

APPENDIX A

SUMMARIES OF AREAS OF ENVIRONMENTAL CONCERN (AECS) AND AREAS OF INTEREST (AREAS)

AEC 1

AEC 1: Lower Boneyard

Area Description	
Location	Surface of reclaimed Tailings Pond (TP1), southwest of Flat River and northeast of inactive tank farm.
Topography	Generally flat on surface with a slight slope to northeast. Steep decline from crest to base of dam and Flat River valley.
Surface Drainage	Northeast towards Flat River.
Background	AEC 1 is an historical and current spent equipment and scrap metal storage area located on TP 1. Equipment is stored in a cold storage building located on north portion of AEC 1, equipment and scrap metal are also stored in open on remainder of AEC 1.
Historical Assessment Information	
Previous Phase II Environmental Site Assessment Results (EBA, 2008)	Number of test pits
	5
	Number of surface soil samples
	3
	Number of monitoring wells installed
	0
	Number of soil samples analyzed
	8
Comments: Stained shallow soil (i.e., less than 0.7 m deep) with PHC and PAH impacts were identified at several assessment locations. Metals exceedances in cover and tailings. Groundwater was not assessed as part of study.	
2017/2018 Environmental Site Assessment Details	
Environmental Site Assessment Scope	
Utility Locate SOP followed?	Yes – in addition to field review with NATC staff, private utility locator used and electrical line was de-energized during assessment work.
EM 31 Geophysics Complete?	Yes – down-gradient of TP towards Flat River.
Number of test pits advanced	11
Number of boreholes advanced	3
Number of hand auger locations advanced	0
Number of soil samples submitted for laboratory chemical analysis	20
Number of boreholes completed as monitoring wells	1
Number of existing monitoring wells	7 total: 3 within TP1 (TC-1, TC-5 and TC-11), 4 down-gradient (RMW series – 4, 5, 8 and 9)
Number of groundwater samples collected	5 (2017), 5 (2018)
Number of sediment and surface water samples collected	N/A
Geophysics (EM 31 Apparent Terrain Conductivity) Findings	
<ul style="list-style-type: none"> ▪ As indicated on Figure A1-3 survey was completed along the base of TP1 between the toe of tailings dams and the edge of Flat River. ▪ Background apparent terrain conductivity values for area are generally between 10 to 30 mS/m; represented by cool colours on Figure A1-3. ▪ Areas of higher than background apparent terrain conductivity values are observed and are indicated by the hot colours shown on figure. ▪ An area of anomalously high apparent terrain conductivities with values ranging from 100 to 200 mS/m is seen 15 m south of Hand Auger hole 17A19HA7; in the area of the Flat River tailings. ▪ Areas with higher apparent terrain conductivities could indicate soils affected by leaching tailings or buried metals. 	

AEC 1: Lower Boneyard

Soil Investigation and Conditions						
Maximum Depth of Investigation	22.85 mbgs (September 21, 2017)					
Stratigraphy						
Description	Depth from (mbgs)	Depth to (mbgs)	Observations			
Sand, gravelly, trace silt	0	1.0 to 1.5	Fill soil containing wood, metal, and plastic debris			
Sand	1.0 to 1.5	11	Mine Tailings. Wood waste observed between approximately 10.8 and 11.0 mbgs			
Silt, sand, and gravel layers	11	22.85	Native Soil			
Combustible Vapour Concentrations (CVC)						
Ranged from less than instrument detection limit to 280.5 ppm in soil sample 17A1TP5-2.						
Groundwater Conditions						
Depth to Groundwater	17.89 mbgs (October 1, 2017), 17.37 mbgs (June 29, 2018)					
Free Product	PHC free product not observed during fall 2017 and summer 2018 assessments.					
2017/2018 Environmental Site Assessment Summary						
<ul style="list-style-type: none"> ▪ Figure A1-1 shows borehole, monitoring well, and test pit locations as well as soils results and exceedances. ▪ Figure A1-2 provides groundwater exceedances. ▪ Table A1-1 summarizes soil chemical results relative to guidelines. ▪ Table A1-2 summarizes groundwater chemical results relative to guidelines. 						
General Site Observations						
<ul style="list-style-type: none"> ▪ Much of scrap metal has been sorted and salvaged in 2017, however, some scrap metals piles remained at time of assessment. ▪ Vehicles stored at site were observed to have drip trays beneath engines. ▪ Hazardous waste storage drums were observed in seacans at time of assessment. ▪ No surface stains were observed surrounding hazardous waste seacans. 						
Soil: Petroleum Hydrocarbons (PHCs, PAHs)						
2017						
<ul style="list-style-type: none"> ▪ Laboratory chemical results less than guidelines with exception of: <ul style="list-style-type: none"> – The duplicate sample of sample 17A1TP1-1 at a depth of 0.25 mbg (17A1Dup1) contained PHCs greater than guidelines. – Sample 17A1TP5-2 at a depth of 1.0 mbgs contained PHCs greater than guidelines. – Sample 17A1TP8-1 at a depth of 1.5 mbgs contained PAH (naphthalene) marginally greater than the guidelines. 						
Soil: Metals						
2017						
<ul style="list-style-type: none"> ▪ Various metals exceeding CCME CEQGs including arsenic, barium, beryllium, cadmium, cobalt, copper, molybdenum, nickel, selenium, thallium, tin, vanadium, and zinc. ▪ Copper exceeded CCME CEQGs in all samples collected at AEC. ▪ The following metals also exceeded proposed background concentrations: <ul style="list-style-type: none"> – Barium (17A1TP6 at 1.1 mbg). – Cadmium (17A1TP8 at 1.5 mbg). <p>Selenium (17A1BH1 at 4.0 mbg, 17A1BH2 at 1.5 mbg, 17A1BH3 at 1.5 and 2.5 mbgs, 17A1TP1 at 0.25 mbgs, 17A1TP10 at 1.2 mbgs, 17A1TP11 at 2.0 mbgs, 17A1TP5 at 4.0 mbgs, 17A1TP7 at 1.1 mbgs, 17A1TP8 at 1.5 mbgs, 17A1TP9 at 2.0 mbgs).</p>						

AEC 1: Lower Boneyard

Soil: Other PCOCs (Glycols, volatile organic compounds [VOCs], polychlorinated biphenyls [PCBs])

- Laboratory results less than detection limits and guidelines with exception of sample 17A1TP1-1 (PCB detection limits greater than guidelines due to matrix interference from elevated PHCs).

Soil: Routine (pH)

- Laboratory results within guidelines with exception of:
 - Sample 17A1BH1-2 at a depth of 4.0 mbgs had a pH value outside guideline range.

Groundwater: Petroleum Hydrocarbons

2017/2018

- All PHC concentrations less than guidelines.

Groundwater: Metals/Routine Parameters

2017

- Laboratory results less than guidelines with exception of:
 - Dissolved fluoride and sulphate - exceed guidelines in all MWs except RMW5; fluoride was also above preliminary background at RMW4, and sulphate above preliminary background at RMW4, 5, 8 and 9.
 - Dissolved cadmium – exceed guidelines in all MWs except at RMW4; cadmium was above preliminary background at RMW8 and 9.
 - Dissolved iron – exceed guideline at RMW4.
 - Dissolved zinc – exceed guideline in RMW8 and RMW9.

2018

- Laboratory results less than guidelines with exception of:
 - pH was slightly outside of guidelines in RMW4 (less than).
 - Total Dissolved Solids (TDS) slightly exceeded guidelines in RMW9.
 - Fluoride exceeded guidelines in RMW4 and RMW9.
 - Sulphate exceeded guidelines and preliminary background at all wells.
 - Cadmium exceeded guidelines in RMW8 and RMW 9, and preliminary background at 17A1MW1, RMW5, RMW8, and RMW9.
 - Copper exceeded guidelines at RMW5.
 - Iron and manganese exceeded guidelines at RMW4.
 - Zinc exceeded guidelines at RMW8.

Groundwater: Other PCOCs (glycols, PCBs, pesticides, and VOCs)

- Laboratory results less than guidelines with exception of:
 - Detection limits for several pesticide and VOC parameters in several samples was greater than guidelines due to matrix interferences.

Environmental Concerns

Location in AEC	Potential Source(s)	Identified Contaminated Media	Parameters Assessed and Contaminant(s) of Concern (COCs; bold & underline)
Surface of whole area	Leaks, spills from spent equipment storage, scrap metal oxidation and leaching, releases of hazardous waste	Soil; groundwater	Soil: <u>Metals</u> , <u>PHCs</u> , glycols, <u>PAHs</u> , VOCs, PCBs Groundwater: <u>dissolved metals</u> , <u>routine parameters</u> , PHCs, glycols, PAHs, VOCs, PCBs, pesticides

Discussion (Significance of the Results)

Soils:

Results for AEC 1 and current hazardous waste storage Area (AEC 39; located adjacent west), show two PHC affected areas:

- On northwest portion of AEC 1 (including both AEC 1 and AEC 39); and

AEC 1: Lower Boneyard

- On southeast portion of AEC 1.
- PHCs and PAHs impacts measured in southeastern affected area have been vertically delineated to maximum depth of 4.0 mbgs.
- PHC impacts at test pit 17A1TP1 located in northwestern affected area have not been vertically delineated.
- PHCs and PAHs impacts have been horizontally delineated, with exception of impacts measured at 17A1TP1 that has not been delineated to northwest.
- Maximum estimated depth of PHC and PAH impacts used to calculate contaminated soil volumes in southeastern affected area is 4.0 mbgs. Maximum estimated depth of PHC and PAH impacts used to calculate contaminated soil volumes in northwestern affected area is 2.0 mbgs.
- There are exceedances of various metals CCME and CEQG guidelines within cover, and also within tailings (as expected); several metals also exceed preliminary background concentrations.
- Glycols, PCBs, and VOCs not detected and no longer considered PCOCs in soil at AECs 1 and 39.
- Based on PCBs results from other samples (i.e., less than detection limit and less than guideline), elevated detection limit for PCBs in sample 17A1TP1-1 is not considered a concern.

Groundwater:

2017

- 17A1MW1 installed immediately below tailings pond and AEC 1; RMW monitoring well series located down-gradient from area in receiving environment. Based on logs and groundwater elevations, we infer that 17A1MW1 is completed in same hydrostratigraphic unit as RMW series wells.
- Metals and routine parameters exceeding guidelines include: fluoride, sulphate, cadmium, and zinc; however, at several locations they were below preliminary background concentrations.
- These parameter concentrations and also dissolved iron generally lower at 17A1MW1 than in down-gradient RMW series wells. RMW series wells may also be influenced by Flat River Tailings.
- PHCs detected at RMW9 only, but less than guidelines.

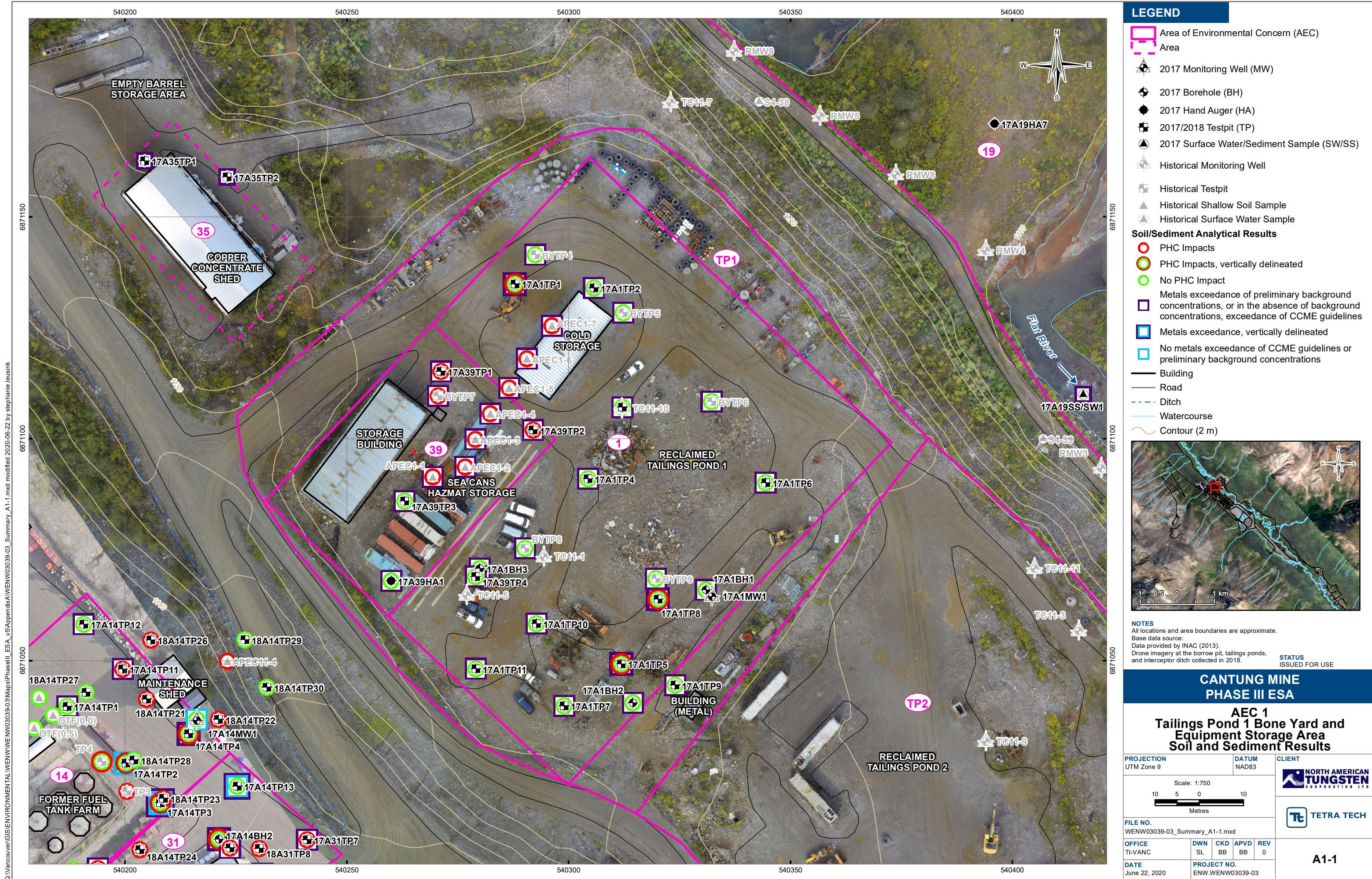
Glycols, pesticides, PAHs, PCBs and VOCs concentrations less than laboratory detection limits and/or guidelines and are no longer PCOCs in groundwater at AEC1.

2018

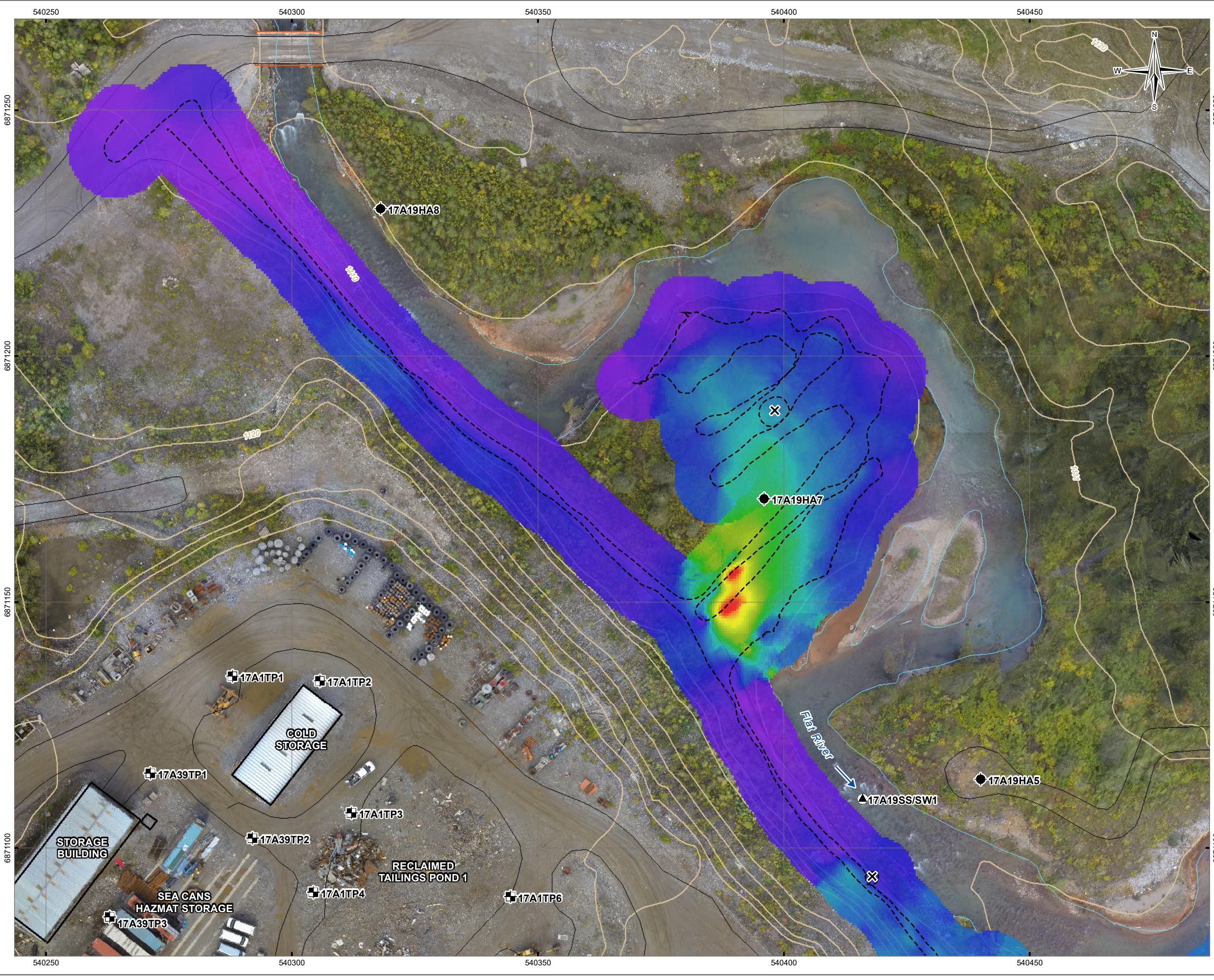
- Metals and routine parameters exceeding guidelines include: pH, TDS, fluoride, sulphate, cadmium, copper, manganese, and zinc; however, at all locations they were below preliminary background concentrations (with the exception of cadmium, which was above preliminary guidelines in 4 out of 5 samples.).
- RMW series wells may be influenced by Flat River Tailings.

Attachments

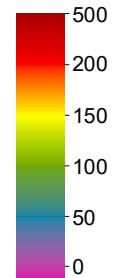
- Figure A1-1 – Soil and Sediment Results
- Figure A1-2 – Groundwater and Surface Water Results
- Figure A1-3 – Geophysics Results
- Table A1-1 – Soil Analytical Results
- Table A1-2 – Groundwater Analytical Results
- Borehole, Monitoring Well, and Test pit Logs
- Photographs





**LEGEND**

- Survey Track
- X Surface Metal
- 2017 Hand Auger (HA)
- 2017/2018 Testpit (TP)
- ▲ 2017 Surface Water/Sediment Sample (SW/SS)
- Building
- Road
- Bridge
- Watercourse
- Contour (2 m)

Apparent Terrain Conductivity (mS/m)

NOTES
All locations and area boundaries are approximate.
EM31 S/N: 8411031 | Data collected: September 8, 2017.
Base data source:
Data provided by INAC (2013).
Drone imagery at the borrow pit, tailings ponds, and interceptor ditch collected in 2018.

STATUS
ISSUED FOR USE

CANTUNG MINE PHASE III ESA

AEC 1 Tailings Pond 1 Bone Yard and Equipment Storage Area EM31 Apparent Terrain Conductivity Survey

PROJECTION	DATUM	CLIENT
UTM Zone 9	NAD83	NORTH AMERICAN TUNGSTEN CORPORATION LTD
<hr/>		
Scale: 1:750		
10	5	0
<hr/>		
Metres		
<hr/>		
FILE NO.	DWN CKD APVD REV	
WENW03039-03_Summary_A1-3.mxd	SL DSM SS 0	
OFFICE		
T-VANC		
DATE	PROJECT NO.	
June 22, 2020	ENW.WENW03039-03	

A1-3

Table A1-1: Soil Analytical Results

Parameter	Unit	Most Stringent of Referenced Guidelines ^{1,2,3}	Preliminary Background Concentration ⁴	A1												
				17A1BH1		17A1BH2		17A1BH3		17A1TP1		17A1TP10				
				17A1BH1-1	17A1BH1-2	17A1BH2-1	17A1BH2-2	17A1BH3-1	17A1BH3-2	17A1TP1-1	17A1TP1-2	17A1TP10-1	17A1TP10-2			
				1.15 m	4.0 m	1.5 m	1.5 m	2.5 m	0.25 m	1.0 m	1.2 m	2.0 m	2.0 m			
2017-09-21 2017-09-21 2017-09-26 2017-09-26 2017-09-17 2017-09-17 2017-09-17 2017-09-17																
Cyanide																
Cyanide (SAD)	mg/kg	NG	NG	-	-	-	-	-	-	-	-	-	-			
Cyanide (WAD)	mg/kg	0.9	NG	-	-	-	-	-	-	-	-	-	-			
Routine / Salinity																
pH	pH Units	6-8	NG	7.73	8.22	7.5	7.26	7.48	7.37	-	7.47	-	7.32			
Moisture	%	NG	NG	12	5.88	6.88	10.7	15.3	3.8	12.9	8.51	-	6.01			
Metals																
Antimony	mg/kg	20	NG	1.1	0.3	0.2	0.4	0.4	0.6	-	0.5	-	0.4			
Arsenic	mg/kg	12	64	1	4	3.8	8.9	5.4	7.3	-	11.4	-	8.3			
Barium	mg/kg	500	946	208	26.4	14.2	50.5	45	242	-	64.3	-	28.1			
Beryllium	mg/kg	4	NG	1.4	3.5	3	1.3	3.1	1.7	-	2	-	4.1			
Cadmium	mg/kg	1.4	2.8	0.92	0.53	0.35	1.94	2.29	2.52	-	2.12	-	1.17			
Chromium	mg/kg	64	NG	45	14	12	10	14	17	-	13	-	17			
Cobalt	mg/kg	40	NG	20.9	22.6	13.1	43.1	21.2	13.1	-	49.8	-	38.4			
Copper	mg/kg	63	NG	81.7	1740	1340	3480	2910	575	-	2840	-	2550			
Lead	mg/kg	70	NG	25.2	3.2	2.4	4.4	6.7	26.2	-	5.4	-	4.5			
Mercury	mg/kg	6.6	NG	0.09	0.04	0.74	2.15	2.89	<0.01	-	0.57	-	0.18			
Molybdenum	mg/kg	5	10	5.6	1.2	0.6	1.5	2.5	3.1	-	4.5	-	2.1			
Nickel	mg/kg	45	72	42.6	10.3	9.5	8.2	9	14.2	-	8.8	-	16			
Selenium	mg/kg	1	1.7	1.5	4.3	2.5	6	4.6	2	-	6.9	-	6.3			
Silver	mg/kg	20	NG	<0.5	1.2	0.7	1.8	1.6	<0.5	-	2.1	-	2.2			
Thallium	mg/kg	1	NG	0.5	0.3	0.2	1.1	0.5	0.5	-	1.2	-	0.3			
Tin	mg/kg	5	NG	2.8	7.5	3.9	8.8	8.2	5.8	-	10.4	-	6.6			
Uranium	mg/kg	23	NG	2.9	1.9	1.1	2.8	2.1	3.5	-	3.4	-	1.8			
Vanadium	mg/kg	130	160	143	14	12	19	14	29	-	21	-	15			
Zinc	mg/kg	200	462	109	96	67	269	258	248	-	257	-	163			
Particle Size																
>75 µm	%	NG	NG	-	-	-	-	-	-	-	-	-	-			
Grain Size	N/A	NG	NG	-	-	-	-	-	-	-	-	-	-			
Petroleum Hydrocarbons																
Benzene	mg/kg	0.03	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005			
Toluene	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Ethylbenzene	mg/kg	0.082	NG	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			
Xylenes (m & p)	mg/kg	NG	NG	-	-	-	-	-	-	-	-	-	-			
Xylene (m)	mg/kg	NG	NG	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			
Xylene (o)	mg/kg	NG	NG	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			
Xylenes Total	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Volatile Hydrocarbons (VH6-10)	mg/kg	NG	NG	-	-	-	-	-	-	-	-	-	-			
F1 (C6-C10)	mg/kg	30	NG	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10			
VPH C6-C10	mg/kg	NG	NG	-	-	-	-	-	-	-	-	-	-			
F1 (C6-C10 / BTEX CORRECTED)	mg/kg	30	NG	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10			
F2 (C10-C16)	mg/kg	150	NG	<20	<20	<20	<20	94	33	<20	<20	38	<20			
F3 (C16-C34)	mg/kg	300	NG	<20	<20	<20	<20	58	107	229	<20	76	<20			
F4: (C34-C50)	mg/kg	2800	NG	<20	<20	<20	<20	20	76	<20	20	<20	<20			
VPHs	mg/kg	NG	NG	-	-	-	-	-	-	-	-	-	-			
Glycols																
Diethylene glycol	mg/kg	NG	NG	<10	<10	-	-	-	<10	-	<10	-	<10			
Ethylene glycol	mg/kg	960	NG	<10	<10	-	-	-	<10	-	<10	-	<10			
Propylene glycol	mg/kg	NG	NG	<10	<10	-	-	-	<10	-	<10	-	<10			
Tetraethylene Glycol	mg/kg	NG	NG	<10	<10	-	-	-	<10	-	<10	-	<10			
Triethylene Glycol	mg/kg	NG	NG	<10	<10	-	-	-	<10	-	<10	-	<10			
Polycyclic Aromatic Hydrocarbons (PAHs)																
ACR (CCME)	mg/kg	1	NG	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6			
B(a)P Total Potency Equivalent	mg/kg	0.6	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
2-methylnaphthalene	mg/kg	NG	NG	<0.005	<0.005	<0.005	<0.005	0								

Table A1-1: Soil Analytical Results

Parameter	Unit	Most Stringent of Referenced Guidelines ^{1,2,3}	Preliminary Background Concentration ⁴	A1																			
				17A1TP2		17A1TP3		17A1TP4		17A1TP5		17A1TP6		17A1TP7		17A1TP8		17A1TP9					
				17A1TP2-1	17A1TP3-1	17A1TP4-1	17A1TP5-2	17A1TP5-3	17A1TP6-2	17A1TP7-1	17A1TP8-1	17A1TP8-3	17A1TP9-1	0.2 m	0.25 m	0.2 m	1.0 m	4.0 m	1.1 m	1.1 m	1.5 m	2.8 m	2.0 m
				2017-09-17	2017-09-17	2017-09-17	2017-09-17	2017-09-17	2017-09-17	2017-09-17	2017-09-17	2017-09-17	2017-09-17	2017-09-17	2017-09-17	2017-09-17	2017-09-17	2017-09-17	2017-09-17	2017-09-17	2017-09-17	2017-09-17	
Cyanide																							
Cyanide (SAD)	mg/kg	NG	NG	-	-	-	<10	<0.5	-	-	-	-	-	<5	-	-	-	-	-	-	-		
Cyanide (WAD)	mg/kg	0.9	NG	-	-	-	<10	<0.5	-	-	-	-	-	<5	-	-	-	-	-	-	-		
Routine / Salinity																							
pH	pH Units	6-8	NG	7.86	7.8	7.8	7.72	7.67	7.8	7.08	7.59	-	-	-	-	-	-	-	6.83	-	-		
Moisture	%	NG	NG	10.6	5.01	5.88	9.24	5.84	14.2	6.8	12.4	13.7	3.6	-	-	-	-	-	-	-	-	-	
Metals																							
Antimony	mg/kg	20	NG	0.8	0.3	0.5	1.1	0.2	1.5	0.2	0.3	-	-	0.2	-	-	-	-	-	-	-	-	
Arsenic	mg/kg	12	64	33	9.4	7.1	35.1	7.5	40.8	3.5	3.2	-	-	-	3.1	-	-	-	-	-	-	-	
Barium	mg/kg	500	946	271	95.9	152	304	23.3	1820	19	74.1	-	-	-	14.5	-	-	-	-	-	-	-	
Beryllium	mg/kg	4	NG	1.1	1.4	1.3	1.6	3.1	1.5	4.1	1.9	-	-	-	3.9	-	-	-	-	-	-	-	
Cadmium	mg/kg	1.4	2.8	1.01	1.96	1.85	1.12	0.85	1.19	0.55	7.72	-	-	-	0.49	-	-	-	-	-	-	-	
Chromium	mg/kg	64	NG	29	13	13	39	10	51	15	16	-	-	-	12	-	-	-	-	-	-	-	
Cobalt	mg/kg	40	NG	15.8	9.8	10	18.4	27.2	19	25.4	28.7	-	-	-	20.7	-	-	-	-	-	-	-	
Copper	mg/kg	63	NG	177	235	323	394	1380	86	1320	1960	-	-	-	1530	-	-	-	-	-	-	-	
Lead	mg/kg	70	NG	28.2	17.7	21.2	29.4	3.4	31.2	2.8	4.5	-	-	-	2.7	-	-	-	-	-	-	-	
Mercury	mg/kg	6.6	NG	0.21	0.48	0.03	0.6	0.06	0.16	0.17	1.86	-	-	-	0.09	-	-	-	-	-	-	-	
Molybdenum	mg/kg	5	10	7.2	2.7	3.8	8.9	1.1	5.6	1.4	1.7	-	-	-	1	-	-	-	-	-	-	-	
Nickel	mg/kg	45	72	30.6	11.5	12.4	40.9	9.8	52	12.6	7	-	-	-	9.3	-	-	-	-	-	-	-	
Selenium	mg/kg	1	1.7	1	1.2	1.7	1.6	5.2	1.4	4.4	3.8	-	-	-	4	-	-	-	-	-	-	-	
Silver	mg/kg	20	NG	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	1.1	-	-	-	0.9	-	-	-	-	-	-	-	
Thallium	mg/kg	1	NG	0.3	0.3	0.4	0.5	0.2	0.6	0.2	0.2	-	-	-	0.2	-	-	-	-	-	-	-	
Tin	mg/kg	5	NG	1.7	4	4	2.9	4.5	2.1	5.1	11.1	-	-	-	4.4	-	-	-	-	-	-	-	
Uranium	mg/kg	23	NG	1.6	3.6	3.3	2.4	1.4	3.3	1.3	3.6	-	-	-	1.1	-	-	-	-	-	-	-	
Vanadium	mg/kg	130	160	46	25	29	111	11	146	14	26	-	-	-	10	-	-	-	-	-	-	-	
Zinc	mg/kg	200	462	127	227	537	153	136	171	99	652	-	-	-	87	-	-	-	-	-	-	-	
Particle Size																							
>75 µm	%	NG	NG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Grain Size	N/A	NG	NG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Petroleum Hydrocarbons																							
Benzene	mg/kg	0.03	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Toluene	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Ethylbenzene	mg/kg	0.082	NG	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Xylenes (m & p)	mg/kg	NG	NG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Xylene (m)	mg/kg	NG	NG	<0.02	<0.02	<0.02	<0.02	<0.05 - 0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		
Xylene (o)	mg/kg	NG	NG	<0.02	<0.02	<0.02	<0.02	<0.05 - 0.07	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		
Xylenes Total	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	<0.05</											

Table A1-2: Groundwater Analytical Results

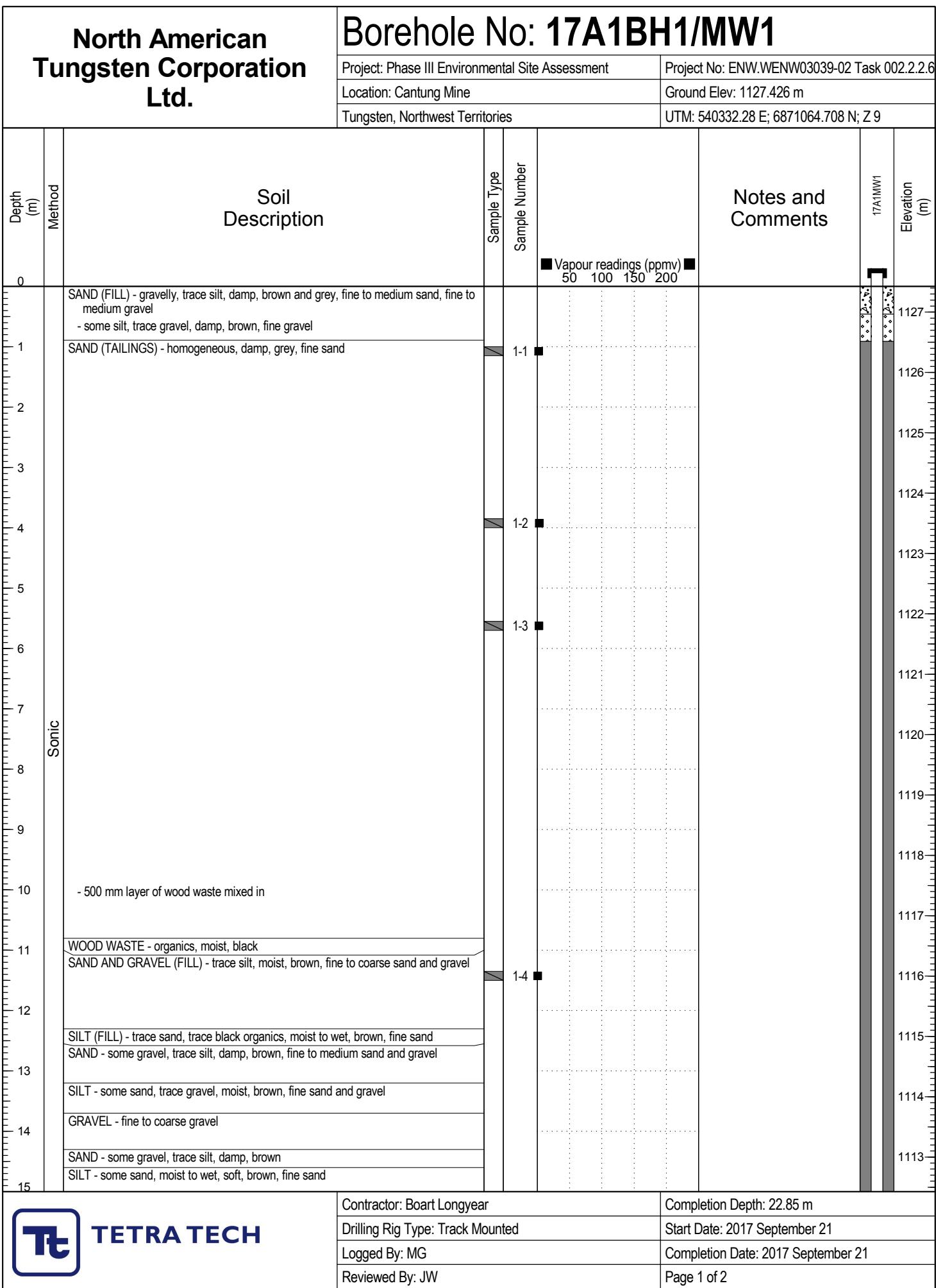
Parameter	Unit	AEC 1											
		17A1MW1			RMW4			RMW5		RMW8		RMW9	
		Field ID	17A1MW1	17Duplicate1	17A1MW1	RMW4	RMW4	RMW5	RMW5	RMW8	RMW8	RMW9	RMW9
		Sample Date	1-Oct-2017	1-Oct-2017	29-Jun-2018	3-Oct-2017	29-Jun-2018	4-Oct-2017	28-Jun-2018	3-Oct-2017	28-Jun-2018	4-Oct-2017	28-Jun-2018
		Laboratory Report Number	17Y269471	17Y269471	18Y358442	17Y268688	18Y358442	17V270219	18V357100	17Y268688	18V357100	17V270219	18V357100
		Laboratory Sample ID	8797131	8797141	9378825	8791179	9378820	8804726	9370715	8791183	9370747	8804732	9370748
		Preliminary Background Concentrations											
Field Parameters													
Field Temperature	°C	-	-	-	2.9	-	3.1	4.7	4.0	4.0	5.2	3.9	3.0
Field pH	pH Units	6.5-9	6.5-9	-	7.39	-	6.93	6.56	6.77	6.74	6.9	6.72	6.90
Field Conductivity	µS/cm	-	-	-	731	-	904	715	1285	997	1050	1120	1450
Routine													
pH	pH Units	6.5-9	6.5-9	-	7.7	7.81	7.22	6.95	6.18	7.67	7.25	7.56	7.16
Electrical Conductivity (EC)	µS/cm	-	-	-	780	781	923	817	1310	1070	991	1270	1510
Total Dissolved Solids (TDS)	mg/L	3000	-	-	502	492	630	628	1020	795	735	990	1220
Hardness as CaCO ₃	mg/L	-	-	-	415	409	509	422	497	560	484	727	946
Alkalinity (total as CaCO ₃)	mg/L	-	-	-	210	212	233	111	98	205	211	265	317
Bromide	mg/L	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05
Chloride	mg/L	100	120	-	2.05	2.08	2.35	2.6	1.86	3.81	1.74	4.95	5.1
Fluoride	mg/L	0.12	0.12	0.39	0.13	0.14	0.1	0.64	0.65	0.11	0.08	0.12	0.25
Sulphate	mg/L	100	100	182	218	221	312	340	752	428	358	511	625
Nutrients													
Ammonia	mg/L	0.021-231 ²	0.021-231 ²	-	-	-	<0.01	-	0.42	-	<0.01	-	<0.01
Nitrate (as NO ₃ -N)	mg/L	13	13	-	0.352	0.358	0.806	0.008	0.005	1.46	1.14	1.01	1.05
Nitrite (as NO ₂ -N)	mg/L	0.06	0.06	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006
Nitrogen (Total)	mg/L	-	-	-	-	-	0.79	-	0.53	-	1.36	-	1.16
Cyanide													
Cyanide (SAD)	mg/L	-	-	-	0.013	0.012	0.011	0.003	<0.002	<0.002	<0.002	0.008	0.006
Cyanide (WAD)	mg/L	-	-	-	<0.002	0.004	-	0.003	-	<0.002	-	0.002	-
Dissolved Metals													
Aluminum	mg/L	0.005 / 0.1 ³	0.005 / 0.1 ³	-	<0.002	<0.002	<0.002	0.006	<0.002	0.023	<0.002	0.014	<0.002
Antimony	mg/L	2	2	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Arsenic	mg/L	0.005	0.005	-	0.0002	0.0002	0.0003	0.0003	0.0002	0.0002	0.0003	0.0003	0.0003
Barium	mg/L	0.5	0.5	-	0.0401	0.046	0.0559	0.0232	0.0178	0.0153	0.0244	0.0265	0.0332
Beryllium	mg/L	0.0053	0.0053	-	<0.0001	<0.0001	<0.0001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Boron	mg/L	0.5	1.5	-	0.015	0.018	0.017	0.016	0.011	0.016	0.013	0.024	0.012
Cadmium	mg/L	0.00012	0.00012	0.000047	0.00007	0.00007	0.00006	<0.00001	<0.00001	0.00002	0.00007	0.00044	0.00042
Calcium	mg/L	-	-	-	120	118	147	123	147	143	133	190	260
Chromium	mg/L	0.0089	0.0089	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	0.05	-	-	0.00034	0.00036	0.0001	<0.0005	<0.0005	0.00007	<0.0005	0.0001	0.00011
Copper	mg/L	0.002	0.002	-	0.0006	0.0009	0.002	0.0006	<0.0002	0.0021	0.003	0.0007	0.0029
Iron	mg/L	0.3	0.3	-	<0.01	<0.01	0.043	37.7	17.3	0.014	0.024	0.077	<0.01
Lead	mg/L	0.001-0.002 ⁴	0.001-0.002 ⁴	-	<0.00005	0.00006	<0.00005	<0.00005	<0.00005	0.00012	<0.00005	<0.00005	<0.00005
Lithium	mg/L	-	-	-	0.0137	0.0154	0.0163	0.0093	0.0078	0.004	0.0051	0.0133	0.0171
Magnesium	mg/L	-	-	-	27.9	27.7	34.4	28	31.6	49.3	37	61.3	72.1
Manganese	mg/L	0.2	-	-	0.045	0.045	<0.01	1.07	1.1	0.002	0.007	0.006	0.014
Mercury	mg/L	0.000016	0.000016	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Molybdenum	mg/L	0.073	0.073	-	0.00033	0.00042	0.0003	0.00036	0.00048	0.00069	0.00075	0.00046	0.00056
Nickel	mg/L	0.025-0.083 ⁴	0.025-0.083 ⁴	-	0.0009	0.0009	0.0007	<0.0002	0.0006	0.0006	0.0015	0.0016	0.0013
Potassium	mg/L	-	-	-	1.86	1.89	2.09	1.95	2.44	2.38	2.36	3.88	3.34
Selenium	mg/L	0.001	0.001	-	<0.005	<0.005	<0.005	<0.005	<0.005	0.0006	0.0006	<0.005	<0.006
Silver	mg/L	0.00025	0.00025	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Sodium	mg/L	-	-	-	2.95	3	4.03	4.04	4.63	4.08	4.45	5.9	6.45
Strontrium	mg/L	-	-	-	-	-	0.189	-	0.164	-	0.143	-	0.341
Thallium	mg/L	0.0008	0.0008	-	0.00003	<0.00001	<0.00001	<0.00001	0.00002	<0.00001</			

Table A1-2: Groundwater Analytical Results

Parameter	Unit	AEC 1															
		17A1MW1			RMW4			RMW5		RMW8		RMW9					
		Field ID	17A1MW1	17Duplicate1	17A1MW1	RMW4	RMW4	RMW5	RMW5	RMW8	RMW8	RMW9	RMW9				
		Sample Date	1-Oct-2017	1-Oct-2017	29-Jun-2018	3-Oct-2017	29-Jun-2018	4-Oct-2017	28-Jun-2018	3-Oct-2017	28-Jun-2018	4-Oct-2017	28-Jun-2018				
		Laboratory Report Number	17Y269471	17Y269471	18Y358442	17Y268688	18Y358442	17V270219	18V357100	17Y268688	18V357100	17V270219	18V357100				
		Laboratory Sample ID	8797131	8797141	9378825	8791179	9378820	8804726	9370715	8791183	9370747	8804732	9370748				
		Preliminary Background Concentrations	Agricultural	Res / Park													
Hydrocarbons																	
Benzene	mg/L	0.088	0.14	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Toluene	mg/L	0.083	0.083	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Ethylbenzene	mg/L	3.2	11	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Xylene (m)	mg/L	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Xylene (o)	mg/L	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Xylenes Total	mg/L	3.9	3.9	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Styrene	mg/L	0.072	0.072	-	<0.0005	<0.0005	-	-	-	-	-	-	-	-	<0.0005	-	-
F1 (C ₆ -C ₁₀)	mg/L	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
F1 (C ₆ -C ₁₀) - BTEX	mg/L	0.81	0.81	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
F2 (C ₁₀ -C ₁₆)	mg/L	1.3	1.3	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
F3 (C ₁₆ -C ₃₄)	mg/L	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.32	<0.1	-
F4 (C ₃₄ -C ₆₀)	mg/L	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.13	<0.1	-	-
VH ₆₋₁₀	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-
VPH	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-
Glycols																	
Diethylene glycol	mg/L	-	-	-	<5	<5	-	<5	-	<5	-	<5	-	-	-	-	-
Ethylene glycol	mg/L	190	190	-	<10	<10	-	<10	-	<10	-	<10	-	-	-	-	-
Propylene glycol	mg/L	500	500	-	<10	<10	-	<10	-	<10	-	<10	-	-	-	-	-
Tetraethylene Glycol	mg/L	-	-	-	<10	<10	-	<10	-	<10	-	<10	-	-	-	-	-
Triethylene Glycol	mg/L	-	-	-	<10	<10	-	<10	-	<10	-	<10	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons (PAHs)																	
Acenaphthene	mg/L	0.0058	0.0058	-	<0.00002	<0.00002	-	<0.00002	-	<0.00002	<0.00002	<0.00002	-	<0.00002	<0.00002	-	-
Acenaphthylene	mg/L	0.046	0.046	-	<0.00002	<0.00002	-	<0.00002	-	<0.00002	<0.00002	<0.00002	-	<0.00002	<0.00002	-	-
Acridine	mg/L	0.00005	0.00005	-	<0.00005	<0.00005	-	<0.00005	-	<0.00005	<0.00005	<0.00005	-	<0.00005	<0.00005	-	-
Anthracene	mg/L	0.000012	0.000012	-	<0.00001	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	-
Benz(a)anthracene	mg/L	0.000018	0.000018	-	<0.00001	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	-
Benz(a)pyrene	mg/L	0.00001	0.00001	-	<0.00001	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	-
Benz(b)fluoranthene	mg/L	-	-	-	<0.00001	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	-
Benz(b+j)fluoranthene	mg/L	0.00048	0.00048	-	<0.00001	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	-
Benz(g,h,i)perylene	mg/L	0.00017	0.00017	-	<0.00001	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	-
Benz(i)fluoranthene	mg/L	-	-	-	<0.00001	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	-
Benz(k)fluoranthene	mg/L	0.00048	0.00048	-	<0.00001	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	-
Chrysene	mg/L	0.0001	0.0001	-	<0.00001	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	-
Dibenz(a,h)anthracene	mg/L	0.00026	0.00026	-	<0.00001	<0.00001	-	<0.00001	-	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	-
Fluoranthene	mg/L	0.00004	0.00004	-	<0.00002	<0.00002	-	<0.00002	-	<0.00002	<0.00002	<0.00002	-	<0.00002	<0.00002	-</	

Table A1-2: Groundwater Analytical Results

Parameter	Unit	Federal Interim Guideline ¹	Preliminary Background Concentrations	AEC 1											
				17A1MW1			RMW4		RMW5		RMW8		RMW9		
		Field ID	Sample Date	17A1MW1	17Duplicate1	17A1MW1	RMW4	RMW4	RMW5	RMW5	RMW8	RMW8	RMW9	RMW9	
		Laboratory Report Number	Laboratory Sample ID	17Y269471	17Y269471	18Y358442	17Y268688	18Y358442	17V270219	18V357100	17Y268688	18V357100	17V270219	18V357100	
				8797131	8797141	9378825	8791179	9378820	8804726	9370715	8791183	9370747	8804732	9370748	
Volatile Organic Compounds (VOCs)															
Acetone	mg/L	13	13	-	<0.01	<0.01	<0.01	-	-	-	-	-	-	0.015	-
Bromodichloromethane	mg/L	8.5	8.5	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
Bromoform	mg/L	0.38	0.38	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
Bromomethane	mg/L	0.0056	0.0056	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
2-Butanone (MEK)	mg/L	150	150	-	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	-
Carbon tetrachloride	mg/L	0.00056	0.00056	-	<0.0005	<0.0005	<0.0005	-	-	-	-	-	-	<0.0005	-
Chlorobenzene	mg/L	0.0013	0.0013	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
Chloroethane	mg/L	-	-	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
Chloroform	mg/L	0.0018	0.0018	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
Chloromethane	mg/L	-	-	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
Dibromochloromethane	mg/L	0.1	1.1	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
1,2-Dibromoethane	mg/L	0.00025	0.00025	-	<u><0.0003</u>	<u><0.0003</u>	<u><0.0003</u>	-	-	-	-	-	-	<u><0.0003</u>	-
1,2-Dichlorobenzene	mg/L	0.0007	0.0007	-	<0.0005	<0.0005	<0.0005	-	-	-	-	-	-	<0.0005	-
1,3-Dichlorobenzene	mg/L	0.042	0.042	-	<0.0005	<0.0005	<0.0005	-	-	-	-	-	-	<0.0005	-
1,4-Dichlorobenzene	mg/L	0.026	0.026	-	<0.0005	<0.0005	<0.0005	-	-	-	-	-	-	<0.0005	-
1,1-Dichloroethane	mg/L	0.32	0.32	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
1,2-Dichloroethane	mg/L	0.005	0.01	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
1,1-Dichloroethene	mg/L	0.039	0.039	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
1,2-Dichloroethene (cis)	mg/L	0.0016	0.0016	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
1,2-Dichloroethene (trans)	mg/L	0.0016	0.0016	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
1,2-Dichloropropane	mg/L	0.016	0.016	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
1,3-Dichloropropene [cis]	mg/L	-	-	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
1,3-Dichloropropene [trans]	mg/L	-	-	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
Hexachlorobenzene	mg/L	0.00052	0.0012	-	-	-	-	<u><0.00001</u>	-	<u><0.00001</u>	-	<u><0.00001</u>	-	-	-
Hexachlorobutadiene	mg/L	0.0013	0.0013	-	-	-	-	<u><0.00001</u>	-	<u><0.00001</u>	-	<u><0.00001</u>	-	-	-
Hexachloroethane	mg/L	-	-	-	-	-	-	<u><0.00001</u>	-	<u><0.00001</u>	-	<u><0.00001</u>	-	-	-
Methyl t-Butyl Ether (MTBE)	mg/L	-	-	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
Methylene Chloride	mg/L	0.05	0.098	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
4-Methyl-2-pentanone (MIBK)	mg/L	58	58	-	<0.01	<0.01	<0.01	-	-	-	-	-	-	<0.01	-
1,1,1,2-Tetrachloroethane	mg/L	0.0033	0.0034	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
1,1,2,2-Tetrachloroethane	mg/L	0.0032	0.0032	-	<0.0008	<0.0008	<0.0008	-	-	-	-	-	-	<0.0008	-
Tetrachloroethene	mg/L	0.012	0.012	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
1,2,4-Trichlorobenzene	mg/L	0.0054	0.0054	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
1,1,1-Trichloroethane	mg/L	0.64	0.64	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
1,1,2-Trichloroethane	mg/L	0.0047	0.0047	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
Trichloroethene	mg/L	0.02	0.02	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
Trichlorofluoromethane	mg/L	-	-	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
Trihalomethanes	mg/L	-	-	-	<0.002	<0.002	<0.002	-	-	-	-	-	-	<0.002	-
Vinyl chloride	mg/L	0.0011	0.0011	-	<0.001	<0.001	<0.001	-	-	-	-	-	-	<0.001	-
Pesticides															
Aldrin	mg/L	0.003	0.003	-	-	-	-	<u><0.00001</u>	-	<u><0.00001</u>	-	<u><0.00001</u>	-	-	-
Chlordane	mg/L	0.015	0.015	-	-	-	-	<u><0.00004</u>	-	<u><0.00004</u>	-	<u><0.00004</u>	-	-	-
DDD-p,p'	mg/L	-	-	-	-	-	-	<u><0.00005</u>	-	<u><0.00005</u>	-	<u><0.00005</u>	-	-	-
DDE-o,p'	mg/L	-	-	-	-	-	-	<u><0.00001</u>	-	<u><0.00001</u>	-	<u><0.00001</u>	-	-	-
DDT-p,p'	mg/L	0.000001	0.000001	-	-	-	-	<u><0.00004</u>	-	<u><0.00004</u>	-	<u><0.00004</u>	-	-	-
Dielein	mg/L	0.000056	0.000056	-	-	-	-	<u><0.00002</u>	-	<u><0.00002</u>	-	<u><0.00002</u>	-	-	-
Endosulfan	mg/L	0.00002	0.00002	-	-	-	-</								



North American Tungsten Corporation Ltd.		Borehole No: 17A1BH1/MW1					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1127.426 m		
		Tungsten, Northwest Territories			UTM: 540332.28 E; 6871064.708 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Notes and Comments		17A1MW1 Elevation (m)
15					■ Vapour readings (ppmv) ■ 50 100 150 200		
16	Sonic	SAND AND GRAVEL - trace silt, moist, mottled black, brown and orange					1112
17		SILT - sandy, trace gravel, wet, brown, fine sand					1111
18		GRAVEL - some sandy, trace silt, moist, brown, fine to medium gravel, fine to coarse sand					1110
19		SILT - some sand, some gravel, moist, mottled					109
20		SAND AND GRAVEL - trace silt, moist to wet, mottled, fine to medium sand and gravel					109
21		SILT - sandy, some gravel, wet, brown - large gravel, occasional cobbles		1-5			1108
22		SAND - silty, trace gravel, wet, brown, fine to coarse sand, fine gravel					1107
23		END OF BOREHOLE (22.85 metres) slough - 22.56 metres at 0 hrs. water - 17.82 metres on October 1, 2017 Monitoring well installed to 22.56 metres					1106
24							1105
25							1104
26							1103
27							1102
28							1101
29							1100
30							1099
							1098
 TETRA TECH		Contractor: Boart Longyear			Completion Depth: 22.85 m		
		Drilling Rig Type: Track Mounted			Start Date: 2017 September 21		
		Logged By: MG			Completion Date: 2017 September 21		
		Reviewed By: JW			Page 2 of 2		

North American Tungsten Corporation Ltd.		Borehole No: 17A1BH2						
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6			
		Location: Cantung Mine			Ground Elev: 1127.503 m			
Tungsten, Northwest Territories		UTM: 540314.435 E; 6871040.538 N; Z 9						
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Notes and Comments		Backfill Elevation (m)	
0	Sonic	SAND (FILL) - gravelly, trace to some silt, trace cobbles, trace organics, damp, grey brown, medium sand			■ Vapour readings (ppmv) ■ 50 100 150 200			
1		SILT (TAILINGS) - sandy, trace clay, damp, soft, grey, moderate hydrocarbon odour		2-1			1127	
2		SAND (TAILINGS) - some silt, damp, soft, grey, slight hydrocarbon odour		2-2			1126	
3				2-3			1125	
4							1124	
5							1123	
6		END OF BOREHOLE (6.00 metres) Note: Backfilled at completion					1122	
7							1121	
8							1120	
9							1119	
10							1118	
11							1117	
12							1116	
13							1115	
14							1114	
15							1113	
 TETRA TECH		Contractor: Boart Longyear			Completion Depth: 6 m			
		Drilling Rig Type: Track Mounted			Start Date: 2017 September 26			
		Logged By: MH			Completion Date: 2017 September 26			
		Reviewed By: JW			Page 1 of 1			

North American Tungsten Corporation Ltd.		<h1>Borehole No: 17A1BH3</h1>					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1127.605 m		
		Tungsten, Northwest Territories			UTM: 540279.993 E; 6871070.821 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)	Notes and Comments	Backfill Elevation (m)
0					■ Vapour readings (ppmv) 50 100 150 200		
1	Sonic	SAND (FILL) - gravelly, some cobbles, trace silt, damp, grey brown, medium sand					1127
1		SAND (TAILINGS) - trace silt, trace gravel, damp, soft, red, fine to medium sand - grey		3-1	■		1126
2		SILT (TAILINGS) - sandy, wet, firm, grey		3-2	■		1125
3		SAND (TAILINGS) - trace to some silt, trace gravel, damp, soft, grey					1124
4		- brown for 600 mm					1123
5		SAND - gravelly, some gravel and cobbles, damp, whitish brown, pulverized rock		3-3	■		1122
6		END OF BOREHOLE (6.00 metres) Note: Backfilled at completion					1121
7							1120
8							1119
9							1118
10							1117
11							1116
12							1115
13							1114
14							1113
15							
 TETRA TECH		Contractor: Boart Longyear			Completion Depth: 6 m		
		Drilling Rig Type: Track Mounted			Start Date: 2017 September 26		
		Logged By: MH			Completion Date: 2017 September 26		
		Reviewed By: JW			Page 1 of 1		

North American Tungsten Corporation Ltd.		<h1>Testpit No: 17A1TP1</h1>					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1127.292 m		
		Tungsten, Northwest Territories			UTM: 540287.932 E; 6871134.912 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)	Notes and Comments	Backfill Elevation (m)
0		SAND (FILL) - some gravel, trace cobbles, trace silt, damp, loose, brown		1-1	■ 50 ■ 100 ■ 150 ■ 200		
1	Excavated	SAND - silty, some gravel, some cobbles, damp, dense, brown, wood and plastic debris		1-2			1127
1		END OF TESTPIT (1.30 metres) Note: Backfilled at completion					1126
2							1125
3							1124
4							1123
5							
 TETRA TECH		Contractor: NATC			Completion Depth: 1.3 m		
		Drilling Rig Type: Track Excavator			Start Date: 2017 September 17		
		Logged By: MH			Completion Date: 2017 September 17		
		Reviewed By: JW			Page 1 of 1		

North American Tungsten Corporation Ltd.		Testpit No: 17A1TP2					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1127.204 m		
Tungsten, Northwest Territories		UTM: 540305.713 E; 6871133.999 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Notes and Comments		Backfill (m)
0		SAND (FILL) - silty, some gravel, some cobbles, damp, soft, brown - trace to some boulders - gravelly, trace silt, trace cobbles, dense		■ Vapour readings (ppmv) 50 100 150 200	2-1		1127
1	Excavated	END OF TESTPIT (1.25 metres) Note: Backfilled at completion		■	2-2		1126
2							1125
3							1124
4							1123
5							
 TETRA TECH		Contractor: NATC			Completion Depth: 1.25 m		
		Drilling Rig Type: Track Excavator			Start Date: 2017 September 17		
		Logged By: MH			Completion Date: 2017 September 17		
		Reviewed By: JW			Page 1 of 1		

North American Tungsten Corporation Ltd.		<h1>Testpit No: 17A1TP3</h1>					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1127.325 m		
		Tungsten, Northwest Territories			UTM: 540312.128 E; 6871107.126 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)	Notes and Comments	Backfill Elevation (m)
0		SAND (FILL) - some gravel, trace cobbles, trace silt, damp, loose, brown, coarse sand - trace cobbles to cobble for 250 mm - silty, wood and plastic debris		3-1	■ 50 ■ 100 ■ 150 ■ 200		
1	Excavated	END OF TESTPIT (1.20 metres) Note: Backfilled at completion		3-2			1127
2							1126
3							1125
4							1124
5							1123
 TETRA TECH		Contractor: NATC			Completion Depth: 1.2 m		
		Drilling Rig Type: Track Excavator			Start Date: 2017 September 17		
		Logged By: MH			Completion Date: 2017 September 17		
		Reviewed By: JW			Page 1 of 1		

North American Tungsten Corporation Ltd.		Testpit No: 17A1TP4					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1127.456 m		
Tungsten, Northwest Territories		UTM: 540304.343 E; 6871090.999 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)	Notes and Comments	Backfill Elevation (m)
0		SAND (FILL) - silty, some gravel, trace cobbles, trace boulders, damp, soft, brown, metal, plastic and wood debris - trace cobbles to cobble for 200 mm - trace gravel, trace cobbles		4-1	■ 50 ■ 100 ■ 150 ■ 200		
	Excavated			4-2			1127
1		END OF TESTPIT (1.30 metres) Note: Backfilled at completion					1126
2							1125
3							1124
4							1123
5							
 TETRA TECH		Contractor: NATC			Completion Depth: 1.3 m		
		Drilling Rig Type: Track Excavator			Start Date: 2017 September 17		
		Logged By: MH			Completion Date: 2017 September 17		
		Reviewed By: JW			Page 1 of 1		
		ENVIRONMENTAL ENW.WENW03039-02.GPJ EBA.GDT 18/2/9					

North American Tungsten Corporation Ltd.		<h1>Testpit No: 17A1TP5</h1>					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1127.508 m		
		Tungsten, Northwest Territories			UTM: 540311.867 E; 6871049.319 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)	Notes and Comments	Backfill Elevation (m)
0		SAND (FILL) (TAILINGS) - some GRAVEL, trace silt, damp, loose, red, fine sand, (100 mm thick) COBBLES - some sand, some gravel, trace boulders, damp, loose, grey, (300 mm thick) SAND - silty, some gravel, trace clay, trace cobbles, damp, firm, brown - no visible staining, strong hydrocarbon odour for 300 mm - white precipitates for 100 mm		5-1	■ 50 ■ 100 ■ 150 ■ 200		
1		SAND (TAILINGS) - trace silt, trace boulders, damp, soft, grey, fine sand, hydrocarbon odour		5-2		281 ■	1127
2	Excavated						1126
3							1125
4		END OF TESTPIT (4.00 metres) Note: Backfilled at completion		5-3	■		1124
5							1123
 TETRA TECH		Contractor: NATC			Completion Depth: 4 m		
		Drilling Rig Type: Track Excavator			Start Date: 2017 September 17		
		Logged By: MH			Completion Date: 2017 September 17		
		Reviewed By: JW			Page 1 of 1		

North American Tungsten Corporation Ltd.		<h1>Testpit No: 17A1TP6</h1>					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1127.039 m		
		Tungsten, Northwest Territories			UTM: 540344.43 E; 6871090.108 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)	Notes and Comments	Backfill Elevation (m)
0					■ Vapour readings (ppmv) 50 100 150 200		
Excavated		SAND (FILL) - silty, some cobbles, trace gravel, damp, soft, brown, wood and rubber debris, (100 mm thick) COBBLES (FILL) - sandy, some gravel, some silt, damp, loose, grey, (300 mm thick) SAND (FILL) - silty, some cobbles, some gravel, trace boulders, soft, brown		6-1			1127
1				6-2			1126
2		SILT (FILL) (TAILINGS) - sandy, some clay, trace gravel, wet, soft, grey		6-3			1125
3		END OF TESTPIT (2.10 metres) Note: Backfilled at completion					1124
4							1123
5							
 TETRA TECH		Contractor: NATC			Completion Depth: 2.1 m		
		Drilling Rig Type: Track Excavator			Start Date: 2017 September 17		
		Logged By: MH			Completion Date: 2017 September 17		
		Reviewed By: JW			Page 1 of 1		

North American Tungsten Corporation Ltd.		<h1 style="margin: 0;">Testpit No: 17A1TP7</h1>					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1127.602 m		
		Tungsten, Northwest Territories			UTM: 540298.988 E; 6871039.863 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)	Notes and Comments	Backfill Elevation (m)
0		SAND (FILL) - gravelly, some silt, some cobbles, damp, loose, grey - silty, some gravel, trace cobbles, dense, brown			■ Vapour readings (ppmv) 50 100 150 200		
1	Excavated	SAND (TAILINGS) - trace silt, trace clay, trace gravel, damp, soft, fine sand, hydrocarbon odour		7-1	■		1127
2				7-2	■		1126
3		END OF TESTPIT (2.20 metres) Note: Backfilled at completion					1125
4							1124
5							1123
 TETRA TECH		Contractor: NATC			Completion Depth: 2.2 m		
		Drilling Rig Type: Track Excavator			Start Date: 2017 September 17		
		Logged By: MH			Completion Date: 2017 September 17		
		Reviewed By: JW			Page 1 of 1		

North American Tungsten Corporation Ltd.		Testpit No: 17A1TP8							
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6				
		Location: Cantung Mine			Ground Elev: 1127.42 m				
		Tungsten, Northwest Territories			UTM: 540320.201 E; 6871063.885 N; Z 9				
Depth (m)	Method	Soil Description		Sample Type	Sample Number	Notes and Comments			
0		COBBLES (FILL) - sandy, some gravel, damp, loose, grey, (300 mm thick)				■ Vapour readings (ppmv) 50 100 150 200			
		SAND (FILL) - silty, some gravel, trace cobbles, damp, soft, reddish brown							
1	Excavated	SAND (TAILINGS) - some clay, trace silt, trace gravel, soft, grey, fine sand, slight hydrocarbon odour			8-1				
		- moderate hydrocarbon odour			8-2				
					8-3				
3		END OF TESTPIT (2.80 metres) Note: Backfilled at completion							
4									
5									
 TETRA TECH		Contractor: NATC			Completion Depth: 2.8 m				
		Drilling Rig Type: Track Excavator			Start Date: 2017 September 17				
		Logged By: MH			Completion Date: 2017 September 17				
		Reviewed By: JW			Page 1 of 1				



TETRA TECH

North American Tungsten Corporation Ltd.		<h1>Testpit No: 17A1TP9</h1>					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1127.467 m		
		Tungsten, Northwest Territories			UTM: 540323.958 E; 6871044.542 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Notes and Comments		Backfill Elevation (m)
0					■ Vapour readings (ppmv) ■ 50 100 150 200		
1	Excavated	SAND (TAILINGS) - silty, some gravel, trace cobbles, damp, soft, grey - red					1127
2		- trace silt, trace gravel, fine sand		9-1			1126
3		END OF TESTPIT (2.10 metres) Note: Backfilled at completion					1125
4							1124
5							1123
 TETRA TECH		Contractor: NATC			Completion Depth: 2.1 m		
		Drilling Rig Type: Track Excavator			Start Date: 2017 September 17		
		Logged By: MH			Completion Date: 2017 September 17		
		Reviewed By: JW			Page 1 of 1		

North American Tungsten Corporation Ltd.		<h1>Testpit No: 17A1TP10</h1>					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1127.618 m		
		Tungsten, Northwest Territories			UTM: 540292.723 E; 6871058.366 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)	Notes and Comments	Backfill Elevation (m)
0		SAND (FILL) - silty, some gravel, trace cobbles, damp, soft, brown			■ 50 100 150 200 ■		
1	Excavated	SAND (FILL) (TAILINGS) - trace silt, trace clay, trace gravel, damp, soft, grey, moderate hydrocarbon odour		10-1	■		1127
2				10-2	■		1126
3		END OF TESTPIT (2.60 metres) Note: Backfilled at completion		10-3	■		1125
4							1124
5							1123
 TETRA TECH		Contractor: NATC			Completion Depth: 2.6 m		
		Drilling Rig Type: Track Excavator			Start Date: 2017 September 17		
		Logged By: MH			Completion Date: 2017 September 17		
		Reviewed By: JW			Page 1 of 1		

North American Tungsten Corporation Ltd.		<h1>Testpit No: 17A1TP11</h1>					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1127.591 m		
		Tungsten, Northwest Territories			UTM: 540279.072 E; 6871048.219 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)	Notes and Comments	Backfill Elevation (m)
0					■ Vapour readings (ppmv) 50 100 150 200		
Excavated		COBBLES (FILL) - sandy, some gravel, trace boulders, trace silt, damp, loose, grey					
		SAND (FILL) - gravelly, some silt, some cobbles, damp, dense, brown					1127
		SAND (FILL) (TAILINGS) - trace silt, trace gravel, damp to moist, soft, reddish brown					
		- grey, no visible staining, slight hydrocarbon odour					1126
2		END OF TESTPIT (2.00 metres) Note: Backfilled at completion		11-1	■		1125
3							1124
4							1123
5							
 TETRA TECH		Contractor: NATC			Completion Depth: 2 m		
		Drilling Rig Type: Track Excavator			Start Date: 2017 September 17		
		Logged By: MH			Completion Date: 2017 September 17		
		Reviewed By: JW			Page 1 of 1		



Photo 1: Facing southeast. Bone yard situated on top of 1 TP1. Current hazardous waste storage area visible on in the blue shipping containers on the left.
(September 21, 2017)



Photo 2: Looking southwest across Lower Boneyard. (September 17, 2017)



Photo 3: Facing southwest. Standing on TP1 looking toward hazardous waste storage area.
(September 21, 2017)



Photo 4: Looking northwest across Lower Boneyard. (September 17, 2017)

AEC 2

AEC 2: Old Landfill

Area Description	
Location	On northeast side of Flat River, accessed from bridge 2.
Topography	Generally flat with a slight slope (0.06 m/m) to southwest towards Flat River. North end of landfill site is about 2 m higher than south end. The terrain immediately behind landfill is steep with slope of 0.6 to 0.7 m/m.
Surface Drainage	An unnamed creek flows off mountain slope behind landfill, and along northeastern boundary of landfill. Marshy area exists immediately to south of landfill. Soils are free-draining; runoff would readily infiltrate to ground in periods when not frozen. During frozen ground conditions, runoff would flow southwesterly towards Flat River.
Background	Period of use of old landfill is unknown. It has been reclaimed since 2001. The current grade matches what was likely pre-existing grade, so it is probable that this was a borrow source area that was subsequently backfilled with refuse. It was likely used since mine began operation for disposal of domestic waste and construction and demolition debris. Landfill does not have a liner or leachate collection system; would be classified as "natural attenuation landfill".
Historical Assessment Information	
Previous Phase II Environmental Site Assessment Results (EBA 2008)	Number of monitoring wells installed
	Number of groundwater samples with petroleum hydrocarbons impacts
	Number of groundwater samples with elevated metals
Comments: With possible exception of iron and arsenic, groundwater analyses did not indicate groundwater impacts due to Old Landfill. Whether identified metals concentrations in groundwater were due to presence of landfill or instead to natural variations in background groundwater chemistry could not be determined.	
2017/2018 Environmental Site Assessment Details	
Environmental Site Assessment Scope	
Utility Locate SOP followed?	Yes – determined that there are no underground utilities in area, so private utility locator was not required, and no mitigations required.
EM 31 Geophysics Complete?	Yes – within cleared area, along roads, and then finally located former landfill through increase in conductivity.
Number of test pits advanced	0
Number of boreholes advanced	4
Number of hand auger locations advanced	0
Number of soil samples submitted for laboratory chemical analysis	8
Number of boreholes completed as monitoring wells	2 (down-gradient)
Number of existing monitoring wells	3 (2017) 5 (2018)
Number of groundwater samples collected	4 (2017), 5 (2018)
Number of sediment and surface water samples collected	2 (upstream and downstream of landfill from stream that flows past) (2017), 0 (2018)
Geophysics (EM 31 Apparent Terrain Conductivity) Findings	
<ul style="list-style-type: none"> ▪ Geophysics survey completed near area of old landfill location; results indicated on Figure A2-3. ▪ Background apparent terrain conductivity values generally between 5 to 20 mS/m (shown by cool colours on figure). ▪ Areas of higher-than-background apparent terrain conductivity values shown by hot colours on figure. ▪ The area on figure outlined by thick black dotted line represents interpreted delineation of landfill. ▪ The higher apparent terrain conductivity data in marked landfill delineation have signatures consistent with buried metals and waste materials. Data could also suggest soils with leaching tailings. – 	
Soil Investigation and Conditions	
Maximum Depth of Investigation	7.6 mbgs (September 24, 2017)

AEC 2: Old Landfill

Stratigraphy (Typical in Landfill)						
Description	Depth from (mbgs)	Depth to (mbgs)	Observations			
Sand, some gravel and cobbles, trace silt.	0	0.9 to 1.15	Cover fill, may have some refuse mixed in (styrofoam noted), and also possible tailings mixed in.			
Sand, trace to some gravel, trace silt, with intermixed refuse	0.9 to 1.15	4.5 to 5.5	Refuse intermixed with cover materials – refuse observed included: wire, metal parts, styrofoam, cloth, wood, plastic and glass. Saturated below about 3.5 m at 17A2BH1, and some refuse below groundwater table at this location.			
Sand, Silt, Gravel	4.5 to 5.5	7.6	Native glacial materials, saturated below 3.5 mbgs at 17A2BH1 and 6 mbgs at 17A2BH2 (note ground surface at BH 2 is 2 m higher than at BH1).			
Combustible Vapour Concentrations (CVC)						
All less than instrument detection limit.						
Groundwater Conditions						
Depth to Groundwater	Approx. 3.5 mbgs at 17A2BH1 (September 24, 2017), 1.73 mbgs at 17A2MW4 (July 7, 2018)					
Free Product	Not observed during 2017 assessment.					
2017/2018 Environmental Site Assessment Summary						
<ul style="list-style-type: none"> ▪ Figure A2-1 shows borehole and monitoring well locations. ▪ Table A2-1 summarizes soil lab results relative to guidelines. ▪ Table A2-2 summarizes groundwater lab results relative to guidelines. ▪ Table A2-3 summarizes surface water lab results relative to guidelines. ▪ Table A2-4 summarizes sediment lab results relative to guidelines. 						
General Site Observations						
<ul style="list-style-type: none"> ▪ Old landfill was likely borrow source area during mine construction that was subsequently backfilled as landfill, unlined with no collection systems; natural attenuation landfill (a common practice in remote northern locations). ▪ Old landfill appears to have coarse-grained fill cover with minor intermixed refuse; cover source likely from nearby borrow area. ▪ Surface of landfill is overgrown with vegetation including trees. Geophysical survey was required to determine extents of landfilling as no longer obvious from ground surface or vegetation disturbance. ▪ Refuse at surface included styrofoam, metals, plastics, glass, wood. ▪ Some refuse scattered and visible at surface around former landfill, but landfill itself appears to have been completely covered with approx. 1 m of well-graded granular fill material. 						
Soil: Petroleum Hydrocarbons (PHCs, PAHs, BTEX)						
<ul style="list-style-type: none"> ▪ Laboratory results less than guidelines with exception of: <ul style="list-style-type: none"> – Sample 17A2BH1-1 at a depth of 1.9 mbgs contained naphthalene greater than guidelines. – Sample 17A2BH1-2 at a depth of 3.6 mbgs contained PHCs (F3) and PAHs (naphthalene) greater than guidelines. – Sample 17A2BH1-3 at a depth of 5.1 mbgs contained benzene, ethylbenzene and total xylenes greater than guidelines. 						
Metals						
<ul style="list-style-type: none"> ▪ Laboratory results indicated the following for 17A2BH1: <ul style="list-style-type: none"> – Sample 17A2BH1-1 at depth of 1.9 mbgs contained several metals (cadmium, copper, molybdenum, selenium, tin and zinc) greater than guidelines; molybdenum was below preliminary background concentration. – Sample 17A2BH1-2 at depth of 3.6 mbgs contained several metals (copper, lead, molybdenum, selenium, tin and zinc) greater than guidelines and preliminary background concentrations. – Sample 17A2BH1-3 at depth of 5.1 mbgs contained several metals (cadmium, chromium, cobalt, copper, molybdenum, nickel, selenium and zinc) exceeding guidelines; molybdenum was below preliminary background concentration. – Sample 17A2BH1-4 at 7.0 mbgs didn't have any metals exceedances. 						

AEC 2: Old Landfill

- Laboratory results indicated following for 17A2BH2:
 - Sample 17A2BH2-1 at depth of 4.0 mbgs contained many metals (antimony, arsenic, cadmium, chromium, cobalt, copper, lead, molybdenum, nickel, selenium, tin and zinc) greater than guidelines; arsenic and selenium were below preliminary background metals concentrations.
 - Sample 17A2BH2-2 from below landfill at 5.2 mbgs didn't have any metals exceedances.
 - All soil samples from 17A2BH3 contained metals less than guidelines and preliminary background concentrations.

Soil: Other PCOCs (Glycols, volatile organic compounds [VOCs], polychlorinated biphenyls [PCBs], pH)

- Laboratory results were less than detection limits and guidelines with exception of:
 - Tetrachloroethene exceeded guidelines value at 17A2BH1-2 @ 3.6 mbgs.
 - pH very low (3.44 and 3.12) in samples from 17A2BH1-2 and 3.
 - pH outside guidelines range in samples 17A2BH2-2, 17A2BH3-1, 17A2BH3-2 at depths of 5.2, 4.0, and 5.8 mbgs
 - Pentachlorophenol in 17A2BH1-3 was above detection; but well below guidelines.
 - The detection limit for PCBs in sample 17A2BH1-3 and 17A2BH2-1 was greater than guidelines due to matrix interference.

Groundwater: Petroleum Hydrocarbons

2017

- All PHC concentrations less than detection limits and guidelines.

2018

- All PHC concentrations less than guidelines.

Groundwater: Metals/Routine Parameters

2017

- Laboratory results less than guidelines with exception of:
 - Dissolved aluminum, cadmium, copper, iron and sulphate at OBLMW1 higher than guidelines; sulphate and cadmium are below preliminary background values.
 - Dissolved cadmium exceeded preliminary background and guidelines at OLMW2.
 - Dissolved sulphate and cadmium concentrations in 17A2MW3 exceeded guideline value; cadmium was below preliminary background concentration.
 - Dissolved iron exceeded guidelines at 17AMW4.

2018

- pH was outside guidelines at 17A2MW4, OLMW1, and OLMW2 (slightly under)
- Sulphate exceeded guidelines at 17A2MW3
- Iron and manganese exceeded guidelines at 17A2MW4
- Copper exceeded guidelines at OBLMW1
- Cadmium exceeded preliminary background at OLMW2 but was less than guideline

Groundwater: Other PCOCs (glycols, PCBs, pesticides, and VOCs)

- Laboratory results less than guidelines with exceptions. The detection limits for some pesticide and VOC parameters in several samples were greater than most stringent guidelines; as these parameters were not detected in soils, or above detection at any location, this is not considered a concern.

Groundwater Elevations

- Groundwater elevations were calculated based on depth to groundwater measurements and surveyed elevations of wells. Inferred groundwater contours shown on Figure A2-2. The inferred groundwater flow direction is southwest, towards Flat River. This is supported by slightly elevated conductivity and chloride concentrations observed at 17A2MW3 (2017) and OLMW2 (2018) relative to samples from other wells; and also supports that OBLMW1 is cross-gradient from landfill.

Surface Water (Cyanide, routine/salinity, nutrients, total metals, PHCs, PAHs, glycols, PCBs)

- Cyanide was less than laboratory detection limits.
- Routine/salinity, nutrients, total metals, PHCs, PAHs, glycols, PCB results were less than guidelines.
- Both samples collected in 2017 contained detectable total coliforms, and sample 17A2SW1 contained detectable *E. coli*.

Sediment (Cyanide, Routine/salinity, PHCs, PAHs, glycols, PCBs)

- Cyanide was less than laboratory detection limits.
- Routine/salinity, PHCs, PAHs, glycols, PCB values were less than guidelines.
- Metals were less than guidelines with exception of copper in sample 17A2SS1 that was greater than guidelines.

AEC 2: Old Landfill

Grainsize Analysis Results

- Collected one representative sample from landfill cover aggregate material, and one from saturated overburden materials down-gradient of landfill. Results are appended with borehole logs. Results indicate:
 - Cover sample from 17A2BH2a (collected immediately beside BH2) from 0.1 m in depth, consisted of: 52% gravel, 39% sand and 9% silt. It is most likely this material came from nearby gravel pit/borrow area immediately north of landfill.
 - Soil material from 17A2BH4-1, from 4.3 m in depth consisted of: 60% sand, 38% gravel, and 2% silt. The D10 particle size is 0.2 mm. Using Hazen approximation (appropriate for a sand with very little fines content), the theoretical hydraulic conductivity (K) is 4.6×10^{-4} m/s.
 - Soil samples collected from boreholes BH1 and BH2 at depths of 5.1 and 4.0 mbgs respectively indicated coarse-grained soil type.
 - Sediment samples collected indicated coarse grained soil type.

Environmental Concerns

Location in AEC	Potential Source(s)	Identified Contaminated Media	Parameters Assessed and Contaminant(s) of Concern (COCs; bold & underline)
Buried refuse and intermixed soils.	Leaching from refuse, leaking from containers with residual.	Soil; Groundwater	Soil: Cyanide, <u>metals</u> , PHCs , glycols, PAHs , VOCs , PCBs, phenols, pesticides Groundwater: <u>dissolved metals</u> , <u>routine parameters</u> , PHCs , PAHs , pesticides

Discussion (Significance of Results)

Landfill Siting:

- The extents of landfill and types of refuse within have been characterized, and down-gradient monitoring wells are established. Typically, at least 1 background, and 2 monitoring wells are required for monitoring of a landfill, so we consider this landfill adequately covered.
- The landfill is approximately 100 m from Flat River. Although there does not appear to be landfill siting guidelines for NWT, other jurisdictions (such as Yukon), require separation of 300 m minimum from water body.
- There are areas where refuse intersects groundwater table. Although there do not appear to be any landfill siting guidelines for NWT, other jurisdictions (such as Yukon), require separation of 3 m vertical separation from bottom of landfill and high groundwater table.

Landfill Cover:

- The landfill cover is sufficient to prevent access to refuse by wildlife, and smaller vegetation, but would not prevent infiltration.

Soils:

- Several parameters (PHCs, PAHs, BTEX, VOCs, and metals) exceed guidelines for soils within landfill; however, no exceedances of any parameters beneath landfill or at locations down-gradient from landfill suggesting that soil contamination and refuse are limited to the landfill footprint.
- Glycols, PCBs, phenols, pesticides and VOCs were not detected and are no longer considered PCOCs in soils at AEC 2.

Groundwater:

2017

- Dissolved metals (aluminum, cadmium, copper and iron) which exceeded CCME guidelines at OBLMW1 suggest there are naturally-occurring elevated concentrations for these metals in this vicinity, as this well is cross-gradient to landfill and considered as a local background monitoring well. Localized elevated background metals concentrations for cadmium and iron at OBLMW1 may explain exceedances at OLMW2 and 17A2MW3 and 17A2MW4.
- Chloride concentrations are often an indication of landfill leachate generation. Chloride concentrations at all down-gradient monitoring wells were consistent and low.
- The elevated metals at background well (being similar to other wells with exceedances), lack of any organic chemicals above detection, and low chloride and conductivity suggest there are no current significant effects on down-gradient groundwater quality from landfill.
- Glycols, PCBs, phenols, pesticides and VOCs were not detected in groundwater, soils or refuse, and are no longer considered groundwater PCOCs at AEC 2.

AEC 2: Old Landfill

2018

- Dissolved copper, which exceeded CCME guidelines at OLBMW1 suggest there are naturally-occurring elevated concentrations for this metal in this vicinity, as this well is cross-gradient to landfill and considered as a local background monitoring well.
- Chloride concentrations are often an indication of landfill leachate generation. Chloride concentrations at all down-gradient monitoring wells were consistent and low.
- The elevated metals at background well (being similar to other wells with exceedances), lack of any organic chemicals above detection, and low chloride and conductivity suggest there are no current significant effects on down-gradient groundwater quality from landfill.
- Glycols, PCBs, phenols, pesticides and VOCs were not detected in groundwater, soils or refuse, and are no longer considered groundwater COCs at AEC 2.

Surface Water:

- Cyanide, routine/salinity, nutrients, total metals, PHCs, PAHs, glycols, and PCB values were less than detection limits and/or guidelines in surface water samples and are no longer considered groundwater PCOCs at AEC 2.

Sediment:

- Cyanide routine/salinity, PHCs, PAHs, glycols, and PCB values were less than detection limits and/or guidelines in surface water samples and are no longer considered groundwater PCOCs at AEC 2.

Attachments

Figure A2-1 – Soil and Sediment Results

Figure A2-2 – Groundwater and Surface Water Results

Figure A2-3 – AEC 2 Old Landfill EM31 Apparent Terrain Conductivity Survey

Table A2-1 – Soil Analytical Results

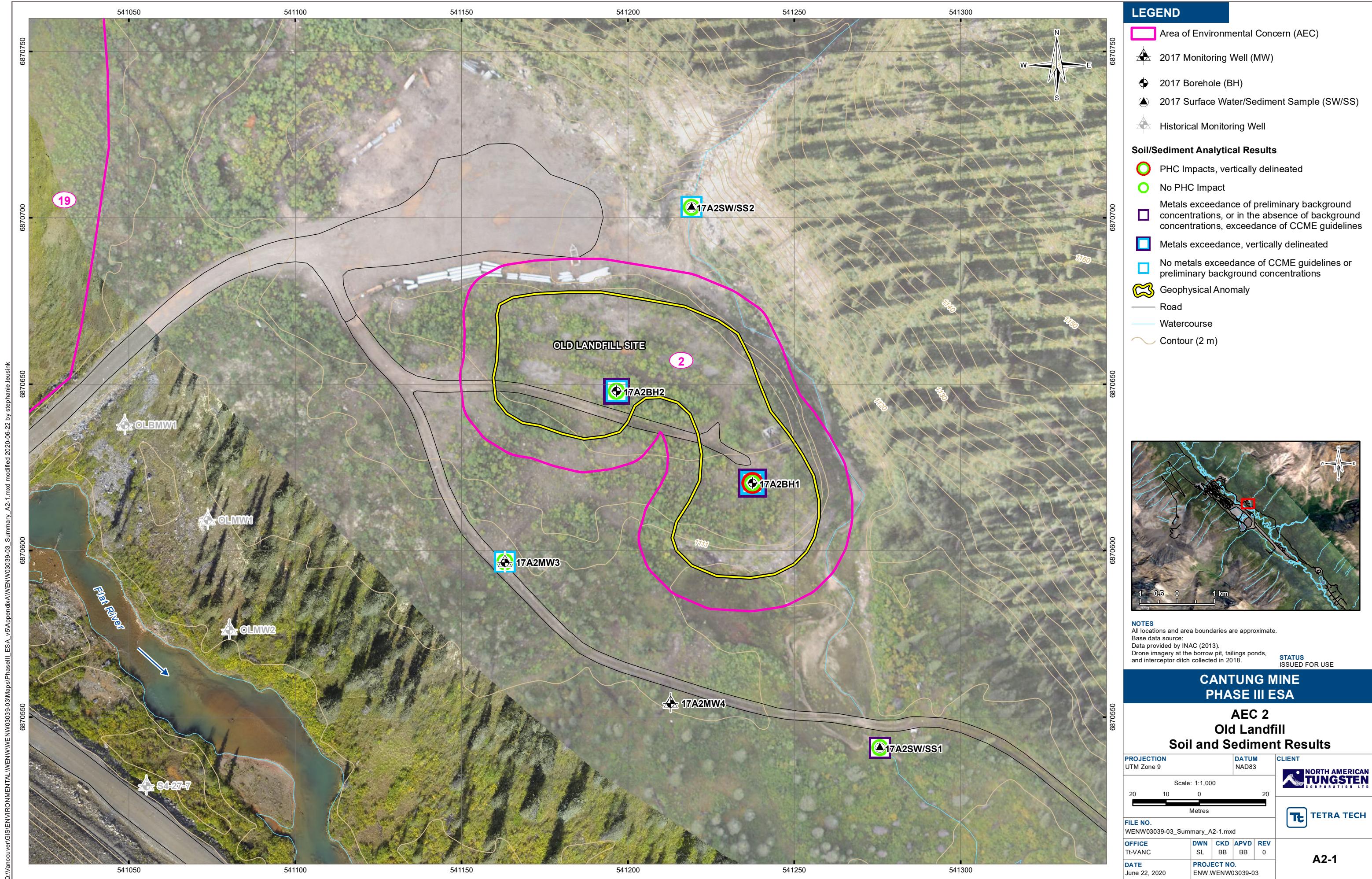
Table A2-2 – Groundwater Analytical Results

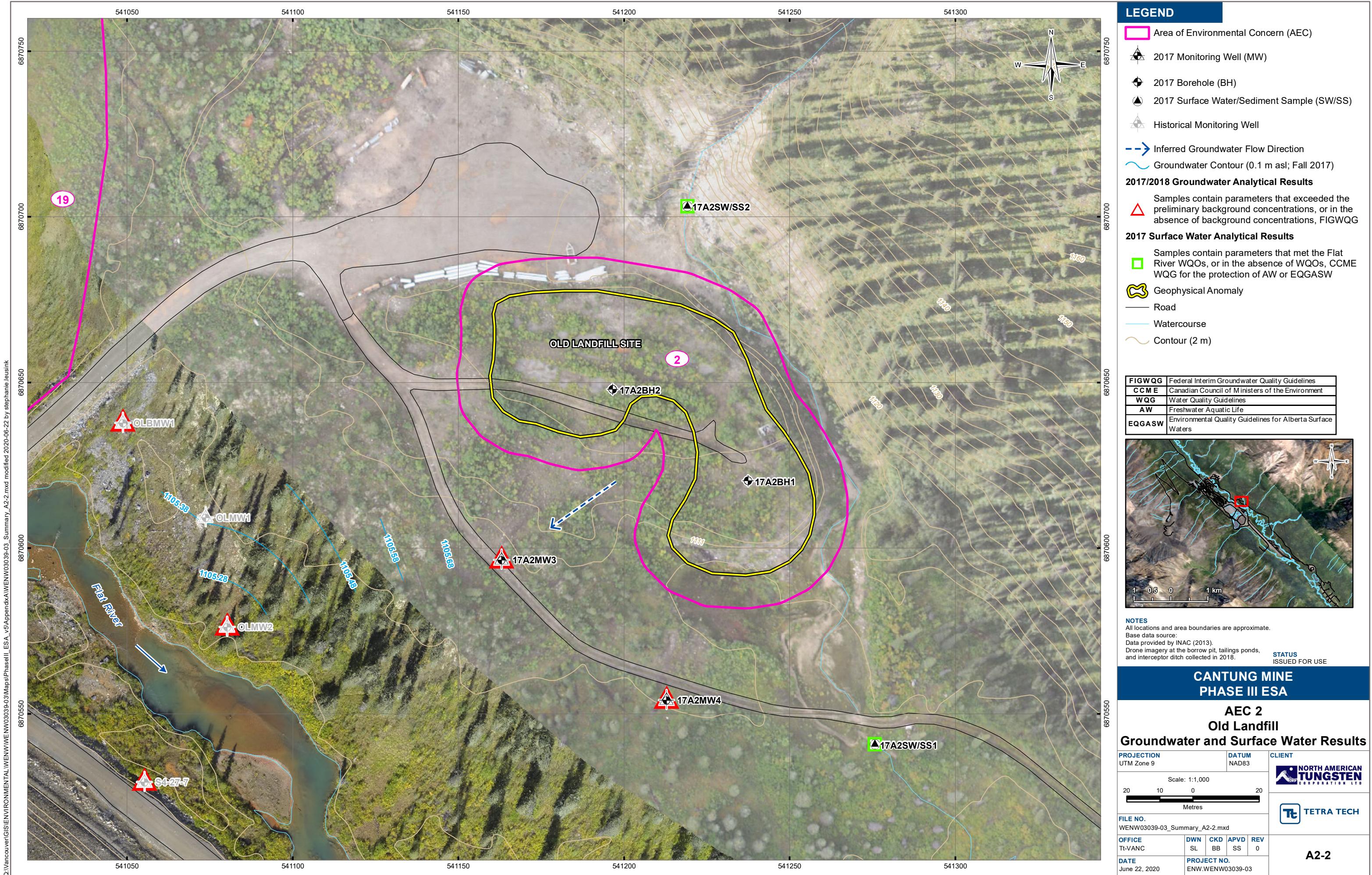
Table A2-3 – Surface Water Analytical Results

Table A2-4 – Sediment Analytical Results

Borehole, Monitoring Well, and Test pit Logs

Photographs





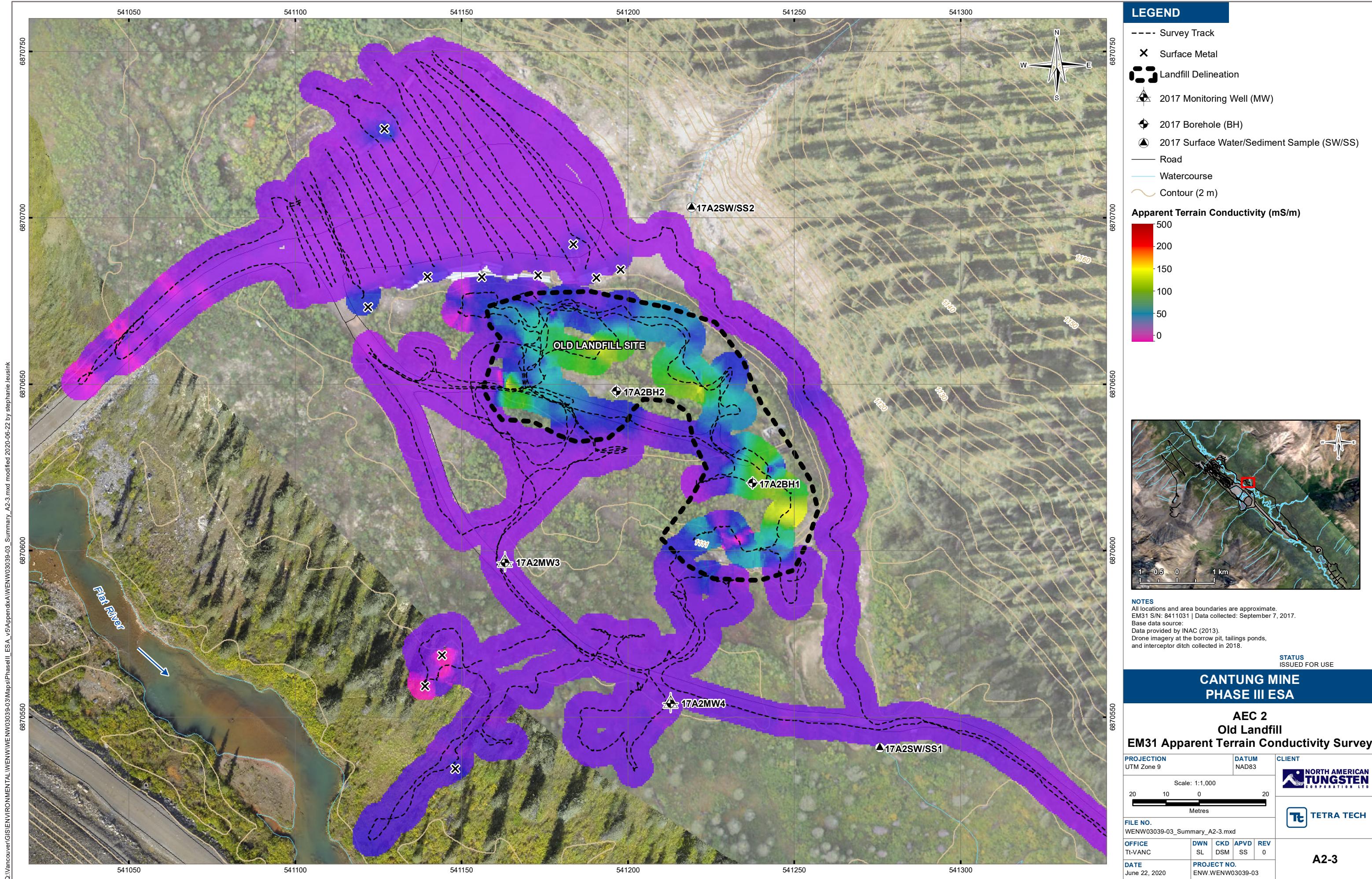


Table A2-1: Soil Analytical Results

Parameter	Unit	Most Stringent of Referenced Guidelines ^{1,2,3}	Preliminary Background Concentration ⁴	AEC 2							
				17A2BH1				17A2BH2		17A2BH3	
				17A2BH1-1	17A2BH1-2	17A2BH1-3	17A2BH1-4	17A2BH2-1	17A2BH2-2	17A2BH3-1	17A2BH3-2
				1.9 m	3.6 m	5.1 m	7.0 m	4.0 m	5.2 m	4.0 m	5.8 m
				2017-09-24	2017-09-24	2017-09-24	2017-09-24	2017-09-24	2017-09-24	2017-09-24	2017-09-24
Cyanide				-	-	<0.5	-	<0.5	-	-	<0.5
Cyanide (SAD)	mg/kg	NG	NG	-	-	<0.5	-	<0.5	-	-	<0.5
Cyanide (WAD)	mg/kg	0.9	NG	-	-	<0.5	-	<0.5	-	-	<0.5
Routine / Salinity											
pH	pH Units	6-8	NG	6.32	3.44	3.12	7.17	7.18	8.28	8.23	8.18
Moisture	%	NG	NG	15.1	29	16.3 - 21.3	4.9	14 - 14.5	2.5	7.1	11.7 - 11.8
Metals											
Antimony	mg/kg	20	NG	6	11	3.1	0.1	45.9	2.5	<0.1	<0.1
Arsenic	mg/kg	12	64	8.7	7.8	8.9	3.9	19.5	4.1	4.5	3.4
Barium	mg/kg	500	946	52.9	64	24.5	73.5	164	76.5	45.7	81.5
Beryllium	mg/kg	4	NG	0.2	0.2	0.7	0.2	0.3	0.1	0.1	0.1
Cadmium	mg/kg	1.4	2.8	15.1	0.65	6.92	0.3	12.6	0.11	0.09	0.07
Chromium	mg/kg	64	NG	39	54	127	7	271	4	5	6
Cobalt	mg/kg	40	NG	28	11.1	207	8.9	24.3	2.5	2.8	2.2
Copper	mg/kg	63	NG	229	475	4030	14	301	6	6.4	5.2
Lead	mg/kg	70	NG	33	211	37.8	3	2250	3.8	2.3	2.1
Mercury	mg/kg	6.6	NG	2.14	3.39	0.91	0.23	1.36	0.07	0.01	0.02
Molybdenum	mg/kg	5	10	6.3	14.9	8.6	0.4	53.5	0.3	<0.2	<0.2
Nickel	mg/kg	45	72	29.3	26.6	260	18.2	275	5.1	7.6	5
Selenium	mg/kg	1	1.7	4.4	10.3	16.1	0.5	1.1	1	0.8	0.7
Silver	mg/kg	20	NG	<0.5	5.2	1.6	<0.5	1.9	<0.5	<0.5	<0.5
Thallium	mg/kg	1	NG	<0.1	0.2	0.2	<0.1	0.2	<0.1	<0.1	<0.1
Tin	mg/kg	5	NG	15.1	47.3	7.1	0.3	122	1	0.3	0.2
Uranium	mg/kg	23	NG	0.8	0.4	2	0.4	2	0.6	0.4	0.3
Vanadium	mg/kg	130	160	8	8	7	11	27	6	8	6
Zinc	mg/kg	200	462	1210	466	594	98	630	13	11	10
Particle Size											
>75 µm	%	NG	NG	-	-	76	-	73	-	-	-
Grain Size	N/A	NG	NG			Coarse		Coarse			
Petroleum Hydrocarbons											
Benzene	mg/kg	0.03	NG	0.008	0.009	0.076	<0.005	<0.02 - 0.005	<0.005	<0.005	<0.005
Toluene	mg/kg	0.1	NG	<0.05 - 0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	mg/kg	0.082	NG	<0.05 - 0.01	<0.01	0.36	<0.01	<0.01	<0.01	<0.01	<0.01
Xylenes (m & p)	mg/kg	NG	NG	-	-	-	-	-	-	-	-
Xylene (m)	mg/kg	NG	NG	<0.02	0.02	1.64	<0.02	<0.02	<0.02	<0.02	<0.02
Xylene (o)	mg/kg	NG	NG	<0.02	<0.02	0.15	<0.02	<0.02	<0.02	<0.02	<0.02
Xylenes Total	mg/kg	0.1	NG	<0.05	<0.05	1.79	<0.05	<0.05	<0.05	<0.05	<0.05
Volatile Hydrocarbons (VH6-10)	mg/kg	NG	NG	-	-	-	-	-	-	-	-
F1 (C6-C10)	mg/kg	30	NG	<10	<10	<10	<10	<10	<10	<10	<10
VPH C6-C10	mg/kg	NG	NG	-	-	-	-	-	-	-	-
F1 (C6-C10 / BTEX CORRECTED)	mg/kg	30	NG	<10	<10	<10	<10	<10	<10	<10	<10
F2 (C10-C16)	mg/kg	150	NG	<20	117	<20	<20	55	<20	<20	<20
F3 (C16-C34)	mg/kg	300	NG	110	312	148	<20	181	<20	<20	<20
F4: (C34-C50)	mg/kg	2800	NG	36	42	49	<20	50	<20	<20	<20
VPHs	mg/kg	NG	NG	-	-	-	-	-	-	-	-
Glycols											
Diethylene glycol	mg/kg	NG	NG	<10	<10	<10	<10	<10	<10	<10	<10
Ethylene glycol	mg/kg	960	NG	<10	<10	<10	<10	<10	<10	<10	<10
Propylene glycol	mg/kg	NG	NG	<10	<10	<10	<10	<10	<10	<10	<10
Tetraethylene Glycol	mg/kg	NG	NG	<10	<10	<10	<10	<10	<10	<10	<10
Triethylene Glycol	mg/kg	NG	NG	<10	<10	<10	<10	<10	<10	<10	<10
Polycyclic Aromatic Hydrocarbons (PAHs)											
IACR (CCME)	mg/kg	1	NG	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
B(a)P Total Potency Equivalent	mg/kg	0.6	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2-methylnaphthalene	mg/kg	NG	NG	0.013	0.095	0.007	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthene	mg/kg	NG	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Acenaphthylene	mg/kg	NG	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Anthracene	mg/kg	2.5	NG	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Benz(a)anthracene	mg/kg	0.1	NG	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Benzo(a) pyrene	mg/kg	0.1	NG	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Benzo(b)fluoranthene	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b+j)fluoranthene	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(e)pyrene	mg/kg	NG	NG	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz(a,h)anthracene	mg/kg	0.1	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoranthene	mg/kg	50	NG	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	mg/kg	NG	NG	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	NG	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Naphthalene	mg/kg	0.013	NG	0.022	0.05	0.011	<0.005	<0.005	<0.005	<0.005	<0.005
Phenanthrene	mg/kg	0.046	NG	0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Pyrene	mg/kg	0.1	NG	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(j)fluoranthene	ug/g	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated Biphenyls (PCBs)											
Aroclor 1242	mg/kg	NG	NG	-	-	<5	-	<5	-	-	<0.05
Aroclor 1254	mg/kg	NG	NG	-	-	<5	-	<5	-	-	<0.05
Aroclor 1260	mg/kg	NG	NG	-	-	<5	-	<5	-	-	<0.05
Aroclor 1262	mg/kg	NG	NG	-	-	-	-	-	-	-	-
PCBs (Sum of total)	mg/kg	0.5	NG	-	-	<5	-	<5	-	-	<0.05
Phenols											
2,3,4,5-tetrachlorophenol	mg/kg	0.05	NG	-	-	<0.005	-	<0.005	-	-	<0.005
2,3,4,6-tetrachlorophenol	mg/kg	0.05	NG	-	-	<0.005	-	<0.005	-	-	<0.005
2,3,4-Trichlorophenol	mg/kg	0.05	NG	-	-	<0.005	-	<0.005	-	-	<0.005
2,3,5,6-Tetrachlorophenol	mg/kg	0.05	NG	-	-	<0.005	-	<0.005	-	-	<0.005
2,3,5-Trichlorophenol	mg/kg	0.05	NG	-	-	<0.005	-	<0.005	-	-	<0.005
2,3,6-Trichlorophenol	mg/kg	0.05	NG	-	-	<0.005	-	<0.005	-	-	<0.005
2,4,5-trichlorophenol											

Table A2-1: Soil Analytical Results

Parameter	Unit	Most Stringent of Referenced Guidelines ^{1,2,3}	Preliminary Background Concentration ⁴	AEC 2										
				17A2BH1				17A2BH2		17A2BH3				
				17A2BH1-1	17A2BH1-2	17A2BH1-3	17A2BH1-4	17A2BH2-1	17A2BH2-2	17A2BH3-1	17A2BH3-2			
				1.9 m	3.6 m	5.1 m	7.0 m	4.0 m	5.2 m	4.0 m	5.8 m			
2017-09-24														
Organochlorine Pesticides														
2,4-DDT	mg/kg	NG	NG	-	-	<0.005	-	<0.005	-	-	<0.005			
4,4-DDE	mg/kg	NG	NG	-	-	<0.005	-	<0.005	-	-	<0.005			
a-BHC	mg/kg	NG	NG	-	-	<0.005	-	<0.005	-	-	<0.005			
Aldrin	mg/kg	NG	NG	-	-	<0.005	-	<0.005	-	-	<0.005			
b-BHC	mg/kg	NG	NG	-	-	<0.005	-	<0.005	-	-	<0.005			
chlordane	mg/kg	NG	NG	-	-	<0.007	-	<0.007	-	-	<0.007			
DDE	mg/kg	NG	NG	-	-	<0.007	-	<0.007	-	-	<0.007			
DDT	mg/kg	0.7	NG	-	-	<0.007	-	<0.007	-	-	<0.007			
Dieldrin	mg/kg	NG	NG	-	-	<0.005	-	<0.005	-	-	<0.005			
Endosulfan I	mg/kg	NG	NG	-	-	<0.0013	-	<0.0013	-	-	<0.0013			
Endrin	mg/kg	NG	NG	-	-	<0.005	-	<0.005	-	-	<0.005			
gamma-Chlordane	mg/kg	NG	NG	-	-	<0.005	-	<0.005	-	-	<0.005			
Heptachlor	mg/kg	NG	NG	-	-	<0.005	-	<0.005	-	-	<0.005			
Heptachlor epoxide	mg/kg	NG	NG	-	-	<0.005	-	<0.005	-	-	<0.005			
Methoxychlor	mg/kg	NG	NG	-	-	<0.005	-	<0.005	-	-	<0.005			
o,p'-DDE	mg/kg	NG	NG	-	-	<0.005	-	<0.005	-	-	<0.005			
Volatile Organic Compounds (VOCs)														
Carbon	%	NG	NG	-	-	0.54	-	1.34	-	-	-			
1-Methylnaphthalene	mg/kg	NG	NG	0.01	0.056	0.005	<0.005	<0.005	<0.005	<0.005	<0.005			
Acetone	mg/kg	NG	NG	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
Bromodichloromethane	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Bromoform	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Bromomethane	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
2-Butanone	mg/kg	NG	NG	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
Carbon tetrachloride	mg/kg	0.1	NG	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			
Chlorobenzene	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Chloroethane	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Chloroform	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Chloromethane	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Dibromochloromethane	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
1,2-Dibromoethane	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
1,2-Dichlorobenzene	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
1,3-Dichlorobenzene	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
1,4-Dichlorobenzene	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
1,1-Dichloroethane	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
1,2-Dichloroethane	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
1,1-Dichloroethene	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
1,2-Dichloroethene (cis)	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
1,2-Dichloroethene (trans)	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
1,2-Dichloropropane	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
1,3-Dichloropropene [cis]	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
1,3-Dichloropropene [trans]	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Methyl t-Butyl Ether (MTBE)	mg/kg	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Methylene Chloride	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
4-Methyl-2-pentanone	mg/kg	NG	NG	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
Styrene	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
1,1,1,2-Tetrachloroethane	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
1,1,2,2-Tetrachloroethane	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Tetrachloroethene	mg/kg	0.1	NG	<0.05	0.19	0.08	<0.05	<0.05	<0.05	<0.05	<0.05			
1,2,4-Trichlorobenzene	mg/kg	0.05	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
1,1,1-Trichloroethane	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
1,1,2-Trichloroethane	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Trichloroethene	mg/kg	0.1	NG	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			
Trichlorofluoromethane	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Vinyl chloride	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Sample Code				8774140	8774141	8774142	8774143	8774144	8774145	8774146	8774147			

Table A2-2: Groundwater Analytical Results

Parameter	Unit	Federal Interim Guideline ¹		Preliminary Background Concentrations		AEC 2											
		Agricultural	Res / Park			17A2MW3	17A2MW3	DUP4	17A2MW4	17A2MW4	OLBMW1	OLBMW1	OLMW1	OLMW2	OLMW2	OLMW2	
Field Temperature	°C	-	-	-	-	5.1	2.7	-	5.5	2.6	5.5	4.8	2.0	5.2	-	4.5	
Field pH	pH Units	6.5-9	6.5-9	-	-	7.36	6.49	-	7.50	6.45	7.76	7.50	6.40	7.74	-	6.43	
Field Conductivity	µS/cm	-	-	-	-	886	671	-	470	429.1	577	517	604	664	-	586	
Routine																	
pH	pH Units	6.5-9	6.5-9	-	-	7.6	7.16	7.25	7.71	7.05	7.89	7.37	7.01	7.58	-	7.04	
Electrical Conductivity (EC)	µS/cm	-	-	-	-	960	823	875	484	473	590	548	653	698	-	655	
Total Dissolved Solids (TDS)	mg/L	3000	-	-	-	652	495	505	248	225	375	270	292	418	-	366	
Hardness as CaCO ₃	mg/L	-	-	-	-	539	451	471	251	262	299	326	392	386	-	388	
Alkalinity (total as CaCO ₃)	mg/L	-	-	-	-	342	317	308	267	266	239	272	381	376	-	346	
Bromide	mg/L	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	
Chloride	mg/L	100	120	-	-	0.38	0.35	0.43	0.13	0.07	0.13	0.1	0.13	0.2	-	0.26	
Fluoride	mg/L	0.12	0.12	0.39	0.03	0.02	<0.02	0.03	0.02	0.09	0.07	<0.02	0.03	-	0.03	-	
Sulphate	mg/L	100	100	182	217	171	159	4.3	12.2	102	44.8	6.1	28.9	-	37.4	-	
Nutrients																	
Ammonia	mg/L	0.021-231 ²	0.021-231 ²	-	-	<0.01	<0.01	-	0.03	-	<0.01	<0.01	-	-	<0.01	-	
Nitrate (as NO ₃ -N)	mg/L	13	13	-	-	0.107	0.229	0.216	<0.005	0.011	0.011	0.008	0.053	0.015	-	0.013	
Nitrite (as NO ₂ -N)	mg/L	0.06	0.06	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	
Nitrogen (Total)	mg/L	-	-	-	-	-	0.24	0.33	-	0.28	-	0.12	0.17	-	-	0.24	
Cyanide																	
Cyanide (SAD)	mg/L	-	-	-	-	0.022	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	
Cyanide (WAD)	mg/L	-	-	-	-	0.004	-	-	<0.002	-	<0.002	-	-	<0.002	-	-	
Dissolved Metals																	
Aluminum	mg/L	0.005 / 0.1 ³	0.005 / 0.1 ³	-	-	0.009	<0.002	<0.002	0.008	0.004	0.243	0.003	0.01	0.005	-	0.003	
Antimony	mg/L	2	2	-	-	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Arsenic	mg/L	0.005	0.005	-	-	0.0003	0.0002	0.0002	0.0032	0.0027	0.0006	0.0003	0.0003	0.0006	-	0.0004	
Barium	mg/L	0.5	0.5	-	-	0.124	0.12	0.112	0.0876	0.0859	0.0568	0.0601	0.105	0.178	-	0.147	
Beryllium	mg/L	0.0053	0.0053	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00003	<0.00001	<0.00001	<0.00001	-	<0.00001	
Boron	mg/L	0.5	1.5	-	-	0.02	0.02	0.022	0.003	<0.002	0.003	<0.002	<0.002	<0.002	-	<0.002	
Cadmium	mg/L	0.00012	0.00012	0.000047	0.00002	0.00002	0.00002	<0.00001	<0.00001	0.00003	0.00002	0.00003	0.00005	-	0.00005	-	
Calcium	mg/L	-	-	-	-	127	104	109	63.4	64.9	87.2	98.6	108	114	-	119	
Chromium	mg/L	0.0089	0.0089	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	
Cobalt	mg/L	0.05	-	-	-	0.00076	0.00017	0.00017	0.00082	0.00102	0.00028	<0.00005	0.00011	0.0002	-	0.00013	
Copper	mg/L	0.002	0.002	-	-	0.0009	0.0004	0.0006	<0.0002	0.0025	0.0134	0.0053	0.0009	0.0021	-	0.002	
Iron	mg/L	0.3	0.3	-	-	0.017	0.03	<0.01	0.9	0.444	0.748	0.049	0.048	0.102	-	0.066	
Lead	mg/L	0.001-0.002 ⁴	0.001-0.002 ⁴	-	-	<0.00005	<0.00005	<0.00005	<0.00005	0.00014	0.0002	<0.00005	<0.00005	<0.00005	-	<0.00005	
Lithium	mg/L	-	-	-	-	<0.0005	0.0005	0.0006	<0.0005	<0.0005	0.0021	0.0015	0.0006	0.0007	-	0.0006	
Magnesium	mg/L	-	-	-	-	53.8	46.4	48.2	22.5	24.2	19.8	19.3	29.7	24.7	-	22.1	
Manganese	mg/L	0.2	-	-	-	0.041	0.02	0.001	0.476	0.235	0.028	0.002	0.016	0.046	-	0.091	
Mercury	mg/L	0.000016	0.000016	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	
Molybdenum	mg/L	0.073	0.073	-	-	0.00048	0.00044	0.00036	0.00032	0.00062	0.00043	0.0005	0.00023	0.0002	-	0.00019	
Nickel	mg/L	0.025-0.083 ⁴	0.025-0.083 ⁴	-	-	0.0009	0.0002	0.0003	0.0006	0.001	0.0006	0.0003	0.0011	-	0.0006	-	
Potassium	mg/L	-	-	-	-	1.53	1.16	1.2	0.9	0.801	1.25	1.3	1.24	0.797	-	1.07	
Selenium	mg/L	0.001	0.001	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	<0.0005	
Silver	mg/L	0.00025	0.00025	-	-	<0.00002	<0.00002	<0.00									

Table A2-2: Groundwater Analytical Results

Parameter	Unit	Federal Interim Guideline ¹		AEC 2														
		Preliminary Background Concentrations		17A2MW3			17A2MW4			OLBMW1			OLMW1		OLMW2			
		Agricultural	Res / Park	17A2MW3	17A2MW3	DUP4	17A2MW4	17A2MW4	OBLMW1	OLBMW1	OLMW1	OLMW2	OLMW2	OLMW2	OBLMW1	OLMW1	OLMW2	
Laboratory Sample ID	Laboratory Report Number	Sample Date	Field ID	Location	17A2MW3	17A2MW3	DUP4	17A2MW4	17A2MW4	OBLMW1	OLBMW1	OLMW1	OLMW2	OLMW2	OLMW2	OBLMW1	OLMW1	OLMW2
8797132	17Y269471	1-Oct-2017	17A2MW3	17A2MW3	17A2MW3	17A2MW3	17A2MW4	17A2MW4	OBLMW1	OLBMW1	OLMW1	OLMW2	OLMW2	OLMW2	OBLMW1	OLMW1	OLMW2	
9378826	18Y358442	1-Jul-2018	1-Jul-2018	1-Jul-2018	17A2MW4	17A2MW4	DUP4	17A2MW4	17A2MW4	OLBMW1	OLBMW1	OLMW1	OLMW2	OLMW2	OLMW2	OLBMW1	OLMW1	OLMW2
9378842	18Y358442	1-Jul-2018	17Y269471	17Y269471	18Y358442	18Y358442	18Y358442	17V270219	17V270219	18Y358442	18Y358442	18Y358442	17Y268688	17Y268688	17Y268688	17V270219	17V270219	18Y358442
8797133	9378827	8804766	8797133	9378827	9378827	9378827	9378827	9378815	9378815	9378816	9378816	9378816	8791169	8791169	8791169	8804786	8804786	9378817
Hydrocarbons																		
Benzene	mg/L	0.088	0.14	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Toluene	mg/L	0.083	0.083	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Ethylbenzene	mg/L	3.2	11	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Xylene (m)	mg/L	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Xylene (o)	mg/L	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Xylenes Total	mg/L	3.9	3.9	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Styrene	mg/L	0.072	0.072	-	<0.0005	-	-	<0.0005	-	<0.0005	-	<0.0005	-	-	-	-	-	-
F1 (C ₆ -C ₁₀)	mg/L	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
F1 (C ₆ -C ₁₀) - BTEX	mg/L	0.81	0.81	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
F2 (C ₁₀ -C ₁₆)	mg/L	1.3	1.3	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
F3 (C ₁₆ -C ₃₄)	mg/L	-	-	-	<0.1	0.14	0.14	0.14	0.14	0.11	0.11	0.11	0.14	0.14	0.14	0.14	0.14	0.14
F4 (C ₃₄ -C ₅₀)	mg/L	-	-	-	<0.1	0.25	0.2	0.2	0.2	<0.1	0.14	0.14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VH ₆₋₁₀	mg/L	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-
VPH	mg/L	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-
Glycols																		
Diethylene glycol	mg/L	-	-	-	<5	-	-	<5	-	<5	-	-	-	-	-	-	-	-
Ethylene glycol	mg/L	190	190	-	<10	-	-	<10	-	<10	-	-	-	-	-	-	-	-
Propylene glycol	mg/L	500	500	-	<10	-	-	<10	-	<10	-	-	-	-	-	-	-	-
Tetraethylene Glycol	mg/L	-	-	-	<10	-	-	<10	-	<10	-	-	-	-	-	-	-	-
Triethylene Glycol	mg/L	-	-	-	<10	-	-	<10	-	<10	-	-	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons (PAHs)																		
Acenaphthene	mg/L	0.0058	0.0058	-	<0.0002	-	-	<0.0002	-	<0.0002	-	-	<0.0002	-	-	-	-	-
Acenaphthylene	mg/L	0.046	0.046	-	<0.0002	-	-	<0.0002	-	<0.0002	-	-	<0.0002	-	-	-	-	-
Acridine	mg/L	0.00005	0.00005	-	<0.0005	-	-	<0.0005	-	<0.0005	-	-	<0.0005	-	-	-	-	-
Anthracene	mg/L	0.000012	0.000012	-	<0.0001	-	-	<0.0001	-	<0.0001	-	-	<0.0001	-	-	-	-	-
Benz(a)anthracene	mg/L	0.000018	0.000018	-	<0.0001	-	-	<0.0001	-	<0.0001	-	-	<0.0001	-	-	-	-	-
Benzo(a) pyrene	mg/L	0.00001	0.00001	-	<0.0001	-	-	<0.0001	-	<0.0001	-	-	<0.0001	-	-	-	-	-
Benzo(b)fluoranthene	mg/L	-	-	-	<0.0001	-	-	<0.0001	-	<0.0001	-	-	<0.0001	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/L	0.00048	0.00048	-	<0.0001	-	-	<0.0001	-	<0.0001	-	-	<0.0001	-	-	<0.0001	<0.0001	<0.0001
Benzo(g,h,i)perylene	mg/L	0.00017	0.00017	-	<0.0001	-	-	<0.0001	-	<0.0001	-	-	<0.0001	-	-	<0.0001	<0.0001	<0.0001
Benzo(j)fluoranthene	mg/L	-	-	-	<0.0001	-	-	<0.0001	-	<0.0001	-	-	<0.0001	-	-	<0.0001	<0.0001	<0.0001
Benzo(k)fluoranthene	mg/L	0.00048	0.00048	-	<0.0001	-	-	<0.0001	-	<0.0001	-	-	<0.0001	-	-	<0.0001	<0.0001	<0.0001
Chrysene	mg/L	0.0001	0.0001	-	<0.0001	-	-	<0.0001	-	<0.0001	-	-	<0.0001	-	-	<0.0001	<0.0001	<0.0001
Dibenz(a,h)anthracene	mg/L	0.00026	0.00026	-	<0.0001	-	-	<0.0001	-	<0.000								

Table A2-2: Groundwater Analytical Results

Parameter	Unit	Federal Interim Guideline ¹		AEC 2														
		Preliminary Background Concentrations		17A2MW3			17A2MW4			OLBMW1			OLMW1			OLMW2		
		Agricultural		Res / Park		Field ID	17A2MW3	17A2MW3	DUP4	17A2MW4	17A2MW4	OLBMW1	OLBMW1	OLMW1	OLMW2	OLMW2	OLMW2	
		Sample Date	Laboratory Report Number	Laboratory Sample ID	1-Oct-2017	1-Jul-2018	1-Jul-2018	1-Oct-2017	1-Jul-2018	5-Oct-2017	30-Jun-2018	1-Jul-2018	2-Oct-2017	5-Oct-2017	1-Jul-2018	17V270219	18Y358442	18Y358442
Phenols					17Y269471	18Y358442	18Y358442	17Y269471	18Y358442	17V270219	18Y358442	18Y358442	17Y268688	17V270219	18Y358442	17V270219	18Y358442	
2-chlorophenol	mg/L	0.33	0.33	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
2,4-dichlorophenol	mg/L	0.0002	0.0002	-	<0.0001	-	-	<0.0001	-	-	-	-	-	-	-	-	-	
2,6-dichlorophenol	mg/L	-	-	-	<0.0001	-	-	<0.0001	-	-	-	-	-	-	-	-	-	
2,3,4-trichlorophenol	mg/L	-	-	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
2,3,5-trichlorophenol	mg/L	-	-	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
2,3,6-trichlorophenol	mg/L	-	-	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
2,4,5-trichlorophenol	mg/L	0.16	0.16	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
2,4,6-trichlorophenol	mg/L	0.018	0.018	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
3,4,5-trichlorophenol	mg/L	-	-	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
2,3,4,5-tetrachlorophenol	µg/L	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-	-	-	-	-	
2,3,4,6-tetrachlorophenol	mg/L	0.001	0.001	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
2,3,5,6-tetrachlorophenol	mg/L	-	-	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
Pentachlorophenol	mg/L	0.0005	0.0005	-	<0.0004	-	-	<0.0004	-	-	-	-	-	-	-	-	-	
4-chloro-3-methylphenol	mg/L	-	-	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
3&4-methylphenol	mg/L	-	-	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
2,4-dimethylphenol	mg/L	3.9	3.9	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
2-nitrophenol	mg/L	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	
4-nitrophenol	mg/L	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	
2,4-dinitrophenol	mg/L	1.1	1.1	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	
4,6-dinitro-2-methylphenol	mg/L	-	-	-	<0.05	-	-	<0.05	-	-	-	-	-	-	-	-	-	
Cresol Total	mg/L	-	-	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
Phenol	mg/L	0.002	0.004	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
Phenols	mg/L	-	-	-	0.006	0.004	-	0.005	0.003	0.006	0.003	0.004	-	0.004	-	0.004	0.003	
Pesticides																		
Aldrin	mg/L	0.003	0.003	-	<0.0001	-	-	<0.0001	-	-	-	-	-	-	-	-	-	
BHC (alpha)	mg/L	-	-	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
Chlordane	mg/L	0.015	0.015	-	<0.0004	-	-	<0.0004	-	-	-	-	-	-	-	-	-	
DDD-p,p'	mg/L	-	-	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
DDE-o,p'	mg/L	-	-	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
DDT-p,p'	mg/L	0.000001	0.000001	-	<0.0004	-	-	<0.0004	-	-	-	-	-	-	-	-	-	
Dieldrin	mg/L	0.000056	0.000056	-	<0.0002	-	-	<0.0002	-	-	-	-	-	-	-	-	-	
Endosulfan	mg/L	0.00002	0.00002	-	<0.00003	-	-	<0.00003	-	-	-	-	-	-	-	-	-	
Endrin	mg/L	0.000036	0.000036	-	<0.0005	-	-	<0.0005	-	-	-	-	-	-	-	-	-	
Heptachlor	mg/L	-	-	-	<0.0001	-	-	<0.0001	-	-	-	-	-	-	-	-	-	
Heptachlor epoxide	mg/L	0.000038	0.000038	-	<0.0001	-	-	<0.0001	-	-	-	-	-	-	-	-	-	
Lindane	mg/L	0.00001	0.00001	-	<0.0001	-	-	<0.0001	-	-	-	-	-	-	-	-	-	
Methoxychlor	mg/L	0.00003	0.00003	-	<0.0003	-	-	<0.0003	-	-	-	-	-	-	-	-	-	

Notes:¹ Environment Canada (June 2016). Guidance Document on Federal Interim Groundwater Quality Guidelines (FIGGG) for Federal Contaminated Sites, for fine and coarse textured soil under Agricultural and Residential/Parkland land use² Guideline varies with pH and temperature³ Guideline varies with pH⁴ Guideline varies hardness^{5,*} No applicable guideline or not analyzed**BOLD** - Greater than Guideline**RED** - Greater than Preliminary Background Concentration*Italic* - Detection limit greater than guideline

Table A2-2: Groundwater Analytical Results

Parameter	Unit	Federal Interim Guideline ¹		AEC 2													
		Preliminary Background Concentrations		17A2MW3			17A2MW4			OLBMW1		OLMW1			OLMW2		
		Agricultural	Res / Park	Field ID	17A2MW3	17A2MW3	DUP4	17A2MW4	17A2MW4	OLBMW1	OLBMW1	OLMW1	OLMW2	OLMW2	OLMW2		
Volatile Organic Compounds (VOCs)				Sample Date	1-Oct-2017	1-Jul-2018	1-Jul-2018	1-Oct-2017	1-Jul-2018	5-Oct-2017	30-Jun-2018	1-Jul-2018	2-Oct-2017	5-Oct-2017	1-Jul-2018		
Acetone	mg/L	13	13	Laboratory Report Number	17Y269471	18Y358442	18Y358442	17Y269471	18Y358442	17V270219	18Y358442	18Y358442	17Y268688	17V270219	18Y358442		
Bromodichloromethane	mg/L	8.5	8.5	Laboratory Sample ID	8797132	9378826	9378842	8797133	9378827	8804766	9378815	9378816	8791169	8804786	9378817		
Bromoform	mg/L	0.38	0.38														
Bromomethane	mg/L	0.0056	0.0056														
2-Butanone (MEK)	mg/L	150	150														
Carbon tetrachloride	mg/L	0.00056	0.00056														
Chlorobenzene	mg/L	0.0013	0.0013														
Chloroethane	mg/L	-	-														
Chloroform	mg/L	0.0018	0.0018														
Chloromethane	mg/L	-	-														
Dibromochloromethane	mg/L	0.1	1.1														
1,2-Dibromoethane	mg/L	0.00025	0.00025														
1,2-Dichlorobenzene	mg/L	0.0007	0.0007														
1,3-Dichlorobenzene	mg/L	0.042	0.042														
1,4-Dichlorobenzene	mg/L	0.026	0.026														
1,1-Dichloroethane	mg/L	0.32	0.32														
1,2-Dichloroethane	mg/L	0.005	0.01														
1,1-Dichloroethene	mg/L	0.039	0.039														
1,2-Dichloroethene (cis)	mg/L	0.0016	0.0016														
1,2-Dichloroethene (trans)	mg/L	0.0016	0.0016														
1,2-Dichloropropane	mg/L	0.016	0.016														
1,3-Dichloropropene [cis]	mg/L	-	-														
1,3-Dichloropropene [trans]	mg/L	-	-														
Hexachlorobenzene	mg/L	0.00052	0.0012														
Methyl t-Butyl Ether (MTBE)	mg/L	-	-														
Methylene Chloride	mg/L	0.05	0.098														
4-Methyl-2-pentanone (MIBK)	mg/L	58	58														
1,1,1,2-Tetrachloroethane	mg/L	0.0033	0.0034														
1,1,2,2-Tetrachloroethane	mg/L	0.0032	0.0032														
Tetrachloroethene	mg/L	0.012	0.012														
1,2,4-Trichlorobenzene	mg/L	0.0054	0.0054														
1,1,1-Trichloroethane	mg/L	0.64	0.64														
1,1,2-Trichloroethane	mg/L	0.0047	0.0047														
Trichloroethene	mg/L	0.02	0.02														
Trichlorofluoromethane	mg/L	-	-														
Trihalomethanes	mg/L	-	-														
Vinyl chloride	mg/L	0.0011	0.0011														

Notes:¹ Environment Canada (June 2016). Guidance Document on Federal Interim Groundwater Quality Guidelines (FIGGG) for Federal Contaminated Sites, for fine and coarse textured soil under Agricultural and Residential/Parkland land use² Guideline varies with pH and temperature³ Guideline varies with pH⁴ Guideline varies hardness^{5,*} No applicable guideline or not analyzed**BOLD** - Greater than Guideline**RED** - Greater than Preliminary Background Concentration*italic* - Detection limit greater than guideline

Table A2-3: Surface Water Analytical Results

Parameter	Unit	RDL	CCME - AW (Freshwater) ¹	Environmental Quality Guidelines for Alberta Surface Waters ²	Flat River Water Quality Objectives ³	AEC 2	
						17A2SW1	17A2SW2
						2017-09-29	2017-09-29
Field Parameters							
Field Temperature	°C	-	NG	NG	NG	2.0	2.2
Field pH	pH Units	-	6.5-9	6.5-9	6.5-9	-	-
Field Conductivity	µS/cm	-	NG	NG	NG	124	126
Cyanide							
Cyanide (SAD)	mg/L	0.002	NG	NG	NG	<0.002	<0.002
Cyanide (WAD)	mg/L	0.002	NG	NG	NG	<0.002	<0.002
Routine / Salinity							
pH	pH Units	0.01	6.5-9	6.5-9	6.5-9	7.93	7.92
Electrical Conductivity (EC)	µS/cm	1	NG	NG	NG	226	225
Total Suspended Solids (TSS)	mg/L	2	NG	NG	6	5	3
Total Dissolved Solids (TDS)	mg/L	5	NG	NG	NG	130	125
Hardness as CaCO ₃	mg/L	0.1	NG	NG	NG	124	125
Hardness as CaCO ₃ (Filtered)	mg/L	0.1	NG	NG	NG	-	-
Alkalinity (total as CaCO ₃)	mg/L	1	NG	NG	NG	118	117
Bromide	mg/L	0.05	NG	NG	NG	<0.05	<0.05
Chloride	mg/L	0.05	120	120	NG	0.1	0.09
Fluoride	mg/L	0.02	0.12	NG	NG	0.03	0.03
Sulphate	mg/L	0.5	NG	309 - 429	NG	3.9	4
Calcium Carbonate	mg/L	0.05	NG	NG	NG	31	31.4
Nutrients							
Ammonia	mg/L	0.01	1.04	1.04	1.27	<0.01	<0.01
Nitrate (as NO ₃ -N)	mg/L	0.005	13	3	3	0.138	0.141
Nitrite (as NO ₂ -N)	mg/L	0.005	0.06	0.06 - 0.60 ⁵	0.06	<0.005	<0.005
Nitrogen (Total)	mg/L	0.05	NG	NG	NG	0.12	0.13
Demand Parameters							
Biochemical Oxygen Demand (BOD)	mg/L	4	NG	NG	NG	<4	<4
Biological							
Total Coliforms	MPN/100mL	1	NG	NG	NG	29.2	7.5
E. Coli	MPN/100mL	1	NG	NG	NG	1	<1
Total Metals							
Aluminum	mg/L	0.005	0.1 ⁶	0.1 ⁶	0.3	<0.005	<0.005
Antimony	mg/L	0.0005	NG	NG	NG	<0.0005	<0.0005
Arsenic	mg/L	0.0001	0.005	0.005	0.005	0.0005	0.0004
Barium	mg/L	0.0005	NG	NG	NG	0.044	0.0425
Beryllium	mg/L	0.00005	NG	NG	NG	<0.00005	<0.00005
Boron - soluble	mg/L	0.005	1.5	1.5	1.5	<0.005	<0.005
Cadmium	mg/L	0.00001	0.001	0.00026 - 0.077 ⁶	0.00035	<0.00001	<0.00001
Chromium	mg/L	0.0005	NG	0.001	0.001	<0.0005	<0.0005
Cobalt	mg/L	0.00005	NG	0.0025	NG	<0.00005	<0.00005
Copper	mg/L	0.0005	0.0028 - 0.004 ⁷	0.020 - 0.062 ⁷	0.0042	0.0008	0.0009
Iron	mg/L	0.01	0.3	0.3	1.3	0.011	<0.01
Lead	mg/L	0.00005	0.0042 - 0.007 ⁷	0.0042 - 0.007 ⁷	0.005	<0.00005	<0.00005
Lithium	mg/L	0.0005	NG	NG	NG	0.0012	0.0011
Magnesium	mg/L	0.05	NG	NG	NG	11.2	11.2
Manganese	mg/L	0.001	NG	NG	NG	<0.001	<0.001
Mercury	mg/L	0.00001	0.000026	0.000005	0.000026	<0.00001	<0.00001
Molybdenum	mg/L	0.0001	0.073	0.073	0.073	0.0003	0.0003
Nickel	mg/L	0.0005	0.1126 - 0.150 ⁷	0.570 - 1.52 ⁷	0.125	<0.0005	<0.0005
Phosphorus	mg/L	0.005	0.004 - 0.010 ⁸	NG	NG	0.006	0.006
Potassium	mg/L	0.1	NG	NG	NG	0.559	0.513
Selenium	mg/L	0.0005	0.001	0.001	0.001	<0.0005	<0.0005
Silver	mg/L	0.00002	0.00025	0.0001	NG	<0.00002	<0.00002
Sodium	mg/L	0.1	NG	NG	NG	0.15	0.155
Thallium	mg/L	0.00002	0.0008	0.0008	0.0008	<0.00002	<0.00002
Titanium	mg/L	0.001	NG	NG	NG	<0.001	<0.001
Uranium	mg/L	0.00001	0.015	0.015	0.015	0.00055	0.00056
Vanadium	mg/L	0.001	NG	NG	NG	<0.001	<0.001
Zinc	mg/L	0.005	0.03	0.03	0.03	<0.005	<0.005
Hydrocarbons							
Benzene	mg/L	0.0005	0.37	0.04	NG	<0.0005	<0.0005
Volatile Hydrocarbons (VH6-10)	mg/L	0.1	NG	NG	NG	-	-
Toluene	mg/L	0.0005	0.002	0.0005	NG	<0.0005	<0.0005
Ethylbenzene	mg/L	0.0005	0.09	0.09	NG	<0.0005	<0.0005
Xylene (m)	mg/L	0.0005	NG	NG	NG	<0.0005	<0.0005
Xylene (o)	mg/L	0.0005	NG	NG	NG	<0.0005	<0.0005
Xylenes Total	mg/L	0.001	NG	0.03	NG	<0.001	<0.001
F1 (C6-C10)	mg/L	0.1	NG	0.15	NG	<0.1	<0.1
TVH: (C6-C10 / BTEX CORRECTED)	mg/L	0.1	NG	0.15	NG	<0.1	<0.1
F2 (C10-C16)	mg/L	0.1	NG	0.11	NG	<0.1	<0.1
F3 TEH: (C16-C34)	mg/L	0.1	NG	NG	NG	<0.1	<0.1
F4: (C34-C50)	mg/L	0.1	NG	NG	NG	<0.1	<0.1
VPHs	mg/L	0.1	NG	NG	NG	-	-
Glycols							
Diethylene glycol	mg/L	5	NG	150	NG	<5	<5
Ethylene glycol	mg/L	10	192	192	NG	<10	<10
Propylene glycol	mg/L	10	500	500	NG	<10	<10
Tetraethylene Glycol	mg/L	10	NG	NG	NG	<10	<10
Triethylene Glycol	mg/L	10	NG	350	NG	<10	<10
Polycyclic Aromatic Hydrocarbons (PAHs)							
Acenaphthene	mg/L	0.00002	0.0058	0.0058	NG	<0.00002	<0.00002
Acenaphthylene	mg/L	0.00002	NG	NG	NG	<0.00002	<0.00002
Acridine	mg/L	0.00005	0.0044	0.0044	NG	<0.00005	<0.00005
Anthracene	mg/L	0.00001	0.000012	0.000012	NG	<0.00001	<0.00001
Benz(a)anthracene	mg/L	0.00001	0.000018	0.000018	NG	<0.00001	<0.00001
Benzo(a) pyrene	mg/L	0.00001	0.000015	0.000015	NG	<0.00001	<0.00001
Benzo(b)fluoranthene	mg/L	0.00001	NG	NG	NG	<0.00001	<0.00001
Benzo(b+j)fluoranthene	mg/L	0.00001	NG	NG	NG	<0.00001	<0.00001
Benzo(g,h,i)perylene	mg/L	0.00001	NG	NG	NG	<0.00001	<0.00001
Benzo(k)fluoranthene	mg/L	0.00001	NG	NG	NG	<0.00001	<0.00001

Table A2-3: Surface Water Analytical Results

Parameter	Unit	RDL	CCME - AW (Freshwater) ¹	Environmental Quality Guidelines for Alberta Surface Waters ²	Flat River Water Quality Objectives ³	AEC 2	
						17A2SW1	17A2SW2
Polychlorinated Biphenyls (PCBs)							
Aroclor 1242	mg/L	0.000009	NG	NG	NG	<0.000009	<0.000009
Aroclor 1254	mg/L	0.000009	NG	NG	NG	<0.000009	<0.000009
Aroclor 1260	mg/L	0.000009	NG	NG	NG	<0.000009	<0.000009
PCBs (Sum of total)	mg/L	0.000009	NG	NG	NG	<0.000009	<0.000009
Sample ID						8777474	8777477
Lab Report Number						17Y266934	17Y266934

Notes:

¹ Canadian Council of Ministers of the Environment (CCME) Environmental Quality Guidelines (EQG), for the protection of freshwater aquatic life.

² Environmental Quality Guidelines for Alberta Surface Waters, July 2014 for the protection of freshwater aquatic life - Guidelines only apply in the absence of CCME EQG.

³ Flat River Water Quality Objectives. Mackenzie Valley Land and Water Board, 2017.

⁴ Guideline is dependant upon the pH value and temperature. The most stringent concentration has been applied.

⁵ Guideline is dependant upon the chloride concentration.

⁶ Guideline is dependant upon the pH value.

⁷ Guideline is based on the Hardness value.

⁸ Guideline shown is based on the typical range of total phosphorous concentrations of a oligotrophic water body.

RDL - Reported Detection Limit

NG - No guideline

mg/L - milligrams per litre.

BOLD Black and Shaded - Concentration exceeds the CCME EWQ for the protection of freshwater aquatic life.

BOLD Red and Shaded - Concentration exceeds the Environmental Quality Guidelines for Alberta Surface Waters for the protection of freshwater aquatic life in the absence of CCME EQG.

BOLD Black, Underline, and Shaded - Concentration exceeds the Flat River Water Quality Objectives

Italic - Detection limit greater than minimum referenced guideline value

Blank - Not analyzed

Table A2-4: Sediment Analytical Results

Parameter	Unit	Canada Wide PHC - Res/Park Coarse ¹	Canada Wide PHC - Agricultural Coarse ¹	CCME Sediment - Fresh ISQG ²	CCME Sediment - Fresh PEL ³	Proposed Preliminary Background Concentration for Flat River	AEC 2								
							17A2SS1	17A2SS2							
								2017-09-29							
							Sediment Type	Sand, gravelly, grey							
							Sand, some gravel, brown								
Cyanide															
Cyanide (SAD)	mg/kg	NG	NG	NG	NG	-	<5	<0.5							
Cyanide (WAD)	mg/kg	NG	NG	NG	NG	-	<5	<0.5							
Routine / Salinity															
pH	pH Units	NG	NG	NG	NG	-	7.75	8.15							
Moisture	%	NG	NG	NG	NG	-	20.1	21.9							
Nutrients															
Nitrogen (Total)	%	NG	NG	NG	NG	-	0.03	0.02							
Metals															
Antimony	mg/kg	NG	NG	NG	NG	-	0.2	<0.1							
Arsenic	mg/kg	NG	NG	5.9	17	56.7	4.5	2.5							
Barium	mg/kg	NG	NG	NG	NG	-	99.7	19.6							
Beryllium	mg/kg	NG	NG	NG	NG	-	0.1	<0.1							
Cadmium	mg/kg	NG	NG	0.6	3.5	1.04	0.12	0.04							
Chromium	mg/kg	NG	NG	37.3	90	-	4	2							
Cobalt	mg/kg	NG	NG	NG	NG	-	2.6	1.1							
Copper	mg/kg	NG	NG	35.7	197	39.8	44.4	2.8							
Lead	mg/kg	NG	NG	35	91.3	-	2.6	1.3							
Mercury	mg/kg	NG	NG	0.17	0.486	-	0.11	<0.01							
Molybdenum	mg/kg	NG	NG	NG	NG	-	0.2	<0.2							
Nickel	mg/kg	NG	NG	NG	NG	-	5.1	2.6							
Phosphorus	mg/kg	NG	NG	NG	NG	-	91	41							
Selenium	mg/kg	NG	NG	NG	NG	-	0.7	0.7							
Silver	mg/kg	NG	NG	NG	NG	-	<0.5	<0.5							
Thallium	mg/kg	NG	NG	NG	NG	-	<0.1	<0.1							
Tin	mg/kg	NG	NG	NG	NG	-	<0.2	<0.2							
Uranium	mg/kg	NG	NG	NG	NG	-	0.4	0.3							
Vanadium	mg/kg	NG	NG	NG	NG	-	7	3							
Zinc	mg/kg	NG	NG	123	315	202	21	7							
Particle Size															
>75 µm	%	NG	NG	NG	NG	-	82	93							
Grain Size	N/A	NG	NG	NG	NG	-	Coarse	Coarse							
Hydrocarbons															
Benzene	mg/kg	NG	NG	NG	NG	-	<0.005	<0.005							
Toluene	mg/kg	NG	NG	NG	NG	-	<0.05	<0.05							
Ethylbenzene	mg/kg	NG	NG	NG	NG	-	<0.01	<0.01							
Xylene (m)	mg/kg	NG	NG	NG	NG	-	<0.02	<0.02							
Xylene (o)	mg/kg	NG	NG	NG	NG	-	<0.02	<0.02							
Xylenes Total	mg/kg	NG	NG	NG	NG	-	<0.05	<0.05							
F1 (C6-C10)	mg/kg	NG	NG	NG	NG	-	<10	<10							
F1 (C6-C10 / BTEX CORRECTED)	mg/kg	30	130	NG	NG	-	<10	<10							
F2 (C10-C16)	mg/kg	150	150	NG	NG	-	<20	<20							
F3 (C16-C34)	mg/kg	300	1300	NG	NG	-	<20	<20							
F4: (C34-C50)	mg/kg	2800	5600	NG	NG	-	<20	<20							
Glycols															
Diethylene glycol	mg/kg	NG	NG	NG	NG	-	<10	<10							
Ethylene glycol	mg/kg	NG	NG	NG	NG	-	<10	<10							
Propylene glycol	mg/kg	NG	NG	NG	NG	-	<10	<10							
Tetraethylene Glycol	mg/kg	NG	NG	NG	NG	-	<10	<10							
Triethylene Glycol	mg/kg	NG	NG	NG	NG	-	<10	<10							
Polycyclic Aromatic Hydrocarbons (PAHs)															
IArC (CCME)	mg/kg	NG	NG	NG	NG	-	<0.6	<0.6							
B(a)P Total Potency Equivalent	mg/kg	NG	NG	NG	NG	-	<0.05	<0.05							
1-Methylnaphthalene	mg/kg	NG	NG	NG	NG	-	<0.005	<0.005							
2-methylnaphthalene	mg/kg	NG	NG	0.0202	0.201	-	<0.005	<0.005							
Acenaphthene	mg/kg	NG	NG	0.00671	0.0889	-	<0.005	<0.005							
Acenaphthylene	mg/kg	NG	NG	0.00587	0.128	-	<0.005	<0.005							
Anthracene	mg/kg	NG	NG	0.0469	0.245	-	<0.004	<0.004							
Benz(a)anthracene	mg/kg	NG	NG	0.0317	0.385	-	<0.03	<0.03							
Benz(a) pyrene	mg/kg	NG	NG	0.0319	0.782	-	<0.03	<0.03							
Benz(b)fluoranthene	mg/kg	NG	NG	NG	NG	-	<0.05	<0.05							
Benz(b+j)fluoranthene	mg/kg	NG	NG	NG	NG	-	<0.05	<0.05							
Benzo(g,h,i)perylene	mg/kg	NG	NG	NG	NG	-	<0.05	<0.05							
Benzo(k)fluoranthene	mg/kg	NG	NG	NG	NG	-	<0.05	<0.05							
Chrysene	mg/kg	NG	NG	0.0571	0.862	-	<0.05	<0.05							
Dibenz(a,h)anthracene	mg/kg	NG	NG	0.00622	0.135	-	<0.005	<0.005							
Fluoranthene	mg/kg	NG	NG	0.111	2.355	-	<0.01	<0.01							
Fluorene	mg/kg	NG	NG	0.0212	0.144	-	<0.02	<0.02							
Indeno(1,2,3-c,d)pyrene	mg/kg	NG	NG	NG	NG	-	<0.02	<0.02							
Naphthalene	mg/kg	NG	NG	0.0346	0.391	-	<0.005	<0.005							
Phenanthrene	mg/kg	NG	NG	0.0419	0.515	-	<0.02	<0.02							
Pyrene	mg/kg	NG	NG	0.053	0.875	-	<0.01	<0.01							
Benzo(j)fluoranthene	ug/g	NG	NG	NG	NG	-	<0.05	<0.05							
							Sample Code	8783996							
							Lab Report Number	17V267776							
								17V267776							

Notes:

¹ - Canadian Council of Ministers of the Environment (CCME) Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (CCME 2008)

² - Canadian Council of Ministers of the Environment (CCME) Sediment Quality Guidelines for the Protection of Aquatic Life - Interim Sediment Quality Guidelines (ISQG) for Freshwater (CCME 1999).

³ - Canadian Council of Ministers of the Environment (CCME) Sediment Quality Guidelines for the Protection of Aquatic Life - Probable Effect Level (PEL) for Freshwater (CCME 1999)

Italic - Laboratory detection limit is greater than Tier 1 guideline

NG - No guideline

Bold and Underline - Exceeds CCME ISQG

Bold and Shaded - Exceeds CCME PEL and ISQG

Bold - Exceeds CCME Canada-Wide Standards for Petroleum Hydrocarbon Guideline

Red - Exceeds proposed preliminary background concentration for Flat River sediment

N/A - Not applicable

“” Not analyzed

Cyanide (SAD) - Strong Acid Dissociable

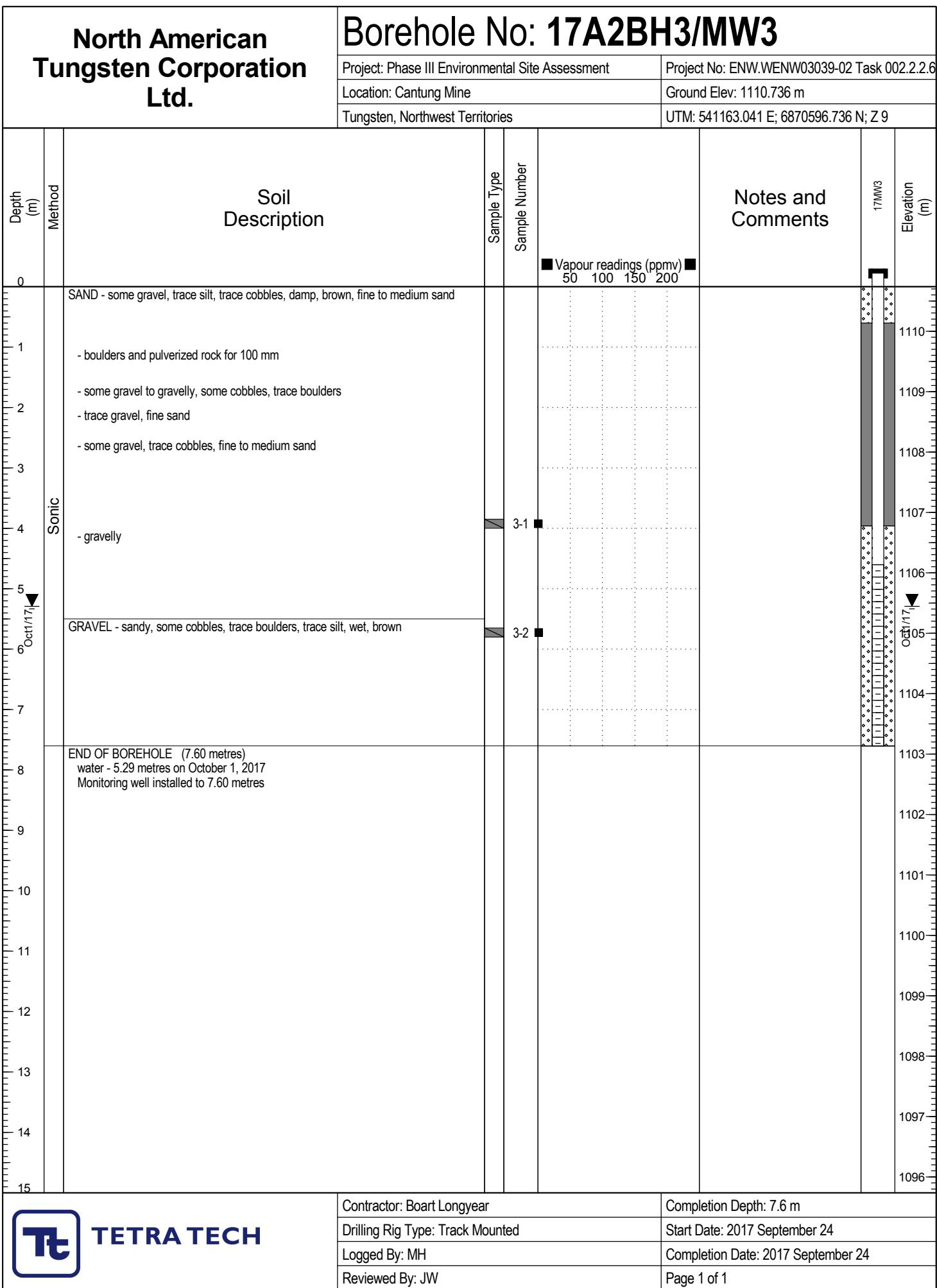
Cyanide (WAD) - Weak Acid Dissociable

North American Tungsten Corporation Ltd.		<h1>Borehole No: 17A2BH1</h1>					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1113.707 m		
		Tungsten, Northwest Territories			UTM: 541237.437 E; 6870620.367 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)	Notes and Comments	Backfill (Elevation) (m)
0					■ Vapour readings (ppmv) ■ 50 100 150 200		
1	Sonic	SAND (TAILINGS) - some gravel, some cobbles, organics, trace silt, damp, brown, styrofoam debris, fine to medium sand - trace gravel		1-1			1113
2		SAND (FILL) - some gravel, some organics, trace silt, damp, plastic, dark brown, wood debris - silty, light brown - trace organics, glass, metal parts, plastics - gravelly - cloth for 600 mm		1-2			1112
3		- trace gravel, trace cobbles, wet, brown		1-3			1111
4		- some gravel		1-4			1110
5		SAND (COLLUVIAL FILL) - silty, some gravel, wet, dark grey				24% particles <75 µm (ie. smaller than sand particle)	1109
6		SAND - gravelly, some silt, some cobbles, damp, light brown					1108
7							1107
8		END OF BOREHOLE (7.60 metres) Note: Backfilled with bentonite at completion					1106
9							1105
10							1104
11							1103
12							1102
13							1101
14							1100
15							1099
 TETRA TECH		Contractor: Boart Longyear			Completion Depth: 7.6 m		
		Drilling Rig Type: Track Mounted			Start Date: 2017 September 24		
		Logged By: MH			Completion Date: 2017 September 24		
		Reviewed By: JW			Page 1 of 1		

North American Tungsten Corporation Ltd.		Borehole No: 17A2BH2								
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6					
		Location: Cantung Mine			Ground Elev: 1115.171 m					
		Tungsten, Northwest Territories			UTM: 541196.598 E; 6870647.938 N; Z 9					
Depth (m)	Method	Soil Description			Sample Type	Sample Number	Notes and Comments			
0	Sonic	GRAVEL AND SAND (FILL) - trace silt, damp to moist, light brown, fine sand - trace organics for 100 mm					■ Vapour readings (ppmv) 50 100 150 200			
1		GRAVEL (FILL) - sandy, trace to some silt, trace cobbles, damp, brown, wire debris, wood debris, cloth, styrofoam, plastic, glass					Gravel - 52%; Sand - 39%; Silt 9%			
2		SILT (FILL) - some sand, some gravel, trace cobbles, trace organics, damp, firm, brown								
3		- sandy								
4		GRAVEL (COLLUVIAL FILL) - silty, some sand, some cobbles, damp, black grey, metal debris, wood debris			2-1	■	27% particles <75 µm (ie. smaller than sand particle)			
5		SAND - gravelly, some cobbles, trace boulders, trace silt, damp, brownish white, medium sand			2-2	■				
6		END OF BOREHOLE (6.00 metres) Note: Backfilled with bentonite at completion								
7										
8										
9										
10										
11										
12										
13										
14										
15										
 TETRA TECH		Contractor: Boart Longyear			Completion Depth: 6 m					
		Drilling Rig Type: Track Mounted			Start Date: 2017 September 24					
		Logged By: MH			Completion Date: 2017 September 24					
		Reviewed By: JW			Page 1 of 1					



TETRA TECH



North American Tungsten Corporation Ltd.		Borehole No: 17A2BH4/MW4					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1108.326 m		
		Tungsten, Northwest Territories			UTM: 541212.793 E; 6870554.361 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Notes and Comments		Elevation (m)
0					■ Vapour readings (ppmv) ■		17MW4
1		SAND - some silt, trace organics, damp, tan to light brown, fine sand - trace gravel, cobbles pushed to 2.50 metres, medium sand					1108
2	Oct 1/17 Sonic	SILT - sandy, trace gravel, moist, tan and light brown - trace sand, wet, grey, tan streaks, fine sand					1107
3		SAND AND GRAVEL - trace silt, wet, grey, fine gravel, medium to coarse sand	4-1		Gravel - 38%; Sand - 60%; Silt - 2%		106
4							1105
5							1104
6		END OF BOREHOLE (6.10 metres) water - 2.12 metres on October 1, 2017 Monitoring well installed to 6.10 metres					1103
7							1102
8							1101
9							1100
10							1099
11							1098
12							1097
13							1096
14							1095
15							1094
 TETRA TECH		Contractor: Boart Longyear			Completion Depth: 6.1 m		
		Drilling Rig Type: Track Mounted			Start Date: 2017 September 29		
		Logged By: MG			Completion Date: 2017 September 29		
		Reviewed By: JW			Page 1 of 1		

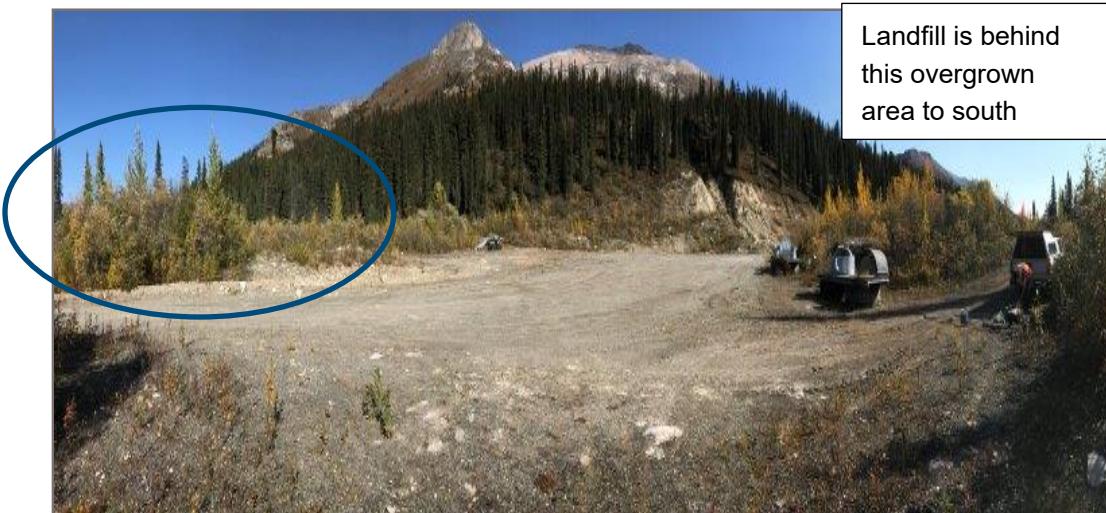


Photo 1: Facing southeast looking towards former landfill (treed area at top left).
(September 18, 2017)



Photo 2: Facing southeast from apartment buildings. Old landfill entrance visible in the background to the right of image. Landfill is in treed area at top right in general area indicated.
(September 28, 2017)



Photo 3: Facing southeast toward Old Landfill. Photo provided by NATC. (May 5, 2014)

AEC 3

AEC 3: New Landfill

Area Description	
Location	Northeast side of Flat River accessed from bridge 3. Located within a former gravel pit, at base of mountain slope on a bench above Flat River floodplain.
Topography	Kettle depressions and/or oxbows to west and south; depression to south is small pond.
Surface Drainage	Runoff would infiltrate to ground in the vicinity of the landfill. Runoff from outside of depressions would be to southwest towards Flat River or oxbow lake.
Background	The landfill currently active (start date unknown; was active in 2001). The landfill has received domestic and some construction and demolition wastes. Incinerators, and burn bins have been used to burn organics prior to disposal. The landfill does not have a liner or leachate collection, and would therefore be classified as "natural attenuation landfill".
Historical Assessment Information	
Phase II Environmental Site Assessment (EBA, 2008)	Number groundwater samples
	Number of groundwater samples with petroleum hydrocarbons impacts
	Number of groundwater samples with metal exceedances
Comments: EBA (2008) analyzed groundwater at two locations that were inferred to be hydraulically down-gradient from new landfill, and at one location inferred to be cross-gradient. Some dissolved metals (arsenic, cadmium, copper, iron, selenium) were present in groundwater; however, some of these parameters are known to be elevated in background. At time of 2008 ESA, EBA concluded that groundwater results do not indicate presence of groundwater impacts due to presence of New Landfill.	
2017/2018 Environmental Site Assessment Details	
Environmental Site Assessment Scope	
Utility Locate SOP followed?	Yes – determined that there are no underground utilities in area, so private utility locator wasn't required and no mitigations required.
EM 31 Geophysics Complete?	Yes
Number of test pits advanced	0
Number of boreholes advanced	4
Number of hand auger locations advanced	4
Number of soil samples submitted for laboratory chemical analysis	12
Number of boreholes completed as monitoring wells	1 (to replace destroyed well thought to be cross-gradient)
Number of existing monitoring wells	3
Number of groundwater samples collected	3 (2017 and 2018)
Number of sediment and surface water samples collected	0
Geophysics (EM 31 Apparent Terrain Conductivity) Findings	
<ul style="list-style-type: none"> ▪ As indicated on Figure A3-3 survey was completed throughout area of new landfill location. ▪ Background apparent terrain conductivity values for area generally between 5 to 20 mS/m (shown by cool colours on figure). ▪ Areas of higher than background apparent terrain conductivity values shown by hot colours shown on figure. ▪ Negative apparent terrain conductivity values likely caused by surface and buried metals. ▪ Thick black dotted line on figure represents interpreted delineation of landfill. ▪ The higher apparent terrain conductivity data in marked landfill delineation have signatures consistent with buried metals and waste materials. 	
Soil Investigation and Conditions	
Maximum Depth of Investigation	13.70 mbgs (September 24, 2017)
General Stratigraphy (Typical in Landfill)	

AEC 3: New Landfill

Description	Depth from (mbgs)	Depth to (mbgs)	Observations			
Sand, silt and gravel (fill) with intermixed refuse	0	9.75	Refuse observed included wood, plastic, metal. Hydrocarbon odour at about 7 m to 9 m.			
Peat - organics	9.75	10.4	No odour			
Silt, trace clay	10.4	13.7	No odour			
Combustible Vapour Concentrations (CVC)						
Ranged from less than detection at many locations to 110 ppm at 7.2 m in 17A3BH2.						
Groundwater Conditions						
Depth to Groundwater	Based on groundwater elevations (September 2017, June 2018) from down-gradient monitoring wells, and moisture contents during drilling within landfill, it is estimated to be about 10 mbgs.					
Free Product	PHC free product not observed during fall 2017 or summer 2018.					
2017/2018 Environmental Site Assessment Results Summary						
<ul style="list-style-type: none"> ▪ Figure A3-1 shows auger hole, borehole and indication of exceedances for soils. ▪ Figure A3-2 provides monitoring well locations, and indication of exceedances for groundwater. ▪ Table A3-1 summarizes soil lab results relative to guidelines. ▪ Table A3-2 summarizes groundwater lab results relative to guidelines. 						
General Site Observations						
<ul style="list-style-type: none"> ▪ Site was a former aggregate source/ gravel pit, now being backfilled as landfill, unlined with no collection systems. ▪ Refuse buried in cells on surface and then covered with sand and gravel from northeast slope of pit. ▪ Refuse included metals, plastics, glass, wood. ▪ Base of waste cells, appears to coincide with a peat layer, and groundwater table. ▪ There are burn bins, and small incinerators, and one AST at Landfill site, and waste appears to be segregated prior to disposal. Primary incinerator (for organics) is near sewage treatment plant. Incinerators also likely used for wood and combustible demolition products. 						
Soil: Petroleum Hydrocarbons (PHCs, PAHs, BTEX)						
<ul style="list-style-type: none"> ▪ Laboratory results for PHCs, PAHs, BTEX were less than guidelines with exception of: <ul style="list-style-type: none"> – Sample 17A3BH2-2 at depth of 7.3 mbgs contained benzene, toluene, ethylbenzene, xylene, PHC (F1, F2, F3), and naphthalene exceeding guidelines. – Sample 17A2BH2-3 at depth of 9.3 mbgs contained PHCs (F3) greater than guidelines. – Sample 17A2BH4-1 at depth of 5.0 mbgs contained benzene and naphthalene greater than guidelines. – Sample 17A3HA2-1 at depth of 0.2 mbgs had xylenes and PHC (F2) greater than guidelines. 						
Metals						
<ul style="list-style-type: none"> ▪ Laboratory results indicated following for 17A2BH1: <ul style="list-style-type: none"> – Sample 17A2BH1-2 at depth of 9.8 mbgs had arsenic, barium, cadmium, molybdenum, nickel, selenium and zinc exceeding guidelines. – Sample 17A2BH1-3 at depth of 11.0 mbgs had arsenic, barium, selenium and zinc exceeding guidelines; barium also above preliminary background concentration. ▪ Laboratory results indicated following for 17A3BH2: <ul style="list-style-type: none"> – Sample 17A3BH2-2 at depth of 7.3 mbgs contained arsenic, barium, cadmium, copper, molybdenum, nickel, selenium, and zinc exceedances. Barium and copper were above their preliminary background concentrations. – Sample 17A3BH2-3 at depth of 9.3 mbgs had metals concentrations exceeding guidelines for arsenic, barium, cadmium, nickel, zinc. Barium was also above preliminary background concentrations. – Sample 17A3BH2-4 from 10.5 mbgs had exceedances of barium, beryllium, cadmium, copper, molybdenum, tin and zinc. Barium, beryllium, copper and tin were also above preliminary background concentrations. ▪ Laboratory results for sample 17A3BH4-1 at 5.0 mbgs had exceedances of guidelines for antimony, arsenic, barium, cadmium, copper, molybdenum, nickel, tin and zinc. Arsenic, cadmium, molybdenum, nickel were all below preliminary background concentrations. 						

AEC 3: New Landfill

- Shallow samples from hand auger holes 17A3HA2, 3, and 4, had exceedances of arsenic, barium, cadmium, molybdenum, nickel, selenium and zinc. Barium and cadmium also exceeded their preliminary background concentrations.

Soil: Other PCOCs (Glycols, VOCs, polychlorinated biphenyls PCBs, pH)

- Laboratory results were less than detection limits and guidelines with exception of:
 - pH outside guidelines limits in samples 17A3BH2-4, 17A3HA2-1, 7A3HA3-1, and 17A3HA4-1.
 - Detection limit for PCBs in sample 17A3BH2-2 was greater than guidelines due to matrix interference.
 - Detection limit for trichlorobenzene in sample 17A3BH2-4 was greater than guidelines due to matrix interference.

Groundwater: Petroleum Hydrocarbons

2017 and 2018

- All PHC concentrations less than detection limits and guidelines.

Groundwater: Metals/Routine Parameters

2017

- Laboratory results less than guidelines with exception of:
 - Dissolved fluoride at all three monitoring wells (fluoride below preliminary background concentration at NLMW3).
 - Dissolved sulphate at NLMW3 above guidelines and preliminary background concentrations.
 - Dissolved cadmium above guidelines and preliminary background concentration at all three monitoring wells.

2018

- Laboratory results less than guidelines with exception of:
 - Fluoride at all three monitoring wells above guidelines and preliminary background concentrations.
 - Sulphate at NLMW 1 and NLMW3 above guidelines but below preliminary background concentrations.
 - Cadmium above guidelines and preliminary background concentration at NLMW1 and NLMW3
 - Copper above guidelines at NLMW3
 - Iron above guidelines at 17A3MW1

Groundwater: Other PCOCs (glycols, PCBs, pesticides, and VOCs)

- The detection limits for select pesticide and VOC parameters for all three samples were greater than most stringent guidelines; as these parameters were not above the higher detection limits, and these parameters were not detected in soils, the elevated detection limits were not a concern.

Environmental Concerns

Location in AEC	Potential Source(s)	Identified Contaminated Media	Parameters Assessed and Contaminant(s) of Concern (COCs; bold & underline)
Buried refuse and intermixed soils.	Leaching from refuse, leaking from containers with residual.	Soil; Groundwater	Soil: Cyanide, <u>metals</u> , <u>PHCs</u> , glycols, PAHs, VOCs, PCBs, phenols, pesticides, dioxins and furans. Groundwater: <u>dissolved metals</u> , <u>routine parameters</u> , nutrients, phenols, PHCs, glycols, PAHs, VOCs, PCBs, pesticides

Discussion (Significance of Results)

Landfill siting and future use considerations:

- The current extent of landfilled material and types of refuse within have been characterized, and 2 or 3 down-gradient MWs established (1 well may be cross-gradient). An up-gradient MW would be beneficial to confirm background groundwater chemistry, and better establish groundwater flow direction.
- There appears to be no vertical separation between base of refuse cells and groundwater; minimum recommended separation of 1.5 and 3 m recommended in many other Canadian jurisdictions; however, Tetra Tech are unaware of any minimum requirement in NWT at this time.
- The landfill is approximately 150 m from Flat River and 100 m from a small lake. Although there do not appear to be landfill siting guidelines for NWT, other jurisdictions (e.g., Yukon) require 300 m minimum separation from waterbodies.
- Substantial vertical capacity remains within existing landfill; and this could be used as a location for landfilling demolition wastes.

AEC 3: New Landfill

Soils:

- Several parameters (PHCs, BTEX and several metals) exceed guidelines within landfill cover and refuse within landfill. The deepest samples from native materials beneath landfill did not have PHCs or BTEX, suggesting that soil hydrocarbon contamination is likely limited to within landfill.
- The cover material, which is sourced from the nearby slope of the gravel pit, had some elevated metals which are above the preliminary background concentrations; suggesting that in this local area, there may be higher background concentrations.
- Glycols, PAHs, PCBs, phenols, pesticides, dioxins & furans, and VOCs were not detected, were well below guidelines and are no longer considered PCOCs in soils at AEC 3.

Groundwater:

2017

- MW NLMW3 showed highest concentrations of landfill leachate indicator parameters (chloride, TDS, sulphate), double those at NLMW1 and about 3x those at 17A3MW1. This suggests that NLMW3 is being affected by landfill leachate, with southeasterly groundwater flow.
- MWs are located in a line, making it difficult to confirm exact groundwater flow direction. An additional background monitoring well on southeast side of landfill help confirm groundwater flow direction and background concentrations.
- Dissolved cadmium, fluoride and sulphate above guidelines in the cross-gradient MW suggest they may be naturally occurring in this vicinity. Localized elevated background metals concentrations for cadmium and iron at OBLMW1 may explain exceedances at OLMW2 and 17A2MW3 and 17A2MW4.
- The lack of any organic chemicals above detection at down-gradient wells and the fact that the metals that do exceed are at similar concentrations to those at the cross-gradient well suggest that there are no current substantial negative effects to down-gradient groundwater quality from landfill leachate.

Glycols, PCBs, phenols, pesticides and VOCs were not detected in groundwater, soils or refuse, and are no longer considered groundwater PCOCs at AEC 3.

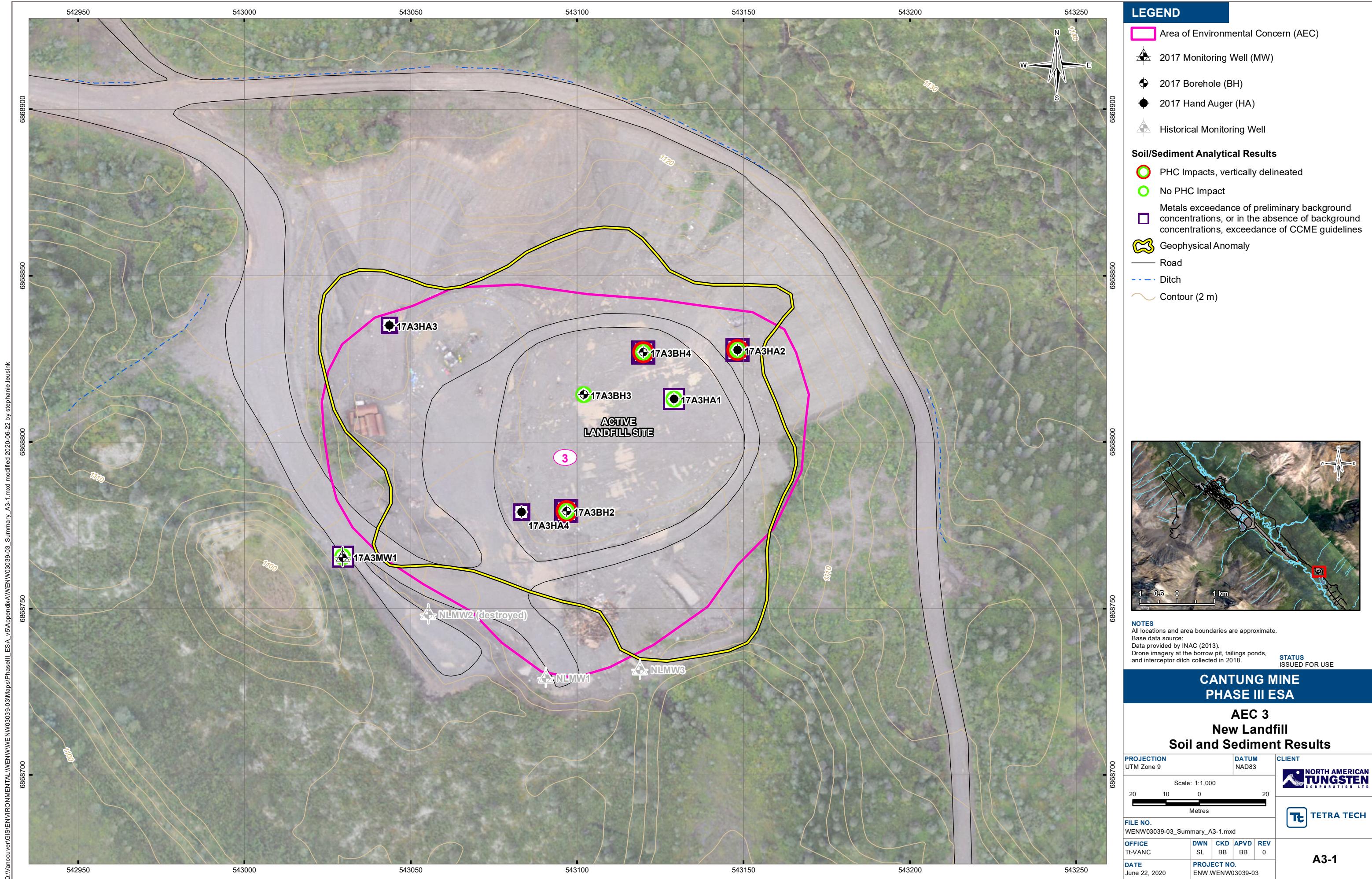
2018

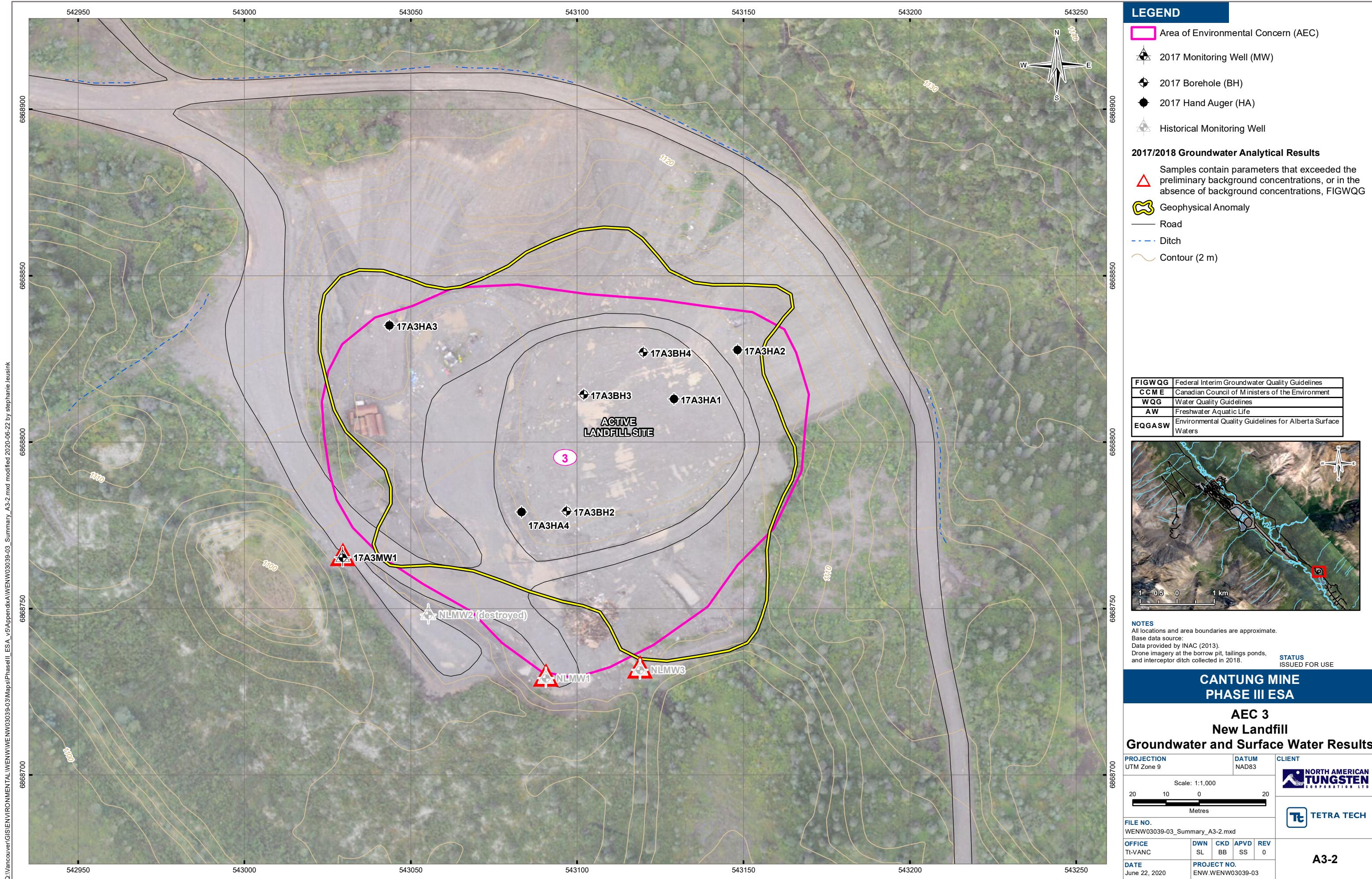
- MWs NLMW1 and NLMW3 showed much higher concentrations of landfill leachate indicator parameters (fluoride, sulphate), approximately 5x those at 17A3MW1. This suggests that NLMW1 and NLMW3 are being affected by landfill leachate, with southeasterly groundwater flow.
- MWs are located in a line, making it difficult to determine precise groundwater flow direction. An additional background monitoring well on southeast side of landfill help confirm groundwater flow direction and background concentrations.

Glycols, PCBs, phenols, pesticides and VOCs were not detected in groundwater, soils or refuse, and are no longer considered groundwater COCs at AEC 3.

Attachments

- Figure A3-1 – Soil and Sediment Results
- Figure A3-2 – Groundwater and Surface Water Results
- Figure A3-3 – AEC 3 New Landfill EM31 Apparent Terrain Conductivity Survey
- Table A3-1 – Soil Analytical Results
- Table A3-2 – Groundwater Analytical Results
- Borehole, Monitoring Well, and Test pit Logs
- Photographs





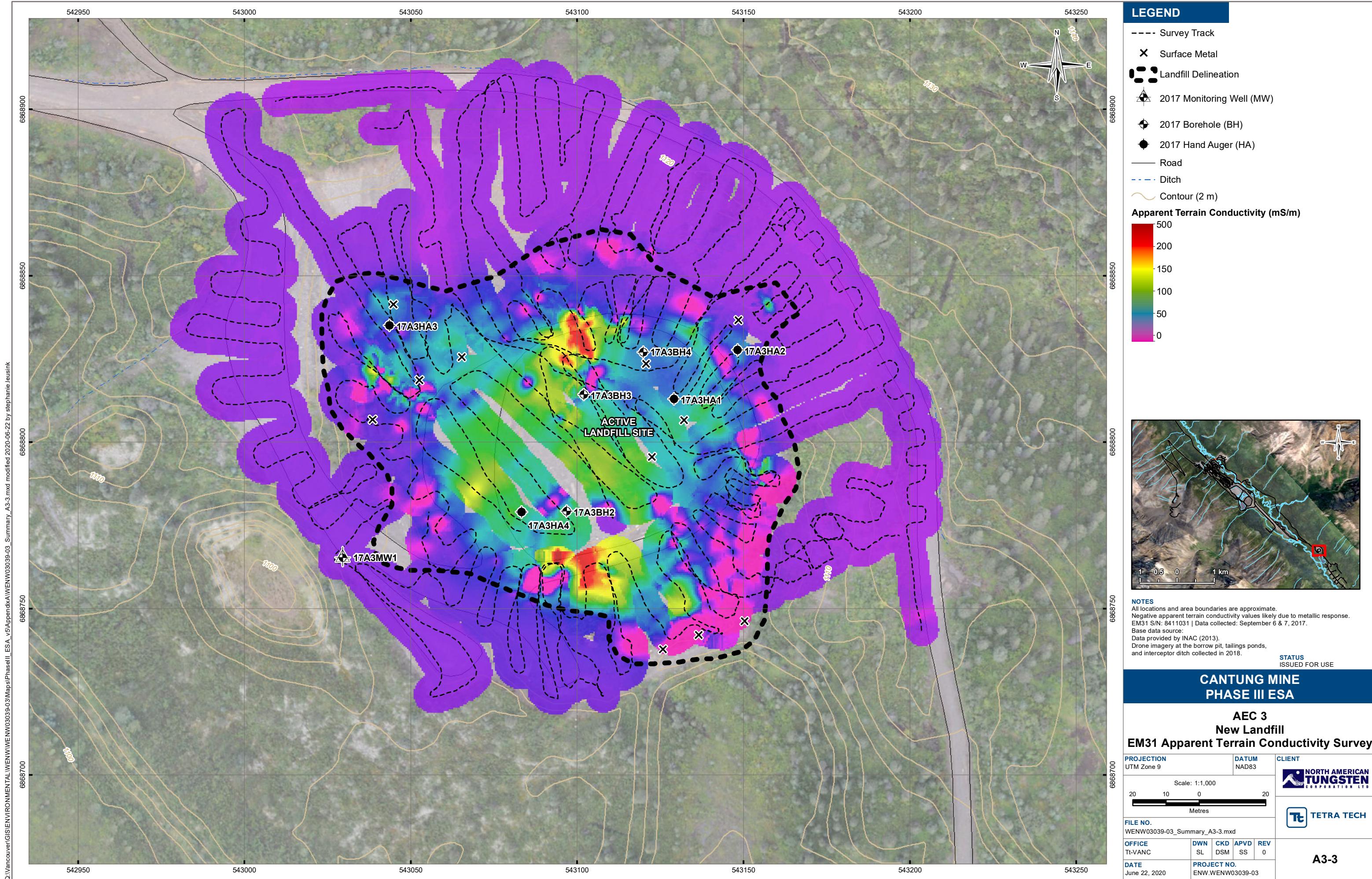


Table A3-1: Soil Analytical Results

Parameter	Unit	Most Stringent of Referenced Guidelines ^{1,2,3}	Preliminary Background Concentration ⁴	AEC 3												
				17A3BH1		17A3BH2			17A3BH4		17A3HA1		17A3HA2		17A3HA3	17A3HA4
				17A3BH1-2	17A3BH1-3	17A3BH2-2	17A3BH2-3	17A3BH2-4	17A3BH4-1	17A3BH4-2	17A3HA1-1	17A3HA2-1	17A3HA2-2	17A3HA3-1	17A3HA4-1	
				9.8 m	11.0 m	7.3 m	9.3 m	10.5 m	5.0 m	11.0 m	0.25 m	0.2 m	0.25 m	0.25 m	0.25 m	
Cyanide																
Cyanide (SAD)	mg/kg	NG	NG	<0.5	<0.5	<10	<0.5	-	<0.5	-	-	-	-	-	-	
Cyanide (WAD)	mg/kg	0.9	NG	<0.5	<0.5	<u><10</u>	<0.5	-	<0.5	-	-	-	-	-	-	
Routine / Salinity																
pH	pH Units	6-8	NG	6.43	7.42	7.51	6.76	5.75	7.33	-	-	8.09	-	8.21	8.15	
Moisture	%	NG	NG	14 - 15.8	16.2 - 17.6	13.4 - 14	16.4 - 21.1	39.4 - 56	10.4 - 11.6	14.7	-	8.18	8.22	-	8.61	
Metals																
Antimony	mg/kg	20	NG	5.1	4.3	4.8	2.6	0.9	23.5	-	-	4.8	-	5.1	4.1	
Arsenic	mg/kg	12	64	28	13.7	26.1	19.2	8.3	17.8	-	-	24.4	-	31.9	23.4	
Barium	mg/kg	500	946	1300	1050	1960	2420	954	1080	-	-	2480	-	3760	2610	
Beryllium	mg/kg	4	NG	0.4	0.4	0.5	0.4	6.1	0.6	-	-	0.7	-	0.6	0.5	
Cadmium	mg/kg	1.4	2.8	3.39	0.93	2.24	1.85	2.53	2.75	-	-	3.46	-	3.37	2.91	
Chromium	mg/kg	64	NG	25	20	27	25	16	55	-	-	21	-	23	20	
Cobalt	mg/kg	40	NG	15.8	6.8	20	17.3	7.2	16.5	-	-	17.5	-	18.2	16.8	
Copper	mg/kg	63	NG	41.6	33.2	75.1	51.6	612	1480	-	-	46.5	-	45.1	40.5	
Lead	mg/kg	70	NG	21.3	18.7	48.9	26.4	50.6	81	-	-	23.8	-	24	22	
Mercury	mg/kg	6.6	NG	0.17	0.23	1.06	0.16	0.33	2.25	-	-	0.09	-	0.09	0.07	
Molybdenum	mg/kg	5	10	7.1	5.2	6.2	4.9	6.7	8.9	-	-	7.1	-	8.6	6.5	
Nickel	mg/kg	45	72	67.2	43.8	64.4	58.5	26.2	62.1	-	-	66.1	-	65.5	66	
Selenium	mg/kg	1	1.7	1.6	1	1.3	0.9	0.7	0.9	-	-	1.3	-	1.2	1.1	
Silver	mg/kg	20	NG	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	-	-	<0.5	-	<0.5	<0.5	
Thallium	mg/kg	1	NG	0.5	0.2	0.4	0.2	0.2	0.3	-	-	0.4	-	0.5	0.4	
Tin	mg/kg	5	NG	0.3	0.3	1.6	1	21.5	6.4	-	-	0.6	-	0.5	0.2	
Uranium	mg/kg	23	NG	1.6	1.6	1.8	1.4	2.2	2.1	-	-	1.7	-	2.2	1.9	
Vanadium	mg/kg	130	160	113	111	89	57	36	70	-	-	82	-	94	77	
Zinc	mg/kg	200	462	441	371	356	297	331	852	-	-	352	-	394	400	
Particle Size																
>75 µm	%	NG	NG	78	-	53	-	-	-	-	-	77	69	-	82	
Grain Size	N/A	NG	NG	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	
Petroleum Hydrocarbons																
Benzene	mg/kg	0.03	NG	<0.005	<0.005	0.057	<0.005	<0.005	0.11	<0.005	-	0.011	<0.005	-	<0.005	
Toluene	mg/kg	0.1	NG	<0.05	<0.05	0.28	<0.05	<0.05	0.09	<0.05	-	<0.05	<0.05	-	<0.05	
Ethylbenzene	mg/kg	0.082	NG	<0.01	<0.01	0.45	<0.01	<0.01	0.04	<0.01	-	0.02	<0.01	-	<0.01	
Xylenes (m & p)	mg/kg	NG	NG	-	-	-	-	-	-	-	-	-	-	-	-	
Xylene (m)	mg/kg	NG	NG	<0.02	<0.02	0.92	<0.02	<0.02	0.03	<0.02	-	0.08	0.02	-	<0.02	
Xylene (o)	mg/kg	NG	NG	<0.02	<0.02	0.4	<0.02	<0.02	<0.02	<0.02	-	0.04	<0.02	-	<0.02	
Xylenes Total	mg/kg	0.1	NG	<0.05	<0.05	1.32	<0.05	<0.05	<0.05	<0.05	-	0.12	<0.05	-	<0.05	
Volatile Hydrocarbons (VH6-10)	mg/kg	NG	NG	-	-	-	-	-	-	-	-	-	-	-	-	
F1 (C6-C10)	mg/kg	30	NG	<10	<10	143	<10	<10	<10	<10	-	10	<10	-	<10	
VPH C6-C10	mg/kg	NG	NG	-	-	-	-	-	-	-	-	-	-	-	-	
F1 (C6-C10 / BTEX CORRECTED)	mg/kg	30	NG	<10	<10	141	<10	<10	<10	<10	-	10	<10	-	<10	
F2 (C10-C16)	mg/kg	150	NG	<20	<20	487	<20	<40	<20	<20	-	161	87	-	<20	
F3 (C16-C34)	mg/kg	300	NG	<20	<20	445	522	139	121	<20	-	132	64	-	<20	
F4: (C34-C50)	mg/kg	2800	NG	<20	<20	162	117	46	48	<20	-	39	<20	-	<20	
VPHs	mg/kg	NG	NG	-	-	-	-	-	-	-	-	-	-	-	-	
Glycols																
Diethylene glycol	mg/kg	NG	NG	<10	<10	<10	<10	-	<10	-	-	<1				

Table A3-1: Soil Analytical Results

Parameter	Unit	Most Stringent of Referenced Guidelines ^{1,2,3}	Preliminary Background Concentration ⁴	AEC 3												
				17A3BH1		17A3BH2			17A3BH4		17A3HA1		17A3HA2		17A3HA3	17A3HA4
				17A3BH1-2	17A3BH1-3	17A3BH2-2	17A3BH2-3	17A3BH2-4	17A3BH4-1	17A3BH4-2	17A3HA1-1	17A3HA2-1	17A3HA2-2	17A3HA3-1	17A3HA4-1	
				9.8 m	11.0 m	7.3 m	9.3 m	10.5 m	5.0 m	11.0 m	0.25 m	0.2 m	0.25 m	0.25 m	0.25 m	
				2017-09-24	2017-09-24	2017-09-25	2017-09-25	2017-09-25	2017-09-25	2017-09-25	2017-09-19	2017-09-19	2017-09-19	2017-09-19	2017-09-19	
Fluoranthene	mg/kg	50	NG	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	-	<0.01	<0.01	-	<0.01	
Fluorene	mg/kg	NG	NG	<0.02	<0.02	<0.2	<0.02	<0.02	<0.02	<0.02	-	<0.02	<0.02	-	<0.02	
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	NG	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	<0.02	<0.02	-	<0.02	
Naphthalene	mg/kg	0.013	NG	<0.005	<0.005	0.19	0.009	0.005	0.061	<0.005	-	<0.005	<0.005	-	<0.005	
Phenanthrene	mg/kg	0.046	NG	<0.02	<0.02	<0.2	0.02	<0.02	0.04	<0.02	-	<0.02	<0.02	-	<0.02	
Pyrene	mg/kg	0.1	NG	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	
Benzo(j)fluoranthene	ug/g	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	
Polychlorinated Biphenyls (PCBs)																
Aroclor 1242	mg/kg	NG	NG	<0.05	-	<5	<0.05	-	<0.05	-	-	<0.05	-	-	<0.05	
Aroclor 1254	mg/kg	NG	NG	<0.05	-	<5	<0.05	-	<0.05	-	-	<0.05	-	-	<0.05	
Aroclor 1260	mg/kg	NG	NG	<0.05	-	<5	<0.05	-	<0.05	-	-	<0.05	-	-	<0.05	
Aroclor 1262	mg/kg	NG	NG	-	-	-	-	-	-	-	-	-	-	-	-	
PCBs (Sum of total)	mg/kg	0.5	NG	<0.05	-	≤5	<0.05	-	<0.05	-	-	<0.05	-	-	<0.05	
Phenols																
2,3,4,5-tetrachlorophenol	mg/kg	0.05	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
2,3,4,6-tetrachlorophenol	mg/kg	0.05	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
2,3,4-Trichlorophenol	mg/kg	0.05	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
2,3,5,6-Tetrachlorophenol	mg/kg	0.05	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
2,3,5-Trichlorophenol	mg/kg	0.05	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
2,3,6-Trichlorophenol	mg/kg	0.05	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
2,4,5-trichlorophenol	mg/kg	0.05	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
2,4,6-trichlorophenol	mg/kg	0.05	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
2,4-dichlorophenol	mg/kg	0.05	NG	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	-	<0.002	-	-	
2,4-dimethylphenol	mg/kg	0.1	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
2,4-dinitrophenol	mg/kg	0.1	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
2,6-dichlorophenol	mg/kg	0.05	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
2-chlorophenol	mg/kg	0.05	NG	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	-	<0.002	-	-	
2-nitrophenol	mg/kg	0.1	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
3-&4-methylphenol	mg/kg	NG	NG	<0.005	<0.005	0.641	0.027	2.08	<0.005	-	-	<0.005	-	-	<0.005	
3,4,5-Trichlorophenol	mg/kg	0.05	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
4,6-Dinitro-2-methylphenol	mg/kg	0.1	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
4-chloro-3-methylphenol	mg/kg	NG	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
4-nitrophenol	mg/kg	0.1	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
Cresol Total	mg/kg	0.1	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
Pentachlorophenol	mg/kg	7.6	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	-	
Phenol	mg/kg	3.8	NG	<0.0012	<0.0012	0.065	<0.0012	<0.0012	0.257	-	-	<0.0012	-	-	<0.0012	
Organochlorine Pesticides																
2,4-DDT	mg/kg	NG	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-	-	
4,4-DDE	mg/kg	NG	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-	-	
a-BHC	mg/kg	NG	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-	-	
Aldrin	mg/kg	NG	NG	<0.005	<0.005	<0.005	<0.005	<0.								

Table A3-1: Soil Analytical Results

Parameter	Unit	Most Stringent of Referenced Guidelines ^{1,2,3}	Preliminary Background Concentration ⁴	AEC 3												
				17A3BH1		17A3BH2			17A3BH4		17A3HA1		17A3HA2		17A3HA3	17A3HA4
				17A3BH1-2	17A3BH1-3	17A3BH2-2	17A3BH2-3	17A3BH2-4	17A3BH4-1	17A3BH4-2	17A3HA1-1	17A3HA2-1	17A3HA2-2	17A3HA3-1	17A3HA4-1	
				9.8 m	11.0 m	7.3 m	9.3 m	10.5 m	5.0 m	11.0 m	0.25 m	0.2 m	0.25 m	0.25 m	0.25 m	
				2017-09-24	2017-09-24	2017-09-25	2017-09-25	2017-09-25	2017-09-25	2017-09-25	2017-09-19	2017-09-19	2017-09-19	2017-09-19	2017-09-19	
Carbon tetrachloride	mg/kg	0.1	NG	<0.02	<0.02	<0.02	<0.02	<0.04	<0.02	-	-	<0.02	<0.02	-	<0.02	
Chlorobenzene	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.1	0.07	-	-	<0.05	<0.05	-	<0.05	
Chloroethane	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
Chloroform	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
Chloromethane	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
Dibromochloromethane	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
1,2-Dibromoethane	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
1,2-Dichlorobenzene	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.1	0.07	-	-	<0.05	<0.05	-	<0.05	
1,3-Dichlorobenzene	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
1,4-Dichlorobenzene	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
1,1-Dichloroethane	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
1,2-Dichloroethane	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
1,1-Dichloroethene	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
1,2-Dichloroethene (cis)	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
1,2-Dichloroethene (trans)	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
1,2-Dichloropropane	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
1,3-Dichloropropene [cis]	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
1,3-Dichloropropene [trans]	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
Methyl t-Butyl Ether (MTBE)	mg/kg	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	-	-	<0.1	<0.1	-	<0.1	
Methylene Chloride	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
4-Methyl-2-pentanone	mg/kg	NG	NG	<0.5	<0.5	<0.5	<0.5	<1	<0.5	-	-	<0.5	<0.5	-	<0.5	
Styrene	mg/kg	0.1	NG	<0.05	<0.05	0.06	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
1,1,1,2-Tetrachloroethane	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
1,1,2,2-Tetrachloroethane	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
Tetrachloroethene	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.1	0.08	-	-	<0.05	<0.05	-	<0.05	
1,2,4-Trichlorobenzene	mg/kg	0.05	NG	<0.05	<0.05	<0.05	<0.05	<0.1	0.05	-	-	<0.05	<0.05	-	<0.05	
1,1,1-Trichloroethane	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
1,1,2-Trichloroethane	mg/kg	0.1	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
Trichloroethene	mg/kg	0.1	NG	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	-	-	<0.01	<0.01	-	<0.01	
Trichlorofluoromethane	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
Vinyl chloride	mg/kg	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	-	-	<0.05	<0.05	-	<0.05	
Dioxins and Furans																
Total PCDDs	ng/kg	NG	NG	0	-	0	0	-	0	-	20	4.8	-	-	-	
Total PCDFs	ng/kg	NG	NG	0	-	0	0	-	0	-	34.7	6	-	-	-	
2,3,7,8-Tetra CDD (TEF 1.0)	TEQ	NG	NG	0	-	0	0	-	0	-	0	0	-	-	-	
1,2,3,7,8-Penta CDD (TEF 1.0)	TEQ	NG	NG	0	-	0	0	-	0	-	0.211	0	-	-	-	
1,2,3,4,7,8-Hexa CDD (TEF 0.1)	TEQ	NG	NG	0	-	0	0	-	0	-	0	0	-	-	-	
1,2,3,6,7,8-Hexa CDD (TEF 0.1)	TEQ	NG	NG	0	-	0	0	-	0	-	0.0354	0	-	-	-	
1,2,3,7,8,9-Hexa CDD (TEF 0.1)	TEQ	NG	NG	0	-	0	0	-	0	-	0	0	-	-	-	
1,2,3,4,6,7,8-Hepta CDD (TEF 0.01)	TEQ	NG	NG	0	-	0	0	-	0	-	0.03	0.00678	-	-	-	
Octa CDD (TEF 0.0003)	TEQ	NG	NG	0	-	0	0	-	0	-	0.00151	0.000677	-	-	-	
2,3,7,8-Tetra CDF (TEF 0.1)	TEQ	NG	NG	0	-	0	0	-	0	-	0	0	-	-	-	
1,2,3,7,8-Penta CDF (TEF 0.03)	TEQ	NG	NG	0	-	0	0	-	0	-	0.0204	0	-	-	-	

Table A3-2: Groundwater Analytical Results

Parameter	Unit	Federal Interim Guideline ¹		Preliminary Background Concentrations	AEC 3						
		Agricultural			Res / Park						
					Location		17A3MW1		NLMW1		
					Field ID	17A3MW1	NLMW1	NLMW1	NLMW3		
Sample Date		2-Oct-2017		1-Jul-2018		2-Oct-2017	2-Jul-2018	2-Oct-2017	2-Jul-2018		
Laboratory Report Number		17Y268688		18Y358442		17Y268688	18Y358442	17Y268688	18Y358442		
Laboratory Sample ID		8791188		9378828		8791189	9378813	8791190	9378812		
Field Parameters											
Field Temperature	°C	-	-	-	5.0	4.9	5.7	2.2	5.5	3.1	
Field pH	pH Units	6.5-9	6.5-9	-	8.14	7.63	7.56	7.29	7.37	7.09	
Field Conductivity	µS/cm	-	-	-	358	357.9	536	551	471	601	
Routine											
pH	pH Units	6.5-9	6.5-9	-	7.84	7.33	7.77	7.18	7.51	7	
Electrical Conductivity (EC)	µS/cm	-	-	-	366	389	574	611	1010	675	
Total Dissolved Solids (TDS)	mg/L	3000	-	-	198	208	370	325	712	312	
Hardness as CaCO ₃	mg/L	-	-	-	179	188	286	283	497	339	
Alkalinity (total as CaCO ₃)	mg/L	-	-	-	179	203	233	212	248	210	
Bromide	mg/L	-	-	-	<0.05	<0.05	0.08	0.07	0.12	<0.05	
Chloride	mg/L	100	120	-	1.9	2.33	15.6	12.9	19.7	4.7	
Fluoride	mg/L	0.12	0.12	0.39	1.05	0.97	1.19	1.28	0.36	0.41	
Sulphate	mg/L	100	100	182	17.3	18.2	54	114	297	156	
Nutrients											
Ammonia	mg/L	0.021-231 ²	0.021-231 ²	-	-	<0.01	-	0.03	-	<0.01	
Nitrate (as NO ₃ -N)	mg/L	13	13	-	0.007	0.01	1.23	1.18	0.225	0.214	
Nitrite (as NO ₂ -N)	mg/L	0.06	0.06	-	<0.005	<0.005	0.012	<0.005	<0.005	<0.005	
Nitrogen (Total)	mg/L	-	-	-	-	0.09	-	1.15	-	0.24	
Cyanide											
Cyanide (SAD)	mg/L	-	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Cyanide (WAD)	mg/L	-	-	-	<0.002	-	<0.002	-	<0.002	-	
Dissolved Metals											
Aluminum	mg/L	0.005 / 0.1 ³	0.005 / 0.1 ³	-	0.009	0.004	0.02	0.004	0.003	0.015	
Antimony	mg/L	2	2	-	0.001	0.0003	<0.0002	<0.0002	0.0005	0.0004	
Arsenic	mg/L	0.005	0.005	-	0.002	0.0019	0.004	0.0002	0.0003	0.0002	
Barium	mg/L	0.5	0.5	-	0.0831	0.0895	0.0858	0.069	0.0659	0.0703	
Beryllium	mg/L	0.0053	0.0053	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	
Boron	mg/L	0.5	1.5	-	0.108	0.09	0.236	0.185	0.271	0.129	
Cadmium	mg/L	0.00012	0.00012	0.000047	0.00017	0.00002	0.00037	0.00033	0.00055	0.00024	
Calcium	mg/L	-	-	-	51	53.8	83.3	78.2	162	111	
Chromium	mg/L	0.0089	0.0089	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Cobalt	mg/L	0.05	-	-	0.00047	0.00007	0.00011	0.00013	0.00005	0.00008	
Copper	mg/L	0.002	0.002	-	0.0005	<0.0002	0.0007	0.001	0.0023	0.0021	
Iron	mg/L	0.3	0.3	-	0.115	0.445	0.056	0.112	0.017	0.232	
Lead	mg/L	0.001-0.002 ⁴	0.001-0.002 ⁴	-	0.00006	0.00005	0.00018	<0.00005	0.00007	<0.00005	
Lithium	mg/L	-	-	-	0.0843	0.0859	0.113	0.116	0.0317	0.0188	
Magnesium	mg/L	-	-	-	12.6	13.1	18.9	21.2	22.5	15	
Manganese	mg/L	0.2	-	-	0.021	0.017	0.003	<0.001	0.001	0.001	
Mercury	mg/L	0.000016	0.000016	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Molybdenum	mg/L	0.073	0.073	-	0.00459	0.00439	0.00182	0.00199	0.00111	0.00166	
Nickel	mg/L	0.025-0.083 ⁴	0.025-0.083 ⁴	-	0.0015	0.0006	0.0016	0.0013	0.0015	0.0007	
Potassium	mg/L	-	-	-	1.11	1.08	3.24	2.97	5.14	3.03	
Selenium	mg/L	0.001	0.001	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Silver	mg/L	0.00025	0.00025	-	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	
Sodium	mg/L	-	-	-	8.54	8.84	18.9	24.8	28.4	13.6	
Strontium	mg/L	-	-	-	-	0.0701	-	0.105	-	0.17	
Thallium	mg/L	0.0008	0.0008	-	0.00001	<0.00001	0.00002	0.00002	0.00002	<0.00001	
Tin	mg/L	-	-	-	-	<0.0005	-	0.00006	-	0.00015	
Titanium	mg/L	0.1	0.1	-	0.0013	0.0017	0.0017	0.0019	0.0011	0.0016	
Tungsten	mg/L	-	-	-	-	0.00968	-	0.00118	-	0.00072	
Uranium	mg/L	0.01	0.015	-	0.00246	0.00262	0.00175	0.00274	0.00308	0.00224	
Vanadium	mg/L	0.1	-	-	<0.0005	<0.0005	0.0005	<0.0005	<0.0005	<0.0005	
Zinc	mg/L	0.01	0.01	0.01	-	<0.002	<0.002	0.006	<0.002	0.006	

Notes:

¹ Environment Canada (June 2016). Guidance Document on Federal Interim Groundwater Quality Guidelines (FIGQQ) for Federal Contaminated Sites, for fine and coarse textured soil under Agricultural and Residential/Parkland land use

² Guideline varies with pH and temperature

³ Guideline varies with pH

⁴ Guideline varies hardness

“” No applicable guideline or not analyzed

BOLD - Greater than Guideline

RED - Greater than Preliminary Background Concentration

Italic - Detection limit greater than guideline

Table A3-2: Groundwater Analytical Results

Parameter	Unit	Federal Interim Guideline ¹		Preliminary Background Concentrations	AEC 3						
		Agricultural			17A3MW1		NLMW1		NLMW3		
		Field ID			17A3MW1		NLMW1		NLMW3		
		Sample Date	2-Oct-2017	1-Jul-2018	2-Oct-2017	2-Jul-2018	2-Oct-2017	2-Jul-2018	2-Oct-2017	2-Jul-2018	
	Laboratory Report Number	17Y268688	18Y358442	17Y268688	18Y358442	17Y268688	18Y358442	17Y268688	18Y358442		
	Laboratory Sample ID	8791188	9378828	8791189	9378813	8791190	9378812	8791190	9378812		
Hydrocarbons											
Benzene	mg/L	0.088	0.14	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Toluene	mg/L	0.083	0.083	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Ethylbenzene	mg/L	3.2	11	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Xylene (m)	mg/L	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Xylene (o)	mg/L	-	-	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Xylenes Total	mg/L	3.9	3.9	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Styrene	mg/L	0.072	0.072	-	<0.0005	-	<0.0005	-	<0.0005	-	
F1 (C ₆ -C ₁₀)	mg/L	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
F1 (C ₆ -C ₁₀) - BTEX	mg/L	0.81	0.81	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
F2 (C ₁₀ -C ₁₆)	mg/L	1.3	1.3	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
F3 (C ₁₆ -C ₃₄)	mg/L	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
F4 (C ₂₄ -C ₅₀)	mg/L	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Glycols											
Diethylene glycol	mg/L	-	-	-	<5	-	<5	-	<5	-	
Ethylene glycol	mg/L	190	190	-	<10	-	<10	-	<10	-	
Propylene glycol	mg/L	500	500	-	<10	-	<10	-	<10	-	
Tetraethylene Glycol	mg/L	-	-	-	<10	-	<10	-	<10	-	
Triethylene Glycol	mg/L	-	-	-	<10	-	<10	-	<10	-	
Polycyclic Aromatic Hydrocarbons (PAHs)											
Acenaphthene	mg/L	0.0058	0.0058	-	<0.00002	-	<0.00002	-	<0.00002	-	
Acenaphthylene	mg/L	0.046	0.046	-	<0.0002	-	<0.0002	-	<0.0002	-	
Acridine	mg/L	0.00005	0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	
Anthracene	mg/L	0.000012	0.000012	-	<0.0001	-	<0.0001	-	<0.0001	-	
Benz(a)anthracene	mg/L	0.000018	0.000018	-	<0.0001	-	<0.0001	-	<0.0001	-	
Benz(a) pyrene	mg/L	0.00001	0.00001	-	<0.0001	-	<0.0001	-	<0.0001	-	
Benz(b)fluoranthene	mg/L	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	
Benz(b+)fluoranthene	mg/L	0.00048	0.00048	-	<0.0001	-	<0.0001	-	<0.0001	-	
Benz(g,h,i)perylene	mg/L	0.00017	0.00017	-	<0.0001	-	<0.0001	-	<0.0001	-	
Benz(j)fluoranthene	mg/L	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	
Benz(k)fluoranthene	mg/L	0.00048	0.00048	-	<0.0001	-	<0.0001	-	<0.0001	-	
Chrysene	mg/L	0.0001	0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	
Dibenz(a,h)anthracene	mg/L	0.00026	0.00026	-	<0.0001	-	<0.0001	-	<0.0001	-	
Fluoranthene	mg/L	0.00004	0.00004	-	<0.0002	-	<0.0002	-	<0.0002	-	
Fluorene	mg/L	0.003	0.003	-	<0.0002	-	<0.0002	-	<0.0002	-	
Indeno(1,2,3-c,d)pyrene	mg/L	0.00021	0.00021	-	<0.0001	-	<0.0001	-	<0.0001	-	
Naphthalene	mg/L	0.0011	0.0011	-	<0.0005	-	<0.0005	-	<0.0005	-	
Phenanthrene	mg/L	0.0004	0.0004	-	<0.0004	-	<0.0004	-	<0.0004	-	
Pyrene	mg/L	0.000025	0.000025	-	<0.0002	-	<0.0002	-	<0.0002	-	
Quinoline	mg/L	0.0034	0.0034	-	<0.0001	-	<0.0001	-	<0.0001	-	
Polychlorinated Biphenyls (PCBs)											
Aroclor 1242	mg/L	-	-	-	<0.00009	-	<0.00009	-	<0.00009	-	
Aroclor 1254	mg/L	-	-	-	<0.00009	-	<0.00009	-	<0.00009	-	
Aroclor 1260	mg/L	-	-	-	<0.00009	-	<0.00009	-	<0.00009	-	
PCBs (Sum of total)	mg/L	-	-	-	<0.00009	-	<0.00009	-	<0.00009	-	

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- No applicable guideline or not analyzed

BOLD - Greater than Guideline**RED** - Greater than Preliminary Background Concentration*Italic* - Detection limit greater than guideline

Table A3-2: Groundwater Analytical Results

Parameter	Unit	Federal Interim Guideline ¹		Preliminary Background Concentrations	AEC 3						
		Agricultural			17A3MW1		NLMW1		NLMW3		
		Field ID			Sample Date		17A3MW1		NLMW1		
		Laboratory Report Number	Sample Date		2-Oct-2017	1-Jul-2018	2-Oct-2017	2-Jul-2018	2-Oct-2017	2-Jul-2018	
		Laboratory Sample ID			17Y268688	18Y358442	17Y268688	18Y358442	17Y268688	18Y358442	
					8791188	9378828	8791189	9378813	8791190	9378812	
Phenols											
2-chlorophenol	mg/L	0.33	0.33	-	<0.0005	-	<0.0005	-	<0.0005	-	
2,4-dichlorophenol	mg/L	0.0002	0.0002	-	<0.0001	-	<0.0001	-	<0.0001	-	
2,6-dichlorophenol	mg/L	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	
2,3,4-trichlorophenol	mg/L	-	-	-	<0.0005	-	<0.0005	-	<0.0005	-	
2,3,5-trichlorophenol	mg/L	-	-	-	<0.0005	-	<0.0005	-	<0.0005	-	
2,3,6-trichlorophenol	mg/L	-	-	-	<0.0005	-	<0.0005	-	<0.0005	-	
2,4,5-trichlorophenol	mg/L	0.16	0.16	-	<0.0005	-	<0.0005	-	<0.0005	-	
2,4,6-trichlorophenol	mg/L	0.018	0.018	-	<0.0005	-	<0.0005	-	<0.0005	-	
3,4,5-trichlorophenol	mg/L	-	-	-	<0.0005	-	<0.0005	-	<0.0005	-	
2,3,4,5-tetrachlorophenol	µg/L	-	-	-	<0.5	-	<0.5	-	<0.5	-	
2,3,4,6-tetrachlorophenol	mg/L	0.001	0.001	-	<0.0005	-	<0.0005	-	<0.0005	-	
2,3,5,6-tetrachlorophenol	mg/L	-	-	-	<0.0005	-	<0.0005	-	<0.0005	-	
Pentachlorophenol	mg/L	0.0005	0.0005	-	<0.0004	-	<0.0004	-	<0.0004	-	
4-chloro-3-methylphenol	mg/L	-	-	-	<0.0005	-	<0.0005	-	<0.0005	-	
3&4-methylphenol	mg/L	-	-	-	<0.0005	-	<0.0005	-	<0.0005	-	
2,4-dimethylphenol	mg/L	3.9	3.9	-	<0.0005	-	<0.0005	-	<0.0005	-	
2-nitrophenol	mg/L	-	-	-	<0.005	-	<0.005	-	<0.005	-	
4-nitrophenol	mg/L	-	-	-	<0.005	-	<0.005	-	<0.005	-	
2,4-dinitrophenol	mg/L	1.1	1.1	-	<0.005	-	<0.005	-	<0.005	-	
4,6-dinitro-2-methylphenol	mg/L	-	-	-	<0.005	-	<0.005	-	<0.005	-	
Cresol Total	mg/L	-	-	-	<0.0005	-	<0.0005	-	<0.0005	-	
Phenol	mg/L	0.002	0.004	-	<0.0005	-	<0.0005	-	<0.0005	-	
Phenols	mg/L	-	-	-	0.005	0.005	0.004	0.004	0.002	0.003	
Pesticides											
Aldrin	mg/L	0.003	0.003	-	<0.00001	-	<0.00001	-	<0.00001	-	
Chlordane	mg/L	0.015	0.015	-	<0.00004	-	<0.00004	-	<0.00004	-	
DDD-p,p'	mg/L	-	-	-	<0.00005	-	<0.00005	-	<0.00005	-	
DDE-o,p'	mg/L	-	-	-	<0.00001	-	<0.00001	-	<0.00001	-	
DDT-p,p'	mg/L	0.000001	0.000001	-	<0.00004	-	<0.00004	-	<0.00004	-	
Dieldrin	mg/L	0.000056	0.000056	-	<0.00002	-	<0.00002	-	<0.00002	-	
Endosulfan	mg/L	0.00002	0.00002	-	<0.00005	-	<0.00005	-	<0.00005	-	
Endrin	mg/L	0.000036	0.000036	-	<0.00005	-	<0.00005	-	<0.00005	-	
Heptachlor	mg/L	-	-	-	<0.00001	-	<0.00001	-	<0.00001	-	
Heptachlor epoxide	mg/L	0.0000038	0.0000038	-	<0.00001	-	<0.00001	-	<0.00001	-	
Lindane	mg/L	0.00001	0.00001	-	<0.00001	-	<0.00001	-	<0.00001	-	
Methoxychlor	mg/L	0.00003	0.00003	-	<0.00004	-	<0.00004	-	<0.00004	-	

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Table A3-2: Groundwater Analytical Results

Parameter	Unit	Federal Interim Guideline ¹		Preliminary Background Concentrations	AEC 3							
		Agricultural			17A3MW1		NLMW1		NLMW3			
		Field ID			Sample Date		17A3MW1		NLMW1			
		Laboratory Report Number	2-Oct-2017	1-Jul-2018	2-Oct-2017	2-Jul-2018	2-Oct-2017	2-Jul-2018	17Y268688	18Y358442		
	Laboratory Sample ID		17Y268688	18Y358442	17Y268688	18Y358442	17Y268688	18Y358442	8791188	9378813	8791190	9378812
Volatile Organic Compounds (VOCs)												
Acetone	mg/L	13	13	-	<0.01	-	<0.01	-	<0.01	-	-	
Bromodichloromethane	mg/L	8.5	8.5	-	<0.001	-	<0.001	-	<0.001	-	-	
Bromoform	mg/L	0.38	0.38	-	<0.001	-	<0.001	-	<0.001	-	-	
Bromomethane	mg/L	0.0056	0.0056	-	<0.001	-	<0.001	-	<0.001	-	-	
2-Butanone (MEK)	mg/L	150	150	-	<0.01	-	<0.01	-	<0.01	-	-	
Carbon tetrachloride	mg/L	0.00056	0.00056	-	<0.0005	-	<0.0005	-	<0.0005	-	-	
Chlorobenzene	mg/L	0.0013	0.0013	-	<0.001	-	<0.001	-	<0.001	-	-	
Chloroethane	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	
Chloroform	mg/L	0.0018	0.0018	-	<0.001	-	<0.001	-	<0.001	-	-	
Chloromethane	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	
Dibromochloromethane	mg/L	0.1	1.1	-	<0.001	-	<0.001	-	<0.001	-	-	
1,2-Dibromoethane	mg/L	0.00025	0.00025	-	<0.0003	-	<0.0003	-	<0.0003	-	-	
1,2-Dichlorobenzene	mg/L	0.0007	0.0007	-	<0.0005	-	<0.0005	-	<0.0005	-	-	
1,3-Dichlorobenzene	mg/L	0.042	0.042	-	<0.0005	-	<0.0005	-	<0.0005	-	-	
1,4-Dichlorobenzene	mg/L	0.026	0.026	-	<0.0005	-	<0.0005	-	<0.0005	-	-	
1,1-Dichloroethane	mg/L	0.32	0.32	-	<0.001	-	<0.001	-	0.001	-	-	
1,2-Dichloroethane	mg/L	0.005	0.01	-	<0.001	-	<0.001	-	<0.001	-	-	
1,1-Dichloroethene	mg/L	0.039	0.039	-	<0.001	-	<0.001	-	<0.001	-	-	
1,2-Dichloroethene (cis)	mg/L	0.0016	0.0016	-	<0.001	-	<0.001	-	<0.001	-	-	
1,2-Dichloroethene (trans)	mg/L	0.0016	0.0016	-	<0.001	-	<0.001	-	<0.001	-	-	
1,2-Dichloropropane	mg/L	0.016	0.016	-	<0.001	-	<0.001	-	<0.001	-	-	
1,3-Dichloropropene [cis]	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	
1,3-Dichloropropene [trans]	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	
Hexachlorobenzene	mg/L	0.00052	0.0012	-	<0.00001	-	<0.00001	-	<0.00001	-	<0.00001	
Hexachlorobutadiene	mg/L	0.0013	0.0013	-	<0.00001	-	<0.00001	-	<0.00001	-	<0.00001	
Hexachloroethane	mg/L	-	-	-	<0.00001	-	<0.00001	-	<0.00001	-	<0.00001	
Methyl t-Butyl Ether (MTBE)	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	
Methylene Chloride	mg/L	0.05	0.098	-	<0.001	-	<0.001	-	<0.001	-	-	
4-Methyl-2-pentanone (MIBK)	mg/L	58	58	-	<0.01	-	<0.01	-	<0.01	-	-	
1,1,1,2-Tetrachloroethane	mg/L	0.0033	0.0034	-	<0.001	-	<0.001	-	<0.001	-	-	
1,1,2,2-Tetrachloroethane	mg/L	0.0032	0.0032	-	<0.0008	-	<0.0008	-	<0.0008	-	-	
Tetrachloroethene	mg/L	0.012	0.012	-	<0.001	-	<0.001	-	<0.001	-	-	
1,2,4-Trichlorobenzene	mg/L	0.0054	0.0054	-	<0.001	-	<0.001	-	<0.001	-	-	
1,1,1-Trichloroethane	mg/L	0.64	0.64	-	<0.001	-	<0.001	-	<0.001	-	-	
1,1,2-Trichloroethane	mg/L	0.0047	0.0047	-	<0.001	-	<0.001	-	<0.001	-	-	
Trichloroethene	mg/L	0.02	0.02	-	<0.001	-	<0.001	-	<0.001	-	-	
Trichlorofluoromethane	mg/L	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	
Trihalomethanes	mg/L	-	-	-	<0.002	-	<0.002	-	<0.002	-	-	
Vinyl chloride	mg/L	0.0011	0.0011	-	<0.001	-	<0.001	-	<0.001	-	-	

Notes:

¹ Environment Canada (June 2016). Guidance Document on Federal Interim Groundwater Quality Guidelines (FIGGG) for Federal Contaminated Sites, for fine and coarse textured soil under Agricultural and Residential/Parkland land use

² Guideline varies with pH and temperature

³ Guideline varies with pH

⁴ Guideline varies hardness

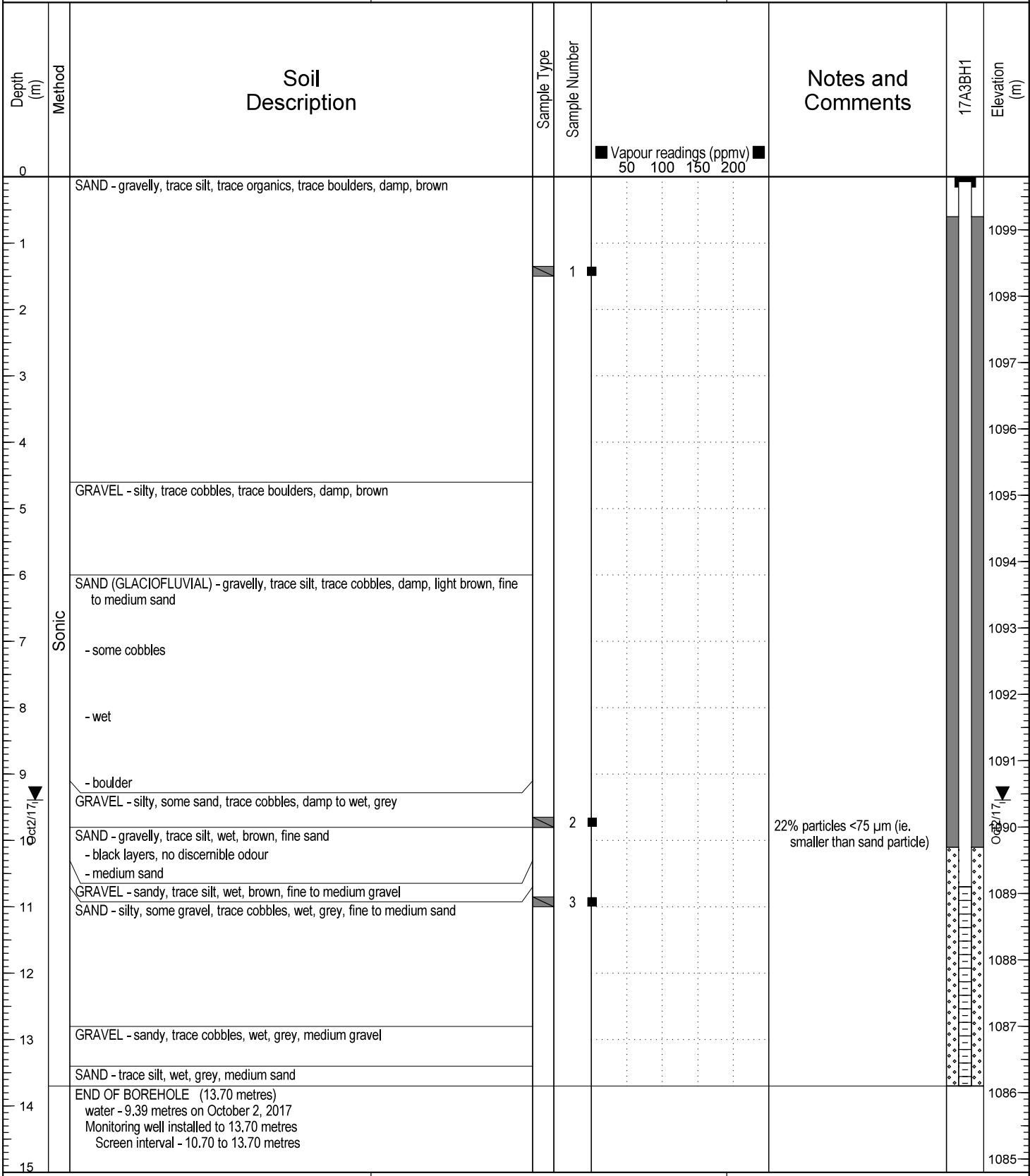
"—" No applicable guideline or not analyzed

BOLD - Greater than Guideline

RED - Greater than Preliminary Background Concentration

Italic - Detection limit greater than guideline

North American Tungsten Corporation Ltd.	Borehole No: 17A3BH1/MW1				
	Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6	
	Location: Cantung Mine			Ground Elev: 1099.798 m	
	Tungsten, Northwest Territories			UTM: 543029.481 E; 6868765.617 N; Z 9	



TETRA TECH

Contractor: Boart Longyear	Completion Depth: 13.7 m
Drilling Rig Type: Track Mounted	Start Date: 2017 September 24
Logged By: MH	Completion Date: 2017 September 24
Reviewed By: JW	Page 1 of 1

North American Tungsten Corporation Ltd.		<h1>Borehole No: 17A3BH2</h1>					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1106.241 m		
		Tungsten, Northwest Territories			UTM: 543096.871 E; 6868779.266 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)	Notes and Comments	Backfill Elevation (m)
0					■ Vapour readings (ppmv) 50 100 150 200		
1	Sonic	SAND (FILL) - gravelly, trace silt, trace cobbles, trace organics, damp, brown, fine to medium sand - trace metal refuse for 300 mm					1106
2		- some silt, some cobbles, trace wood, plastic and metal refuse					1105
3		- trace silt					1104
4		SAND (FILL) - silty, some gravel, damp, brown, wood, plastic and metal refuse, fine to medium sand					1103
5				1	■		1102
6		SILT AND SAND (FILL) - some gravel, trace organics, moist, brown to grey, metal refuse - gravelly, some organics		2	■		1101
7		- black sand layer with silt, no discernible odour - trace gravel, grey, plastic, metal and wood refuse, hydrocarbon odour			■	47% particles <75 µm (ie. smaller than sand particle)	1099
8		GRAVEL (FILL) - sandy, trace silt, wet, brown, wood refuse, no discernible hydrocarbon odour					1098
9		SILT (FILL) - some sand, trace gravel, damp, light brown, glass, wood refuse - sandy, some gravel, wet, grey, metal, glass, wood refuse, hydrocarbon staining, no discernible odour		3	■		1097
10		SAND (FILL) - trace silt, wet, grey, metal and glass refuse, hydrocarbon odour					1096
11		PEAT - organics, damp, no discernible hydrocarbon odour					1095
12		SILT - trace clay, damp, grey, no discernible odour		4	■		1094
13		END OF BOREHOLE (10.70 metres) Note: Backfilled at completion					1093
14							1092
15							
 TETRA TECH		Contractor: Boart Longyear			Completion Depth: 10.7 m		
		Drilling Rig Type: Track Mounted			Start Date: 2017 September 25		
		Logged By: NH			Completion Date: 2017 September 25		
		Reviewed By: JW			Page 1 of 1		

North American Tungsten Corporation Ltd.		<h1>Borehole No: 17A3BH3</h1>			
		Project: Phase III Environmental Site Assessment		Project No: ENW.WENW03039-02 Task 002.2.2.6	
		Location: Cantung Mine		Ground Elev: 1106.465 m	
		Tungsten, Northwest Territories		UTM: 543102.021 E; 6868814.292 N; Z 9	
Depth (m)	Method	Soil Description		Notes and Comments	Backfill Elevation (m)
0				■ Vapour readings (ppmv) ■ 50 100 150 200	
1	Sonic	SILT (FILL) - sandy, trace to some gravel, trace clay, damp to moist, brown			1106
2		SAND (FILL) - silty, some gravel, damp to moist, brown, plastic debris - gravelly, some silt, trace to some cobbles, damp, brown, fine to medium sand			1105
3		- some gravel, trace cobbles			1104
4		SAND (FILL) - some gravel to gravelly, trace silt, damp, reddish brown, metal and wood debris, medium sand			1103
5		- grey - brown			1102
6		SILT (FILL) - some sand, some gravel, wet, grey black, moderate hydrocarbon odour - damp to moist			1101
7		- wood debris			1100
8		END OF BOREHOLE (7.50 metres) Note: Backfilled at completion			1099
9					1098
10					1097
11					1096
12					1095
13					1094
14					1093
15					1092
 TETRA TECH		Contractor: Boart Longyear		Completion Depth: 7.5 m	
		Drilling Rig Type: Track Mounted		Start Date: 2017 September 25	
		Logged By: MH		Completion Date: 2017 September 25	
		Reviewed By: JW		Page 1 of 1	
ENVIRONMENTAL ENW-WENW03039-02.GPJ EBA.GDT 18/2/9					

North American Tungsten Corporation Ltd.		Borehole No: 17A3BH4							
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6				
		Location: Cantung Mine			Ground Elev: 1106.998 m				
		Tungsten, Northwest Territories			UTM: 543119.888 E; 6868827.02 N; Z 9				
Depth (m)	Method	Soil Description		Sample Type	Sample Number	Notes and Comments			
0	Sonic	SAND (FILL) - silty, some gravel, trace cobbles, damp, brown, fine to medium sand - some cobbles for 300 mm				■ Vapour readings (ppmv) 50 100 150 200			
1		- trace metal refuse for 200 mm							
2									
3		SAND (FILL) - gravelly, some silt, trace cobbles, damp, dark grey, trace metal, rubber and plastic, fine to medium sand							
4		- 150 mm boulder - some gravel, trace silt, trace rootlets, damp, brown, trace oxides, coarse sand							
5		- wet							
6		- metal debris for 200 mm							
7		- 200 mm boulder							
8		- some silt, damp, brown grey, wood debris, fine to medium sand							
9		SILT (FILL) - sandy, trace to some gravel, moist to wet, grey, wood debris							
10		SAND (FILL) - some silt, some gravel, moist, grey, medium to coarse sand							
11		SILT (FILL) - some sand, trace gravel, wet, grey brown							
12		COBBLES (FILL) - some sand, some gravel, damp, grey, metal debris							
13		SAND - gravelly, some cobbles, trace silt, wet, brown, coarse sand							
14									
15		END OF BOREHOLE (12.00 metres) Note: Backfilled at completion							
 TETRA TECH		Contractor: Boart Longyear			Completion Depth: 12 m				
		Drilling Rig Type: Track Mounted			Start Date: 2017 September 25				
		Logged By: MH			Completion Date: 2017 September 25				
		Reviewed By: JW			Page 1 of 1				



TETRA TECH

North American Tungsten Corporation Ltd.		Testpit No: 17A3HA1			
		Project: Phase III Environmental Site Assessment		Project No: ENW.WENW03039-02 Task 002.2.2.6	
		Location: Cantung Mine		Ground Elev: 1106.829 m	
		Tungsten, Northwest Territories		UTM: 543129.1 E; 6668812.952 N; Z 9	
Depth (m)	Method	Soil Description	Sample Type	Notes and Comments	Backfill Elevation (m)
0		SILT (GLACIOFLUVIAL FILL) - sandy, some gravel, trace to some cobbles, trace organics, trace rootlets, damp, firm, brown	■ Vapour readings (ppmv) 50 100 150 200		
	Hand auger	END OF AUGER HOLE (0.3 metres) Note: Backfilled at completion			
1					1106
2					1105
3					1104
4					1103
5					1102
 TETRA TECH		Contractor:	Completion Depth: 0.3 m		
		Drilling Rig Type:	Start Date: 2017 September 19		
		Logged By: NH	Completion Date: 2017 September 19		
		Reviewed By: JW	Page 1 of 1		

North American Tungsten Corporation Ltd.		<h1 style="margin: 0;">Testpit No: 17A3HA2</h1>					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1107.442 m		
Tungsten, Northwest Territories		UTM: 543148.185 E; 6868827.715 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)	Notes and Comments	Backfill Elevation (m)
0	Hand auger	SAND (FILL) - silty, some gravel, trace to some cobbles, damp, firm, brown, (100 mm thick) SAND (GLACIOFLUVIAL FILL) - silty, some gravel, some cobbles, damp, dense, brown, fine sand END OF AUGER HOLE (0.3 metres) Note: Stopped due to refusal. Backfilled at completion		1 2	■ 50 ■ 100 ■ 150 ■ 200	23% particles <75 µm (i.e. smaller than sand particle) 31% particles <75 µm (i.e. smaller than sand particle)	1107
1							1106
2							1105
3							1104
4							1103
5							
 TETRA TECH		Contractor:			Completion Depth: 0.3 m		
		Drilling Rig Type:			Start Date: 2017 September 19		
		Logged By: NH			Completion Date: 2017 September 19		
		Reviewed By: JW			Page 1 of 1		

North American Tungsten Corporation Ltd.		<h1>Testpit No: 17A3HA3</h1>					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1107.505 m		
Tungsten, Northwest Territories		UTM: 543043.615 E; 6868835.042 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Notes and Comments		Backfill Elevation (m)
0					■ Vapour readings (ppmv) ■ 50 100 150 200		
	Hand auger	SILT (FILL) - sandy, some gravel, trace to some cobbles, damp, firm, brown, (150 mm thick) SAND (GLACIAL TILL FILL) - silty, some gravel, some cobbles, damp, dense, brown END OF AUGER HOLE (0.3 metres) Note: Backfilled at completion		1			
1							1107
2							1106
3							1105
4							1104
5							1103
 TETRA TECH		Contractor:			Completion Depth: 0.3 m		
		Drilling Rig Type:			Start Date: 2017 September 19		
		Logged By: NH			Completion Date: 2017 September 19		
		Reviewed By: JW			Page 1 of 1		

North American Tungsten Corporation Ltd.		<h1 style="margin: 0;">Testpit No: 17A3HA4</h1>					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1105.908 m		
Tungsten, Northwest Territories		UTM: 543083.293 E; 6868779.002 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)	Notes and Comments	Backfill Elevation (m)
0	Hand auger	SILT (FILL) - sandy, some gravel, trace cobbles, damp, firm, brown, (70 mm thick) SAND (GLACIAL TILL FILL) - some silt, some gravel, some cobbles, damp, dense, brown, fine sand END OF AUGER HOLE (0.3 metres) Note: Backfilled at completion	■	1	50 100 150 200	18% particles <75 µm (ie, smaller than sand particle)	1101
1							1102
2							1103
3							1104
4							1105
5							1106
 TETRA TECH		Contractor:		Completion Depth: 0.3 m			
		Drilling Rig Type:		Start Date: 2017 September 19			
		Logged By: NH		Completion Date: 2017 September 19			
		Reviewed By: JW		Page 1 of 1			



Photo 1: Facing east at incinerators. AST is visible on the right (October 3, 2017).



Photo 2: Facing southeast at current incinerators. AST visible on the right (October 2, 2017).



Photo 3: Facing west. New Landfill visible at centre of the photo (October 5, 2017).



Photo 4: Facing northwest above the New Landfill. Photo provided by NATC (May 29, 2014).

AEC 5

AEC 5: Contaminated Soil Land Treatment Area

Area Description						
Location	Surface of southeast portion of Tailings Pond 3					
Topography	Relatively flat, steep embankments of tailings dam to north and east					
Surface Drainage	Towards lower areas in Tailings Pond 3					
Background	Contaminated soil excavated from various location at the mine are transported and stockpiled on the southeast portion of Tailings Pond 3					
Historical Assessment Information						
Previous Phase II Environmental Site Assessment Results (EBA, 2008)	Number of surface soil samples		9			
	Number of soil samples analyzed		9			
	Number of soil samples with petroleum hydrocarbons impacts		3			
	Number of soil samples with metal impacts		6			
Comments: CWS fraction concentrations in soil in one stockpile met the NWT IL criteria, CWS fractions F2 and F3 concentrations in two stockpiles may exceed the NWT IL criteria, and concentrations of one or more of arsenic, copper, nickel, and zinc in soil from two stockpiles exceed their estimated local background concentrations.						
2017/2018 Environmental Site Assessment Details						
Environmental Site Assessment Scope						
Utility Locate SOP followed?	Yes					
EM 31 Geophysics Complete?	No					
Number of test pits advanced	0 (2017), 4 (2018)					
Number of boreholes advanced	0					
Number of hand auger locations advanced	3 (2017)					
Number of soil samples submitted for laboratory chemical analysis	8 (2017, including 5 composite samples each comprising 10 point samples from the stockpile), 8 (2018)					
Number of boreholes completed as groundwater monitoring wells	0					
Number of historical groundwater monitoring wells	0					
Number of groundwater samples collected	N/A					
Number of sediment and surface soil samples collected	N/A					
Geophysics Findings						
N/A						
Soil Investigation and Conditions						
Maximum Depth of Investigation	1 mbgs (June 26, 2018)					
General Stratigraphy						
Description	Depth from (mbgs)	Depth to (mbgs)	Observations			
Sand	0	1.0	Tailings			
Combustible Vapour Concentrations (CVC)						
Less than 10 parts per million by volume (ppmv) at all soil sample locations						
Groundwater Conditions						
Depth to Groundwater	N/A					
Free Product	N/A					

AEC 5: Contaminated Soil Land Treatment Area

2017/18 Environmental Site Assessment Results Summary

- Figure A5-1 shows soil sampling locations.
- Figure A5-2 provides groundwater elevation contours.
- Table A5-1 summarizes soil lab results relative to guidelines and management limits.

General Site Observations

- Stockpiles of soil were observed on the southeast portion of Tailings Pond 3. According to NATC, impacted soil excavated from the mine are stockpiled here.
- Impacted soil stockpiles are stored directly on tailings without a berm or liner.
- There are also two seacan containers next to the stockpile, one of which contains potentially impacted soil according to NATC (not observed in 2018).

Soil: Petroleum Hydrocarbons (PHCs)

2017

- Laboratory results for all composite samples are greater than the CCME/CSR guidelines and one sample (17A5Comp3) contained PHCs greater than the management limits.
- Laboratory results for hand auger samples were less than the CCME/CSR guidelines with the exception of:
 - Sample 17A5HA2-1 at a depth of 0.15 mbgs which contained PHCs greater than guidelines. This soil sample also exceeded the Management Limits for PHC F3.

2018

- Test pits 18A5TP1 to 18A5TP3 were excavated at 6 m to 8 m step-out distances from 17A5HA2 to the west, north and east, respectively, to delineate the PHC management limit exceedance found at 0.15 mbgs. To delineate the southern extent of the management limit exceedance, test pit 18A5TP4 was excavated 25 m south of 17A5HA2 because the presence of a soil stockpile immediately south of 17A5HA2 did not allow for the excavation of a test pit at a closer step-out distance.
- Laboratory results from the two soil samples tested for PHCs F2-F4 at each of the four test pit locations were less than the management limits.

Soil: Metals

- Three hand auger samples (17A5HA1, 17A5HA2, 17A5HA3) consisted of tailings with high metals concentrations. The following parameters exceeded CCME CEQG in at least one of the samples: pH, arsenic, cadmium, cobalt, copper, selenium, and zinc.
- The following parameters also exceeded the proposed background concentrations:
 - Cadmium (only 17A5HA2).
 - Selenium.
- Five composite samples were collected from the soil stockpile. The following exceedances of CCME CEQGs were noted in at least two of the samples: arsenic, barium, cadmium, cobalt, copper, molybdenum, nickel, and selenium.
- The following parameters also exceeded the preliminary background concentrations:
 - Barium (one sample).
 - Cadmium (two samples).
 - Selenium (all samples).

Soil: Other PCOCs (PAHs, VOCs, Glycols, PCBs)

- Laboratory results less than detection limits and guidelines with exception of:
 - Detection limits of PCBs and PAHs in several samples greater than guidelines due to elevated PHCs.

Soil: Routine (pH)

- Laboratory results within guidelines with exception of:
 - Samples 17A5HA1-1 and 17A5HA3-1 (both at depth 0.15 mbgs) had a pH value outside the guidelines range.

Groundwater: Petroleum Hydrocarbons

N/A

Groundwater: Metals/Routine Parameters

N/A

Groundwater: Other PCOCs

N/A

AEC 5: Contaminated Soil Land Treatment Area

Sediment: Petroleum Hydrocarbon

N/A

Sediment: Metals

N/A

Sediment: Other PCOCs

N/A

Surface Water: Petroleum Hydrocarbons

N/A

Surface Water: Metals/Nutrients

N/A

Surface Water: Other PCOCs

N/A

Grainsize Analysis

N/A

Environmental Concerns

Location in AEC	Potential Source(s)	Identified Contaminated Media	Parameters Assessed and Contaminant(s) of Concern (COCs; bold & underline)
Southeast portion of Tailings Pond 3	Potentially impacted soils from mine	Soil	Soil: <u>metals, petroleum hydrocarbons (PHCs),</u> glycols, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs)

Discussion (Significance of the Results)

Soils:

- The soil stockpile contains PHC impacts greater than the CCME/CSR guidelines and management limits.
- Assessment results suggest that PHC impacts have migrated from a soil stockpile to hand auger location 17A5HA2 located immediately northeast of the stockpile where hydrocarbon concentrations greater than the CCME/CSR guidelines and management limits were identified. PHC migration may be associated with precipitation runoff.
- There were no PHC impacts measured southwest and southeast of stockpile at hand auger sampling locations 17A5HA1 and 17A5HA3, respectively.
- No PHC impacts were identified at test pits 18A5TP1 to 18A5TP4 surrounding 17A5HA2 and therefore the PHC impacts at 17A5HA2 are horizontally delineated. Based on current assessment results, maximum estimated depth of PHC impacts used to calculate the contaminated soil volume found at 17A5HA2 is 0.5 mbgs.
- Glycols, PAHs, PCBs and VOCs impacts were not detected and are no longer considered PCOCs in soil at AEC.
- Both stockpile composite samples and tailings samples exceeded various CCME CEQGs for metals. Some of samples also exceeded proposed background concentrations of barium and cadmium. All samples exceeded proposed background concentration for selenium.
- All samples (stockpile and tailings) showed very high copper concentrations (930-2420 mg/kg).

Attachments

Figure A5-1 – Soil and Sediment Results

Figure A5-2 – Groundwater and Surface Water Results

Table A5-1 – Soil Analytical Results

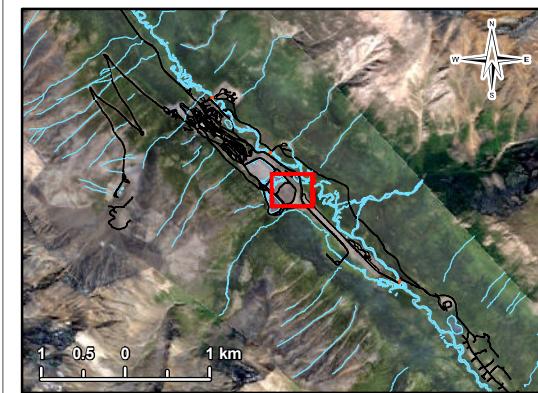
Hand Auger and Test pit Logs

Photographs



LEGEND

- Area of Environmental Concern (AEC)
- Area
- 2017 Hand Auger (HA)
- 2017/2018 Testpit (TP)
- Historical Monitoring Well
- Historical Surface Water Sample
- Soil/Sediment Analytical Results**
- PHC Impacts
- No PHC Impact
- Metals exceedance of preliminary background concentrations, or in the absence of background concentrations, exceedance of CCME guidelines
- Building
- Road
- Ditch
- Watercourse
- 2 m Contour (2 m)



NOTES
All locations and area boundaries are approximate.
Base data source:
Data provided by INAC (2013).
Drone imagery at the borrow pit, tailings ponds, and interceptor ditch collected in 2018.

STATUS
ISSUED FOR USE

CANTUNG MINE PHASE III ESA

AEC 5 Contaminated Soils Land Treatment Area at Tailings Pond 3 Soil and Sediment Results

PROJECTION	DATUM	CLIENT
UTM Zone 9	NAD83	NORTH AMERICAN TUNGSTEN CORPORATION LTD
Scale: 1:1,500		
20	10	0
Metres		
FILE NO. WENW03039-03_Summary_A5-1.mxd		
OFFICE	DWN CKD APVD	REV
Tt-VANC	SL BB	0
DATE	PROJECT NO.	
June 22, 2020	ENW.WENW03039-03	
A5-1		

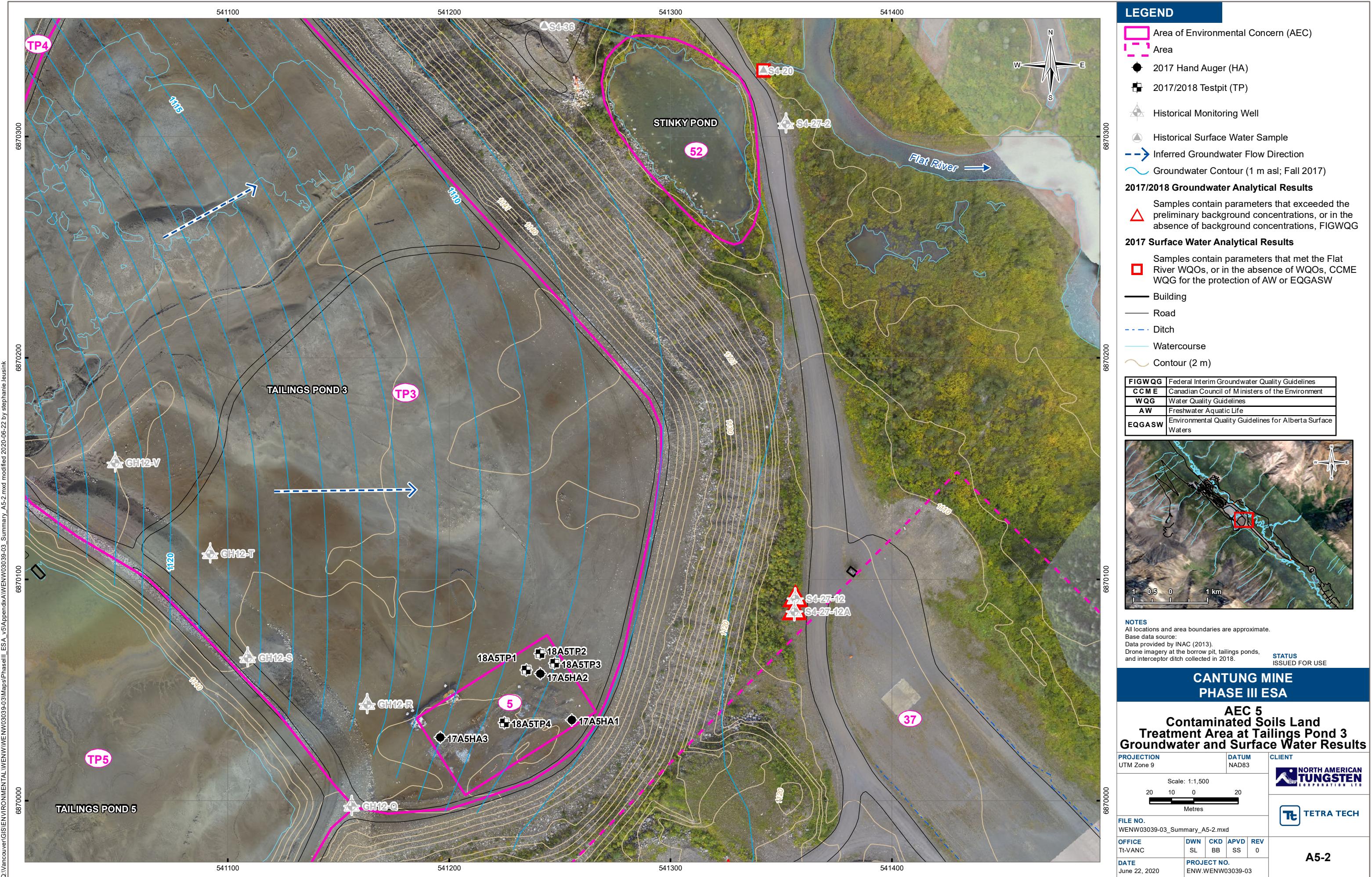


Table A5-1: Soil Analytical Results

AEC	Location Sample Depth	Field ID Sample Date Laboratory Report Number	AEC 5	TP1-1 TP1-3 TP2-1 TP2-3 TP3-1 TP3-3 TP4-1 TP4-3	17A5Comp1 21-Sep-2017 8755690 17Y264351	17A5Comp2 21-Sep-2017 8755697 17Y264351	17A5Comp3 21-Sep-2017 8755629 17Y264351	17A5Comp4 21-Sep-2017 8755630 17Y264351	17A5HA1-1 16-Sep-2017 8749058 17Y264351	17A5HA2-1 16-Sep-2017 8741019 17Y262775	17A5HA3-1 16-Sep-2017 18Y357306 17Y262775	18A5TP1-1 16-Jun-2018 8741019 17Y262775	18A5TP2-1 26-Jun-2018 18Y357306 9372290	18A5TP2-3 26-Jun-2018 18Y357306 9372311	18A5TP3-1 26-Jun-2018 18Y357306 9372313	18A5TP3-3 26-Jun-2018 18Y357306 9372314	18A5TP4-1 26-Jun-2018 18Y357306 9372315	18A5TP4-3 26-Jun-2018 18Y357306 9372320
					Comp	HA1	HA2	HA3	TP1-1	TP1-3	TP2-1	TP2-3	TP3-1	TP3-3	TP4-1	TP4-3		
					-	-	-	-	0.15 m	0.15 m	0.15 m	0.2 m	1.0 m	0.2 m	1.0 m			
					17A5Comp1 21-Sep-2017 8755690 17Y264351	17A5Comp2 21-Sep-2017 8755697 17Y264351	17A5Comp3 21-Sep-2017 8755629 17Y264351	17A5Comp4 21-Sep-2017 8755630 17Y264351	17A5HA1-1 16-Sep-2017 8749058 17Y264351	17A5HA2-1 16-Sep-2017 8741019 17Y262775	17A5HA3-1 16-Sep-2017 18Y357306 17Y262775	18A5TP1-1 16-Jun-2018 8741019 17Y262775	18A5TP2-1 26-Jun-2018 18Y357306 9372290	18A5TP2-3 26-Jun-2018 18Y357306 9372311	18A5TP3-1 26-Jun-2018 18Y357306 9372313	18A5TP3-3 26-Jun-2018 18Y357306 9372314	18A5TP4-1 26-Jun-2018 18Y357306 9372315	18A5TP4-3 26-Jun-2018 18Y357306 9372320
					17Y264351	17Y264351	17Y264351	17Y264351	17Y262775	17Y262775	17Y262775	9372290	9372311	9372313	9372314	9372315	9372320	
Parameter	Unit	CCME ^{1,2} and NWT CSR ³	Background Concentration ⁴	Management Limits ⁵														
Physical Parameters																		
pH	pH Units	6-8	-	-	6.69	6.61	7.33	7.33	7.09	3.01	7.22	5.36	-	-	-	-	-	
Moisture	%	-	-	-	8.27	7.06	18.8	12.4	21.8	14.7	10	8.13	11.7	5.3	17.4	3.0	8.2	
Metals																		
Antimony	mg/kg	20	-	-	0.3	0.4	3.1	4.8	1	0.7	0.5	0.3	-	-	-	-	-	
Arsenic	mg/kg	12	64	-	11.7	10	24.8	19.3	16.9	13.8	6.1	8.6	-	-	-	-	-	
Barium	mg/kg	500	946	-	55.6	62.7	1490	918	395	121	175	16.1	-	-	-	-	-	
Beryllium	mg/kg	4	-	-	2.1	2.1	1	0.8	1.5	1.1	1.9	3.2	-	-	-	-	-	
Cadmium	mg/kg	1.4	2.8	-	2.8	1.51	2.81	3.01	1.94	1.51	3.26	1.17	-	-	-	-	-	
Chromium	mg/kg	64	-	-	10	9	28	21	16	10	15	9	-	-	-	-	-	
Cobalt	mg/kg	40	-	-	54.8	61.3	23.5	21.4	31.9	50.9	26.7	57	-	-	-	-	-	
Copper	mg/kg	63	-	-	2290	1890	930	1260	1260	2150	1160	2420	-	-	-	-	-	
Lead	mg/kg	70	-	-	4.4	8.4	23.3	20.2	11.3	10.9	12.5	4.4	-	-	-	-	-	
Mercury	mg/kg	6.6	-	-	0.58	0.59	0.57	0.37	0.28	1.06	1.58	0.79	-	-	-	-	-	
Molybdenum	mg/kg	5	10	-	3.8	4.2	6.8	7.1	3.4	4.4	4.6	2.2	-	-	-	-	-	
Nickel	mg/kg	45	72	-	10.4	10.4	53.5	54.6	21.9	13.9	10.1	11.8	-	-	-	-	-	
Selenium	mg/kg	1	1.7	-	9.7	10	3.3	2.8	4.9	9.5	4.3	10.9	-	-	-	-	-	
Silver	mg/kg	20	-	-	1.6	1.2	0.7	0.7	0.8	1.4	1.1	1.8	-	-	-	-	-	
Thallium	mg/kg	1	-	-	0.3	0.2	0.5	0.4	0.3	0.4	0.6	0.2	-	-	-	-	-	
Tin	mg/kg	5	-	-	5.1	4	2.5	2	2.9	5.2	5.8	4.1	-	-	-	-	-	
Uranium	mg/kg	23	-	-	3.1	3.4	2.8	2.3	2.2	1.3	3.2	2.8	-	-	-	-	-	
Vanadium	mg/kg	130	160	-	12	10	85	75	41	25	23	9	-	-	-	-	-	
Zinc	mg/kg	200	462	-	368	212	426	459	258	265	343	142	-	-	-	-	-	
Petroleum Hydrocarbons																		
Benzene	mg/kg	0.03	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-	-	
Toluene	mg/kg	0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	
Ethylbenzene	mg/kg	0.082	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	
Xylenes (m & p)	mg/kg	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-	-	-	
Xylene (m)	mg/kg	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-	-	-	
Xylene (o)	mg/kg	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-	-	-	
Xylenes Total	mg/kg	0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-	
F1 (C ₆ -C ₁₀)	mg/kg	30	-	-	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-	
F1 (C ₆ -C ₁₀) - BTEX	mg/kg	30	-	700	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-	
F2 (C ₁₀ -C ₁₆)	mg/kg	150	-	1000	840	56	23	73	224	<20	876	<20	<20	<20	<20	<20	<20	
F3 (C ₁₆ -C ₂₄)	mg/kg	300	-	2500	944	2720	1060	750	1230	74	3150	<20	<20	21	<20	<20	<20	
F4 (C ₂₄ -C ₅₀)	mg/kg	2800	-	10,000	106	2840	748	425	628	28	1380	<20	<20	21	<20	79	89	
VH _e -10	mg/kg	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-	
VPH _e -10	mg/kg	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-	
Glycols																		
Diethylene glycol	mg/kg	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-	
Ethylene glycol	mg/kg	960	-	-	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-	
Propylene glycol	mg/kg	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-	
Tetraethylene Glycol	mg/kg	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-	
Triethylene Glycol	mg/kg	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-	-	
Polycyclic Aromatic Hydrocarbons (PAHs)																		
B(a)P Total Potency Equivalent	mg/kg	0.6	-	-	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	-	-	-	-	-	
iACR (CCME)	mg/kg	1	-	-	<6	<0.6	<0.6	<0.6	<0.6	<0.6	<6	<0.6	-	-	-	-	-	
Acenaphthene	mg/kg	-	-	-	<0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.05	<0.005	-	-	-	-	-	
Acenaphthylene	mg/kg	-	-	-	<0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.05	<0.005	-	-	-	-	-	
Anthracene	mg/kg	2.5	-	-	<0.04	<0.004	<0.004	<0.004	<0.004	<0.004	<0.4	<0.04	-	-	-	-	-	
Benz(a)anthracene	mg/kg	0.1	-	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.3	<0.03	-	-	-	-	-	
Benz(a)pyrene	mg/kg	0.1	-	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.3	<0.03	-	-	-	-	-	
Benz(b)fluoranthene	mg/kg	0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	-	-	-	-	-	
Benz(b+)fluoranthene	mg/kg	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	-	-	-	-	-	
Benz(e)pyrene	mg/kg	-	-	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.5	<0.05	-	-	-	-	-	
Benz(g,h)perylene	mg/kg	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	-	-	-	-	-	
Benz(i)fluoranthene	mg/kg	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	-	-	-	-	-	
Benz(k)fluoranthene	mg/kg	0.1	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	-	-	-	-	-	
Chrysene	mg/kg	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	-	-	-	-	-	
Dibenz(a,h)anthracene	mg/kg	0.1	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.05	<0.005	-	-	-	-	-	
Fluoranthene	mg/kg	50	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	-	-	-	-	-</	

Note

¹ Canadian Council of Ministers of the Environment (CCME) Canada-Wide Standards (CWS) for Petroleum Hydrocarbons (PHC) in Soil (CCME 2008), for coarse textured soils under Agricultural and Residential/Parkland soils

² Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CEQG) - Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CCME 1999), for coarse textured soils under Agricultural and Residential/Parkland soils

³ Northwest Territories Environmental Guideline for Contaminated Site Remediation (NWT CSR 2003), for coarse textured soils under Agricultural and Residential/Parkland land uses.

⁴ Preliminary Background Concentration

⁵ Canadian Council of Ministers of the Environment.

BOLD - Exceeds most stringent CCME or NWT CSR standard/guideline

Red - Exceeds Preliminary Background Concentration

Shaded - Exceeds Management Limits

Italic - Laboratory detection limit is greater than one or more referenced c

"-" Not analyzed or no applicable standard/guideline

- Not analyzed or no applicable standard/guideline

Table A5-1: Soil Analytical Results

Note

¹ Canadian Council of Ministers of the Environment (CCME) Canada-Wide Standards (CWS) for Petroleum Hydrocarbons (PHC) in Soil (CCME 2008), for coarse textured soils under Agricultural and Residential/Parkland soils

² Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CEQG) - Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CCME 1999), for coarse textured soils under Agricultural and Residential/Parkland soils

³ Northwest Territories Environmental Guideline for Contaminated Site Remediation (NWT CSR 2003), for coarse textured soils under Agricultural and Residential/Parkland land uses.

⁴ Preliminary Background Concentrations

^b Canadian Council of Ministers of the Environment (CCME) (2008), Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil Technical Supplement, for coarse textured soil under Agricultural land use, management limit pathway only
BOLD - Excludes most stringent CCME or NMFS CSF standard guideline

BOLD - Exceeds most stringent CCME or NWI CSR standard/guideline

Red - Exceeds Preliminary Background Concentration

Shaded - Exceeds Management Limits

Italic - Laboratory detection limit is greater than one or more referenced guidelines

"—" Not analyzed or no applicable standard/guideline

North American Tungsten Corporation Ltd.		Testpit No: 17A5HA1					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine		Ground Elev: 1145.809 m			
Tungsten, Northwest Territories		UTM: 541255.404 E; 6870036.423 N; Z 9					
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Notes and Comments		Backfill (m)
0		SAND (TAILINGS) - trace silt, trace gravel, damp, loose, red oxidization - grey		■ Vapour readings (ppmv) 50 100 150 200	1		
1	Hand auger	END OF AUGER HOLE (1.0 metre) Note: Backfilled at completion		2			1145
2							1144
3							1143
4							1142
5							1141
 TETRA TECH		Contractor:		Completion Depth: 1 m			
		Drilling Rig Type:		Start Date: 2017 September 16			
		Logged By: NH		Completion Date: 2017 September 16			
		Reviewed By: JW		Page 1 of 1			

North American Tungsten Corporation Ltd.		<h1>Testpit No: 17A5HA2</h1>					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1145.606 m		
		Tungsten, Northwest Territories			UTM: 541241.197 E; 6870057.36 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)	Notes and Comments	Backfill Elevation (m)
0					■ Vapour readings (ppmv) ■ 50 100 150 200		
	Hand auger	SAND (TAILINGS) - some gravel, trace silt, damp, loose, brown - no visible gravel, damp, loose, blue grey - red		1	■		
1		END OF AUGER HOLE (1.0 metre) Note: Backfilled at completion		2	■		
2							1144
3							1143
4							1142
5							1141
 TETRA TECH		Contractor:			Completion Depth: 1 m		
		Drilling Rig Type:			Start Date: 2017 September 16		
		Logged By: NH			Completion Date: 2017 September 16		
		Reviewed By: JW			Page 1 of 1		

North American Tungsten Corporation Ltd.		Testpit No: 17A5HA3					
		Project: Phase III Environmental Site Assessment			Project No: ENW.WENW03039-02 Task 002.2.2.6		
		Location: Cantung Mine			Ground Elev: 1146.451 m		
		Tungsten, Northwest Territories			UTM: 541195.924 E; 6870028.56 N; Z 9		
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Vapour readings (ppmv)	Notes and Comments	Backfill (m)
0	Hand auger	SAND (TAILINGS) - trace silt, damp, loose, grey		1	■ 50 ■ 100 ■ 150 ■ 200		
1	Hand auger	END OF AUGER HOLE (1.0 metre) Note: Backfilled at completion		2	■ 50 ■ 100 ■ 150 ■ 200		
2							1145
3							1144
4							1143
5							1142
 TETRA TECH		Contractor:		Completion Depth: 1 m			
		Drilling Rig Type:		Start Date: 2017 September 16			
		Logged By: NH		Completion Date: 2017 September 16			
		Reviewed By: JW		Page 1 of 1			

North American Tungsten Corp.		Testpit No: 18A5TP1			
		Project: Phase III Environmental Site Assessment		Project No: ENW.WENW03039-03	
		Location: Cantung Mine		Ground Elev: 1145.716 m	
		Cantung, Northwest Territories		UTM: 541234.769 E; 6870059.048 N; Z 9	
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Notes and Comments
0		SAND (TAILINGS) - uniformly graded, moist, orange brown, fine sand			■ Vapour readings (ppmv) ■ 100 200 300 400
0.2				1-1	
0.4				1-2	
0.6		- silty, poorly graded, grey			
0.8					
1.0		END OF TESTPIT (1.00 metre) Location: 6 m west of 17A5HA2, 2.5 m from hydrocarbon biopile Note: Testpit location surveyed by Tetra Tech on August 28, 2018			
1.2					
1.4					
1.5					
 TETRA TECH		Contractor: NATC	Completion Depth: 1 m		
		Drilling Rig Type: Backhoe	Start Date: 2018 June 26		
		Logged By: BB	Completion Date: 2018 June 26		
		Reviewed By: SS	Page 1 of 1		
		ENVIRONMENTAL ENW.WENW03039-03-JUNELOGS.GPJ EBA.GDT 19-1-8			

**North American
Tungsten Corp.**

Testpit No: 18A5TP2

Project: Phase III Environmental Site Assessment

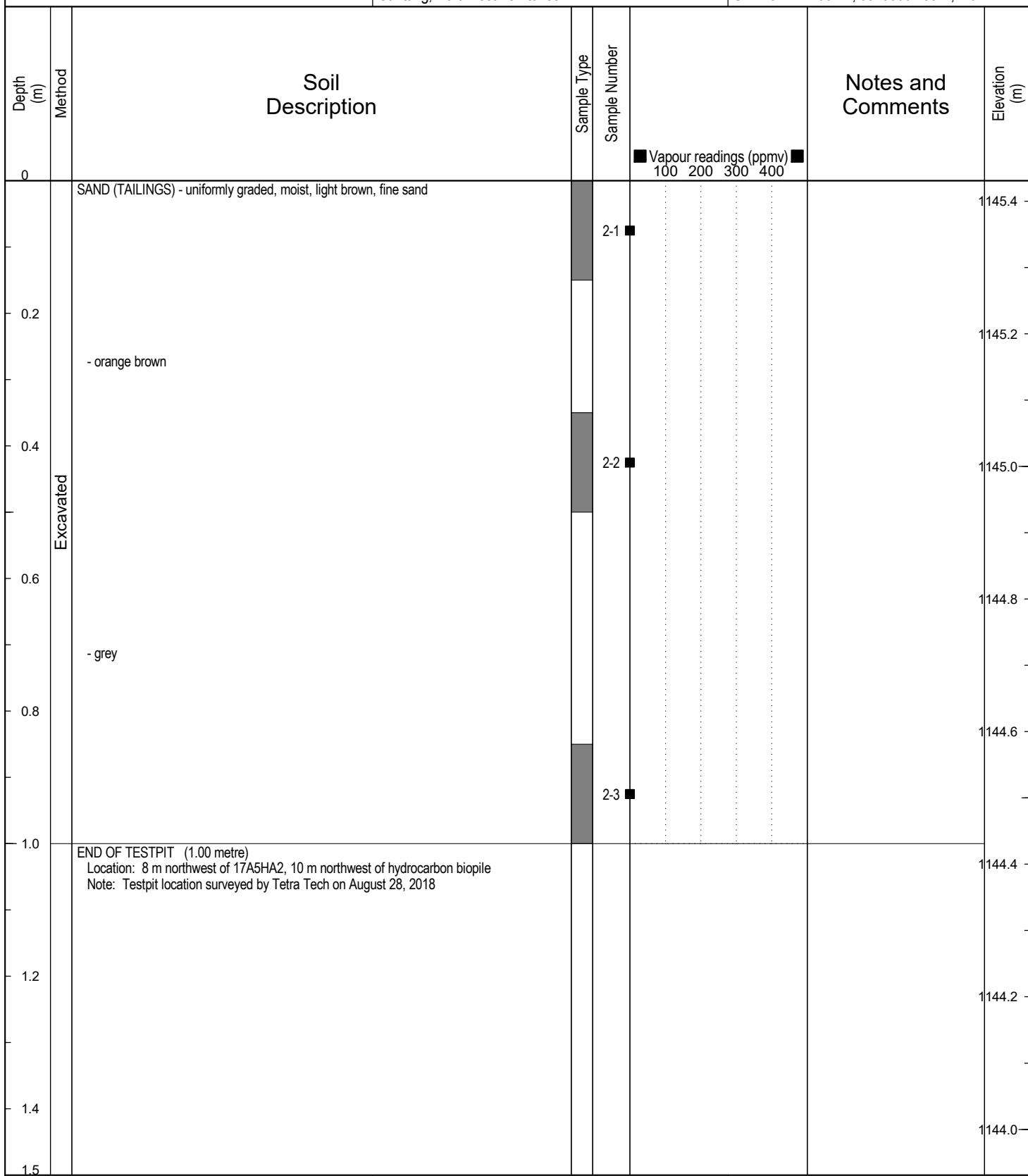
Project No: ENW.WENW03039-03

Location: Cantung Mine

Ground Elev: 1145.431 m

Cantung, Northwest Territories

UTM: 541241.001 E; 6870066.458 N; Z 9



TETRA TECH

Contractor: NATC	Completion Depth: 1 m
Drilling Rig Type: Backhoe	Start Date: 2018 June 26
Logged By: BB	Completion Date: 2018 June 26
Reviewed By: SS	Page 1 of 1

North American Tungsten Corp.		Testpit No: 18A5TP3			
		Project: Phase III Environmental Site Assessment		Project No: ENW.WENW03039-03	
		Location: Cantung Mine		Ground Elev: 1145.932 m	
		Cantung, Northwest Territories		UTM: 541247.655 E; 6870062.095 N; Z 9	
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Notes and Comments
0		SAND (TAILINGS) - uniformly graded, moist, fine sand - orange brown			■ Vapour readings (ppmv) 100 200 300 400
0.2				3-1	
0.4				3-2	
0.6				3-3	
1.0		END OF TESTPIT (1.00 metre) Location: 6 m east of 17A5HA2, 8 m east of hydrocarbon biopile Note: Testpit location surveyed by Tetra Tech on August 28, 2018			
1.2					
1.4					
1.5					
 TETRA TECH		Contractor: NATC		Completion Depth: 1 m	
		Drilling Rig Type: Backhoe		Start Date: 2018 June 26	
		Logged By: BB		Completion Date: 2018 June 26	
		Reviewed By: SS		Page 1 of 1	
		ENVIRONMENTAL ENW.WENW03039-03-JUNELOGS.GPJ EBA.GDT 19-1-8			

North American Tungsten Corp.		Testpit No: 18A5TP4			
		Project: Phase III Environmental Site Assessment		Project No: ENW.WENW03039-03	
		Location: Cantung Mine		Ground Elev: 1146.367 m	
		Cantung, Northwest Territories		UTM: 541224.977 E; 6870035.172 N; Z 9	
Depth (m)	Method	Soil Description	Sample Type	Sample Number	Notes and Comments
0		SAND (TAILINGS) - uniformly graded, moist, brown, fine sand - reddish brown			■ Vapour readings (ppmv) 100 200 300 400
0.2				4-1	
0.4				4-2	
0.6				4-3	
0.8					
1.0		END OF TESTPIT (1.00 metre) Location: 25 m southwest of 17A5HA2, 3.0 m from hydrocarbon biopile Note: Testpit location surveyed by Tetra Tech on August 28, 2018			
1.2					
1.4					
1.5					
 TETRA TECH		Contractor: NATC		Completion Depth: 1 m	
		Drilling Rig Type: Backhoe		Start Date: 2018 June 26	
		Logged By: BB		Completion Date: 2018 June 26	
		Reviewed By: SS		Page 1 of 1	
		ENVIRONMENTAL ENW.WENW03039-03-JUNELOGS.GPJ EBA.GDT 19-1-8			



Photo 1: Panorama at contaminated soils land treatment area at Tailings Pond 3.
(September 5, 2017)



Photo 2: Looking east. Standing on top of contaminated soils land treatment area at Tailings Pond 3. (September 16, 2017)



Photo 3: Tailings Pond 3, contaminated soils land treatment area seen on right. Photo provided by NATC. (May 29, 2014)