1, Part B, Item h. As discussed above, this requirement is not yet applicable.

- k) *A summary of activities conducted in accordance with the approved **Spill Contingency Plan** required in Part G of this Licence, undertaken during the previous calendar year, including;*
- i. *A list of all Unauthorized Discharges that occurred during the previous calendar year, including the date, NWT spill number, volume, location, summary of the circumstances and follow-up actions taken and status (i.e. open or closed), in accordance with the reporting requirements in Part G of this Licence; and*

No Unauthorized Discharges occurred during the 2017 period. Cleanup measures taken to address reported Unauthorized Discharges during previous calendar years are discussed in Item u below.

- ii. *An outline of any spill training and communication exercises carried out during the previous calendar year.*

At the commencement of the field program, on-site workers were provided with instruction on the requirements of the approved Interim Spill Contingency Plan. This included outlining the products on site (e.g. fuels), the location of the spill response supplies and the procedures to follow in the event of the spill. Workers were briefed on the requirements of the Water Licence, Land Use Permit and applicable legislation and procedures were discussed to prevent spills, respond and report. Emphasis was placed on spill prevention and measures such as the use of drip trays and preparations before handling fuel.

- l) *A summary of all results in accordance with the approved **Geochemical Verification Program**, referred to under Part D, Item 8 and Schedule 2, Item 3 of this Licence;*

As indicated in the Water Licence, the Geochemical Verification Program is required to be submitted to the Sahtu Land and Water Board “90 days prior to the commencement of Remediation”. Consequently, this Plan has not yet been developed and this requirement does not yet apply. There were no geochemical verification activities implemented in the 2017 period.



m) A summary of all results in accordance with the approved **Pre-Construction Monitoring Plan**, referred to under Part D, Item 12 of this Licence;

It is noted that Part D, Item 12 of the Water Licence refers to the Post-Construction Monitoring Plan, and the Pre-Construction/Remediation Monitoring Plan is instead referenced in Part D, Item 9.

It is also relevant to note that the monitoring plan submission requirements evolved from the first licence renewal on July 13, 2017, to the subsequent amendments issued on September 11, 2017 and October 30, 2017. The 2017 monitoring program was implemented September 6-15, 2017, after which the formal requirement for a Pre-Construction Monitoring Plan was provided by the Sahtu Land and Water Board. Consequently, a formal Pre-Construction Monitoring Plan is not yet in place and the monitoring plan was outlined solely within the 2017 Water Sampling Plan.

The 2017 field program successfully implemented water quality monitoring in accordance with the 2017 Water Sampling Plan as submitted to the Sahtu Land and Water Board. A complete report of findings is found within the Great Bear Lake Sites 2017 Water Quality Monitoring Report, provided as Appendix C. The principal findings are as follows:

- Water sample results were below applicable Effluent Quality Criteria (EQC) at SNP Stations within the Water Licence.
- Consistent with previous monitoring events, elevated metal concentrations above background were reported in water samples at mine adits, shallow standing water, waste rock seeps, tailings ponds, tailings containment areas and in discharge streams at the Silver Bear Mines and Contact Lake Mine. However, in the downstream receiving environments (i.e. Camsell River and Contact Lake), metal concentrations were generally consistent with background stations.
- There were no metal concerns identified in water quality samples from El Bonanza Mine or Sawmill Bay.
- Despite analysis of multiple samples at each of the sites, there were no PHC concerns identified in any aquatic waterbody.
- At Contact Lake Mine, radionuclide concentrations in one sample of pooled water within the tailings area was above drinking water guidelines, though below guidelines at all downstream stations and aquatic waterbodies. All radionuclide results at Sawmill Bay were consistent with reference stations.
- Results of 2017 monitoring were generally consistent with previous monitoring events.

n) A summary of all monitoring results and any Action Level exceedances in accordance with the approved **Construction Monitoring Plan**, referred to under Part D, Item 11 and Schedule 2, Item 4 of this Licence;

As indicated in the Water Licence, the Construction Monitoring Plan is required to be





submitted to the Sahtu Land and Water Board “90 days prior to the commencement of Remediation”. The site is currently in pre-remediation (i.e. there were no construction activities) and this plan has not yet been developed.

o) *A summary of all monitoring results and Action Level exceedances in accordance with the approved **Post-Construction Monitoring Plan**, referred to under Part D, Item 13 and Schedule 2, Item 6 of this Licence;*

As indicated in the Water Licence, the Post-Construction Monitoring Plan is required to be submitted to the Sahtu Land and Water Board “90 days prior to demobilization”. The site is currently in pre-remediation (i.e. there were no post-construction activities) and this plan has not yet been developed.

q) *A summary of activities conducted in accordance with the approved **Remedial Action Plans** undertaken during the previous calendar year, including;*

- i. A summary of all Remediation and reclamation activities carried out at each site during the previous calendar year, as they relate to Water Use and Waste Disposal including progress made to develop the schedule for Phase II implementation,*
- ii. A summary of updates or changes to the process or facilities required for the management of Waste Rock and Tailings;*
- iii. The monthly and annual quantities in cubic metres of excavated Tailings for placement into Landfills and any excavation contingency measures implemented;*
- iv. The monthly and annual quantities in cubic metres of PAG Waste Rock excavated and deposited into trenches or adits;*
- v. The monthly and annual quantities in cubic metres of soil and rock placed below Waste Rock Covers, placed above Waste Rock Covers, and used elsewhere on site;*
- vi. Any geochemical inspection reports, as appendices to the Annual Water Licence Report;*
- viii. A camp set-up schematic;*
- viii. An outline of anticipated activities for the next year; and*
- ix. Any other item as directed by the Board.*

The GBL Sites are currently in pre-remediation and no activities related to the Remedial Action Plans were implemented during the 2017 period.

r) *Any other details on Water Use or Waste disposal requested by the Board by November 30 of the year being reported;*

INAC is not aware of any other information requests from the Board.



s) *Tabular summaries of all data and information generated under the Surveillance Network Program and graphical summaries of parameters with effluent quality criteria referred to in Part D, and the points of compliance (SNP Stations-001 (1), (2), (3), S17L8-002 (14I), (7A) and 7 (B), in excel or an electronic and printed format acceptable to the Board. The Licensee shall provide raw data in electronic form to the Board.*

The sampling requirements of the SNP were successfully implemented during the 2017 field program. SNP sampling was integrated with the larger pre-remediation water quality monitoring program. Results from both programs are included in the 2017 Water Quality Monitoring Report provided in Appendix C. The report also details the monitoring approaches, sampling methodologies, Quality Assurance and Quality Control (QA/QC) procedures, field measurements and photographic documentation.

## 2017 SNP Sampling and Data

Currently in pre-remediation, many of the stations listed in the SNP are not yet active. This includes stations associated with discrete remedial activities (e.g. soil treatment areas, process water generation) and the operation of a remediation camp. For clarity, each of the SNP stations within Water Licence S17L8-002 is discussed below, including sampling rationale and results where applicable.

### SNP Station S15L8-001 (1)

- Water Licence Description: Treated Sewage effluent prior to Discharge
- Water Licence Location: Camp Operations
- 2017 Sampling Rationale: Not sampled. Remediation camp and sewage treatment facility not yet constructed.

### SNP Station S15L8-001 (2)

- Water Licence Description: Treated grey water prior to disposal
- Water Licence Location: Camp Operations
- 2017 Sampling Rationale: Not sampled. Remediation camp and grey water treatment facility not yet constructed.

### SNP Station S15L8-001 (3 a, b, c, d....)

- Water Licence Description: Treated Process Water prior to disposal
- Water Licence Location: Camp Operations
- 2017 Sampling Rationale: Not sampled. No remediation activities conducted or process water generated.

### SNP Station S15L8-001 (4)

- Water Licence Description: Camsell River Intake
- Water Licence Location: Camp Operations
- 2017 Sampling Rationale: Not sampled. Water Licence requires quantity measurement only, provided in Table 2 above. It is noted that given the short duration of the field program, potable water was transported to site and the Camsell River was not used as a potable water source.



SNP Station S15L8-001 (5)

- Water Licence Description: Great Bear Lake Intake
- Water Licence Location: Camp Operations
- 2017 Sampling Rationale: Not sampled. Water Licence requires quantity measurement only. No water use from Great Bear Lake in 2017.

SNP Station S17L8-002 (6)

- Water Licence Description: Contact Lake Intake
- Water Licence Location: Camp Operations
- 2017 Sampling Rationale: Not sampled. Water Licence requires quantity measurement only. No water use from Contact Lake in 2017.

SNP Station S17L8-002 (7A)

- Water Licence Description: Ho Hum Tailings Containment Area (TCA) – Corresponding with station T-8
- Water Licence Location: Silver Bear – Terra Mine
- 2017 Sampling Rationale: Sampled once in 2017 (September) and SNP data provided in Appendix 1, Table A1. Multiple depth station with duplicate. Complete dataset provided in Appendix C – 2017 Water Quality Monitoring Report. Laboratory provided Oil and Grease quantification without visible determination (despite request); BTEX/F1-F4 values included for second line of evidence that PHCs are below detection or absent.
- EQC Evaluation: Table A1 provides parameters as specified in the Water Licence with the EQC as indicated in Part D, Item 25. All sample results are below the EQC. Sample results are a maximum 44% of the EQC for copper in depth sample T-8-C and all other parameters are a maximum of 0.1-12% of the respective EQCs. Given the order of magnitude difference between the sample results and the EQCs, graphical summaries are not beneficial.

SNP Station S17L8-002 (7B)

- Water Licence Description: Moose Bay – Corresponding with station T-10
- Water Licence Location: Silver Bear – Terra Mine
- 2017 Sampling Rationale: Sampled once in 2017 (September) and SNP data provided in Appendix 1, Table A1. Complete dataset provided in Appendix C – 2017 Water Quality Monitoring Report. Laboratory provided Oil and Grease quantification without visible determination (despite request); BTEX/F1-F4 values included for second line of evidence that PHCs are below detection or absent.
- EQC Evaluation: Table A1 provides parameters as specified in the Water Licence with the EQC as indicated in Part D, Item 25. All sample results are below the EQC values. Sample results are a maximum of 0.05-4% of the respective EQCs. Given the order of magnitude difference between the sample results and the EQCs, graphical summaries are not beneficial.

SNP Station S17L8-002 (8C)

- Water Licence Description: Hermandy Lake – Corresponding with station NO-7
- Water Licence Location: Silver Bear – Northrim Mine
- 2017 Sampling Rationale: Sampled once in 2017 (September) and SNP data provided in Appendix 1, Table A2. Complete dataset provided in Appendix C – 2017 Water Quality Monitoring Report.



- EQC Evaluation: No EQC for this station.

SNP Station S17L8-002 (9D)

- Water Licence Description: Camsell River – Corresponding with station NO-6
- Water Licence Location: Silver Bear – Northrim Mine
- 2017 Sampling Rationale: Sampled once in 2017 (September) and SNP data provided in Appendix 1, Table A2. Complete dataset provided in Appendix C – 2017 Water Quality Monitoring Report.
- EQC Evaluation: No EQC for this station.

SNP Station S17L8-002 (10E)

- Water Licence Description: Norex Waste Rock – Corresponding with station Norex-3 (also known as NX-3)
- Water Licence Location: Silver Bear – Norex Mine
- 2017 Sampling Rationale: Sampled once in 2017 (September) and SNP data provided in Appendix 1, Table A2. Complete dataset provided in Appendix C – 2017 Water Quality Monitoring Report.
- EQC Evaluation: No EQC for this station.

SNP Station S17L8-002 (11F)

- Water Licence Description: Camsell River – Corresponding with station NX-12
- Water Licence Location: Silver Bear – Norex Mine
- 2017 Sampling Rationale: Sampled once in 2017 (September) and SNP data provided in Appendix 1, Table A2. Complete dataset provided in Appendix C – 2017 Water Quality Monitoring Report.
- EQC Evaluation: No EQC for this station.

SNP Station S17L8-002 (12G)

- Water Licence Description: Tailings Pond – Corresponding with established station CL-3
- Water Licence Location: Contact Lake Mine
- 2017 Sampling Rationale: Sampled once in 2017 (September) and SNP data provided in Appendix 1, Table A2. Complete dataset provided in Appendix C – 2017 Water Quality Monitoring Report.
- EQC Evaluation: No EQC for this station.

SNP Station S17L8-002 (13H)

- Water Licence Description: Contact Lake – Corresponding with established station CL-26
- Water Licence Location: Contact Lake Mine
- 2017 Sampling Rationale: Sampled once in 2017 (September) and SNP data provided in Appendix 1, Table A2. Complete dataset provided in Appendix C – 2017 Water Quality Monitoring Report.
- EQC Evaluation: No EQC for this station.

SNP Station S17L8-002 (14I)

- Water Licence Description: Landfarm Discharge Water
- Water Licence Location: Landfarm at Silver Bear Mines, Sawmill Bay and El



Bonanza/Bonanza

- 2017 Sampling Rationale: Not sampled. Landfarms not yet constructed.

## 2017 SNP Actions

As required by the Water Licence, updated signage was added to active SNP stations to reflect nomenclature provided in Water Licence S17L8-002. Where the station was off shore, the signage was added to the nearest accessible shoreline with text indicating “off shore station”.

All 2017 sampling results were below respective EQCs and no response actions were required.

*t) A map depicting all the SNP Stations with GPS locations;*

Maps depicting the location of all SNP stations sampled during the 2017 season are provided in Appendix B. These figures include station coordinates for future reference.

It is noted that stations which are not yet active (landfarm monitoring, process water, sewage treatment discharge, etc.) are not included in the figures. The exact coordinates will be determined during the start of active remediation and incorporated in future figures.

*u) A summary of actions taken to address concerns, non-conformances or deficiencies in any report filed by an Inspector.*

## 2017 Environmental Inspection Report – Follow Up Activities

The INAC Resource Management Officer (Inspector) completed an inspection of the Terra Mine Site on July 12, 2017. The associated Environmental Inspection Report dated July 14, 2017 identified a small number of deficiencies to be addressed.

From September 6<sup>th</sup>-15<sup>th</sup>, 2017, the implementation of the Water Quality Monitoring Program at the GBL Sites provided opportunity to address all deficiencies as follows:

- The Environmental Inspection Report noted that the INAC-CARD storage area for drummed aviation fuel needed to be moved to the opposite side of the Terra Mine runway to increase the distance from the normal high-water mark of any stream (i.e. Moose Bay). In September 2017 INAC-CARD constructed a new fuel containment area on the east side of the runway. The containment structure was constructed of impermeable liner within a stable wooden frame, providing sufficient capacity to contain any release of fuel products (i.e. >110% of the largest container). Pursuant to the conditions of the new Land Use Permit, the drums were marked “INAC”, inspected, placed horizontally with outlets at 3 and 9 o’clock and high visibility markers installed on the four corners of the storage area. A fully equipped spill kit was placed adjacent to the fuel storage area. *During demobilization on September 15<sup>th</sup>, 2017, no drums of*



*aviation fuel remained at the airstrip storage area.* However, this structure will remain available for any future site visits.

- The Environmental Inspection Report noted unburned refuse and food in the Terra Mine incinerator. Upon completion of the field program on September 15<sup>th</sup>, 2017, the incinerator was inspected to ensure there were no residual food products, refuse or animal attractants. The residual ash was removed from the incinerator and containerized in a sealed drum for management in the pending remedial program. Any waste materials generated after the last incineration was transported to Yellowknife for disposal.
  - The Inspection Report also referenced additional sampling conducted by the Inspector at a discrete PHC spill area at the Sawmill Bay airstrip. These activities were in response to the "Order of Inspector" issued February 12<sup>th</sup>, 2014 to complete soil cleanup near crushed drums stored at the airstrip. In summary, on September 7<sup>th</sup>, 2017 additional soil excavation was completed by INAC-CARD to a depth of 1.5m below surface. Samples were collected and results received on September 12<sup>th</sup>, 2017. Results confirmed the remaining soils were below the applicable PHC Site-Specific Cleanup Criteria for surface and subsurface soils at Sawmill Bay. Upon receipt of Inspector approval, the excavation was backfilled with surrounding surficial soils on September 13<sup>th</sup>, 2017. The excavated PHC contaminated soils remain in sealed overpacks at Sawmill Bay for management during the future remedial program.
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## **Great Bear Lake Sites**

### **2017 Annual Water Licence Report (# S17L8-002)**

#### **APPENDIX A – SNP Data Tables**



Table A1 - Terra Mine: SNP Water Quality Data

Site			SNP Effluent Quality Criteria (EQC)	TERRA MINE				
Sample Area				Ho Hum TCA				Moose Bay
Sample ID				T-8-A	T-DUP-1	T-8-B	T-8-C	T-10
SNP Sample ID				S17L8-002 (7A)	S17L8-002 (7A)	S17L8-002 (7A)	S17L8-002 (7A)	S17L8-002 (7B)
Sample Depth				1 m	1 m (Duplicate)	7 m	10 m	Surface
PARAMETER	Lowest Detection Limit	Units		13-Sep-2017	13-Sep-2017	13-Sep-2017	13-Sep-2017	13-Sep-2017
Conductivity	2.0	uS/cm		196	196	197	235	148
Hardness (as CaCO3)	0.50	mg/L		78.3	78.7	79.1	92.6	67.9
pH	0.10	pH	Between 6.0 and 9.0	7.93	7.92	7.93	7.90	7.95
Total Suspended Solids	3.0	mg/L	30	<3.0	<3.0	<3.0	<3.0	<3.0
Ammonia, Total (as N)	0.0050	mg/L	10	0.0118	<0.0050	0.0082	<0.0050	<0.0050
Nitrate (as N)	0.0050	mg/L	10	0.0051	0.0051	<0.0050	0.0843	<0.0050
Nitrite (as N)	0.0010	mg/L	0.8	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulfate (SO4)	0.30	mg/L		16.1	16.1	16.1	18.6	14.2
Aluminum (Al)-Total	0.0030	mg/L	0.8	0.0339	0.0327	0.0339	0.0190	0.0276
Arsenic (As)-Total	0.00010	mg/L	1 @T-8 and 0.2@T-10	0.0607	0.0608	0.0602	0.0769	0.00036
Copper (Cu)-Total	0.00050	mg/L	0.02	0.00797	0.00812	0.00808	0.00882	0.00088
Lead (Pb)-Total	0.000050	mg/L	0.02	0.000131	0.000137	0.000136	0.000080	<0.000050
Nickel (Ni)-Total	0.00050	mg/L	0.1	0.00377	0.00385	0.00380	0.00438	<0.00050
Silver (Ag)-Total	0.000010	mg/L	0.004	0.000015	0.000017	0.000026	0.000013	<0.000010
Zinc (Zn)-Total	0.0030	mg/L	0.04	0.0032	0.0040	0.0042	0.0048	<0.0030
F1-BTEX	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
F2 (C10-C16)	0.30	mg/L		<0.30	<0.30	<0.30	<0.30	<0.30
F3 (C16-C34)	0.30	mg/L		<0.30	<0.30	<0.30	<0.30	<0.30
F4 (C34-C50)	0.30	mg/L		<0.30	<0.30	<0.30	<0.30	<0.30
Oil and Grease			5 mg/L	<5.0	<5.0	<5.0	<5.0	<5.0

Table A2 - Northrim Mine, Norex Mine and Contact Lake Mine: SNP Water Quality Data

Site			Northrim Mine		Norex Mine		Contact Lake Mine		
Sample Area			Hermady Lake	Camsell River	On-Land	Camsell River	Tailings Pond		Contact Lake
Sample ID			NO-7	NO-6	NX-3	NX-12	CL-3	CL-DUP-2	CL-26
SNP Sample ID			S17L8-002 (8C)	S17L8-002 (9D)	S17L8-002 (10E)	S17L8-002 (11F)	S17L8-002 (12G)	S17L8-002 (12G)	S17L8-002 (13H)
Sample Depth			Surface	Surface	Surface	Surface	Surface	Surface (Duplicate)	Surface
PARAMETER	Lowest Detection Limit	Units	12-Sep-2017	12-Sep-2017	10-Sep-2017	12-Sep-2017	10-Sep-2017	10-Sep-2017	9-Sep-2017
Conductivity	2.0	uS/cm	139	148	508	152	238	238	48.0
Hardness (as CaCO3)	0.50	mg/L	72.3	70.6	313	70.8	128	128	22.9
pH	0.10	pH	7.91	7.90	7.66	7.97	8.25	8.26	7.23
Total Suspended Solids	3.0	mg/L	3.0	<3.0	69.8	<3.0	<3.0	<3.0	<3.0
Sulfate (SO4)	0.30	mg/L	8.95	14.8	186	14.8	6.28	6.27	1.08
Aluminum (Al)-Total	0.0030	mg/L	0.0184	0.0262	0.0336	0.0269	0.0033	0.0038	0.0033
Antimony (Sb)-Total	0.00010	mg/L	0.00019	<0.00010	0.00099	<0.00010	0.00047	0.00048	<0.00010
Arsenic (As)-Total	0.00010	mg/L	0.00605	0.00027	0.0391	0.00020	0.0115	0.0115	0.00015
Barium (Ba)-Total	0.000050	mg/L	0.00725	0.0108	0.0258	0.0110	0.0284	0.0279	0.00354
Beryllium (Be)-Total	0.000020	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Bismuth (Bi)-Total	0.000050	mg/L	<0.000050	<0.000050	0.000094	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total	0.010	mg/L	<0.010	0.011	0.055	0.011	0.034	0.035	<0.010
Cadmium (Cd)-Total	0.0000050	mg/L	<0.0000050	<0.0000050	0.000765	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Calcium (Ca)-Total	0.050	mg/L	21.3	16.1	92.1	15.0	30.6	30.7	4.85
Cesium (Cs)-Total	0.000010	mg/L	<0.000010	<0.000010	0.000040	<0.000010	0.000013	0.000014	<0.000010
Chromium (Cr)-Total	0.00010	mg/L	0.00013	0.00015	0.00037	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt (Co)-Total	0.00010	mg/L	0.00019	<0.00010	0.0554	<0.00010	0.00012	0.00011	<0.00010
Copper (Cu)-Total	0.00050	mg/L	0.00262	0.00090	0.00153	0.00078	0.00813	0.00796	0.00069
Iron (Fe)-Total	0.010	mg/L	0.046	0.030	3.23	0.028	0.041	0.041	<0.010
Lead (Pb)-Total	0.000050	mg/L	0.000297	0.000092	0.0367	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Total	0.0010	mg/L	0.0017	0.0027	0.0069	0.0022	0.0031	0.0032	<0.0010
Magnesium (Mg)-Total	0.10	mg/L	4.71	6.99	10.9	6.59	10.9	10.6	2.01
Manganese (Mn)-Total	0.00010	mg/L	0.0127	0.00146	1.39	0.00131	0.0973	0.0970	0.00102
Mercury (Hg)-Total	0.0000050	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Total	0.000050	mg/L	0.000717	0.000287	0.00511	0.000247	0.000435	0.000402	0.000170
Nickel (Ni)-Total	0.00050	mg/L	0.00085	0.00052	0.0109	<0.00050	0.00125	0.00125	<0.00050
Phosphorus (P)-Total	0.050	mg/L	<0.050	<0.050	0.069	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Total	0.10	mg/L	0.63	0.94	2.20	1.00	1.55	1.55	0.49
Selenium (Se)-Total	0.000050	mg/L	0.000056	<0.000050	0.000252	<0.000050	<0.000050	<0.000050	<0.000050
Silicon (Si)-Total	0.10	mg/L	0.86	0.82	4.42	0.85	2.29	2.31	0.31
Silver (Ag)-Total	0.000010	mg/L	<0.000010	<0.000010	0.000027	<0.000010	0.000035	0.000040	<0.000010
Sodium (Na)-Total	0.050	mg/L	1.54	2.52	6.01	2.53	4.84	4.77	0.910
Strontium (Sr)-Total	0.00020	mg/L	0.0271	0.0567	0.160	0.0522	0.0782	0.0783	0.0100
Sulfur (S)-Total	0.50	mg/L	3.06	4.82	79.3	5.07	2.52	2.52	0.53
Thallium (Tl)-Total	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Total	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total	0.00030	mg/L	0.00033	0.00078	0.00137	0.00077	<0.00030	<0.00030	<0.00030
Uranium (U)-Total	0.000010	mg/L	0.000200	0.000520	0.000921	0.000505	0.0490	0.0482	0.000151
Vanadium (V)-Total	0.00050	mg/L	<0.00050	<0.00050	0.00104	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Total	0.0030	mg/L	0.0057	<0.0030	1.25	<0.0030	<0.0030	0.0055	<0.0030
Zirconium (Zr)-Total	0.00030	mg/L	<0.00030	<0.00030	0.00034	<0.00030	<0.00030	<0.00030	<0.00030
Benzene	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene	0.00050	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	0.00045	mg/L	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045
Xylenes	0.00075	mg/L	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
F1-BTEX	0.10	mg/L	<0.10	<0.10	<0.30	<0.10	<0.10	<0.10	<0.10
F2 (C10-C16)	0.30	mg/L	<0.30	<0.30	0.7 <sup>L</sup>	<0.30	<0.30	<0.30	<0.30
F3 (C16-C34)	0.30	mg/L	<0.30	<0.30	<0.3 <sup>L</sup>	<0.30	<0.30	<0.30	<0.30
F4 (C34-C50)	0.30	mg/L	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30

<sup>L</sup> Silica gel cleanup applied due to organic constituents



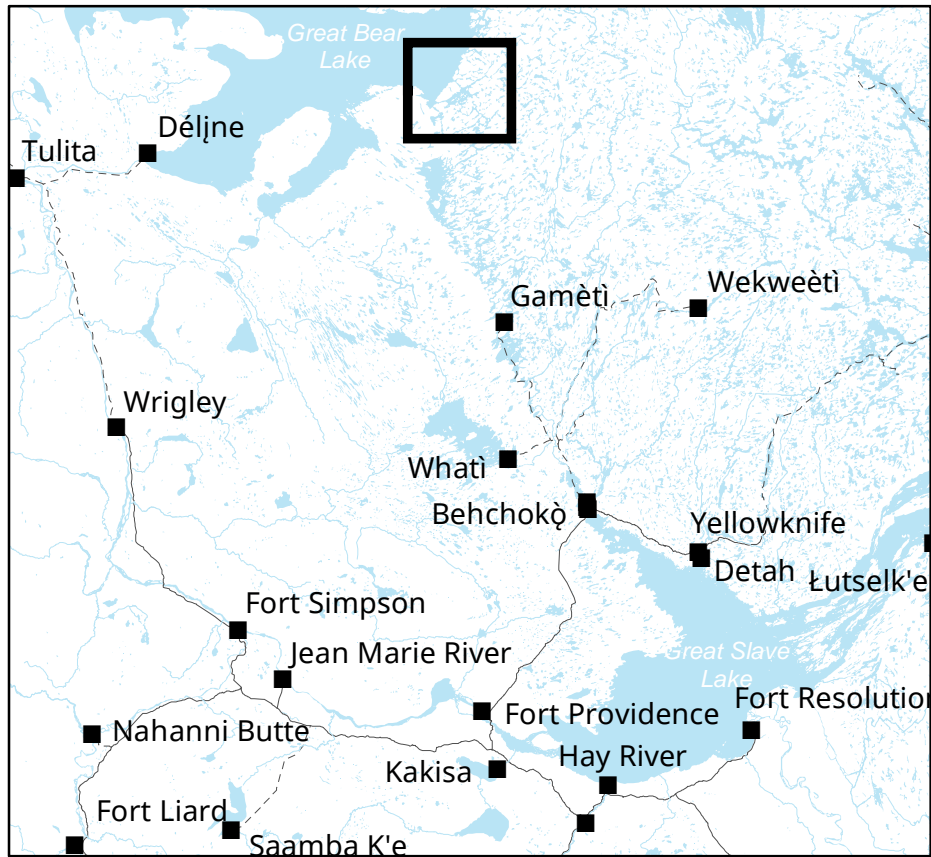
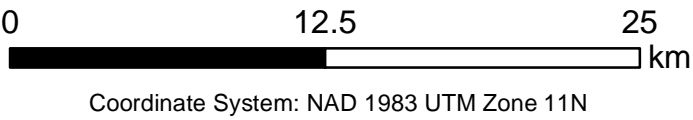
## **Great Bear Lake Sites**

### **2017 Annual Water Licence Report (# S17L8-002)**

#### **APPENDIX B – SNP Location Figures**

Figure 1: Great Bear Lake - Site Overview

Contaminated Sites and Remediation Division



Date: 2/16/2018

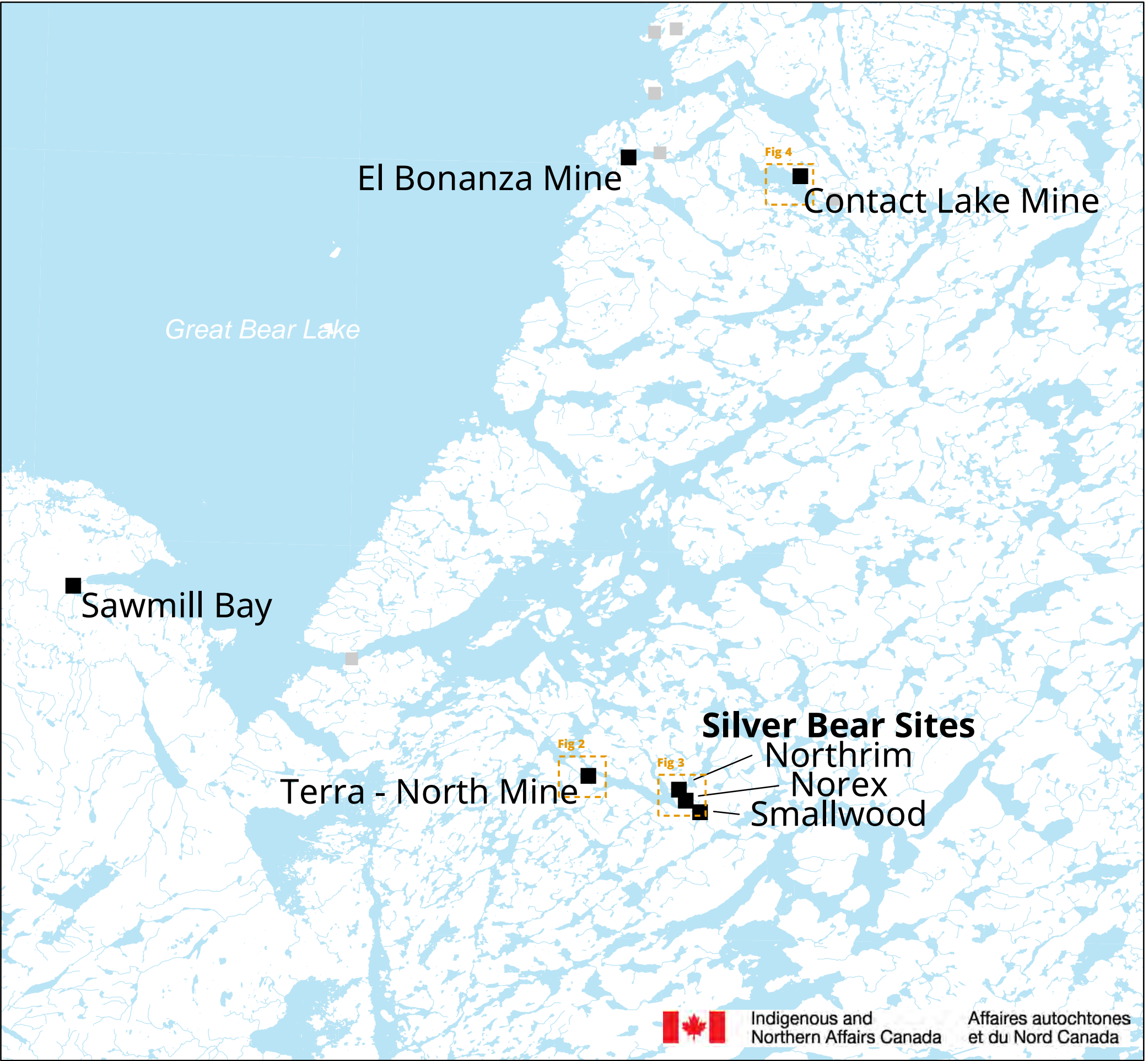
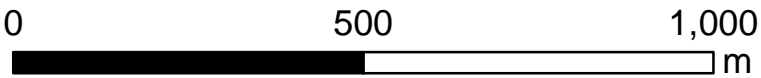




Figure 2: Great Bear Lake  
Terra Mine SNP Stations

Contaminated Sites and Remediation Division

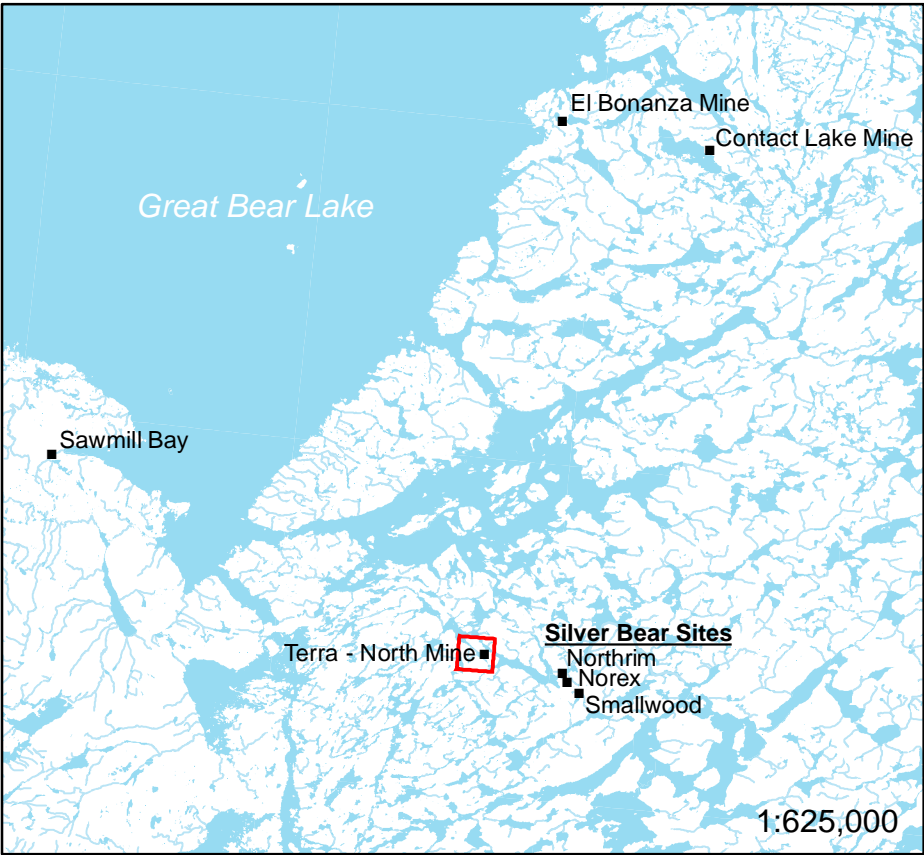


Coordinate System: NAD 1983 UTM Zone 11N

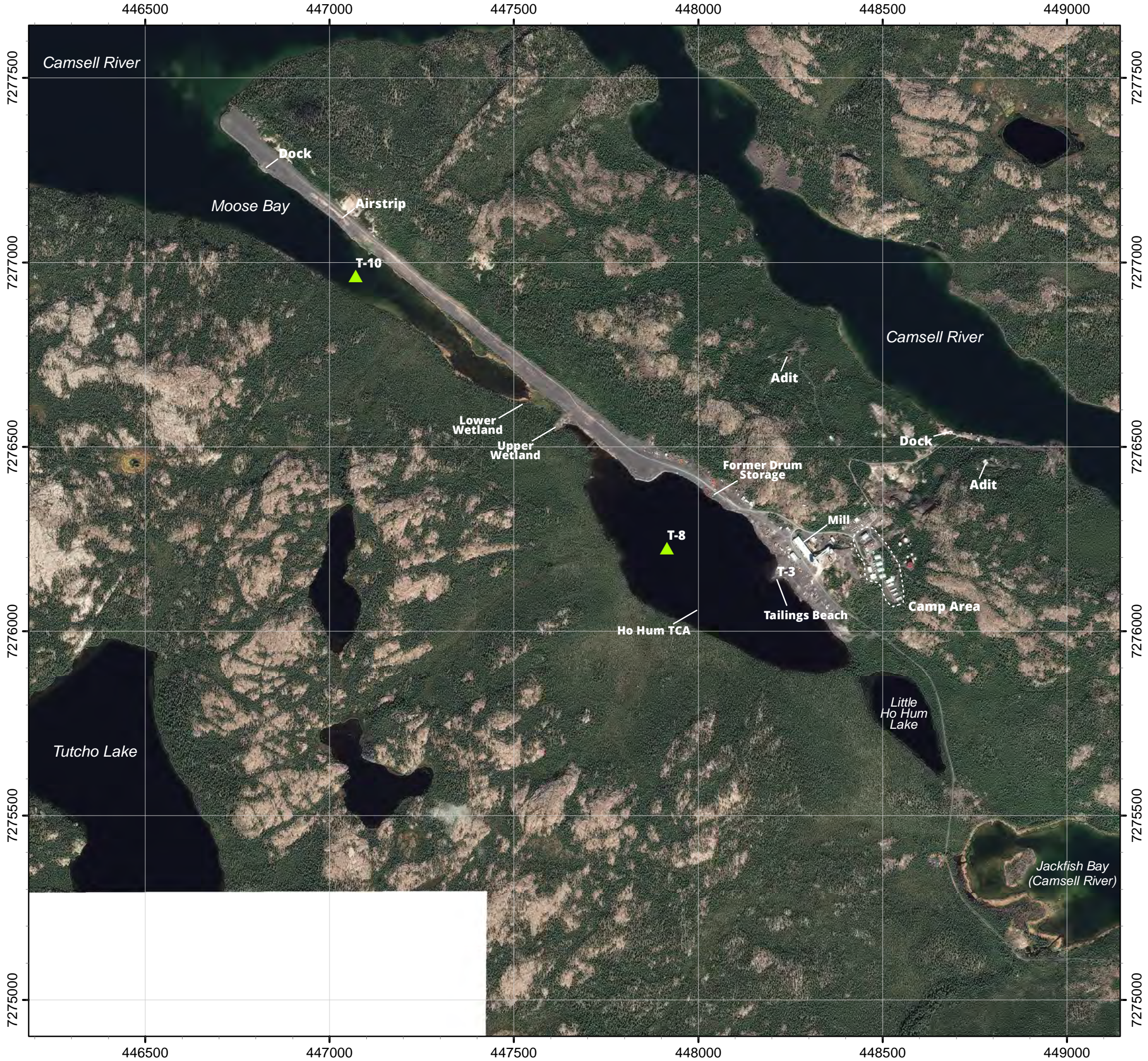
▲ SNP Sample Station

Station Name	SNP Number	Latitude <sup>A</sup>	Longitude <sup>A</sup>
T-8	S17L8-002 (7A)	65° 36' 13.93" N	118° 7' 48.43" W
T-10	S17L8-002 (7B)	65° 36' 37.30"N	118° 8' 55.42" W

<sup>A</sup> Datum: NAD 83

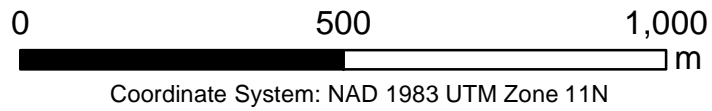


Date: 2/16/2018





**Figure 3: Great Bear Lake**  
**Northrim & Norex Mine SNP Stations**  
Contaminated Sites and Remediation Division



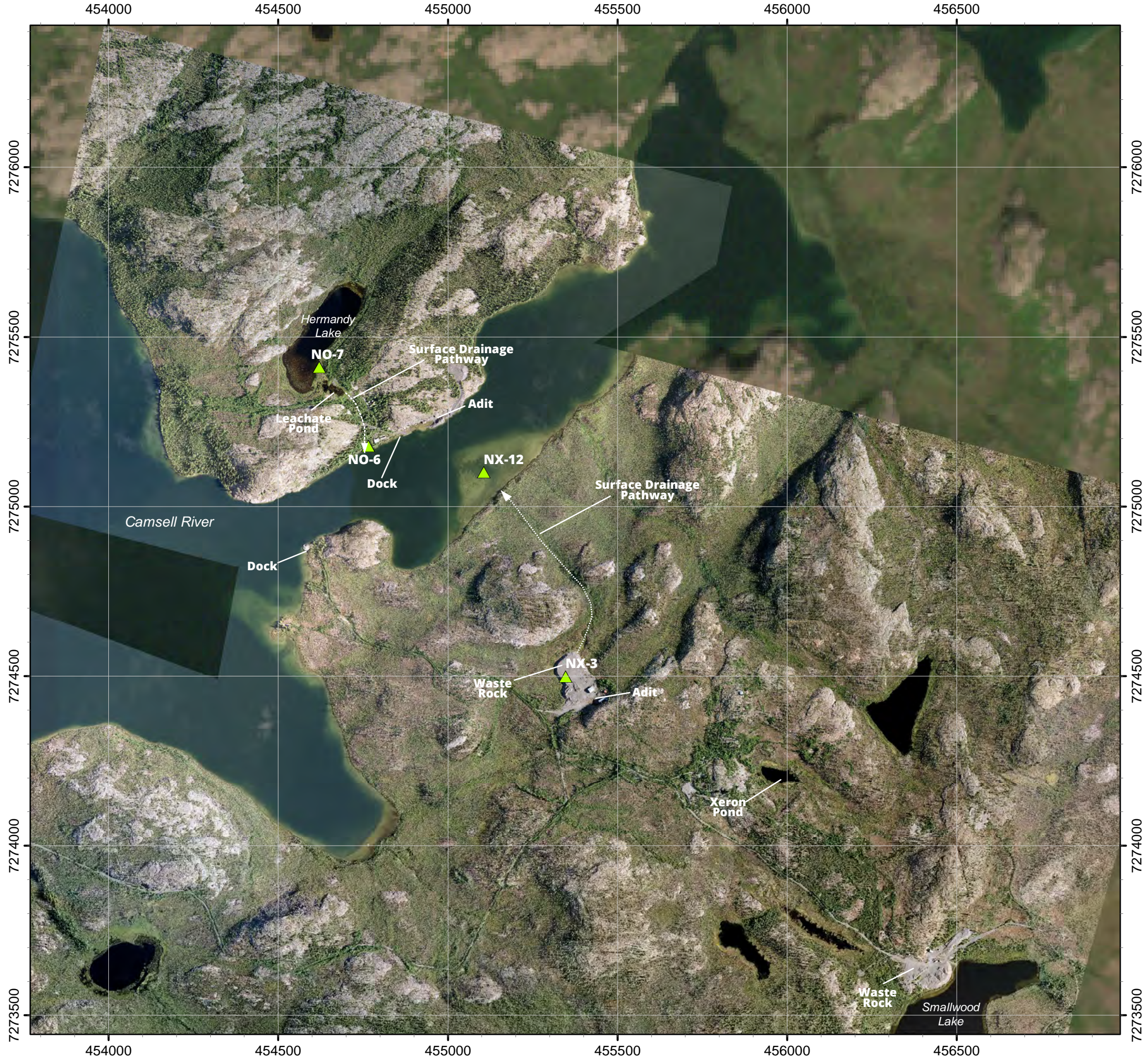
▲ SNP Station

Station Name	SNP Number	Latitude <sup>A</sup>	Longitude <sup>A</sup>
NO-7	S17L8-002 (8C)	65° 35' 51.25" N	117° 59' 3.80" W
NO-6	S17L8-002 (9D)	65° 35' 43.84" N	117° 58' 52.18" W
NX-3	S17L8-002 (10E)	65° 35' 22.20" N	117° 58' 6.00" W
NX-12	S17L8-002 (11F)	65° 35' 41.50" N	117° 58' 25.54" W

<sup>A</sup> Datum: NAD 83

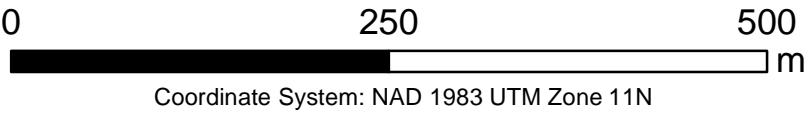


Date: 2/16/2018





**Figure 4: Great Bear Lake  
Contact Lake Mine SNP Stations**  
Contaminated Sites and Remediation Division



Station Name	SNP Number	Latitude <sup>A</sup>	Longitude <sup>A</sup>
CL-3	S17L8-002 (12G)	65° 59' 27.18" N	117° 48' 3.00" W
CL-26	S17L8-002 (13H)	65° 59' 23.21" N	117° 48' 6.16"W

<sup>A</sup> Datum: NAD 83

