Memorandum

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Date: September 24, 2015

To: Trevor Boyd, P.Geo.
Canadian North Resources and Development Corp.

From: Tonia Robb and François Landry

Cc:

Subject: 2015 Fuel Containment Area Water and Soil Sampling

1. INTRODUCTION

The previous owner (Starfield Resources Inc.) constructed and operated a lined embankment secondary containment fuel storage area as part of their Ferguson Lake Project. Canadian North Resources and Development Corp. has acquired the property recently and at their request, ERM visited the Project area July 28 to 30, 2015 to assess the quality of the impounded water, assess quality of the soil in the Waste Storage Area (WSA), and inspect the meteorology station.

The fuel containment area (FCA) is approximately 40 m × 40 m (Plate 1-1). The containment area was constructed using local materials for the embankments and a HDPE liner was welded as the impermeable membrane. The liner was keyed into the top of the embankment and was covered with a non-woven geotextile fabric. A layer of sand and gravel was placed on top of the fabric to form a ramp and a working area within the embankment.

Plate 1-1. Fuel containment area (FCA) during July 2015 visit.

Contact water from snowmelt and rainfall collects seasonally in the containment area. Regular management of this contact water involves assessing water quality prior to discharge of untreated water onto the tundra.

2. OBJECTIVES

As part of the necessary maintenance procedures ("duty to care" of the facility and surroundings situated on Kivalliq Inuit Association surface lands), the following tasks were completed:

- Independent sampling and analysis of water in the fuel containment area (berm);
- Independent assessment of the physical condition of the containment;
- Inspection and surface soil sampling at the Waste Storage Area; and
- Inspection of the meteorological station.

3. METHODS

3.1 Sampling and Analysis of Water

Similar to that completed in 2012 and 2013, untreated water within the flooded FCA and the four berms (generator, crushed drum, tractor and helicopter; Plate 3.1-1) was collected on July 29, 2015. Samples were analyzed for heavy petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), BTEX, and oil and grease.

To assess the quality of the impounded FCA water, grab water samples were collected from the FCA at the water's surface (4 samples) and at depth (2 samples from the middle of the water column). Samples were collected from the northeast (surface and depth), southeast (surface and depth), southwest (surface) and northwest (surface) corners of the berm. An additional sample set was collected from the northeast corner of the FCA for analysis of general water quality parameters, including pH, turbidity and nutrients. A visual assessment of the physical condition of the FCA was also conducted.

Single grab samples were collected from each of the four berms.

Following receipt of the FCA water quality results indicating they were acceptable for discharge (i.e., no detectable contamination; see Section 4.1.1) two samples of untreated water from the FCA were collected on August 15, 2015, by on-site personnel prior to partial discharge of the FCA. These water samples were also analyzed for heavy petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), BTEX, and oil and grease.

For QA/QC purposes, one duplicate sample of water was collected during the July sampling; field and travel blanks were collected and analyzed during the July sampling program. Samples were kept cool and immediately sent to ALS Environmental Laboratories in Burnaby, BC for analysis.

All water quality samples were compared to applicable Canadian Council of Ministers of the Environment (CCME) guidelines for the protection of freshwater aquatic life (CCME 2015).

Generator berm

Crushed drum berm

Tractor berm

Helicopter berm

Plate 3.1-1. Additional berms at Ferguson Lake Camp where water quality samples were collected.

3.2 Assessment and Surface Sampling of Waste Storage Area

Following an AANDC inspection of the site in 2014, there were some concerns about leakage of contaminants from the waste pile (hazardous waste, scrap steel, and empty fuel barrels). ERM inspected the WSA on July 29, 2015 and collected surface soil samples at 14 locations within the WSA (Plate 3.2-1). In addition, four surface soil samples were collected from reference locations and to two duplicate samples from the WSA were collected for QA/QC purposes. Samples were collected from the WSA in and around where it appeared that there may be some contamination (i.e., soil stains, hydrocarbon odour). Reference location samples were collected from an area southeast of the WSA, away from any potential contamination source. All soil samples were analyzed for metals, heavy petroleum hydrocarbons, PAHs and BTEX.

All soil samples were compared to applicable Canada-wide standards for industrial ecological soil contact criteria (CCME 2008) and the Industrial CCME soil quality guidelines for the protection of environmental and human health (CCME 2010).

Plate 3.2-1. Waste storage area during July 2015 visit.

3.3 Meteorology Station Inspection

A meteorology station was originally installed at Ferguson Lake in 2005. The climatic variables monitored at the station are temperature, relative humidity, wind speed and direction, incoming global short-wave solar radiation, net radiation, snow-water-equivalent (SWE) precipitation and snow depth. The power supply for the station consists of a 12 volt deep cycle lead acid battery that is recharged with a 30 watt solar panel. The station was serviced in 2013 and the sensors were replaced during that year. Sensors usually need recalibration or replacement every two years, however, they can be left un-calibrated, but the accuracy of the data will decrease overtime. On July 30, 2015 ERM personnel inspected the station and downloaded the available data.

4. RESULTS AND DISCUSSION

4.1 Sampling and Analysis of Water

All water quality results are presented in Appendix 1.

4.1.1 Fuel Containment Area

Heavy petroleum hydrocarbons, PAHs, BTEX, and oil and grease, concentrations were less than the analytical detection limit at all water quality samples collected from the fuel containment area with the exception of FCA-Surf4 (collected from the southwest corner of the berm). The southwest corner of the berm (FCA-Surf4) had detectable levels of F2 (C10-C16) equal to 0.35 mg/L. Petroleum products associated with F2 include most diesel oils, furnace oils, kerosenes, jet fuel, and some weathered gasolines. This same sample also had detectable concentrations of fluorene and naphthalene, however concentrations were less than their respective CCME guideline values (Appendix 1). During field sampling it was noted that there were signs of a fuel slick in this vicinity, but the source could not be located. The duplicate

sample of FCA-Surf3 had detectable levels of oil and grease (7.0 mg/L) but the corresponding sample was below detection limits (< 5.0 mg/L; Appendix 1).

4.1.2 Berms

Concentrations of heavy petroleum hydrocarbons, PAHs, BTEX, and oil and grease were generally less than detection limits in all untreated grab samples collected from the berm sites (generator, crushed drum, tractor and helicopter). The one exception was Fraction 3 (F3 or C16-C34) in the generator berm water sample, which had a concentration of 0.77 mg/L (Appendix 1). The F3 fraction is comprised of both aromatics and aliphatics including diesel, furnace, and lubricating oils, greases, waxes, heavy fuels and asphalts. Thus the results are indicative of diesel storage in the berm.

4.1.3 Fuel Containment Area Water Discharge

Two additional water samples were collected on August 15, 2015, prior to the partial discharge from the FCA. Both samples did not contain any detectable levels of heavy petroleum hydrocarbons, PAHs, BTEX, or oil and grease (Appendix 1).

4.2 Assessment and Surface Sampling of Waste Storage Area

All soil quality results are presented in Appendix 2. Soil quality samples were collected around the perimeter of the WSA (SOIL-1 to SOIL-6; Table 4.2-1), within the WSA (SOIL-7 to SOIL-16; Table 4.2-1) and at four reference locations (SOIL-17 to SOIL-20; Table 4.2-1).

Table 4.2-1. Soil Sample Locations Within the Waste Storage Area and Reference Area, July 30, 2015

Sample ID	UTM*		Location description
	Easting	Northing	
Soil-1	606717	6975174	SE corner of the Waste Storage Area (WSA)
Soil-2	606714	6975181	East edge of WSA
Soil-3	606688	6975185	NE corner of WSA
Soil-4	606710	6975160	SW corner of WSA
Soil-5	606691	6975165	W edge of WSA
Soil-6	606683	6975175	NW corner of WSA
Soil-Dup-1	606683	6975175	NW corner of WSA
Soil-7	606687	6975179	N area, inside the WSA
Soil-8	606692	6975171	NW area, inside the WSA
Soil-9	606696	6975178	N central area, inside the WSA
Soil-10	606695	6975174	Central W area, inside the WSA
Soil-11	606698	6975174	Central W area, inside the WSA

(continued)

Table 4.2-1. Soil Sample Locations Within the Waste Storage Area and Reference Area, July 30, 2015 (complete)

Sample ID	UTM*		Location description
	Easting	Northing	
Soil-12	606708	6975170	SW area, inside the WSA
Soil-13	606710	6975173	SE area, inside the WSA
Soil-14	606705	6975175	Central E area, inside the WSA
Soild-15	606703	6975181	Central E area, inside the WSA
Soild-16	606700	6975186	NE area, inside the WSA
Soil-Dup-2	606700	6975186	NE area, inside the WSA
Soil-17	606750	6975148	Reference location
Soil-18	606757	6975144	Reference location
Soil-19	606764	6975155	Reference location
Soil-20	606766	6975160	Reference location

**NAD 83 (14V)*

Of the 16 samples collected around and within the WSA, only two samples had detectable levels of heavy petroleum hydrocarbons, PAHs or BTEX. These two samples were collected from the western area of the WSA, and included SOIL-5 (Table 4.2-1) and SOIL-10 (Table 4.2-1; Plate 4.2-1). Both samples had detectable levels of F3 (C16-34 and minus PAHs), and concentrations were elevated in the SOIL-5 sample, with 1,950 mg/kg which is greater than the coarse-grained standard guideline (1,700 mg/kg). SOIL-5 also had detectable levels of F4 (C34-C50), benzo(g,h,i)perylene and pyrene present; however, concentrations were below applicable guidelines. F2 (C10-C16 and minus naphthalene) were detected in the SOIL-10 sample (32 mg/kg) but concentrations were less than the standard of 260 mg/kg.

SOIL-5 *SOIL-10*

Plate 4.2-1. Soil sample sites within the WSA that had detectable levels of hydrocarbons.

There were no detectable levels of heavy petroleum hydrocarbons, PAHs or BTEX in any of the reference samples. Reference samples and WCA samples also had similar metal concentrations

and pH (Appendix 2). Thus results suggests that the parameters detected in and around the WSA are uncharacteristic for the area and likely related to project activities (waste storage).

4.3 Meteorology Station Inspection

The meteorology station at Ferguson Lake was visited on July 30, 2015 (Plate 4.3-1). During the visit there was significant damage to the station making it inoperable, including sensor wires torn out, battery box detached and broken, broken sensors, broken rain gauge and strewn wires (Plate 4.3-2). Data was downloaded however as a result of damage to the station, only a limited data set was recorded and upon review some data may be erroneous (i.e., data is only available up to May 2014; snow depth, solar radiation, and precipitation after October 2013 appear erroneous). The data logger was removed and returned the ERM Yellowknife office and can be sent for maintenance and repair.

Plate 4.3-1. Ferguson Lake meteorology station on July 30th, 2015.

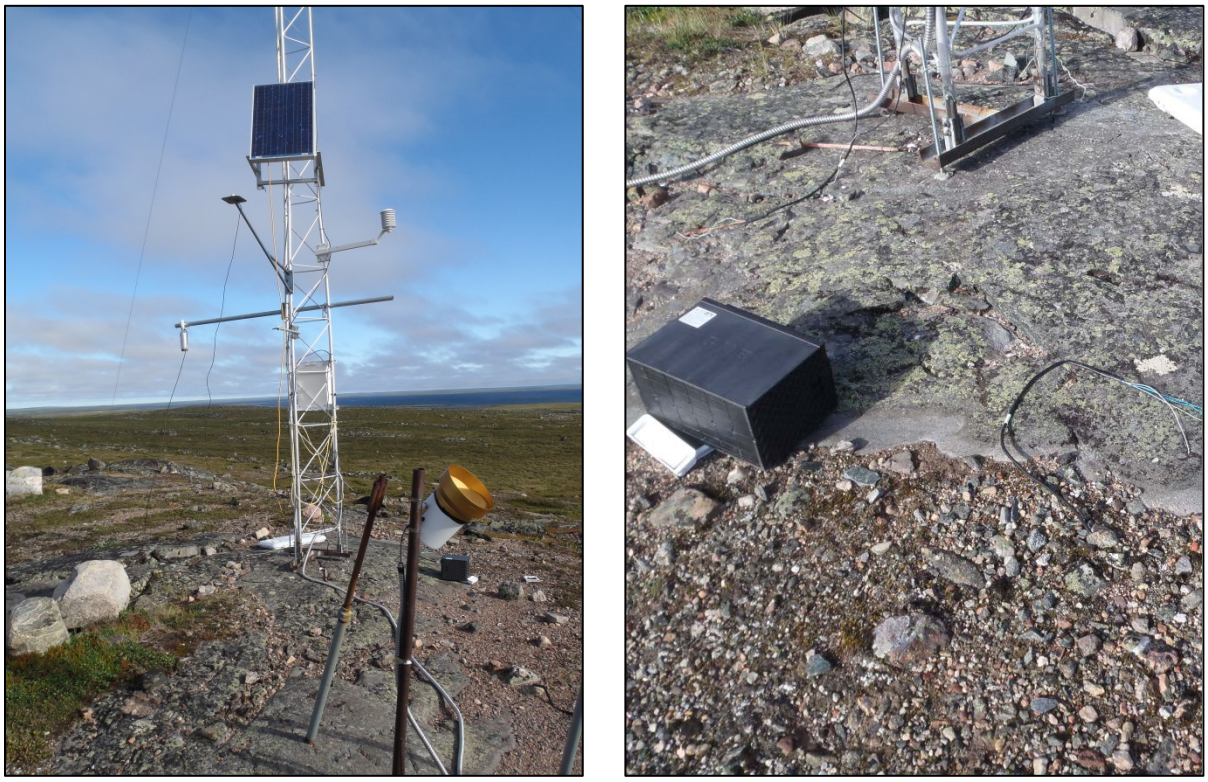

Plate 4.3-2. Damage to Ferguson Lake meteorology station on July 30th, 2015.

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REFERENCES

CCME. 2008. *Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil.* Winnipeg, MB: Canadian Council of Ministers of the Environment. Table 1 Revised January 2008.

CCME. 2010. *Canadian Soil Quality Guidelines for Carcinogenic and Other Polycyclic Aromatic Hydrocarbons (PAHs) for the Protection of Environmental and Human Health Effects*. Scientific Criteria Document. Winnipeg, MB: Canadian Council of Ministers of the Environment. http://ceqg-rcqe.ccme.ca/

CCME. 2015. *Canadian Water Quality Guidelines for the Protection of Aquatic Life*. Summary tables. Winnipeg, MB: Canadian Council of Ministers of the Environment. http://ceqg-rcqe.ccme.ca/

– Appendix 1 –

Appendix 1. Analytical Results of Hydrocarbons and PAH Testing of Untreated Water (FCA), July 29 and August 15, 2015

				Untreated Water Collected from the FCA						
Client Sample ID				**FCA-SURF1**	**FCA-MID1**	**FCA-SURF2**	**FCA-MID2**	**FCA-SURF4**	**FCA-SURF3**	**DUP-1 of FCA-SURF3**
Date Sampled				**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**
ALS Sample ID				**L1650943-1**	**L1650943-2**	**L1650943-3**	**L1650943-4**	**L1650943-5**	**L1650943-6**	**L1650943-7**
Parameter	**Lowest Detection Limit**	**Units**	**CCME Guidelines (mg/L)[1]**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**
Physical Tests (Water)										
Conductivity	2.0	uS/cm	-	7.4	-	-	-	-	-	-
pH	0.10	pH	6.5 to 9.0	6.44	-	-	-	-	-	-
Total Suspended Solids	3.0	mg/L	-	<3.0	-	-	-	-	-	-
Total Dissolved Solids	10	mg/L	-	<10	-	-	-	-	-	-
Turbidity	0.10	NTU	-	1.97	-	-	-	-	-	-
Anions and Nutrients (Water)										
Alkalinity, Bicarbonate (as $CaCO_3$)	2.0	mg/L	-	2.7	-	-	-	-	-	-
Alkalinity, Carbonate (as $CaCO_3$)	2.0	mg/L	-	<2.0	-	-	-	-	-	-
Alkalinity, Hydroxide (as $CaCO_3$)	2.0	mg/L	-	<2.0	-	-	-	-	-	-
Alkalinity, Total (as $CaCO_3$)	2.0	mg/L	-	2.7	-	-	-	-	-	-
Ammonia, Total (as N)	0.0050	mg/L	-	0.0054	-	-	-	-	-	-
Bromide (Br)	0.050	mg/L	-	<0.050	-	-	-	-	-	-
Chloride (Cl)	0.50	mg/L	120	0.52	-	-	-	-	-	-
Fluoride (F)	0.020	mg/L	0.12	<0.020	-	-	-	-	-	-
Nitrate (as N)	0.0050	mg/L	13	<0.0050	-	-	-	-	-	-
Nitrite (as N)	0.0010	mg/L	0.197	<0.0010	-	-	-	-	-	-
Total Kjeldahl Nitrogen	0.050	mg/L	-	0.318	-	-	-	-	-	-
Orthophosphate-Dissolved (as P)	0.0010	mg/L	-	<0.0010	-	-	-	-	-	-
Phosphorus (P)-Total	0.0020	mg/L	-	0.0158	-	-	-	-	-	-
Sulfate (SO_4)	0.30	mg/L	-	<0.30	-	-	-	-	-	-
Organic / Inorganic Carbon (Water)										
Total Organic Carbon	0.50	mg/L	-	4.16	-	-	-	-	-	-
Aggregate Organics (Water)										
Oil and Grease	1.0	mg/L	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**7.0**
Volatile Organic Compounds (Water)										
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
Methyl t-butyl ether (MTBE)	0.00050	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Styrene	0.00050	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	0.00050	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
ortho-Xylene	0.00050	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
meta- & para-Xylene	0.00050	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes	0.00075	mg/L	-	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
F1 (C6-C10)	0.10	mg/L	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4-Bromofluorobenzene (SS)		%	-	99	99.3	100.2	100.1	98	98.9	98.6
1,4-Difluorobenzene (SS)		%	-	100.4	100.2	100	99.7	100.6	101	98.8

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				Untreated Water Collected from the FCA						
Client Sample ID				**FCA-SURF1**	**FCA-MID1**	**FCA-SURF2**	**FCA-MID2**	**FCA-SURF4**	**FCA-SURF3**	**DUP-1 of FCA-SURF3**
Date Sampled				**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**
ALS Sample ID				**L1650943-1**	**L1650943-2**	**L1650943-3**	**L1650943-4**	**L1650943-5**	**L1650943-6**	**L1650943-7**
Parameter	**Lowest Detection Limit**	**Units**	**CCME Guidelines (mg/L)[1]**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**
Hydrocarbons (Water)										
F1-BTEX	0.10	mg/L	-	<0.10	<0.10	<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	**0.35**	<0.30	<0.30
F3 (C16-C34)	0.30	mg/L	-	<0.30	<0.30	<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	<0.30	<0.30
2-Bromobenzotrifluoride, F2-F4 (%)		%	-	96.3	96.4	92.4	98.6	97	95.9	96.5
3,4-Dichlorotoluene (SS)		%	-	108	113.5	114.8	110.8	102.9	106.9	117.2
Polycyclic Aromatic Hydrocarbons (Water)										
Acenaphthene	0.000010	mg/L	0.0058	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050*	<0.000010	<0.000010
Acenaphthylene	0.000010	mg/L	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000030*	<0.000010	<0.000010
Acridine	0.000010	mg/L	0.0044	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Anthracene	0.000010	mg/L	0.000012	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benz(a)anthracene	0.000010	mg/L	0.000018	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(a)pyrene	0.000010	mg/L	0.000015	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(b)fluoranthene	0.000010	mg/L	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(g,h,i)perylene	0.000010	mg/L	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(k)fluoranthene	0.000010	mg/L	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Chrysene	0.000010	mg/L	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Dibenz(a,h)anthracene	0.000010	mg/L	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Fluoranthene	0.000010	mg/L	0.00004	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Fluorene	0.000010	mg/L	0.003	<0.000010	<0.000010	<0.000010	<0.000010	**0.000082**	<0.000010	<0.000010
Indeno(1,2,3-c,d)pyrene	0.000010	mg/L	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Naphthalene	0.000050	mg/L	0.0011	<0.000050	<0.000050	<0.000050	<0.000050	**0.000317**	<0.000050	<0.000050
Phenanthrene	0.000020	mg/L	0.0004	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Pyrene	0.000010	mg/L	0.000025	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Quinoline	0.000050	mg/L	0.0034	<0.000050	<0.000050	<0.000050	<0.000050	<0.00020*	<0.000050	<0.000050
Acridine d9		%	-	84.6	91.7	94.8	91.6	90.5	90.2	85.4
Chrysene d12		%	-	80.8	90.1	88.7	86.9	86.4	91	86.9
Naphthalene d8		%	-	105.1	108.5	103.9	108	109.5	106.1	105.7
Phenanthrene d10		%	-	94.8	100.4	98.3	97.8	97.2	97	93.4

[1] *Canadian water quality guidelines for the protection of freshwater aquatic life, Canadian Council of Ministers of the Environment.*

**Detection Limit adjusted due to sample matrix effects.*

Dashes indicated analysis not completed or no applicable guideline.

Bolded values indicate sample greater than the analytical detection limit.

Appendix 1. Analytical Results of Hydrocarbons and PAH Testing of Untreated Water (FCA), July 29 and August 15, 2015

				Berm Untreated Grab Sample				Blanks (July 29)		FCA Untreated Water at Discharge	
Client Sample ID				**Generator Berm**	**Crushed Drum Berm**	**Tractor Berm**	**Helicopter Berm**	**Field Blank**	**Travel Blank**	**Sample-1**	**Sample-2**
Date Sampled				**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**	**15-Aug-2015**	**15-Aug-2015**
ALS Sample ID				**L1650943-10**	**L1650943-11**	**L1650943-12**	**L1650943-13**	**L1650943-8**	**L1650943-9**	**L1658581-1**	**L1658581-2**
Parameter	**Lowest Detection Limit**	**Units**	**CCME Guidelines (mg/L)[1]**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**
Physical Tests (Water)											
Conductivity	2.0	uS/cm	-	-	-	-	-	<2.0	<2.0	-	-
pH	0.10	pH	6.5 to 9.0	-	-	-	-	5.33	5.41	-	-
Total Suspended Solids	3.0	mg/L	-	-	-	-	-	<3.0	<3.0	-	-
Total Dissolved Solids	10	mg/L	-	-	-	-	-	<10	<10	-	-
Turbidity	0.10	NTU	-	-	-	-	-	<0.10	<0.10	-	-
Anions and Nutrients (Water)											
Alkalinity, Bicarbonate (as $CaCO_3$)	2.0	mg/L	-	-	-	-	-	<2.0	<2.0	-	-
Alkalinity, Carbonate (as $CaCO_3$)	2.0	mg/L	-	-	-	-	-	<2.0	<2.0	-	-
Alkalinity, Hydroxide (as $CaCO_3$)	2.0	mg/L	-	-	-	-	-	<2.0	<2.0	-	-
Alkalinity, Total (as $CaCO_3$)	2.0	mg/L	-	-	-	-	-	<2.0	<2.0	-	-
Ammonia, Total (as N)	0.0050	mg/L	-	-	-	-	-	<0.0050	<0.0050	-	-
Bromide (Br)	0.050	mg/L	-	-	-	-	-	<0.050	<0.050	-	-
Chloride (Cl)	0.50	mg/L	120	-	-	-	-	<0.50	<0.50	-	-
Fluoride (F)	0.020	mg/L	0.12	-	-	-	-	<0.020	<0.020	-	-
Nitrate (as N)	0.0050	mg/L	13	-	-	-	-	0.0157	<0.0050	-	-
Nitrite (as N)	0.0010	mg/L	0.197	-	-	-	-	<0.0010	<0.0010	-	-
Total Kjeldahl Nitrogen	0.050	mg/L	-	-	-	-	-	<0.050	<0.050	-	-
Orthophosphate-Dissolved (as P)	0.0010	mg/L	-	-	-	-	-	<0.0010	<0.0010	-	-
Phosphorus (P)-Total	0.0020	mg/L	-	-	-	-	-	<0.0020	<0.0020	-	-
Sulfate (SO_4)	0.30	mg/L	-	-	-	-	-	<0.30	<0.30	-	-
Organic / Inorganic Carbon (Water)											
Total Organic Carbon	0.50	mg/L	-	-	-	-	-	<0.50	<0.50	-	-
Aggregate Organics (Water)											
Oil and Grease	1.0	mg/L	-	<5.0	<5.0	<5.0	<5.0	-	-	<1.0	<1.0
Volatile Organic Compounds (Water)											
Benzene	0.00050	mg/L	-	<0.00050	-	-	-	-	<0.00050	<0.00050	<0.00050
Ethylbenzene	0.00050	mg/L	-	<0.00050	-	-	-	-	<0.00050	<0.00050	<0.00050
Methyl t-butyl ether (MTBE)	0.00050	mg/L	-	<0.00050	-	-	-	-	<0.00050	<0.00050	<0.00050
Styrene	0.00050	mg/L	-	<0.00050	-	-	-	-	<0.00050	<0.00050	<0.00050
Toluene	0.00050	mg/L	-	<0.00050	-	-	-	-	<0.00050	<0.00050	<0.00050
ortho-Xylene	0.00050	mg/L	-	<0.00050	-	-	-	-	<0.00050	<0.00050	<0.00050
meta- & para-Xylene	0.00050	mg/L	-	<0.00050	-	-	-	-	<0.00050	<0.00050	<0.00050
Xylenes	0.00075	mg/L	-	<0.00075	-	-	-	-	<0.00075	<0.00075	<0.00075
F1 (C6-C10)	0.10	mg/L	-	<0.10	-	-	-	-	<0.10	-	-
4-Bromofluorobenzene (SS)		%	-	98.7	-	-	-	-	97.1	96.3	99.8
1,4-Difluorobenzene (SS)		%	-	101.1	-	-	-	-	100.8	100.3	100.3

Appendix 1. Analytical Results of Hydrocarbons and PAH Testing of Untreated Water (FCA), July 29 and August 15, 2015

				Berm Untreated Grab Sample				Blanks (July 29)		FCA Untreated Water at Discharge	
Client Sample ID				**Generator Berm**	**Crushed Drum Berm**	**Tractor Berm**	**Helicopter Berm**	**Field Blank**	**Travel Blank**	**Sample-1**	**Sample-2**
Date Sampled				**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**	**29-Jul-2015**	**15-Aug-2015**	**15-Aug-2015**
ALS Sample ID				**L1650943-10**	**L1650943-11**	**L1650943-12**	**L1650943-13**	**L1650943-8**	**L1650943-9**	**L1658581-1**	**L1658581-2**
Parameter	**Lowest Detection Limit**	**Units**	**CCME Guidelines (mg/L)[1]**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**	**Water**
Hydrocarbons (Water)											
F1-BTEX	0.10	mg/L	-	<0.10	-	-	-	-	<0.10	-	-
F2 (C10-C16)	0.30	mg/L	-	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
F3 (C16-C34)	0.30	mg/L	-	**0.77**	<0.30	<0.30	<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	<0.30	<0.30	<0.30
2-Bromobenzotrifluoride, F2-F4 (%)		%	-	97.6	92	91.9	91.9	96.4	95.4	96.1	88.4
3,4-Dichlorotoluene (SS)		%	-	90.3	-	-	-	-	95.5	93.9	88.2
Polycyclic Aromatic Hydrocarbons (Water)											
Acenaphthene	0.000010	mg/L	0.0058	<0.000060*	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Acenaphthylene	0.000010	mg/L	-	<0.000040*	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Acridine	0.000010	mg/L	0.0044	<0.000040*	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Anthracene	0.000010	mg/L	0.000012	<0.000020*	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benz(a)anthracene	0.000010	mg/L	0.000018	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(a)pyrene	0.000010	mg/L	0.000015	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(b)fluoranthene	0.000010	mg/L	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(g,h,i)perylene	0.000010	mg/L	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(k)fluoranthene	0.000010	mg/L	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Chrysene	0.000010	mg/L	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Dibenz(a,h)anthracene	0.000010	mg/L	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Fluoranthene	0.000010	mg/L	0.00004	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Fluorene	0.000010	mg/L	0.003	<0.000040*	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Indeno(1,2,3-c,d)pyrene	0.000010	mg/L	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Naphthalene	0.000050	mg/L	0.0011	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Phenanthrene	0.000020	mg/L	0.0004	<0.000050*	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Pyrene	0.000010	mg/L	0.000025	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Quinoline	0.000050	mg/L	0.0034	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Acridine d9		%	-	76.5	86.3	87	99.9	100.1	85.9	81.3	78.4
Chrysene d12		%	-	80.5	80.8	78.2	87.9	94.9	84.2	79.2	81
Naphthalene d8		%	-	100.9	100.1	105.3	109.1	123.5	107.2	86	82.2
Phenanthrene d10		%	-	80.7	91	92.1	100	110.1	91.6	90	85.7

[1] *Canadian water quality guidelines for the protection of freshwater aquatic life, Canadian Council of Ministers of the Environment.*

**Detection Limit adjusted due to sample matrix effects.*

Dashes indicated analysis not completed or no applicable guideline.

Bolded values indicate sample greater than the analytical detection limit.

— Appendix 2 —

Appendix 2. Soil Sample Analytical Results, July 29, 2015

Client Sample ID Date Sampled ALS Sample ID Parameter	Lowest Detection Limit	Units	Standard - Coarse Grain (mg/kg)[1]	Standard - Fine Grain (mg/kg)[1]	CCME Guideline (mg/kg)[2]	SOIL-1 29-Jul-2015 L1651135-1 Soil	SOIL-2 29-Jul-2015 L1651135-2 Soil	SOIL-3 29-Jul-2015 L1651135-3 Soil	SOIL-4 29-Jul-2015 L1651135-4 Soil	SOIL-5 29-Jul-2015 L1651135-5 Soil	SOIL-6 29-Jul-2015 L1651135-6 Soil	Duplicate of SOIL-6 29-Jul-2015 L1651135-7 Soil
Physical Tests (Soil)												
Moisture	0.25	%				3.67	3.23	1.92	3.46	1.62	4.37	4.06
pH (1:2 soil:water)	0.10	pH			6 - 8	4.94	5.51	6.04	5.39	5.76	5.29	5.44
Metals (Soil)												
Antimony (Sb)	0.10	mg/kg				<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic (As)	0.10	mg/kg				1.67	1.35	1.28	1.17	1.24	1.25	1.22
Barium (Ba)	0.50	mg/kg				26.3	17.1	20.0	12.3	22.4	19.7	16.8
Beryllium (Be)	0.10	mg/kg				0.33	0.38	0.32	0.31	0.30	0.28	0.30
Cadmium (Cd)	0.050	mg/kg				0.051	<0.050	<0.050	<0.050	<0.050	0.061	<0.050
Chromium (Cr)	0.50	mg/kg				23.2	15.1	17.6	11.0	15.6	12.1	12.6
Cobalt (Co)	0.10	mg/kg				4.19	3.97	3.76	3.08	4.00	3.30	2.85
Copper (Cu)	0.50	mg/kg				3.54	4.99	5.25	2.95	6.53	3.30	3.96
Lead (Pb)	0.50	mg/kg				7.17	6.68	5.21	5.92	5.09	5.42	5.50
Mercury (Hg)	0.0050	mg/kg				<0.0050	<0.0050	<0.0050	0.0054	<0.0050	0.0062	0.0067
Molybdenum (Mo)	0.10	mg/kg			40	0.21	0.19	0.10	0.20	0.18	0.16	0.14
Nickel (Ni)	0.50	mg/kg			50	11.0	9.06	10.7	6.90	9.58	6.24	6.89
Selenium (Se)	0.20	mg/kg			2.9	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver (Ag)	0.10	mg/kg			40	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Thallium (Tl)	0.050	mg/kg			1	0.108	0.084	0.089	0.077	0.090	0.077	0.076
Tin (Sn)	2.0	mg/kg			300	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Uranium (U)	0.050	mg/kg			300	1.01	0.977	1.06	0.880	0.873	0.967	1.04
Vanadium (V)	0.20	mg/kg			130	25.6	14.6	14.2	13.6	15.9	16.6	14.4
Zinc (Zn)	2.0	mg/kg			360	25.2	21.3	22.4	20.5	24.6	24.9	21.1
Volatile Organic Compounds (Soil)												
Benzene	0.0050	mg/kg				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Ethylbenzene	0.015	mg/kg				<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Methyl t-butyl ether (MTBE)	0.20	mg/kg				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Styrene	0.050	mg/kg				<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene	0.050	mg/kg				<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
ortho-Xylene	0.050	mg/kg				<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
meta- & para-Xylene	0.050	mg/kg				<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Xylenes	0.075	mg/kg				<0.075	<0.075	<0.075	<0.075	<0.075	<0.075	<0.075
4-Bromofluorobenzene (SS)		%				100.5	95.8	101.4	94.9	98.1	94.6	96.8
1,4-Difluorobenzene (SS)		%				94.7	89.1	94.5	89	94.1	91.7	90.7
Hydrocarbons (Soil)												
F1 (C6-C10)	10	mg/kg	320	320		<10	<10	<10	<10	<10	<10	<10
F1-BTEX	10	mg/kg				<10	<10	<10	<10	<10	<10	<10
F2 (C10-C16)	30	mg/kg	260	260		<30	<30	<30	<30	<30	<30	<30
F2-Naphth	30	mg/kg				<30	<30	<30	<30	<30	<30	<30

Appendix 2. Soil Sample Analytical Results, July 29, 2015

Client Sample ID Date Sampled ALS Sample ID Parameter	Lowest Detection Limit	Units	Standard - Coarse Grain (mg/kg)[1]	Standard - Fine Grain (mg/kg)[1]	CCME Guideline (mg/kg)[2]	SOIL-1 29-Jul-2015 L1651135-1 Soil	SOIL-2 29-Jul-2015 L1651135-2 Soil	SOIL-3 29-Jul-2015 L1651135-3 Soil	SOIL-4 29-Jul-2015 L1651135-4 Soil	SOIL-5 29-Jul-2015 L1651135-5 Soil	SOIL-6 29-Jul-2015 L1651135-6 Soil	Duplicate of SOIL-6 29-Jul-2015 L1651135-7 Soil
Hydrocarbons (Soil) ***(cont'd)***												
F3 (C16-C34)	50	mg/kg	1700	2,500		<50	<50	<50	<50	1950	<50	<50
F3-PAH	50	mg/kg				<50	<50	<50	<50	1950	<50	<50
F4 (C34-C50)	50	mg/kg	3,300	6,600		<50	<50	<50	<50	271	<50	<50
Chrom. to baseline at nC50		-				YES	YES	YES	YES	YES	YES	YES
3,4-Dichlorotoluene (SS)		%				113.8	108.6	104.7	107.3	80.8	104.1	101.2
Polycyclic Aromatic Hydrocarbons (Soil)												
Acenaphthene	0.0050	mg/kg				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Acenaphthylene	0.0050	mg/kg				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Anthracene	0.0040	mg/kg	32	32		<0.0040	<0.0040	<0.0040	<0.0040	<0.0050**	<0.0040	<0.0040
Benz(a)anthracene	0.010	mg/kg			10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	0.010	mg/kg	72	72	1.4	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b)fluoranthene	0.010	mg/kg			10	<0.010	<0.010	<0.010	<0.010	<0.020*	<0.010	<0.010
Benzo(b+j+k)fluoranthene	0.015	mg/kg				<0.015	<0.015	<0.015	<0.015	<0.022*	<0.015	<0.015
Benzo(g,h,i)perylene	0.010	mg/kg				<0.010	<0.010	<0.010	<0.010	0.059	<0.010	<0.010
Benzo(k)fluoranthene	0.010	mg/kg			10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	0.010	mg/kg				<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	0.0050	mg/kg			10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	0.010	mg/kg	180	180		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Fluorene	0.010	mg/kg				<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	0.010	mg/kg			10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	0.010	mg/kg				<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Naphthalene	0.010	mg/kg			22	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	0.010	mg/kg			50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Pyrene	0.010	mg/kg			100	<0.010	<0.010	<0.010	<0.010	0.061	<0.010	<0.010
Acenaphthene d10		%				80.1	78.5	77.4	80.7	91.8	89.5	77.6
Chrysene d12		%				96.1	88.9	90.9	90	88.9	96.2	86.9
Naphthalene d8		%				75.5	75.6	75.9	78.3	80.8	83.2	73.9
Phenanthrene d10		%				96.3	92.3	90.1	92.4	94.3	100.3	89.6
B(a)P Total Potency Equivalent	0.020	mg/kg				<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
IACR (CCME)	0.15	mg/kg				<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15

[1] *Canada-wide Standards for Industrial Ecological Soil Contact criteria.*

[2] *Canadian Environmental Quality Guidelines for the Protection of Environmental and Human Health Industrial.*

***Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.*

**Detection Limit Adjusted due to sample matrix effects.*

Dashes indicated analysis not completed or no applicable guideline.

Appendix 2. Soil Sample Analytical Results, July 29, 2015

Client Sample ID Date Sampled ALS Sample ID Parameter	Lowest Detection Limit	Units	Standard - Coarse Grain (mg/kg)[1]	Standard - Fine Grain (mg/kg)[1]	CCME Guideline (mg/kg)[2]	SOIL-7 29-Jul-2015 L1651135-8 Soil	SOIL-8 29-Jul-2015 L1651135-9 Soil	SOIL-9 29-Jul-2015 L1651135-10 Soil	SOIL-10 29-Jul-2015 L1651135-11 Soil	SOIL-11 29-Jul-2015 L1651135-12 Soil	SOIL-12 29-Jul-2015 L1651135-13 Soil	SOIL-13 29-Jul-2015 L1651135-14 Soil	SOIL-14 29-Jul-2015 L1651135-15 Soil
Physical Tests (Soil)													
Moisture	0.25	%				5.55	4.03	4.92	7.19	2.89	3.29	4.96	2.70
pH (1:2 soil:water)	0.10	pH			6 - 8	5.20	5.47	5.63	5.28	5.41	5.10	5.21	5.68
Metals (Soil)													
Antimony (Sb)	0.10	mg/kg				<0.10	<0.10	<0.10	0.80	<0.10	<0.10	<0.10	<0.10
Arsenic (As)	0.10	mg/kg				1.76	1.16	1.39	1.43	1.49	1.30	1.55	1.72
Barium (Ba)	0.50	mg/kg				19.6	29.9	20.2	25.1	21.1	21.9	20.8	18.2
Beryllium (Be)	0.10	mg/kg				0.38	0.30	0.34	0.29	0.34	0.30	0.34	0.35
Cadmium (Cd)	0.050	mg/kg				<0.050	<0.050	<0.050	0.051	<0.050	<0.050	<0.050	<0.050
Chromium (Cr)	0.50	mg/kg				26.3	14.1	14.9	14.8	17.5	16.7	15.5	12.3
Cobalt (Co)	0.10	mg/kg				5.02	3.20	3.68	3.74	4.06	3.51	4.33	3.62
Copper (Cu)	0.50	mg/kg				5.84	3.68	6.61	6.86	6.76	4.16	3.52	5.15
Lead (Pb)	0.50	mg/kg				6.36	6.02	5.56	6.02	6.47	5.48	7.09	5.39
Mercury (Hg)	0.0050	mg/kg				0.0062	<0.0050	0.0071	0.0197	<0.0050	0.0063	<0.0050	<0.0050
Molybdenum (Mo)	0.10	mg/kg			40	0.21	0.17	0.22	0.19	0.15	0.24	0.17	0.12
Nickel (Ni)	0.50	mg/kg			50	14.0	7.62	9.25	8.73	10.4	9.14	9.54	8.81
Selenium (Se)	0.20	mg/kg			2.9	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver (Ag)	0.10	mg/kg			40	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Thallium (Tl)	0.050	mg/kg			1	0.117	0.109	0.114	0.111	0.130	0.130	0.101	0.089
Tin (Sn)	2.0	mg/kg			300	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Uranium (U)	0.050	mg/kg			300	1.18	1.09	1.08	0.992	1.33	1.04	0.986	1.01
Vanadium (V)	0.20	mg/kg			130	21.0	15.8	14.7	18.3	17.3	15.2	19.7	12.9
Zinc (Zn)	2.0	mg/kg			360	29.5	22.4	25.1	26.6	22.6	22.3	25.0	21.4
Volatile Organic Compounds (Soil)													
Benzene	0.0050	mg/kg				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Ethylbenzene	0.015	mg/kg				<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Methyl t-butyl ether (MTBE)	0.20	mg/kg				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Styrene	0.050	mg/kg				<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene	0.050	mg/kg				<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
ortho-Xylene	0.050	mg/kg				<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
meta- & para-Xylene	0.050	mg/kg				<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Xylenes	0.075	mg/kg				<0.075	<0.075	<0.075	<0.075	<0.075	<0.075	<0.075	<0.075
4-Bromofluorobenzene (SS)		%				99.5	94.8	97.1	98.1	100.3	96.2	99.4	96.5
1,4-Difluorobenzene (SS)		%				96.9	88.6	91	91.9	93.2	89.7	91.8	95
Hydrocarbons (Soil)													
F1 (C6-C10)	10	mg/kg	320	320		<10	<10	<10	<10	<10	<10	<10	<10
F1-BTEX	10	mg/kg				<10	<10	<10	<10	<10	<10	<10	<10
F2 (C10-C16)	30	mg/kg	260	260		<30	<30	<30	32	<30	<30	<30	<30
F2-Naphth	30	mg/kg				<30	<30	<30	32	<30	<30	<30	<30

Appendix 2. Soil Sample Analytical Results, July 29, 2015

Client Sample ID Date Sampled ALS Sample ID Parameter	Lowest Detection Limit	Units	Standard - Coarse Grain (mg/kg)[1]	Standard - Fine Grain (mg/kg)[1]	CCME Guideline (mg/kg)[2]	SOIL-7 29-Jul-2015 L1651135-8 Soil	SOIL-8 29-Jul-2015 L1651135-9 Soil	SOIL-9 29-Jul-2015 L1651135-10 Soil	SOIL-10 29-Jul-2015 L1651135-11 Soil	SOIL-11 29-Jul-2015 L1651135-12 Soil	SOIL-12 29-Jul-2015 L1651135-13 Soil	SOIL-13 29-Jul-2015 L1651135-14 Soil	SOIL-14 29-Jul-2015 L1651135-15 Soil
Hydrocarbons (Soil) ***(cont'd)***													
F3 (C16-C34)	50	mg/kg	1700	2,500		<50	<50	<50	93	<50	<50	<50	<50
F3-PAH	50	mg/kg				<50	<50	<50	93	<50	<50	<50	<50
F4 (C34-C50)	50	mg/kg	3,300	6,600		<50	<50	<50	<50	<50	<50	<50	<50
Chrom. to baseline at nC50		-				YES	YES	YES	YES	YES	YES	YES	YES
3,4-Dichlorotoluene (SS)		%				103.7	108.5	101.1	100.8	110.3	102.9	103.2	96.3
Polycyclic Aromatic Hydrocarbons (Soil)													
Acenaphthene	0.0050	mg/kg				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Acenaphthylene	0.0050	mg/kg				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Anthracene	0.0040	mg/kg	32	32		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Benz(a)anthracene	0.010	mg/kg			10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	0.010	mg/kg	72	72	1.4	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b)fluoranthene	0.010	mg/kg			10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	0.015	mg/kg				<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(g,h,i)perylene	0.010	mg/kg				<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	0.010	mg/kg			10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	0.010	mg/kg				<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	0.0050	mg/kg			10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	0.010	mg/kg	180	180		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Fluorene	0.010	mg/kg				<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	0.010	mg/kg			10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	0.010	mg/kg				<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Naphthalene	0.010	mg/kg			22	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	0.010	mg/kg			50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Pyrene	0.010	mg/kg			100	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthene d10		%				83.5	82.5	79.6	92.3	88.9	87.6	81.9	86.2
Chrysene d12		%				91.3	92.2	91.8	101	97.4	94.6	90.3	95.2
Naphthalene d8		%				78.7	78.7	75.4	84.2	89.7	84.5	77.7	84.2
Phenanthrene d10		%				92.8	95	94.2	104.3	99.9	102	93.5	93.1
B(a)P Total Potency Equivalent	0.020	mg/kg				<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
IACR (CCME)	0.15	mg/kg				<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15

[1] *Canada-wide Standards for Industrial Ecological Soil Contact criteria.*

[2] *Canadian Environmental Quality Guidelines for the Protection of Environmental and Human Health Industrial.*

***Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.*

**Detection Limit Adjusted due to sample matrix effects.*

Dashes indicated analysis not completed or no applicable guideline.

Appendix 2. Soil Sample Analytical Results, July 29, 2015

Client Sample ID						SOIL-15	SOIL-16	Duplicate of SOIL-16	SOIL-17	SOIL-18	SOIL-19	SOIL-20
Date Sampled						29-Jul-2015	29-Jul-2015	29-Jul-2015	29-Jul-2015	29-Jul-2015	29-Jul-2015	29-Jul-2015
ALS Sample ID	Lowest Detection Limit	Units	Standard - Coarse Grain (mg/kg)[1]	Standard - Fine Grain (mg/kg)[1]	CCME Guideline (mg/kg)[2]	L1651135-16	L1651135-17	L1651135-18	L1651135-19	L1651135-20	L1651135-21	L1651135-22
Parameter						Soil	Soil	Soil	Soil	Soil	Soil	Soil
Physical Tests (Soil)												
Moisture	0.25	%				3.17	4.71	4.01	3.13	3.11	6.10	4.84
pH (1:2 soil:water)	0.10	pH			6 - 8	5.26	5.40	5.36	5.62	5.48	5.03	5.53
Metals (Soil)												
Antimony (Sb)	0.10	mg/kg				<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic (As)	0.10	mg/kg				1.38	1.56	1.20	1.59	1.46	0.93	1.15
Barium (Ba)	0.50	mg/kg				17.2	15.5	15.7	18.2	15.5	19.3	17.0
Beryllium (Be)	0.10	mg/kg				0.40	0.34	0.25	0.35	0.33	0.21	0.35
Cadmium (Cd)	0.050	mg/kg				0.058	<0.050	0.061	<0.050	<0.050	<0.050	<0.050
Chromium (Cr)	0.50	mg/kg				19.1	12.6	12.1	15.7	16.7	16.0	10.8
Cobalt (Co)	0.10	mg/kg				5.07	3.25	2.90	4.89	3.67	2.76	3.36
Copper (Cu)	0.50	mg/kg				6.63	3.64	3.73	9.20	10.1	2.19	4.72
Lead (Pb)	0.50	mg/kg				6.09	6.46	5.88	7.52	6.15	4.71	5.88
Mercury (Hg)	0.0050	mg/kg				0.0057	0.0056	0.0067	0.0103	0.0099	0.0062	0.0084
Molybdenum (Mo)	0.10	mg/kg			40	0.15	0.21	0.17	0.18	0.24	0.19	0.14
Nickel (Ni)	0.50	mg/kg			50	12.2	8.55	6.78	10.4	10.7	7.37	6.88
Selenium (Se)	0.20	mg/kg			2.9	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver (Ag)	0.10	mg/kg			40	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Thallium (Tl)	0.050	mg/kg			1	0.091	0.083	0.076	0.090	0.085	0.064	0.089
Tin (Sn)	2.0	mg/kg			300	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Uranium (U)	0.050	mg/kg			300	1.00	1.05	1.05	1.19	0.957	0.826	1.10
Vanadium (V)	0.20	mg/kg			130	22.7	13.7	13.5	17.6	16.9	16.9	14.3
Zinc (Zn)	2.0	mg/kg			360	26.2	20.8	20.5	24.4	21.1	19.8	23.9
Volatile Organic Compounds (Soil)												
Benzene	0.0050	mg/kg				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Ethylbenzene	0.015	mg/kg				<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Methyl t-butyl ether (MTBE)	0.20	mg/kg				<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Styrene	0.050	mg/kg				<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Toluene	0.050	mg/kg				<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
ortho-Xylene	0.050	mg/kg				<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
meta- & para-Xylene	0.050	mg/kg				<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Xylenes	0.075	mg/kg				<0.075	<0.075	<0.075	<0.075	<0.075	<0.075	<0.075
4-Bromofluorobenzene (SS)		%				91.1	95.1	93.1	103.5	101.1	99	99.8
1,4-Difluorobenzene (SS)		%				88.1	92.4	89.2	96.4	95.4	93.7	94.3
Hydrocarbons (Soil)												
F1 (C6-C10)	10	mg/kg	320	320		<10	<10	<10	<10	<10	<10	<10
F1-BTEX	10	mg/kg				<10	<10	<10	<10	<10	<10	<10
F2 (C10-C16)	30	mg/kg	260	260		<30	<30	<30	<30	<30	<30	<30
F2-Naphth	30	mg/kg				<30	<30	<30	<30	<30	<30	<30

Appendix 2. Soil Sample Analytical Results, July 29, 2015

Client Sample ID						SOIL-15	SOIL-16	Duplicate of SOIL-16	SOIL-17	SOIL-18	SOIL-19	SOIL-20
Date Sampled						29-Jul-2015	29-Jul-2015	29-Jul-2015	29-Jul-2015	29-Jul-2015	29-Jul-2015	29-Jul-2015
ALS Sample ID	Lowest Detection Limit	Units	Standard - Coarse Grain (mg/kg)[1]	Standard - Fine Grain (mg/kg)[1]	CCME Guideline (mg/kg)[2]	L1651135-16	L1651135-17	L1651135-18	L1651135-19	L1651135-20	L1651135-21	L1651135-22
Parameter						Soil	Soil	Soil	Soil	Soil	Soil	Soil
Hydrocarbons (Soil) ***(cont'd)***												
F3 (C16-C34)	50	mg/kg	1700	2,500		<50	<50	<50	<50	<50	<50	<50
F3-PAH	50	mg/kg				<50	<50	<50	<50	<50	<50	<50
F4 (C34-C50)	50	mg/kg	3,300	6,600		<50	<50	<50	<50	<50	<50	<50
Chrom. to baseline at nC50		-				YES	YES	YES	YES	YES	YES	YES
3,4-Dichlorotoluene (SS)		%				99.6	97.4	95.5	114.9	112.4	78.5	114.3
Polycyclic Aromatic Hydrocarbons (Soil)												
Acenaphthene	0.0050	mg/kg				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Acenaphthylene	0.0050	mg/kg				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Anthracene	0.0040	mg/kg	32	32		<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
Benz(a)anthracene	0.010	mg/kg			10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	0.010	mg/kg	72	72	1.4	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b)fluoranthene	0.010	mg/kg			10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	0.015	mg/kg				<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(g,h,i)perylene	0.010	mg/kg				<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	0.010	mg/kg			10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	0.010	mg/kg				<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	0.0050	mg/kg			10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	0.010	mg/kg	180	180		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Fluorene	0.010	mg/kg				<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	0.010	mg/kg			10	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	0.010	mg/kg				<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Naphthalene	0.010	mg/kg			22	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	0.010	mg/kg			50	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Pyrene	0.010	mg/kg			100	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthene d10		%				84.1	77.8	80.3	88.3	86.5	84.2	87.8
Chrysene d12		%				77.2	93.6	93.3	93.5	94	93.8	95
Naphthalene d8		%				82.7	70.6	74	87.6	84.6	78.4	80.9
Phenanthrene d10		%				93.2	95	96.3	96.9	98.3	97.8	99.7
B(a)P Total Potency Equivalent	0.020	mg/kg				<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
IACR (CCME)	0.15	mg/kg				<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15

[1] *Canada-wide Standards for Industrial Ecological Soil Contact criteria.*

[2] *Canadian Environmental Quality Guidelines for the Protection of Environmental and Human Health Industrial.*

***Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.*

**Detection Limit Adjusted due to sample matrix effects.*

Dashes indicated analysis not completed or no applicable guideline.