



December 16, 2014

Executive Director
Northwest Territories Water Board
P.O. Box 2531, 125 Mackenzie Road
Suite 302, Professional building
Inuvik, NT X0E 0T0

Dear Mardy Semmler,

**Project: BAR-C DEW Line / IOL Tununuk Point Remediation Project
Annual Report**

Regarding: Water Use License Number N7L1-1836

Imperial Oil Limited is providing the following information as per the requirements listed in Part B 2. for Water License Number N7L1-1836. The information was prepared by AECOM Canada Ltd. and WorleyParsons on behalf of Imperial Oil Limited (Imperial).

a) Water Usage from Water Source

The monthly and annual quantities in cubic meters of water obtained from the unnamed surface water lake (termed Water Source) in the 2014 Construction Season is shown on Table 1.

Table 1: Water Usage from Water Source

Month	Source	Volume (Cubic Meters)
July-14	Water Source	0
August-14	Water Source	906
September-14	Water Source	252
October-14	Water Source	0
TOTAL		1158

b) Sewage Accepted by the Town of Inuvik

The monthly and annual quantities in cubic meters of sewage accepted by the Town of Inuvik in the 2014 Construction Season is shown on Table 2.

Table 2: Sewage Accepted by the Town of Inuvik

Month	Discharge Location	Volume (Cubic Meters)
September-14	Inuvik Sewage Lagoon	140
October-14	Inuvik Sewage Lagoon	616
TOTAL		756

c) Non-Hazardous Waste

There was limited non-hazardous waste removed from site in 2014 with no waste removed from site until late September and early October. One hundred and forty five (145) bags (about one cubic meter each) of non-hazardous debris were removed from the site and disposed of in the Northern Rockies Landfill near Fort Nelson, B.C. in October. The total weight of these 145 bags was 22,580 kg.

All of these bags were filled with rigid building insulation and /or pieces of an old tank liner excavated out of the ground.

d) Hazardous Waste

No hazardous waste was left or removed from the site.

e) Waste Water Discharge

Areas containing contaminant plumes A, B, F, and D (see Water License Application for the location of these plumes) had excavations where waste water was pumped into the surrounding areas. The coordinates of the discharge point and the direction of the flow are presented in Table 3. This water was tested prior and met discharge criteria.

Table 3: Waste Water Discharge

Area	UTM's (Northing/Easting)	Direction of Discharge
Landfill A Trench	7655841/ 512570	Southwest
Landfill B Trench	7655877/ 512684	East
Plume A7	7655734/ 512589	Southwest
Plume A5	7655765/ 512642	North
Plume D4	7655313/ 512685	Northwest
Plume D2	7655380/ 512751	East
Area F Treatment Cell	7655380/ 513121	Northwest

f) Bioremediation Facility Treated Soils

The volumes of soil removed from the bioremediation facility during the 2014 Construction Season and the associated locations of placement are summarized in Table 4.

Table 4: Bioremediation Facility Treated Soils

Plume Source ID	Volume Treated (Cubic Meters)	Location of Placement
A5	1222	A5 A7 Landfill E
A6	90	Landfill E below 0.5 m of surface
A7	3180	A5 D4 F3 F3 (below 0.5 m of surface) Landfill E (below 0.5 m of surface)
D2	758	A5 Landfill E (below 0.5 m of surface)
D4	491	A5 A5 (below 0.5 m of surface) D4 Landfill E (below 0.5m of surface)
F3	485	A7 A7 (below 0.5 m of surface) Landfill E (below 0.5 m of surface)
J1	20	A7 (below 0.5 m of surface) Landfill E (below 0.5 m of surface)
TOTAL	6748	-

g) Surveillance Network Program Summary

See **Appendix A**, attached.

h) Monitoring Plan Summary

A summary of the data and information generated during the execution of the Monitoring Plan is presented in the following sections.

Baseline Geochemical Monitoring

During previous assessments at BAR-C, baseline soil quality data was collected from all identified landfills (Areas A, B, E, and G) and debris areas (Area F). As such, no additional soil data was collected during the 2014 Construction Season of the project.

As per the Monitoring Plan, new groundwater monitoring wells were installed at Landfill A and Landfill B. Not all of the planned monitoring well installations at Landfill A and Landfill B were completed during the 2014 Construction Season and will be completed in the 2015 Construction Season. The groundwater monitoring wells installed during the 2014 Construction Season are presented in Table 5.

Table 5: 2014 Monitoring Well Installations

Monitoring Well ID	Location	Northing (m)	Easting (m)	Relative Elevation of Top (m)
MW14-2A	Landfill A	7655854.828	512568.405	46.523
MW14-1B	Landfill B	7655829.811	512682.185	49.770
MW14-2B	Landfill B	7655866.069	512756.887	47.750
MW14-3B	Landfill B	7655918.327	512743.971	47.091
MW14-4B	Landfill B	7655903.447	512680.376	48.656

As the new groundwater monitoring wells were installed in early October, 2014 following capping of Landfill A and Landfill B, no “baseline” groundwater samples were collected. As such, “baseline” groundwater quality following landfill capping activities is not yet available.

Natural Environment Monitoring

Natural Environment data collected during the 2014 Construction Season is summarized as follows:

Wildlife Sightings

Wildlife sightings noted during the 2014 Construction season are summarized in Table 6.

Table 6: 2014 Wildlife Sightings

Date	Wildlife sighted
August 11	Moose (swimming in channel)
August 12	Northern Harrier
August 13	Geese
August 14	Sandhill Cranes, Red Fox, Beaver, Ptarmigan
August 15	Martin, Swans, Rabbit (tracks), Bald Eagle
August 16	Beluga Whale
August 17	Bearded Seal, Fox, Peregrine Falcon
August 18	Beluga Whale, Peregrine Falcon (two)
August 20	Sandhill Cranes, Snow Geese
August 21	Northern Harrier
August 22	Sandhill Cranes (3), Golden Eagle, Beavers (3), Snow Geese (9), Peregrine Falcon
August 23	Fox, Northern Harrier
August 24	Snow Geese (~40 & 24), Sandhill Cranes (2), Swans (2), Ptarmigan (2), Bald Eagle
August 25	Ptarmigan (5), Snow Geese (38), Gyrfalcon, Swans (2), Seal
August 26	Seal (twice), Peregrine Falcon, Snow Geese (3, 6 & 33), Eagle (possible), Red-throated Loon (4), Swans (4), Golden Eagle, Gyrfalcon, Canada Geese (30)
August 27	Bearded Seal, Swans (2 & 5), Ptarmigan (7), Sik Sik, Snow Geese (18, & 8), Canvasback (2) Scaup (2), , Red-throated Loon (2), Sandhill Cranes (3), Brown bird with yellow stomachs (2)
August 28	Bearded Seal, Ptarmigan (2 & 5), Sik Sik, Crow (2), Ringed Seal, Canada Geese (21), Swans (5), Scaup (17), Northern Harrier, Fox
August 29	Seal, Bald Eagle, Ducks (20), Crow (3),
August 30	Ptarmigan (9), Golden Eagle, Snow Geese (24), Swans (4), Sandhill Cranes (3)
August 31	Swans (10), Snow Geese (17), Ptarmigan (6), Sik Sik, Crow (3), Ducks (2)
September 1	Snow Geese (70+), Canada Geese, Beaver, Red-throated Loon, Swans (6), Ptarmigan (3), Swans (2), Sik Sik (4), Crow (6), Bald Eagle
September 2	Ptarmigan (2), Swans (3), Shrew
September 8	Geese, Swans, Falcon
September 9	Geese, Swans
September 10	Sik Sik, Northern Harrier
September 11	Duck
September 14	Ringed Seal
September 15	Red Fox
September 16	Moose
September 19	Sandhill Cranes (5)
September 22	Red Fox, Snow Birds, Fish
September 23	Ptarmigan (7), Red Fox, Fish (jumping)
September 24	Ptarmigan (12)
September 25	Ptarmigan (12)
September 26	Ptarmigan (12)
September 27	Ptarmigan (12)
September 28	Fox (2), Ravens, Seal, Swan, Ptarmigan, Crows
September 29	Arctic Fox, Ptarmigan, Crows
September 30	Arctic Fox, Ptarmigan (21), Crows, Sandhill Crane, Red Fox
October 1	Ptarmigan, Crows, Sandhill Crane
October 8	Fox (2), Ptarmigan (7 & 8)
October 9	Ptarmigan (15), Wolverine (tracks)
October 10	Fox, Ptarmigan (8)

Note that records of wildlife sightings were not kept at the start of the project.

Re-vegetation of Disturbed Areas

No re-vegetation activities were conducted during the 2014 Construction Season.

Use of Site by People for Traditional Activities

No use of the Site by people for traditional activities was observed during the 2014 Construction Season.

Monitoring During Remediation

As per the NWT Water Board License, required monitoring during remediation has been detailed in the other items of this report.

Post-Construction Monitoring

As per the Monitoring Plan, new thermistors were installed Landfill B as part of a thermal monitoring system. Not all of the planned thermistor installations at Landfill A and Landfill B were completed during the 2014 Construction Season and will be completed in the 2015 Construction Season. The thermistors installed during the 2014 Construction Season are presented in Table 7.

Table 7: 2014 Thermistor Installations

Thermistor ID	Location	Northing (m)	Easting (m)	Relative Elevation of Top (m)
T1-B	Landfill B	7655854.634	512698.473	53.825
T3-B	Landfill B	7655900.902	512727.122	52.237
T5-B	Landfill B	7655873.375	512749.637	48.820
T-Background	Landfill B	7655842.040	512642.934	49.894

As remediation activities were recently completed or on-going during the 2014 Construction Season, no post-construction monitoring data is yet available.

i) Reclamation Activity Summary

The reclamation activities completed at site are presented in Table 8.

Table 8: 2014 Reclamation Activities

Items	Comments
Plume A5	The soil in Plume A5 was backfilled and compacted on October 10, 2014
Plume A6	The soil in Plume A6 was backfilled and compacted on September 15, 2014
Plume A7	The soil in Plume A7 was backfilled and compacted on October 4, 2014
Plume A12	The soil in Plume A12 was backfilled and compacted on September 15, 2014
Plume A14	The soil in Plume A14 was backfilled and compacted on September 15, 2014
Plume D1	The soil in Plume D1 was backfilled and compacted on October 8, 2014
Plume D2	The soil in Plume D2 was backfilled and compacted on October 8, 2014
Plume D3	The soil in Plume D3 was backfilled and compacted on October 7, 2014
Plume D4	The soil in Plume D4 was backfilled and compacted on October 7, 2014
Plume E1, E2 and E3	The soil in Area E1 and E3 excavations addressed.
Plume F1	The soil in Plume F1 was backfilled and compacted on October 11, 2014
Plume F2	The soil in Plume F2 was backfilled and compacted on September 21, 2014
Plume F3	The soil in Plume F3 was backfilled and compacted on September 21, 2014
Plume F9	The soil in Plume F9 was backfilled and compacted on September 23, 2014
Plume J1	The excavation area was backfilled and reshaped
Plume J2	No impacted soil remains above permafrost
Plume J3	No impacted soil remains above permafrost
North Borrow Pit Area F	The reclamation of the north borrow pit Area F was completed on September 21, 2014
Laydown/Camp Area F	The reclamation of the laydown/camp area F was completed on October 7, 2014
South Borrow Pit Area E	The reclamation of the south borrow pit Area E was completed on September 28, 2014

The updated reclamation schedule is presented in Table 9.

Table 9: Reclamation Schedule

Items	Comments
Plume G1	Scheduled for 2015.
Plume G2	Scheduled for 2015.
Installation of Thermistors	Four thermistors were installed. Seven more thermistors need to be installed.
Installation of Groundwater Monitoring Wells	Five monitoring wells were installed. Seven more monitoring wells need to be installed/re-installed.
Airstrip	The reclamation of the airstrip is partially done and will need to be completed in 2015.
Treatment Cell Remediation	The treatment cell will be decommissioned in 2015. There are additional petroleum hydrocarbon soils to be treated next season, therefore they were left in place.
Area H	Dock removal

j) Modifications to the Reclamation Project

There were number of modifications to the Remedial Action Plan (RAP) and Landfill and Debris Area Cap Designs.

One significant change to the RAP was the change in the Tier II criteria for Barium. This is discussed in Revision to the Remedial Action Plan section below.

The following were modifications to the Landfill and Debris Cap Designs as submitted on the Landfill and Debris Cap Drawings in Appendix D of the RAP and as revised in April 2014:

- the location of the anchor trenches around Area A and B Landfills was moved outward to encompass additional landfill debris found in the key trench excavations.
- the key trenches were excavated deeper and wider to reach the permafrost

Additionally, maintenance work was required on the barge dock walls.

k) Studies

No studies were required by the Water Board and no future studies are expected.

l) Plan Updates

i) Waste Management Plan

No updates or revisions were made to this plan.

ii) Spill Contingency Plan

No updated or revisions were made to this plan.

iii) Quality Assurance/Quality Control Plan

No updated or revisions were made to this plan.

iv) Monitoring Plan

In conjunction with site conditions observed during the excavation of the landfill key trenches, the Northwest Territories Water Board (NWTWB) was advised on October 10, 2014 that the location of some monitoring wells and thermistors shown in the Monitoring Plan would be field-fit to better assess groundwater quality and landfill freeze back. Locations of the thermistor and monitoring well networks will be provided to the NWTWB as part of the as-builts drawings due 90 days after the end of the 2014 construction season. The final day of the 2014 construction season was October 15, 2014.

v) Remedial Action Plan

The remedial action plan had the following three modifications:

- a) Barite Guideline: a rationale for the implementation of the Alberta Barite Guideline was submitted to the NWTWB on September 8, 2014. The NWTWB provided its acceptance on September 11, 2014. Updates to the applicable parts of the RAP incorporating this updated guideline were provided to the NWTWB.
- b) Key Trench Alignment: the NWTWB was advised on August 27, 2014 that a field-fit of the landfill key trench alignment shown in the tender drawings was required based on conditions observed at site. As an interim update, the NWTWB was provided with the approximate, constructed location

and permafrost depths within the key trench on September 23, 2014. As-built drawings showing the constructed key trench location will be included in the as-built drawings to be provided to the NWTWB in January, 2015.

- c) Size of Landfill A / B: In conjunction with the key trench realignment notification, the NWTWB also advised that the overall size of the engineered caps for Landfills A and B would increase. As-built drawings showing the constructed landfills will be included in the as-built drawings to be provided to the NWTWB in January, 2015.

m) Discharges and Spills

No discharges or spills greater than or equal to the amount listed in the GNWT Spill Contingency Planning and Reporting Regulations occurred on-site. This is also in accordance with the "Spill Contingency Plan" already submitted to the NWTWB in April, 2014.

n) Spill Training

Training on spill mitigation and clean up procedures was provided to all on-site staff during the project kick-off meeting or during site orientation.

We trust the information provided is sufficient. Please feel free to contact the undersigned if you have any questions or comments.

Sincerely,



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Appendix A – Surveillance Network Program (SNP) Summary



Water License – Annual Summary

GENERAL INFORMATION
Project: BAR-C Tununuk Point Remediation
Water License Number: N7L1 – 1836
Reporting Period: 2014

Summary Report:

- Monitoring locations were established on July 26th, as noted below:

Northing	Easting	Sample Monitoring Name
7655755.548	513199.799	SNP 1836-2
7655248.066	513168.383	SNP 1836-3
7654732.334	513147.286	SNP 1836-4
7654497.321	513027.588	SNP 1836-5
7655259.511	513011.809	SNP 1836-1

- The total monthly discharge is summarized as:

Month	Discharge Period (m ³)	Project to Date (m ³)
July	0	0
August	0	0
September	0	0
October	1,000	1,000

Additional Comments

Samples were collected from SNP 1836-1 on September 23, sample number SW-TC-01-E, with results received October 2. The water was discharged at that time with treatment through filter sock, following confirmation that required parameters were below discharge criteria.

Water License – Annual Summary

GENERAL INFORMATION
Project: BAR-C Tununuk Point Remediation
Water License Number: N7L1 – 1836
Reporting Period: 2014

SNP 1836-1

July – before liner was down and the location was fully established

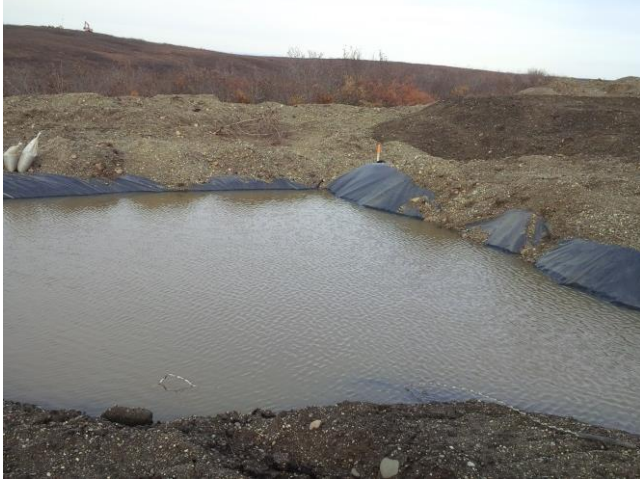


August



Water License – Annual Summary

September



October – Water from the corner of the treatment cell was discharged before freezing.



Water License – Annual Summary

SNP 1836-2

July



August



Water License – Annual Summary

September



October – Area has been re-graded and the SNP monitoring location is not remaining.



Water License – Annual Summary

SNP 1836-3

July



August



Water License – Annual Summary

September



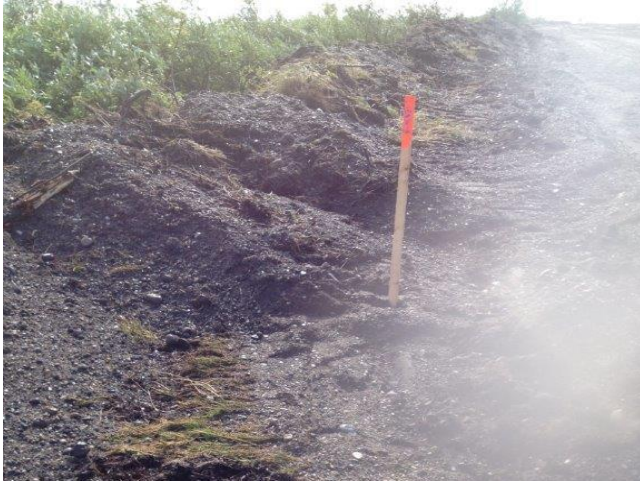
October



Water License – Annual Summary

SNP 1836-4

July



August



Water License – Annual Summary

September



October



Water License – Annual Summary

SNP 1836-5

July



August



Water License – Annual Summary

September



October





Water License – Annual Summary

GENERAL INFORMATION
Project: BAR-C Tununuk Point Remediation
Water License Number: N7L1 – 1836
Reporting Period: 2014

Weather Statistics			
Date	Temp (°C)		Precip. (mm)
	High	Low	
7/20/2014	16.7	9.7	1.2
7/21/2014	20.3	7.9	0.2
7/22/2014	18.5	11.4	0
7/23/2014	21.5	12.2	2.4
7/24/2014	18.4	11.8	1.9
7/25/2014	11.9	7.2	6.4
7/26/2014	9.1	6	7
7/27/2014	9.5	3.3	*
7/28/2014	8.3	5.2	*
7/29/2014	9.2	4.8	*
7/30/2014	6.6	2.3	*
7/31/2014	12.8	0.1	*
8/1/2014	10.5	6.3	*
8/2/2014	12.3	5.3	*
8/3/2014	13.1	4.6	*
8/4/2014	10.1	5.8	*
8/5/2014	11.5	3	*
8/6/2014	12.8	6.3	*
8/7/2014	11.9	6.3	*
8/8/2014	17.2	9.2	*
8/9/2014	17.3	8.5	*
8/10/2014	15.8	2.3	*
8/11/2014	20.4	6.5	*
8/12/2014	19.6	9.4	*
8/13/2014	13.9	6.6	*
8/14/2014	17.8	3.8	*
8/15/2014	19.2	7.5	*
8/16/2014	14.2	7.5	*
8/17/2014	18.7	9.5	*
8/18/2014	17.4	7.4	*
8/19/2014	14.1	7.7	*
8/20/2014	14.4	5.1	*
8/21/2014	20.5	3.7	*



Water License – Annual Summary

8/22/2014	15.5	8.5	*
8/23/2014	18	7.4	*
8/24/2014	13	8.5	*
8/25/2014	8.6	4.4	*
8/26/2014	12.5	2.8	*
8/27/2014	18.3	6.2	*
8/28/2014	18.4	6.8	*
8/29/2014	20.9	5.9	*
8/30/2014	6.5	3.2	*
8/31/2014	10.6	1.8	*
9/1/2014	13.4	3.1	*
9/2/2014	9	0.9	*
9/3/2014	*	0.6	*
9/4/2014	*	-1.3	*
9/5/2014	4.5	-0.3	2.6
9/6/2014	3.9	-0.3	1.2
9/7/2014	7.2	-1.7	0
9/8/2014	11.7	-1.3	0
9/9/2014	15	2.2	0
9/10/2014	11.9	1.8	0
9/11/2014	2.1	-0.8	*
9/12/2014	12.4	-3.1	0
9/13/2014	14.5	2.6	0
9/14/2014	10.3	4.1	0.2
9/15/2014	5.8	2.8	1.8
9/16/2014	7.3	4.6	0
9/17/2014	6.1	3.2	3.6
9/18/2014	5.5	3.8	0.6
9/19/2014	5.8	2.8	0
9/20/2014	6.3	3.4	0.4
9/21/2014	6.3	3.3	0.2
9/22/2014	3.3	0.3	12.7
9/23/2014	6.7	-0.9	0
9/24/2014	3.3	-1.2	2.2
9/25/2014	5.1	-3.6	0
9/26/2014	2.3	-5.3	0
9/27/2014	1.8	-6.3	0
9/28/2014	3.8	-2.2	0
9/29/2014	2.6	0.2	5
9/30/2014	4	-0.3	0.4
10/1/2014	1.9	-0.7	0.4
10/2/2014	1.7	-0.8	0.8



Water License – Annual Summary

10/3/2014	1.9	-0.8	0.2
10/4/2014	1	-1.1	0.8
10/5/2014	0.7	-3.1	0.4
10/6/2014	2	-2.1	8.4
10/7/2014	-1.9	-3.4	7.3
10/8/2014	-2.8	-5.3	6.4
10/9/2014	-3.3	-10	0.4
10/10/2014	-2.4	-12.1	1.9
10/11/2014	-0.2	-2.5	2
10/12/2014	-2	-4.3	0.5
10/13/2014	-1.4	-4.5	0.2
10/14/2014	-2.4	-4.9	0
10/15/2014	-2.8	-7.2	0
10/16/2014	-0.5	-7.5	0.2
10/17/2014	-3.9	-7.5	0.2
10/18/2014	-5	-9.3	1
10/19/2014	-3.1	-11	0.2

* Weather station did not report these values.