



Contaminants and Remediation Division
P.O. Box 1500
Yellowknife NT X1A 2R3C

April 25, 2017

To: Bonnie Bergsma
Regulatory Specialist
Sahtu Land and Water Board
(867) 598-2413 ext. 227

Dear Ms. Bonnie Bergsma

Re: Great Bear Lake (GBL) Sites Water Licence S15L8-001 Report 2016/17

Indigenous and Northern Affairs Canada – Northwest Territories Region – Contaminant and Remediation Directorate received a Water Licence renewal from the Sahtu Land and Water Board effective July 24, 2015. The Water Licence entitles the use of water in remediation and restoration activities of the Great Bear Lake Mine Sites. Table 1 outlines the Licence information.

Table 1: Licence Information

Licensee	Aboriginal Affairs & Northern Development Canada – NT Region Contaminant and Remediation Division
Licensee Mailing Address	Box 1500, Yellowknife, NT X1A 2R3
Licence Number	S15L8-001
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 during reclamation and remediation activities of old mining sites
Effective Date of Licence	July 24, 2015
Expiry Date of Licence	July 23, 2017

A summary of work which occurred during 2016 at the Great Bear Lake Mine Sites is provided in this report. From July 27 to October 17, the barrel removal program was

INAC: AANIC



conducted and the number of people on site supporting this program varied throughout this time. A monitoring program was undertaken as was some assessment work. On August 12, 2016 and again on October 12, 2016 land use inspections were carried out at Terra Mine.

Part B: Reporting Requirements

a) The Monthly and Annual Quantities of Fresh Water Obtained

Approximately 47.85 m³ of water was used from Camsell River during the 2016 activities at Terra Mine. No water (0 m³) from Great Bear Lake or other sources was used for any purpose in 2016. The monthly water usage is presented in Table 2.

Table 2: Monthly Water usage from the Camsell River

	m ³
July 2016	2.60
August 2016	22.80
September 2016	15.55
October 2016	6.90

b) The Monthly and Annual Quantities of Waste(s) Discharges

The underground sewage holding tank was identified to likely have a leak in 2016. All sewage and grey water was discharged into the septic tank, so monthly quantities of waste discharges are difficult to quantify. It is estimated that less than or equal to 47.85 m³ of wastewater was discharged to the environment through infiltration. The septic tank is estimated to be 200 m from the nearest waterbody (Ho-Hum Lake). The inspector has recommended that this be investigated and addressed before any large scale operation onsite.

c) Itemized List of Substances used during Remediation

An itemized list of substances used during the field programs are presented in Table 3.

Table 3: List of Substances used at Terra Mine Site, 2016

Substance	Amount Used
Engine oil	60 L
Transmission Oil	26 L
Hydraulic Oil	20 L
Diesel	10,660 L
Oxygen	3.25 m ³

Substance	Amount Used
Acetylene	2.15 m ³
Propane	5 x 100 lb. tanks
A-1 jet fuel	16,000 L
Drinking water (bottled water for drinking and cooking)	1,600 L
Grease	1.656 L
Gasoline	3,270 L
Brita Filters (Activated charcoal)	4
Detergent and soaps	16 L
Absorbent pads	6 rolls (30" x 150')
Plumbing antifreeze	60 L

d) Remediation Activity Summary

The following is a summary of activities undertaken in 2016:

- Supplies and equipment were transported to Deline on the winter road in 2016 in advance of the barrel program. Supplies and equipment were transported to site from Deline by barge and helicopter. Initial plans had been to barge directly to site, but this was deemed not possible by the operator of the barge.
- From July 27 to October 17, the site was occupied by the contractor, consultants and the crown. Throughout this time, numbers of people on site varied from 3 to 18 people based on the activities being undertaken. There was an average of about 12 people on site for the duration of the program. .
- Drums containing product (waste oil, fuel, and glycol) were consolidated and transferred to competent drums or placed in overpacks for transport. 950 drums containing product were removed from Terra, Norex, Northrim, Smallwood Sawmill Bay, and El Bonanza.
- Drums that were drained in the process of consolidating product were crushed and removed from site for proper disposal. One barge load of full drums was transported to Deline. The barge made most of the return trip to site with equipment and supplies before encountering mechanical difficulties. Supplies and equipment were offloaded by helicopter to site and the barge returned to Plummer's Lodge.
- Four large above ground storage tanks (Camsell River Tank, tank adjacent to Atco trailer camp, and two tanks adjacent to the crusher) and three smaller tanks (inside Camsell River Pump House, beside bunkhouse and in shed beside the mill) were drained and product and water was containerized in drums for removal and disposal.

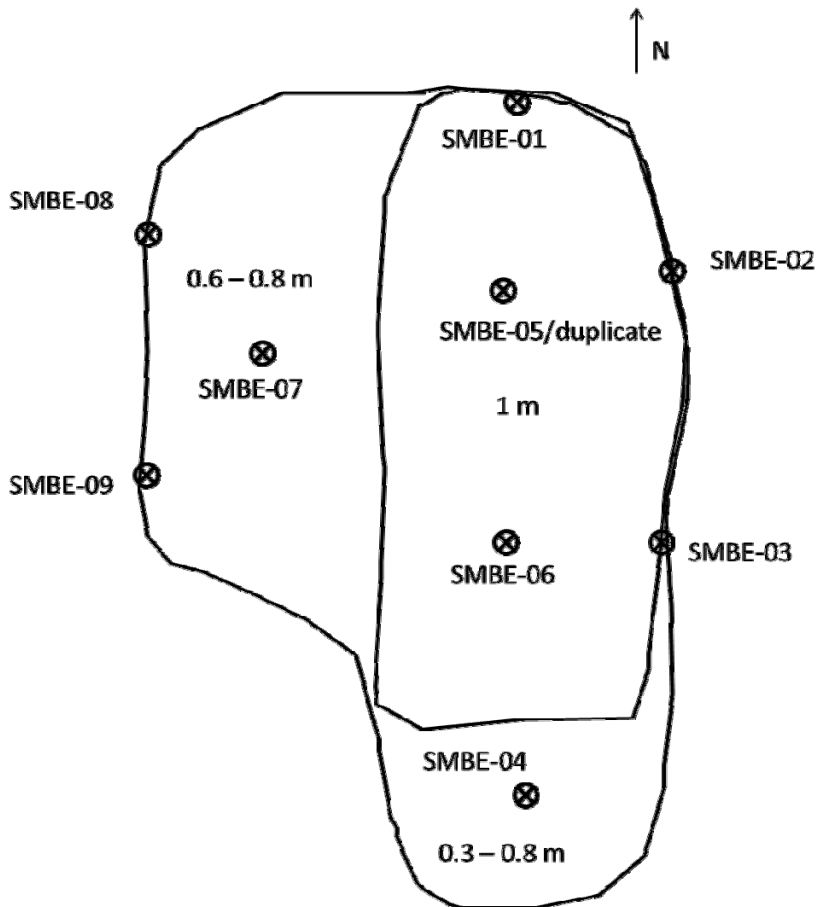
- Flights were used to transport drums to Deline and to Yellowknife
- Flights were also used to transport equipment, and waste to Yellowknife, Deline and Gameti for removal on the winter road in 2017.
- A helicopter was on site from approximately July 27 to September 3, 2016 to support the barrel program and the water quality sampling program.
- Drums were stored in Deline in a Hazardous Waste Temporary Storage Facility until removal on the winter road in 2017
- Equipment maintenance and repairs were undertaken (forklift, ATVs, old generator from the mine, camp generator, and vehicles). Minor maintenance and improvements were undertaken at camp and the garage door was repaired.
- From August 3 to 8 a crew was on site doing further assessment of drum contents, and some hand test pitting at Northrim, Norex, Smallwood, Sawmill Bay and El Bonanza
- On August 10, further excavation of the spill at Sawmill Bay was undertaken and samples were taken. Excavated soil was placed into overpack drums for later removal.
- The source of the leak from the compressor building was cleaned up and the drains and outlet pipe were plugged with sorbent material.
- From August 29 to September 6, 2016, 3 people were on site completing a water quality sampling program at Silverbear (Terra, Northrim Norex, and Smallwood), El Bonanza, Bonanza, Contact Lake and Sawmill Bay. The results will be provided under separate cover.

Sawmill Bay Clean-up

On August 10, 2016, further clean-up of the spill at Sawmill Bay was undertaken. Four overpacks were filled with excavated soil and samples were taken from the sidewalls and floor of the excavation. The hole was left open as per the inspector's direction. The primary area of the excavation was dug to a depth of 1 m, with an area to the west end of the excavation dug to 0.6 to 0.8 m and an area in the southern portion of the excavation dug to 0.3 to 0.8 m.

Sample ID	Approximate Depth	F1 (C6-C10)	F2 (C10-C16 Hydrocarbons)	F3 (C16-C34 Hydrocarbons)	F4 (C34-C50 Hydrocarbons)	F4G-SG (Heavy Hydrocarbon)
	m	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Site Specific Criteria (<1.5 m depth, >30		30	250	2700	4500	

Sample ID	Approximate Depth	F1 (C6-C10)	F2 (C10-C16 Hydrocarbons)	F3 (C16-C34 Hydrocarbons)	F4 (C34-C50 Hydrocarbons)	F4G-SG (Heavy Hydrocarbon)
m from waterbody)						
SMBE-01	1	0	52	9000	17000	23000
SMBE-02	1	0	0	270	470	730
SMBE-03	1	0	25	11000	22000	29000
SMBE-04	0.6	0	37	6400	12000	19000
SMBE-05	1	0	27	6400	12000	20000
SMBE-A (duplicate of SMBE-05)	1	0	26	9100	18000	28000
SMBE-06	1	0	53	12000	25000	39000
SMBE-07	0.7	0	0	61	97	
SMBE-08	0.6	0	0	0	0	
SMBE-09	0.6	0	0	0	0	



e) Surveillance Network Program

The Surveillance Network Programs (SNP) consists of a specific sampling location within the site at which water quality and quantity are measured. The SNP program is a requirement of the water license. The document entitled '*Water and Effluent Quality Management Policy*' prepared by the Sahtu Land and Water Board, dated March 31, 2011, states that the SNP program is designed to ensure that the effluent quality criteria (EQC) are being and will continue to be consistently met. Typically, one of the SNP stations is assigned to the end-of-pipe and is the point at which the licensee must comply with the EQC.

Table 4 presents the Station Numbers but there was no treated sewage disposal, grey water or treated process water discharged from end of pipe to report this year.

Table 4: Surveillance Network Program Stations

Station Number	Description	Notes
S09L8-001(1)	Treated sewage effluent prior to disposal	Not sampled in 2016, no direct discharge
S09L8-001(2)	Grey water end-of-pipe, prior to disposal	Not sampled in 2016, no direct discharge
S09L8-001(3)	Treated process water prior to disposal	Not sampled in 2016, no process water
S09L8-001(4)	Camsell River (intake)	Sampled prior to camp start-up
S09L8-001(5)	Great Bear Lake (intake)	Not sampled in 2016, not used

Table 5 presents the results from the sample taken at the Camsell River intake on July 24, 2016. The 2016 program was intended to be less than a month, but took longer than expected. Monthly sampling was not anticipated to be needed and was inadvertently missed when the program exceeded the one month timeframe. When the sample was collected in July, some sample containers were not available and hydrocarbon sampling was missed. No sheen was noted on the water and no petroleum odours were noted during water use at the camp. INAC will ensure future compliance with SNP sampling.

Table 5: S09L8-001(4) Sample Results

Test Parameter	Result	Units
pH	7.96	pH units
Phenols, Total	< 0.0010	mg/L
Dissolved Cadmium	< 0.05	µg/L

Dissolved Cobalt	< 0.1	µg/L
Dissolved Copper	0.6	µg/L
Dissolved Lead	< 0.1	µg/L
Dissolved Nickel	< 0.1	µg/L
Total Arsenic	< 0.2	µg/L
Total Chromium	< 0.1	µg/L
Total Mercury	< 0.01	µg/L
Total Zinc	< 0.4	µg/L

f) Unauthorized discharges

Spill # NT 16-321

This greywater/sewage spill was minor in nature and the release occurred an estimated 220 meters from the nearest waterbody. This spill was immediately reported and the sewage line was repaired in order to stop further discharge to the environment.

Spill # NT 16-363

A diesel drum fell into HoHum Lake and was retrieved and removed from site. It was determine that only 12L to 20L of diesel was lost into HoHum Lake. Containment booms were utilized during the retrieval of the drum. Since the amount of hydrocarbons lost was considered minimal and HoHum Lake is not considered fish bearing no further action was required by the inspector.

Spill # NT 16-341

NorthWright Airways reported a spill of approximately 2 L of Jet-B while refueling a float plane. The visible sheen and surface of the dock, plane and area was cleaned using sorbent materials. The sorbent material was then added to other spill material at Terra Mine.

g) Annual Summer Site Inspection

A land use inspection by INAC Inspector, Tim Morton of Yellowknife was carried out at Terra Mine Site on August 12, 2016. The inspector was pleased with the progress on the barrel program. The oil noted leaking from the generator building in 2015 had been addressed. It was noted that the underground sewage holding tank at Terra must have a leak as there was no discharge from the end of pipe. With regards to the spill at Sawmill Bay, the inspector requested further excavation to a depth of at least 1.5 m be completed by July 31st 2017 to determine if the sub-surface soil (depth >1.5 m) meet the site specific criteria. The inspector noted that a fuel filter was in the incinerator and reminded the contractor that this practice is not acceptable.

A land use inspection by INAC Inspectors Tim Morton and Devin Penny was carried out on October 12, 2016. The INAC inspectors were pleased with the drum consolidation and removal project. No concerns were noted with the product transfer process. The

inspector noted again that there was no discharge from the sewage treatment system which confirmed the presence of a leak which must be addressed before any large scale operations onsite. A fitting from a drum connected to the generator was noted to be leaking, the leak was addressed and the small amount of hydrocarbons was cleaned up.

h) Water Quality Monitoring Plan

From August 29 to September 6, 2016, a water quality sampling program at Silverbear (Terra, Northrim Norex, and Smallwood), El Bonanza, Bonanza, Contact Lake and Sawmill Bay was completed. The results will be provided under separate cover. The board granted CARD a 90 day extension until June 29, 2017.

i) Camp Schematic

A camp was used for the 2016 field activities. Crew members at the Terra Mine Site stayed at the onsite administrative building and in the bunk house closest to the administrative building. All domestic wastes were removed from site during the field program or incinerated where appropriate.

j) Remediation Activities

Regulatory requirement and care and maintenance activities took place as explained above under Section D.

k) Engagement Plan

An updated engagement plan was submitted to the board in June 2016 in advance of the barrel program. This Plan was approved by the Board on September 7, 2016. It is anticipated that another updated engagement plan will be submitted as part of the renewal application later in 2017.

l) Spill Contingency Plan

A detailed Spill Contingency Plan was provided to Sahtu Land and Water Board for approval prior to on site activities in 2016. This Plan was approved by the Board on September 7, 2016.

m) Waste Management Plan

A detailed Waste Management Plan was provided to Sahtu Land and Water Board for approval prior to on site activities in 2016. This Plan was approved by the Board on September 7, 2016.

n) Remedial Action Plan

There are no changes to the current Remedial Action Plan. Any revisions to the Remedial Action Plan will be submitted to Sahtu Land and Water Board for approval.

o) Other Details requested by Board

A monitoring plan and results of the 2016 monitoring program will be submitted in 2017. The board has given an extension until June 29th.

p) Map of SNP Stations with GPS Coordinates

There is no further information at this time, as full scale remediation is still on hold.