AGNICO EAGLE

MEADOWBANK DIVISION

Monitoring Program Summary Report

July 2014

Type A Water License 2AM-MEA0815

Table of Contents

SECTION 1 • BACKGROUND

As required under Part I, Item 25 of Type A Water License 2AM-MEA0815, this report documents the water management and monitoring activity at the mine site for the month. This includes water usage, Portage Attenuation Pond discharge water quality, Vault Attenuation Pond discharge water quality, East Dike Seepage discharge water quality, RSF Seepage, Assay Road Seepage and sewage treatment plant discharge water quality (to onsite storm water management pond). Attached in Appendix C you will find the Meadowbank Mine: Assay Road Seepage Phase 2 report prepared by Tetra Tech EBA (TT, 2014) documenting the investigation, follow up mitigation and monitoring.

In addition, a summary of spills/actions for the month are reported.

SECTION 2 • WATER MANAGEMENT

2.1 WATER USAGE

Freshwater usage for July 2014 is summarized in Table 2.1 below. Total freshwater used for the month was 49,527 m^3 for a total year to date of 728,938 m^3. The total amount of reclaim water used in the mill for July was 247,982 m^3.

On April 23rd, 2013 Agnico Eagle Mines (AEM) Meadowbank Division submitted a request to the Nunavut Water Board for an amendment to increase the freshwater use rate at the Meadowbank Gold Project. AEM received on June 30th, 2014 the Nunavut Water Board approval for Freshwater amendment and reasons for decision. Those documents have been forwarded by NWB to the Minister of Aboriginal Affairs for his final approval. On July 23rd, 2014 AEM received from the Minister the final approval (Appendix A) which permits the withdrawal of 1,150,000 m^3 of freshwater per year.

Table 2-1: Freshwater Usage (m^3)

	July
Freshwater Storage Tank	49,340
Emulsion Plant	188
Water Truck	0
Total	**49,527**
Year to date total	**728,938**

2.2 WASTE ROCK STORAGE FACILITY SEEPAGE

In July, AEM continue to pump any seepage water from ST-16 to the North Cell TSF. During the month, a total of 7,009 m^3 was pumped out for a total year to date of 33,372 m^3. AEM also completed bi-weekly monitoring for CN and weekly and after rain event inspections were completed at RSF and NP-2 Lake. To date, the water level in ST-16 area was very low avoiding any seepage to pass thru the cut off plug and till road.

2.3 ASSAY ROAD SEEPAGE

In July, the water in the interception sump and original sump was pumped back to the mill for a total of 1,557 m^3 during the month. Year to date pumped volume is 7,821 m^3. Weekly and after rain event inspection of the area is conducted and all the water was contain in these containments and do not reach TPL. Samples are taken in TPL and to date no contaminants (CN) have been detected. AEM engaged Tetra Tech (formerly EBA) to perform an assessment, drilling delineation program and to provide a report with recommendations. The final report is appended to this report (Appendix C). Repairs to the containment systems in and outside the mill have continued and are progressing well.

2.4 SEWAGE TREATMENT PLANTS

One (1) effluent wastewater sample was taken from the onsite sewage treatment plant (STP's) in July.

The Seprotech STP results are shown in Table 2.3.1 below; the LJ-Mix STP results are shown in Table 2.3.2. The results of the discharge indicate the system was working well. The effluent is discharged to the onsite storm water pond and is not discharged to the natural environment.

Table 2.3.1: Seprotech Effluent Results

Parameters	Units	July 8, 2014
Ammonia	mg N/L	<0.01
Ammonia-Nitrogen	mg N/L	9.1
Total Kjeldahl Nitrogen	mg N/L	10.1
BOD-5	mg/L	4
COD	mg/L	53
Total Suspended Solids	mg/L	5
Nitrate	mg N/L	27.2
Nitrite	mg N/L	0.28
pH*	Units	7.30
Fecal Coliform	UFC/100 mL	2
Total Coliform	UFC/100 mL	200

*Parameter measured by STP operators

Table 2.3.2: LJ-Mix Effluent Results

Parameters	Units	July 8, 2014
Ammonia	mg N/L	<0.01
Ammonia-Nitrogen	mg N/L	11.4
Total Kjeldahl Nitrogen	mg N/L	15.6
BOD-5	mg/L	6
COD	mg/L	79
Total Suspended Solids	mg/L	13
Nitrate	mg N/L	35
Nitrite	mg N/L	0.10
pH*	Units	4.90
Fecal Coliform	UFC/100 mL	88
Total Coliform	UFC/100 mL	5,000

*Parameter measured by STP operators

2.5 PORTAGE ATTENUATION POND EFFLUENT

Three (3) days discharge occurred in July (1^{st}, 2^{nd} and 5^{th}). AEM did not plan to discharge again water from Portage Attenuation Pond because after 2014 water contained into the Attenuation Pond will be contaminated by reclaim water. A total of 14,090 m^3 of water was discharge during the month of July into Third Portage Lake for a total year to date of 207,813 m^3.

One weekly effluent samples were taken from the Actiflo Water Treatment Plant (ST-9) in July. All the results respected the Water License Part F, Item 2 for effluent quality limits except for aluminium concentration and daphnia toxicity. The effluent was toxic for daphnia on the last day of discharge on July 5th but not for Rainbow trout (see Appendix B for Certificate). Also, on July 5th, the aluminum concentration was 1.79 mg/L exceeding the license limit of 1.5 mg/L as a maximum grab sample. AEM exceeded the monthly average concentration limit as only one sample was taken given the short duration of discharge (3 days). The source of the elevated level of aluminium appears to be from the fact that the WTP was in decommissioning and the coagulant used in the water treatment plant was not eliminated in an optimal dosage. WTP operators and engineering staff were made aware of the exceedances; improvements in commissioning and decommissioning will be made in the future to ensure the treated water discharge meets the limits.

The sample results are shown in Table 2.4.1 below.

Table 2.4.1: ST-9 - Effluent Monitoring

Date Parameters	Units	Max. grab conc.	5-July-14	Monthly Average	Max. avg. conc.
pH*		6.0-9.0	7.21	7.21	6.0-9.0
TSS	mg/L	30	9	9	15
Turbidity*	NTU	15	1.69	1.69	15
Aluminium	mg/L	1.5	1.79	1.79	1.5
Dissolved Aluminium	mg/L	1.0	0.052	0.052	1.0
Arsenic	mg/L	0.6	0.0029	0.0029	0.3
Cadmium	mg/L	0.004	<0.00002	<0.00002	0.002
Cyanide Total	mg/L	1.0	0.45	0.45	0.5
Copper	mg/L	0.2	0.006	0.006	0.1
Mercury	mg/L	0.0008	<0.00001	<0.00001	0.0004
Ammonia nitrogen	mg N/L	32	7.8	7.8	16
Nickel	mg/L	0.4	<0.0005	<0.0005	0.2
Nitrate	mg N/L	40	1.6	1.6	20
Lead	mg/L	0.2	0.0011	0.0011	0.1
Phosphorus	mg/L	2.0	<0.01	<0.01	1.0
Zinc	mg/L	0.8	0.003	0.003	0.4
Chloride	mg/L	2000	97.9	97.9	1000
C10-C50	mg/L	6	<0.1	<0.1	3

*Parameter measured by Environmental Technicians on field

2.6 VAULT ATTENUATION POND EFFLUENT

Vault Lake Dewatering (non-contact water) was completed on June 29th. On July 24th, AEM started to discharge contact water from the Vault Attenuation Pond into Wally Lake. A total of 91,500 m^3 of water was discharge during the month for a total year to date (including dewatering water) of 231,400 m^3.

One weekly effluent samples were taken at ST-10 in July. No Actiflo Water Treatment Plant was necessary during the month as the level of regulated parameter respected the Water License Part F, Item 3 for effluent quality limits.

The sample results are shown in Table 2.5.1 below.

Table 2.4.1: ST-10 - Effluent Monitoring

Date Parameters	Units	Max. grab conc.	31-July-14	Monthly Average	Max. avg. conc.
pH*		6.0-9.0	7.88	7.88	6.0-9.0
TSS	mg/L	30	3	3	15
Turbidity*	NTU	15	2.33	2.33	15
Aluminium	mg/L	3.0	0.013	0.013	1.5
Dissolved Aluminium	mg/L	2.0	0.012	0.012	1.0
Arsenic	mg/L	0.2	0.0006	0.0006	0.1
Cadmium	mg/L	0.004	<0.00002	<0.00002	0.002
Copper	mg/L	0.2	0.0022	0.0022	0.1
Mercury	mg/L	0.008	<0.00001	<0.00001	0.004
Ammonia nitrogen	mg N/L	40	0.41	0.41	20
Nickel	mg/L	0.4	0.0012	0.0012	0.2
Nitrate	mg N/L	100	1.0	1.0	50
Lead	mg/L	0.2	<0.0003	<0.0003	0.1
Phosphorus	mg/L	3.0	0.02	0.02	1.5
Zinc	mg/L	0.4	<0.001	<0.001	0.2
Chloride	mg/L	1000	3.1	3.1	500

*Parameter measured by Environmental Technicians on field

2.7 EAST DIKE SEEPAGE EFFLUENT

East Dike Seepage Discharge was stopped on May 2nd following a visual turbidity increase due to the freshet. On July 29th, AEM restarted the East Dike Discharge. During these three (3) days of July, a total of 1,716 m^3 was discharged thru a diffusor into Second Portage Lake. Total year to date discharged is 50,461 m^3. Monitoring results are shown in Table 2.7.1 below.

TSS results did not exceed the maximum average concentration (15 mg/L) and maximum allowable grab sample concentration (30 mg/L) permitted by the Water License, Part F, Item 4.

Table 2.7.1: East Dike Seepage Discharge Results

Parameters	Units	31-July-14	Average Concentration
Total Suspended Solids	mg/L	2	2

2.8 NON CONTACT WATER

Portage Area East diversion ditch (ST-5) results are shown in Table 2.4.1 below and Portage Area West diversion ditch (ST-6) results are shown in Table 2.4.2.

TSS results didn't exceed the maximum average concentration (15 mg/L) and maximum allowable grab sample concentration (30 mg/L) permitted by the Water License, Part F, Item 4. Furthermore, to comply with Water License Part D item 22, sediment barriers were in place throughout the month of July and weekly and after rain event visual inspections were conducted to prevent entry of sediments into the receiving environment.

Table 2.4.1: Portage Area East Diversion Ditch (ST-5) Results

Parameters	Units	July-01-14
Total Suspended Solids	mg/l	<1

Table 2.4.2: Portage Area West Diversion Ditch (ST-6) Results

Parameters	Units	July-01-14
Total Suspended Solids	mg/l	<1

SECTION 3 • SPILL MANAGEMENT

AEM has developed a system of tracking spills on-site. Table 3.1 summarizes the AEM spill reports for the month. Seven (7) spills occurred on site and two (2) were reportable to the GN spill hotline but only one (1) was reported following logistics error. AEM contained and cleaned up all the spills.

Table 3-1: Summary of AEM Internal Spill Reports

Date of Spill	Hazardous Material	Quantity (L/Kg)	Location	Cause of spill	Clean-up action taken	Reported to Spill Hot Line
2014-07-08	Diesel	10	Dome side of the truck shop	A punctured secondary containment container.	Damaged container will be repaired by the welding shop. The area was cleaned up by site surfaces and contaminated material disposed of to the landfarm.	No
2014-07-11	Drill Oil	140	Row 2 of Laydown sea can	Pallet wrap broke off while being relocated, the tubs then fell off balanced and 7 tubs of 20L were spilled.	Empty Pails relocated to Hazmat. Contaminated soil was scraped and disposed of to the landfarm.	Not reported following logistic error.
2014-07-11	Diesel	25	Vault Fuel unloading station	Gasket hose broke on equipment	Hose gasket replaced. Contaminated material cleaned up and disposed of at the landfarm.	No
2014-07-14	Hydraulic oil	4	Between power plant and dome warehouse	Broken hydraulic hose on zoom-boom	Stopped equipment immediately and put down absorbant pads. Cleaned up of the contaminated material and advised the truck shop for repairs.	No
2014-07-15	Tailing Slurry	1000	Mill garage door A	Inside the mill, while mill was operating, the tailings line became disconnected. Before being able to completely stop the mill operation the tailings continued to come out of the pipe. The vast majority of the tailings slurry stayed inside the mill. However, the level became high enough that some leaked outside the door of the mill.	Site services department immediately commenced clean-up of the slurry. Back hoes where used to mix slurry with rock fill. This material was excavated and disposed to the Tailings Storage Facility.	Yes
2014-07-20	Hydraulic oil	20	East side of the truck shop	Leaking cylinder hydraulic hose on HTR 04.	Put some absorbant. Cleaned up the contaminated soil and sent it to the landfarm.	No
2014-07-29	Hydraulic oil	5	In front of the warehouse dome	Broken hydraulic hose.	Stop the machine and put some absorbant pads. Call site services for clean-up and disposed of the contaminated material in the yellow roll off. Call maintenance to fix the broken hose.	No

APPENDIX A
Minister Final Approval for Freshwater Amendment to Water License 2AM-MEA0815

Ministre des Affaires autochtones
et du développement du Nord

Minister of Aboriginal Affairs and
Northern Development

Ottawa, Canada K1A 0H4

JUL 23 2014

Mr. Lootie Toomasie
Hearing Chair
Nunavut Water Board
PO Box 119
GJOA HAVEN NU X0B 1J0

Dear Mr. Toomasie:

Thank you for your letter of June 30, 2014, which was received on July 2, 2014, conveying the amended Type "A" water licence 2AM-MEA0815 for Agnico-Eagle Mines Ltd.'s Meadowbank Gold Project.

I am pleased to inform you that I have approved the water licence as recommended by the Nunavut Water Board. The signed original is enclosed.

Sincerely,

Bernard Valcourt, PC, QC, MP

Encl.

PART A: SCOPE, DEFINITIONS AND ENFORCEMENT

1. SCOPE

Amend Item a — This Licence authorizes Agnico-Eagle Mines Ltd. ("AEM" or "Licensee") to the use of Waters and deposit of Waste associated with the Mining undertaking at the Meadowbank Gold Project as outlined in the Water Licence Application, submitted to the Board throughout the regulatory process.

AEM may conduct mining, milling and associated activities at the Meadowbank Gold Project in the Kivalliq Region of Nunavut, (65°01'33" N, 96°04'01" W) including, in general, as follows: (bulleted items remain unchanged).

PART B: GENERAL CONDITIONS

Amend Item 3 — The amount of Water use fees shall be determined in accordance with the section 12(1)(b) of the Regulations.

Amend Item 4 — Payment of fees shall be made in accordance with sections 12(2)(b) and 12(7)(b) of the Regulations.

PART E: CONDITIONS APPLYING TO WATER USE AND MANAGEMENT

Amend Item 3 — The use of Waters, for all purposes as per Items 1 and 2, shall not exceed a total of 1,870,000 cubic metres per annum in 2013, followed by a maximum of 1,150,000 cubic metres per annum in subsequent years.

SCHEDULE A – Scope, Definitions, and Enforcement

Amend **"Regulations"** — **"Regulations"** means the *Nunavut Waters Regulations SOR/2013-69.*

All remaining terms and conditions of Licence 2AM-MEA0815 Type "A" dated June 9, 2008 and Licence Amendment No. 1 dated May 5, 2010, shall continue to apply.

This Licence Amendment issued and recorded at Gjoa Haven, Nunavut on June 30, 2014.

Lootie Toomasie
Nunavut Water Board
Hearing Chair

APPROVED BY: **The Honourable Bernard Valcourt**
Minister of Aboriginal Affairs and Northern Development Canada

DATE LICENCE APPROVED: July 22nd 2014

APPENDIX B
Trout and Daphnia Certificates Results July 5th, 2014

RESULTS OF DAPHNIA - LC50 (ACUTE-48H)-FEDERAL

Success Through Science®

Client : 4299 MULTILAB - VAL-D'OR

Job Number: B439976

Client Project Name & Number:

No. d'échantillon : Y99947-02

Test Result:

48 hrs LC50 %v/v (95% CL): 91.6 (50.0-100) Statistical Method: Binomial

48 hrs EC50 %v/v (95% CL): 91.6 (50.0-100) Statistical Method: Binomial

Toxic Units: 1.10

Comment: toxic

Sample Name : 35665

Description: colorless, translucent, odorless, few particle

Sample Collected: Jul 05, 2014 04:30 PM — Sampling Method : Grab

Sample Collected By: JK — Site Collection: ST-9

Sample Received: Jul 09, 2014 10:30 AM — Volume Received: 1L

Analysis Start : Jul 10, 2014 03:15 PM — Temp.Upon Arrival: 19 °C

End : Jul 12, 2014 03:15 PM — Storage: 4°C

Sample Matrix : WASTE WATER

Sample Prior to Analysis:

pH: 7.2

Temperature : 20.7 °C

Dissolved Oxygen: 9.0 mg/L

Sample Conductance: 1193 µS/cm

Hardness: 365 mg $CaCO_3$/L

Concentration	Temperature (°C)	Temperature (°C)	pH (pH)	pH (pH)	Conductivity (uS/cm)	Dissolved oxygen (mg/L)	Dissolved oxygen (mg/L)	Immobility (#)	Immobility (%)	Mortality (#)	Mortality (%)
%v/v	Initial	48 hrs	Initial	48 hr	Initial	Initial	48 hrs	48 hrs	48 hrs	48 hrs	48 hrs
0	20.0	20.6	7.9	7.9	424	9.0	8.6	0	0	0	0
6.25	20.0	20.3	7.8	7.9	469	9.0	8.5	0	0	0	0
12.5	20.0	20.3	7.8	7.9	520	9.0	8.4	0	0	0	0
25	20.0	20.3	7.7	7.9	622	9.0	8.4	0	0	0	0
50	20.1	20.4	7.6	7.9	799	9.0	8.3	0	0	0	0
100	20.3	20.4	7.4	8.1	1189	8.9	8.7	6	60.0	6	60.0

Comments :

Culture/Control/Dilution Water: Dechlorinated municipal Daphnia

Hardness (EDTA Method): 176 mg/l $CaCO_3$ — Other parameters available on request.

Test Conditions — Test concentration : 0,6.25,12.5,25,50,100 (%v/v)

Organisms per Vessel : 10 — Pre-aeration Time : 0 min — Rate of Pre-aeration : 40±5 mL/min/L

Total # of Organisms Used : 60 — Test Temperature : 20 ± 2 °C — Test Hardness Adjusted : No

Test Volume : 150 mL — Vessel Volume : 270 ml — Test pH Adjusted: No

Loading Density : 15.0 mL/Daphnia — Photoperiod : 16 hours of of light; 8 hours of darkness

Test Organism : *Daphnia magna* — Source : Maxxam Lab Culture

Age at Test Initiation : <24 hres — Average Brood Size : 28.5

Culture Photoperiod : 16 hours of of light; 8 hours of darkness — % Mortality within 7 days : 5.3

Culture Temperature : 20 ± 2 °C — Time To First Brood : 7 Days

Culture Diet: Fed twice a day.

Reference chemical: Potassium Dichromate — Test Date: Jul 08, 2014

Test Endpoint 48 hrs LC50 (95% confidence interval) : 0.21 (0.18, 0.25) mg/L — Statistical Method : Binomial

Historical Mean LC50 (warning limits) : 0.20 (0.13, 0.29) mg/L — Concentration : 0,0.0884,0.1237,0.1767,0.251,0.3535 mg/L

Test Method QUE SOP-00406. Méthode de référence pour la détermination de la létalité aiguë d'effluents chez Daphnia magna. SPE1/RM/14 - Deuxième édition. Environnement Canada. 2000.

Essentiellement, il s'agit d'un essai statique d'une durée de 48 heures. Dix individus sont soumis à différentes concentrations d'effluent pour en mesurer la CL50 dans des conditions de température, d'éclairement et de densité de chargement contrôlées.

Method Deviations: Aucune

RESULTS OF DAPHNIA - LC50 (ACUTE-48H)-FEDERAL

Client : 4299 MULTILAB - VAL-D'OR
Client Project Name & Number:

Job Number: B439976
No. d'échantillon : Y99947-02

Analyst : Alain Dionne, Isabelle Parenteau, Jonathan Cote, Karine Gauthier

Verified By : Alain Dionne, B. Sc. Biologist

Date: Jul 30, 2014 04:37 PM

Maxxam

RESULTS OF RAINBOW TROUT - LC50 (ACUTE-96H)

Success Through Science®

Client : 4299 MULTILAB - VAL-D'OR — Job Number: B439976

Client Project Name & Number:

Test Result:

96 hrs LC50 %v/v (95% CL): >100 (N/A) Statistical Method: Visual

Toxic Units: <1.0

Comment: no toxic

Sample Name : 35665

Sample Matrix : WASTE WATER

Description: transparent, translucent, odorless, few particle

Sample Number: Y99947-01

Sample Collected: Jul 05, 2014 04:30 PM — Sampling Method : Grab — Site Collection: ST-9

Sample Collected By: JAMIE KATALUK — Volume Received: 40L — Temp.Upon Arrival: 19 °C Storage: 4°C

Sample Received: Jul 09, 2014 10:30 AM — pH: 7.4 — Dissolved Oxygen: 9.3 mg/L

Analysis Start : Jul 10, 2014 04:25 PM — Temperature : 15.3 °C — Sample Conductance: 1061 µS/cm

Concentration	Temperature (°C)	Temperature (°C)	pH (pH)	pH (pH)	Dissolved oxygen (mg/L)	Dissolved oxygen (mg/L)	Conductivity (uS/cm)	Atypical Behaviour (#)	Atypical Behaviour (%)	Mortality (#)	Mortality (%)
%v/v	Initial	96 hrs	Initial	96 hr	Initial	96 hrs	Initial	96 hrs	96 hrs	96 hrs	96 hrs
0	15.2	14.9	7.7	7.8	9.6	9.3	223	0	0	0	0
6.25	13.9	15.3	7.6	7.7	10.1	9.1	277	0	0	0	0
12.5	14.0	15.2	7.6	7.8	10.1	9.4	333	0	0	0	0
25	14.0	14.9	7.6	7.8	10.0	9.3	435	0	0	0	0
50	14.2	14.6	7.5	7.8	9.9	9.5	648	0	0	0	0
100	14.6	14.5	7.5	7.9	9.5	9.5	1049	0	0	0	0

Comments : No discrepancies observed during the test. No change was made to the method.

Culture/Control/Dilution Water Dechlorinated municipal Trout

Hardness (EDTA Method): 100 mg/l $CaCO_3$ — Other parameters available on request.

Test Conditions — Test concentration : 0,6.25,12.5,25,50,100 (%v/v)

Organisms per Vessel : 10 — Test Temperature : 15 ± 1 °C — Solution Depth : 20 cm

Total # of Organisms Used : 60 — Pre-aeration Time : 30 min. — Rate of Pre-aeration : 6.5±1 mL/min/L

Test Volume : 16 L — Vessel Volume : 20L — Test pH Adjusted: No

Loading Density : 0.29 g/L — Photoperiod : 16 hours of of light; 8 hours of darkness

Type de réservoir d'essai: 20L glass aquarium with polyethylene bag.

Test Organism : Rainbow Trout *(Oncorhynchus mykiss)* Source : Pisciculture Jacques-Cartier

Culture Temperature : 15 ± 2 °C — Weight (Mean) +- SD : 0.46 ± 0.10 g — Length (Mean) +- SD : 3.60 ± 0.23 cm

Culture Water Renewal : 2 liters/min — Weight (Range) : 0.37 – 0.70 g — Length (Range) : 3.40 – 4.20 cm

Culture Photoperiod : 16 hours of of light; 8 hours of darkness — % Mortality within 7 days : 0%

Feeding rate and frequency : 1-2x a day; 1-5% of the body weights.

Reference chemical: Phenol — Test Date: Jul 15, 2014

Test Endpoint 96 hrs LC50 (95% confidence interval) : 12 (10, 13) mg/L — Statistical Method : Probit

Historical Mean LC50 (warning limits) : 11 (9.0, 14) mg/L — Concentration : 0,4,6,9,13,18 mg/L

Test Method QUE SOP - 00408. Méthode de référence pour la détermination de la létalité aiguë d'effluents chez la truite arc-en-ciel. SPE1/RM/13 - Deuxième édition. Environnement Canada. 2000. (incluant les modifications de mai 2007).

Essentiellement, il s'agit d'un essai statique d'une durée de 96 heures. Dix individus sont soumis à différentes concentrations d'effluent pour en mesurer la CL50 dans des conditions de température, d'éclairement et de densité de chargement contrôlées.

Method Deviations : Aucune

Maxxam

RESULTS OF RAINBOW TROUT - LC50 (ACUTE-96H)

Success Through Science®

Client : 4299 MULTILAB - VAL-D'OR

Client Project Name & Number:

Job Number: B439976

Sample Number: Y99947-01

Analyst : Alain Dionne, Maxime Thibeault, Yan Dubé

Verified By : Alain Dionne, B. Sc. Biologist

Date: Jul 30, 2014 04:35 PM

Maxxam Analytique 2690, avenue Dalton, Sainte-Foy, Quebec G1P 3S4 Tél: (418) 658-5784 Télécopieur: (418) 658-6594 www.maxxam.ca

APPENDIX C
Meadowbank Mine, Assay Road Seepage Phase 2: Environmental Site Assessment and Engineering QA/QC, TetraTech EBA (2014)

TETRA TECH EBA

MEADOWBANK MINE, ASSAY ROAD SEEPAGE PHASE 2: ENVIRONMENTAL SITE ASSESSMENT AND ENGINEERING QA/QC

PRESENTED TO

Agnico Eagle Mines Limited

AUGUST 2014
ISSUED FOR USE
FILE: E14103172-01

CONSULTING ENGINEERS & SCIENTISTS · www.eba.ca

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EXECUTIVE SUMMARY

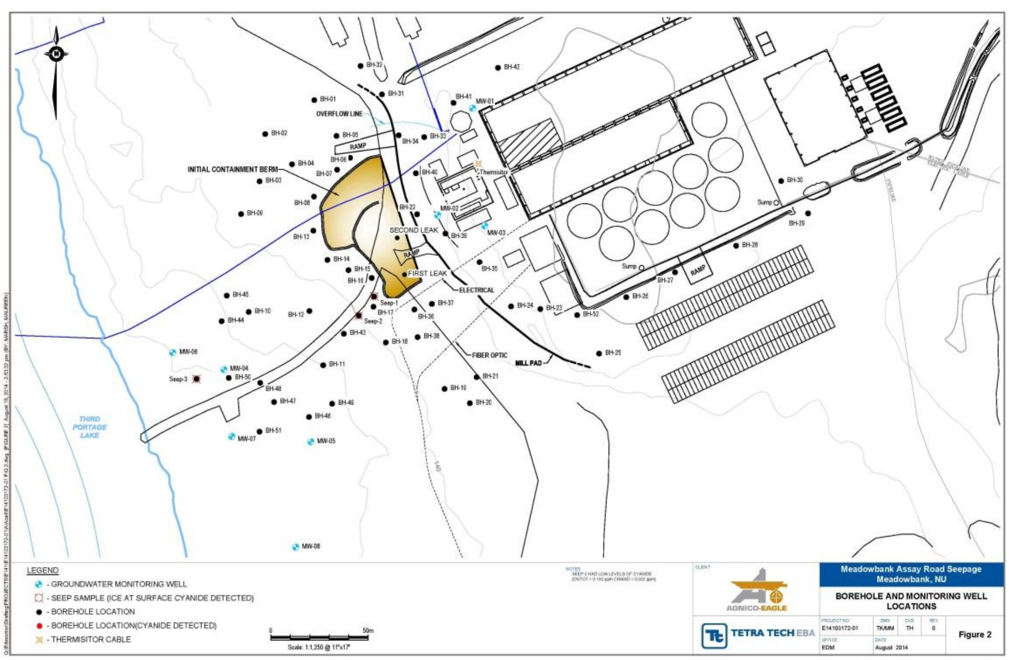
Tetra Tech EBA Inc. is pleased to provide this report to Agnico Eagle Mines (AEM) summarizing our findings from our Environmental Site Assessment of the Assay Road Seepage and the Quality Assurance/Quality Control (QA/QC) monitoring for the construction of the interception trench at the Meadowbank Mine, about 80 km north of Baker Lake, Nunavut. The purpose of this project was to identify cyanide impacted soil and groundwater; provide monitoring suggestions for cyanide impacted soil and groundwater; and perform QA/QC for the construction of an interception trench. The objectives of this work were as follows:

- Evaluate the extent of the soil impacted by the cyanide leak from the Meadowbank Mine Mill, with the goal of selecting a location for an interception trench;
- Provide recommendations for soil and groundwater monitoring after installation of the interception trench;
- Provide QA/QC services for the construction of the interception trench, and
- Provide a report summarizing the findings of the Environmental Site Assessment and the QA/QC services.

Phase 2 Environmental Evaluation

Tetra Tech EBA conducted an Environmental Site Assessment from February 19, 2014 to March 6, 2014 to investigate and evaluate the extent of ground impacted by the cyanide leak with the goal of selecting a location for an interception trench and to allow future determination of clean-up requirements of the contaminated materials.

The Environmental Site Assessment was conducted with a downhole hammer-air rotary drill without water. A total of 52 boreholes were drilled in various areas located on the tundra and pad. In addition to the boreholes, eight (8) monitoring wells were installed, three (3) on the pad and five (5) on the tundra (Figure 2). Soil samples were collected from each borehole and analysed for pH, Total (Strong Acid Dissociable) Cyanide and Weak Acid Dissociable (WAD) Cyanide. Where possible, ice or water samples were collected and analyzed for Total Cyanide and WAD Cyanide.



There are no guidelines for Total and WAD Cyanide in the Canadian Council of Ministers of the Environment (CCME), "*Soil Quality Guideline for the Protection of Environmental and Human Health*" or the Environmental Protection Division, Department of Environment, Government of Nunavut, "*Environmental Guideline for Contaminated Site Remediation*" (March 2009 Revised). Free cyanide was not analyzed in this assessment since WAD Cyanide includes free cyanide and this was an initial investigation to determine the extent of cyanide impacted soil down the grade from the Assay Lab. Therefore, the British Columbia Environmental Management Act for Contaminated Sites Regulations, Schedule 4 and 6 for Total and WAD Cyanide were used to evaluate the level of contamination.

A total of 62 soil samples collected from the natural area downslope of the mill pad were submitted for analysis of Total and WAD Cyanide, of which 17 samples detected Total Cyanide with values ranging from 0.5 to 51 mg/kg. Only one location (BH-38, 51 mg/kg) was greater than the British Columbia guidelines for Total Cyanide. As for WAD Cyanide, there were only three samples where WAD Cyanide was detected, with values ranging from 0.9 to 3 mg/kg. A total of 30 soil samples were collected from the mill pad and submitted for analysis of Total and WAD Cyanide, of which there was one sample (BH-22, 1.7 mg/kg) where Total Cyanide was detected. No WAD Cyanide was detected.

A total of 6 water (ice) samples collected from the natural area outside of the mill pad were submitted for analysis of Total and WAD Cyanide. Total Cyanide was detected with values ranging from 0.192 to 2.23 ppm. All water samples analyzed, except one (Seep 3), exceed Meadowbank's Water License No. 2AM-MEA0815 for Total Cyanide in effluent. On the mill pad, there was one water sample (BH-22) submitted where Total Cyanide (24.59 ppm) and WAD Cyanide (10.6 ppm) was detected.

Phase 2 Engineering

Tetra Tech EBA agreed with AEM's suggestion that an interception trench needed to be constructed downstream of the temporary containment berms that were rapidly constructed downslope of the mill pad when the seepage was first observed. AEM designed the interception trench, with consultation by Tetra Tech EBA, and Tetra Tech EBA was selected to perform geotechnical QA/QC during its construction. The purpose of the geotechnical engineering QA/QC program was to verify that geotechnical related construction activities were undertaken in accordance with the project drawings and specifications, and that the design intent was satisfied.

The AEM design for the interception trench utilizes shallow ditches and a sump. To mitigate anticipated thaw in permafrost the final design for the interception trench included significant over excavation and replacement with thaw stable materials, and a liner and cut-off system that is keyed in deep enough below the ditch or sump bottom to be below the depth of anticipated thaw. However, to insure thermal stability, it will be essential that water not be allowed to pond in the ditches or sump.

Conclusions

During this investigation cyanide was detected at a depth of 1.68 mbgs near the location where the seep was initially identified. Down gradient of the initial containment, cyanide was detected to depths of 0.7 mbgs. Cyanide was not detected approximately 60 m from the lake (BH-47) in the soil, but was found at low levels in water (ice) that accumulated on the surface (Seep 3). Seep 3 is located about 30 m from the lakes edge and had low levels of cyanide (Total cyanide - 0.192 mg/L; WAD cyanide - 0.033 mg/L). This information suggests that the cyanide initially infiltrated into the soil close to the initial seepage area; however further away from the seepage location cyanide may have accumulated only in the topsoil with little or no penetration into the underlying till overburden or bedrock.

It was decided that the interception trench would be installed between Seep 3 and BH-47. The location of the interception trench was based on the desire to minimize disturbance to the natural tundra downslope of the mill pad, and so it would act as a barrier between areas with detected cyanide contamination and the lake, while staying at least 30 m away from Third Portage Lake. An interception trench at this location should prevent the cyanide contamination from reaching Third Portage Lake. It is recommended that any water pooling within the collection area of the interception trench be pumped out within one day.

Spills from the CIP tanks were not being contained by the secondary containment system and hence cyanide impacted water was leaking into the foundation soils below the mill building and then out through the mill pad fill materials to the natural area downslope of the mill.. In order to remove the source of contamination, AEM has taken steps to repair/reseal areas in the secondary containment that were identified to be leaking and that lead to the observed seepage. The main area of concern was the secondary containment system around the CIP tanks, which has now been repaired.

A ground temperature monitoring cable (thermistor cable) was installed near the mill to determine ground temperatures in the pad. The cable indicates that the pad fill materials and underlying native ground have refrozen and the active layer was determined to be about 1.5 m thick in June. Therefore, repairs to the containment system in the mill in conjunction with the presence of frozen ground indicate that the potential for continued seepage should be minimal.

Recommendations

AEM has established a Freshet Action Plan (April 2014), which outlines work that AEM will undertake to monitor the interception trench and the sampling protocols. AEM will conduct daily inspections of the pumping, collection systems and perimeter area and will record all pumped volumes of water from the interception trench. Any of the water collected will be pumped to the mill and discharged with the tailings to the tailings storage facility (TSF). The sampling program in this action plan states that on a monthly basis AEM will submit water samples to Multi Lab for analysis of Free Cyanide, Total Cyanide, Copper and Iron from the interception trench, monitoring wells 14MW04, 14MW05,14MW06, 14MW07, and 14MW08, the original containment area and Third Portage Lake. Bi-weekly they will collect waters twice a week from the original containment berm, the interception trench, and monitoring wells 14MW02, 14MW03, 14MW08, 201, 202, and 203 to be submitted to the AEM on-site lab for WAD cyanide analysis.

After reviewing the information from this Environmental Site Assessment and AEM's Freshet Action Plan (April 2014), the following recommendations apply:

- Continue to sample the original containment berm, interception trench, Third Portage Lake and monitoring wells 14MW01 to 14MW08, 201, 202 and 203, if water is present and not frozen, for analysis of Free and Total cyanide, Copper, and Iron;
- In monitoring wells with known detected cyanide, collect water samples once in the spring and fall for analysis of ammonium, nitrate/nitrite, and pH. The purpose for the ammonium and nitrate/nitrite is that these compounds increase in response to biodegradation of cyanide;
- If water is ponding down gradient of the interception trench, water samples should be collected and submitted for analysis of Free and Total cyanide, Copper, and Iron;
- During the investigation, no seep (water) samples or soil samples were collected within 30 m of the lake. Cyanide was detected at Seep 3, thus further sampling should be conducted down gradient of the trench in

the soil and water. Water should be analyzed for Free and Total Cyanide, Copper, and Iron, while soils should be analyzed for Free and Total cyanide;

- Depending on the results of the soil samples collected and potentially ponded water samples collected within 30 m of Third Portage Lake it is recommended that sediment samples be collected from the shore of Third Portage Lake. These sediment samples should be analyzed for Free and Total Cyanide, Copper and Iron.
- AEM should install sumps inside the original containment berm to aid in the collection of water. This water can be pumped up to the mill and discharged with the TSF. This should improve collection of water in the spring near the mill pad;
- AEM should continue with the repairs to the mill to ensure seepage sources are eliminated; and
- Collect additional soil samples on the northeast side of the mill in the direction of Tear Drop Lake to confirm if any cyanide travelled in that direction. If water is observed in a drill hole a well should be installed.

The following soil sampling recommendations should be implemented at closure of the mine:

- Soil samples should be collected and tested for Free Cyanide in the areas where known cyanide was detected, as free cyanide was not analyzed in this investigation. These areas should be delineated in order to produce a remedial action plan, if needed;

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ACRONYMS & ABBREVIATIONS

AEM	Agnico Eagle Mines
CCME	Canadian Council of Ministers of the Environment
mbgs	metres below ground surface
QA/QC	Quality Assurance/Quality Control
TSF	Tailings Storage Facility
SAD	Strong Acid Dissociable
WAD	Weak Acid Dissociable

LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Agnico Eagle Mines Limited and their agents. Tetra Tech EBA Inc. (Tetra Tech EBA) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Agnico Eagle Mines Limited, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in Tetra Tech EBA's Services Agreement. Tetra Tech EBA's General Conditions are provided in Appendix G of this report.

1.0 INTRODUCTION

Tetra Tech EBA Inc. (Tetra Tech EBA) is pleased to provide this report to Agnico Eagle Mines (AEM) summarizing our findings from our Environmental Site Assessment of the Assay Road Seepage and the quality assurance/quality control (QA/QC) monitoring of the construction of the interception trench at the Meadowbank Mine, about 80 km north of Baker Lake, Nunavut,. The purpose of this project was to identify cyanide impacted soil and groundwater; provide monitoring suggestions for cyanide in soil and groundwater; and perform quality assurance/quality control (QA/QC) during construction of an interception trench. The objectives of this work were as follows:

- Evaluate the extent of the soil impacted by a cyanide leak from the Meadowbank Mine Mill, with the goal of selecting a location for an interception trench;
- Provide recommendations for soil and groundwater monitoring after installation of the interception trench;
- Provide QA/QC services for the construction of the interception trench, and
- Provide a report summarizing the findings of the Environmental Site Assessment and the QA/QC services.

The Environmental Site Assessment was conducted in general accordance with the "*Environmental Guideline for Contaminated Site Remediation*" (Government of Nunavut 2009).

2.0 SCOPE OF WORK

2.1 Phase 2 Environmental Evaluation

Tetra Tech EBA conducted an Environmental Site Assessment from February 19, 2014 to March 6, 2014 to investigate and evaluate the extent of ground impacted by the cyanide leak with the goal of selecting a location for an interception trench and to allow future determination of clean-up requirements of the contaminated materials. During the drilling program there were some modifications made to the work plan. These changes included additional boreholes and monitoring wells and some proposed borehole locations were moved as the program progressed.

2.1.1 Scope of Environmental Site Assessment

The scope of work for the Environmental Site Assessment included the following:

- Conducting a safety meeting with AEM and Tetra Tech EBA representatives to review the Safety Plan and identify all hazards, PPE requirements, emergency contacts, and safe work practices.
- Determining where all underground utilities such as electrical and water lines are located on site prior to drilling.
- A total of 52 boreholes were drilled in various areas located on the tundra and pad. In addition to the boreholes, eight (8) monitoring wells were installed, three (3) on the pad, and five (5) on the tundra. All holes were drilled using a downhole hammer-air rotary drill without water.
- Samples were collected in most boreholes and monitoring well locations, where possible. There were some locations on the pad where soil samples could not be collected due to voids underneath or in the pad. Each borehole and monitoring well was drilled to bedrock.

- Samples were collected at the drill using either plywood or a metal pan and then scooped into plastic bags using a metal spoon. After each sample was collected, the pans, spoon, and plywood were brushed off to minimize cross contamination. In addition, before drilling each hole, the drill was purged using compressed air to clean off the drill bit. When moved from a known contaminated site on the pad to the tundra, the drill rod and drill bit where exchanged for clean rods and drill bits.
- A total of 92 soil samples were submitted to Maxxam Analytics in Montreal Quebec for analysis of Total (Strong Acid Dissociable) Cyanide and Weak Acid Dissociable (WAD) Cyanide. There were 10 samples submitted for soil pH. All soil samples were maintained below 4°C.
- Where possible, ice or water samples were collected and placed into plastic containers for analysis. A total of 7 samples were sent to Multi-Lab Direct in Val-d'Or Quebec for analysis of Total Cyanide and WAD Cyanide. All water/ice samples were maintained below 4°C. An additional sample was taken at the same time for each of the 7 water/ice samples and submitted to the on-site Assay Lab for analysis of WAD Cyanide.
- All borehole locations and monitoring well locations were determined using a handheld Trimble GPS.

2.2 Phase 2 Engineering

Tetra Tech EBA agreed with AEM's suggestion that an interception trench needed to be constructed downstream of the temporary containment berms. AEM designed the interception trench and Tetra Tech EBA performed geotechnical QA/QC during its construction. The QA/QC for the interception trench was carried out between April 24, 2014 and May 1, 2014. The purpose of the geotechnical engineering QA/QC program was to verify that geotechnical related construction activities were undertaken in accordance with the project drawings and specifications, and that the design intent was satisfied. This section provides Tetra Tech EBA's scope for the engineering work.

2.2.1 Phase 2 Engineering Scope of Work

The proposed Phase 2 engineering scope of work included the following:

- Reviewing AEM's Engineering design plan for the interception trench and providing feedback in a memo;
- Performing a visual inspection of the interception trench excavation and cleaning/preparation prior to 20 mm crushed aggregate/8% bentonite fill placement;
- Observing 20 mm crushed aggregate/8% bentonite fill placement and compaction;
- Providing geotechnical design clarifications and verification that the design intent was being achieved; and
- Overseeing the construction of the permanent interception trench in a QA/QC only capacity.

3.0 BACKGROUND INFORMATION

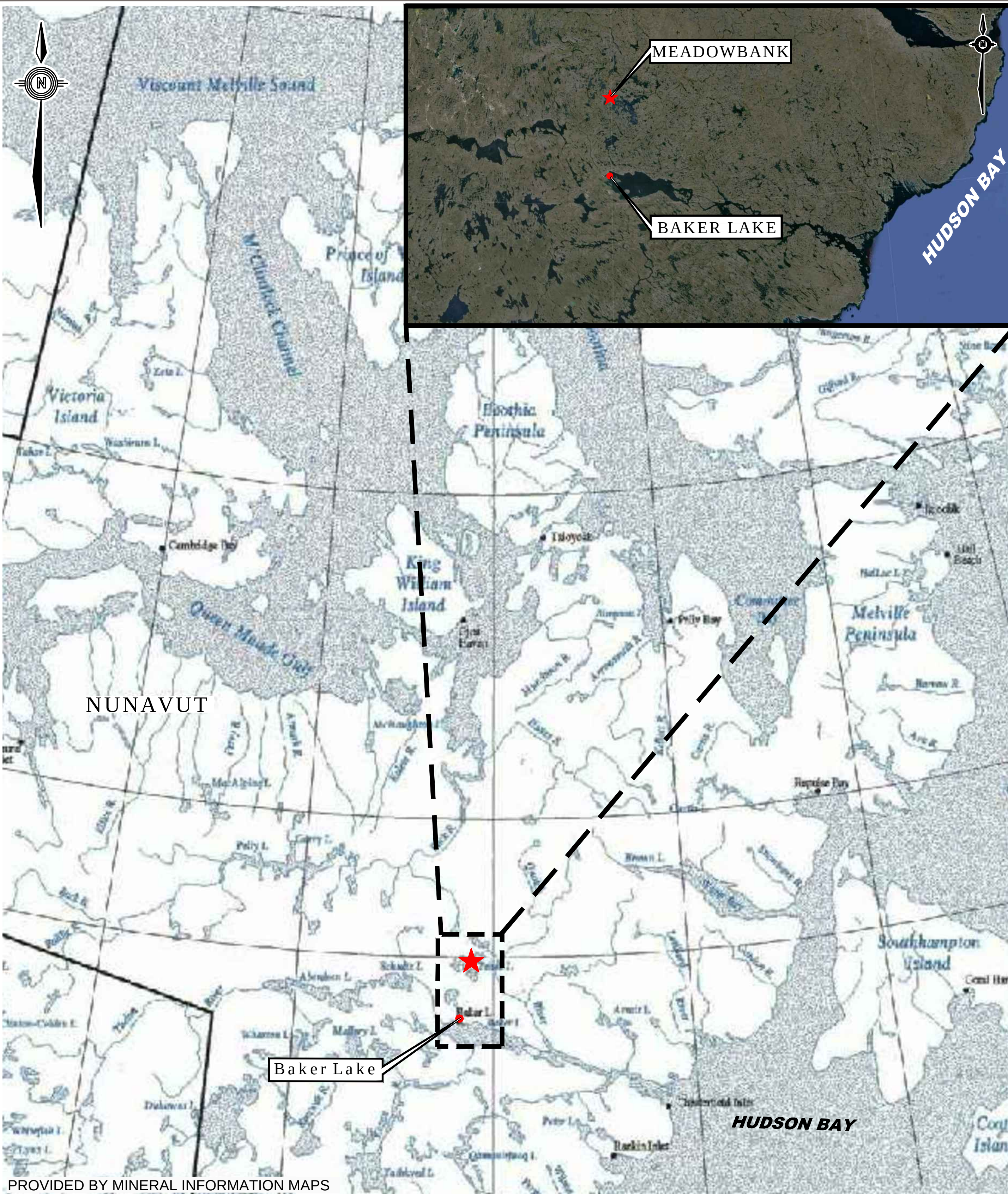
3.1 Site Details and Background

The Meadowbank Mine is located approximately 80 km north of Baker Lake, Nunavut (Figure 1) in the Kivalliq Region (formerly District of Keewatin). It is located near Third Portage Lake approximately 190 m northeast from the edge of the lake (65°1'30"N, 96°4'14"W). On November 26, 2013, Tetra Tech EBA was provided with a detailed report, "*Preliminary AEM Report – Assay Road Seepage*" (AEM, November 2013) discussing the seepage issue identified at the Meadowbank Mine. This report noted that on November 4, 2013, seepage was first observed coming through the road embankment in front of the Assay Lab. Testing of the seepage water identified that it was process water, as indicated by the presence of cyanide, copper, and iron.

After the seepage was identified by AEM, a temporary containment berm was constructed downstream of the road to contain the water. Because of winter conditions, the seepage water froze relatively quickly and the ice was regularly removed from the containment area using a backhoe. As winter conditions continued, the amount of seepage decreased, due to freezing within the road embankment. The seepage was thought to be primarily originating from the mill, particularly from the CIP secondary containment system.

AEM drilled a number of boreholes on the mill pad, but only water samples were collected from holes that had enough water. AEM also collected water samples from groundwater wells installed by AEM (201, 202, and 203) located on the pad in front of the CIP area behind the Assay Lab. In the area where the cyanide leaked onto the ground surface downslope of the mill pad, three samples were collected from inside the temporary containment berm, along with an additional sample collected from the surface water of the lake downgrade of the leak. Cyanide was detected from the water samples collected from the wells and inside the temporary containment berm. Cyanide was not detected in the sample that was taken from the lake. Additional samples were taken from the lake near the water tank intake pipe intermittently from November 26, 2013 to May 26, 2014 and submitted to Multi Lab for analysis of Total Cyanide. Cyanide values ranged from less than 0.005 (detection limit is 0.005 mg/L) to 0.087 mg/L. These values are very low, as well, the Total Cyanide values have been below detection limits since April 1, 2014.

AEM conducted an assessment program inside the mill and determined that there were several secondary containment systems that required repair. AEM is currently undertaking an extensive repair/reseal program within the mill to ensure integrity of these containment systems that were identified to be leaking and which lead to the seepage. The main area of concern identified in this assessment program was the CIP tank secondary containment system which was designed to contain spills from the CIP tanks. This containment system has now been repaired.



DRAWING NOT TO SCALE

CLIENT

AGNICO-EAGLE

TETRA TECH EBA

Meadowbank Assay Road Seepage
Meadowbank, NU

SITE LOCATION

PROJECT NO.	DWN	CKD	REV
E14103172-01	TK	TH	0

OFFICE	DATE
EDM	June 2014

Figure 1

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3.2 Climate

Based on meteorological data from weather stations at Baker Lake, the mean annual temperature is -11°C. Based on 153 complete months of data at the Baker Lake Airport, the mean monthly air temperatures for Baker Lake ranged from -38.2°C in January 2004 to 13.7°C in June 2007. Total annual rainfall from 2000 to 2012 averaged 26 mm and 11 mm of snow water equivalent (Government of Canada 2014).

3.3 Site Topography and Vegetation

The Meadowbank Mine is located adjacent to Third Portage Lake in the Low Arctic ecoclimatic zone, characterized with low relief, having an elevation range of 0 to 70 m above the lake level. The site is predominantly covered in heath tundra interspersed with lichen-dominated bedrock outcroppings and boulder fields (Cumberland Resources Ltd. 2005).

3.4 Regional Bedrock Geology

The Meadowbank Mine is located on the Canadian Shield, which consists of Archean rocks. Archean rocks are greater than 2.5 billion years old and the Shield contains the largest area in the world of Archean rocks. The mine site is underlain with Archaean greenstone and metasedimentary rocks consisting of iron formation, intermediate volcanic and ultramafic rocks with quartzite in some areas. Enclosed within the greenstone are volcaniclastic sediments, felsic-to-intermediate flows and tuffs, sediments and oxide iron formations, and sericite schists. The ultramafic rocks contain serpentinite, chlorite, actinolite, and talc. There are two main faults identified in the Meadowbank Mine region, the Bay Zone Fault and the Second Portage Fault. There are areas where bedrock outcrops are found and the bedrock appears to follow the surface topography, with some local relief in the bedrock surface of 0.5 meters (Cumberland Resources Ltd. 2005).

3.5 Regional Surficial Soils

The area is partially covered with glacial till that has a sandy silty till with gravel matrix. The percent fines for silt and clay are typically 20 to 40%. Both boulders and cobbles are present in the till with the cobble content ranging from 0 to 35% with an average of 12% by volume. The colour of the till in this area ranges from dark brown to reddish brown (Cumberland Resources Ltd. 2005; Golder Associates. 2008).

3.6 Hydrogeology

The Meadowbank Mine is located near the surface water divide between the Back River basin, which flows north to northwest towards the Arctic Ocean and the Thelon River basin, which flows east to southeast into Hudson Bay. The regional deep groundwater flows northwest from the northwestern end of Third Portage Lake and in the southeast direction from the southeast end of Third Portage Lake and Second Portage Lakes.

Continuous permafrost depth extends between 450 and 550 m. Ground temperature measurements in the project area indicate an active zone thickness averaging 1.3 m in shallow overburden and up to 4 m adjacent to the lakes (Cumberland Resources Ltd. 2005). The shallow groundwater flow has little to no hydraulic connection with the groundwater regime located below the deep permafrost. Based on the regional geology and the presence of permafrost, the groundwater flow is likely complex and controlled by topography, surface water bodies, and bedrock structure. Vertical groundwater flow is limited by the permafrost. The period of groundwater flow is highly influenced by climatic conditions and flow is also likely limited to the short summer season when the active layer thaws, thus allowing water to flow in this horizon. It is expected that the surface water bodies are expressions of the water table.

Based on the site topography, it is expected that flow of water in the active layer is towards Third Portage Lake. Third Portage Lake is located approximately 190 m from the Mill Pad. From photos taken in the fall, there are areas located near the lake where water ponds, thus water in the active layer is close to surface in this area, and the grassy vegetation observed reflects wetland conditions.

3.7 Cyanide

Cyanide is a general term that refers to a group of chemicals where carbon and nitrogen combine to form compounds (CN). The chemistry of cyanide is complex, as there are different cyanide compounds, which have been grouped into five groups: free cyanide, simple cyanide compounds, weakly complexed cyanide, moderately strong complexed cyanide and strong complexed cyanide. These five groups have then been categorized into three common names: free cyanide, WAD cyanide, and Total cyanide. Most cyanide in solution combines with metals and metalloids and form dissolved complexes (Lottermoser, Bernd. 2007).

Free Cyanide

Free cyanide refers to two species: the cyanide anion (CN^-) dissolved in water and the hydrocyanic acid (HCN) formed in solution (Lottermoser, Bernd. 2007):

$$CN^-_{(aq)} + H_2O_{(l)} \longleftrightarrow HCN_{(aq)} + OH^-_{(aq)}$$

The amount of cyanide converted to hydrogen cyanide depends on the salinity and pH of the solution. At alkaline pH greater than 10.5, most of the free cyanide is present as the cyanide anion. Equal concentrations of CN and HCN are present at a pH of 9.3. At neutral to acidic pH conditions (pH < 8.3), all free cyanide is present as hydrogen cyanide. Hydrogen cyanide is volatile and can be dispersed to the atmosphere. As for the salinity, hydrogen cyanide is promoted in high saline conditions (Lottermoser, Bernd. 2007).

WAD Cyanide

Weak acid dissociable (WAD) cyanide consists of free cyanide, simple cyanide compounds, and weak to moderately strong complexes. Simple cyanide compounds are the salts of hydrocyanic acid (e.g.: NaCN, KCN, $Ca(CN)_2$, Cu(CN), Ni(CN)). These compounds exist as solid cyanides, some of which are water soluble, which can form free cyanide and dissolved cations. The weak to moderately strong complexes are metal complexes (e.g. $Zn(CN)^{-2}_4$, $Cd(CN)^-_3$, $Cu(CN)^-_2$, $Ni(CN)^{-2}_4$ and $Ag(CN)^-_2$) which create free cyanide when the pH is lowered to approximately 4.5 (Lottermoser, Bernd. 2007)

Total Cyanide

Total Cyanide consists of free cyanide, simple compounds, weak to moderately strong complexes and strong complexes. These strong complexes include complexes of gold, iron, and cobalt, and their destruction is slow under natural conditions. A change in environmental conditions such as pH, water temperature, salinity, complex concentration, oxidant concentration, and intensity of sunlight or UV radiation reduces the stability of the strong cyanide complexes (Lottermoser, Bernd. 2007).

Toxicity

Free cyanide is the most toxic cyanide form, since it causes toxicity at low concentrations. For the other cyanide species, WAD and Total, higher concentrations are required to induce toxicity. Hydrogen cyanate and cyanate ions are less toxic than hydrogen cyanide, while thiocyanate is relatively non-toxic compared to free cyanide. The stability of the cyanide influences the toxicity of the different cyanides. The more stable the cyanide, the less toxic it is, particularly to aquatic life. Therefore, WAD cyanide is an appropriate measure for assessing potential toxicity of cyanide solutions to humans and animals (Lottermoser Bernd. 2007).

Fate and Transport in Soil

Transport and distribution of cyanide is mainly affected by volatilization and biodegradation in soils. Volatilization of cyanide increases in acidic soils and can be the dominant mechanism for cyanide loss from soil surfaces. Cyanide can also create metal complexes with heavy metals, especially iron, and precipitate out of solution. Hydrogen cyanide is not affected by photolysis in soils, but complex cyanides may rapidly photo dissociate and release free cyanide when exposed to sunlight. Cyanide can be absorbed to soil particles, particularly to clays and organic matter. The rate at which hydrogen cyanide and metal cyanide adsorb to soils in not significant when compared to volatilization and biodegradation. The high volatility of cyanide and the action of soil microbes do not permit high levels of cyanide to persist or accumulate in the soil under natural conditions. Biodegradation of cyanide in the soil by microbes tends to generate carbonates and ammonia. Cyanide in the soil will decompose to ammonia, carbon dioxide, and nitrogen (nitrate) in aerobic conditions and nitrogen (ammonium), thiocyanate, and carbon dioxide under anaerobic conditions (CCME. 1999).

Mobility of cyanide in the soil changes with stability and dissociation of the compound, soil type, soil permeability, soil chemistry, and presence of aerobic and anaerobic conditions. The following soil characteristics increase the mobility of cyanide: low pH, high negative soil charges, and low clay content. Whereas soils with neutral to alkaline pH, high clay content, high positive soil charges, presence of organic matter, iron, or other metal oxides can increase soil attenuation. Attenuation may be increased under aerobic conditions, since biodegradation is higher in aerobic conditions. Some comparisons were completed for different cyanide complexes for mobility, in that aqueous simple cyanide and ferricyanides tend to be very mobile in soil, while cyanides dissolved in leachate move slower than those in the aqueous solution. Copper, cobalt, zinc, and nickel-cyanide complexes were found to be more mobile than iron and manganese complexes (CCME. 1999).

4.0 ENVIRONMENTAL CRITERIA

The following subsections outline the rationale for the selection of applicable generic risk management guidelines for soil.

4.1 Regulatory Guidelines

The regulatory guideline documents that were consulted are summarized below. These documents provide a generic set of guidelines against which the analytical results are compared to provide a general site condition.

- Canadian Council of Ministers of the Environment, Soil Quality Guideline for the Protection of Environmental and Human Health (2007) - Wildland Land Use;
- Canadian Council of Ministers of the Environment, Canadian Water Quality Guidelines for Protection of Fresh/ Marine Water Aquatic Life (2007);
- Environmental Protection Division, Department of Environment, Government of Nunavut, Environmental Guideline for Contaminated Site Remediation (March 2009 Revised) - Wildland Land Use;
- British Columbia Environmental Management Act for Contaminated Sites Regulations, Schedule 4 Generic Numerical Soil Standards (2014) – Wildland Use and;
- British Columbia Environmental Management Act for Contaminated Sites Regulations, Schedule 6 Generic Numerical Water Standards (2014).

4.2 Criteria for Cyanide in Soil

Currently, there are no soil guidelines for Total and WAD Cyanide under the Canadian Council of Ministers of the Environment (CCME), "*Soil Quality Guideline for the Protection of Environmental and Human Health*" or the Environmental Protection Division, Department of Environment, Government of Nunavut, "*Environmental Guideline for Contaminated Site Remediation*" (March 2009 Revised). Only free cyanide is regulated under these guidelines, in which for Wildland land use, the guideline is 0.9 mg/kg. Free cyanide was not analyzed in this assessment since WAD Cyanide includes free cyanide and this was an initial investigation to determine the extent of cyanide impacted soil downgrade of the Assay Lab.

There are guidelines under the British Columbia (BC) Environmental Management Act for Contaminated Sites Regulations, Schedule 4 for Total and WAD Cyanide. Under these guidelines there are five (5) land use categories, Agriculture, Commercial Residential, Industrial, and Urban Park (Wildlands). Below are the definitions for each land use:

- **Agricultural:** means the use of land for the primary purpose of producing agricultural products for human or animal consumption including, without limitation, livestock raising operations, croplands, orchards, pastures, greenhouses, plant nurseries and farms;
- **Commercial:** means the use of land for the primary purpose of buying, selling or trading of merchandise or services including, without limitation, shopping malls, office complexes, restaurants, hotels, motels, grocery stores, automobile service stations, petroleum distribution operations, dry cleaning operations, municipal yards, warehouses, law courts, museums, churches, golf courses, government offices, air and sea terminals, bus and railway stations, and storage associated with these uses;
- **Residential:** means the use of land for the primary purpose of a residence by persons on a permanent, temporary or seasonal basis, including, without limitation, single family dwellings, cabins, apartments, condominiums or townhouses, or institutional facilities, including, without limitation, schools, hospitals, daycare operations, prisons, correctional centres and community centres;
- **Urban Park:** means the use of urban land for the primary purpose of outdoor recreation including, without limitation, municipal parks, fairgrounds, sports fields, rifle ranges, captive wildlife parks, biking and hiking areas, community beaches and picnic areas, but does not mean Wildlands such as ecological reserves, national or provincial parks, protected wetlands or woodlands, native forests, tundra and alpine meadows;
- **Wildlands:** means the use of land for the primary purpose of supporting natural ecosystems, including the use of land for ecological reserves, national or provincial parks, protected wetlands or woodlands, native forests, tundra and alpine meadows, but does not include uses defined as urban park land use. The land use of the site is Wildlands land use when the concentration of any substance in the soil at a depth of less than 3 metres is greater than the numerical standards for soil that would apply if the land use of the site were urban park land use.

For the purposes of this comparison, the urban park (Wildland) land use values from British Columbia (BC) Environmental Management Act for Contaminated Sites Regulations, Schedule 4 for Total and WAD Cyanide were used as a guideline. Maximum Total and WAD Cyanide from this act are 50 and 10 mg/kg, respectively.

4.3 Criteria for Cyanide in Water

4.3.1 Water Licence

As per Water Licence No. 2AM-MEA0815 (see Table A below), all effluent shall not exceed the following criteria for Cyanide:

Table A – Cyanide Effluent Criteria

Parameter	Max. Average Concentration	Max. Allowable Grab Sample Concentration
Total Cyanide (mg/L)	0.5	1.0

4.3.2 General Criteria

In this investigation Total and WAD cyanide were measured on site, but not free cyanide. The reason for this is that WAD cyanide includes free cyanide. Thus, free cyanide was not included in the analysis as the purpose of this investigation was to determine the extent of the cyanide impacted material. Also, WAD cyanide is an appropriate measure for assessing potential toxicity of cyanide solutions to humans and animals.

Currently, there are no water guidelines for Total, WAD and Free Cyanide under the Under the Government of Nunavut's Contaminated Guidelines, "*Environmental Guideline for Contaminated site Remediation*" (March 2009 Revised) for water. As for CCME's, "*Canadian Water Quality Guidelines for Protection of Fresh/ Marine Water Aquatic Life*" guideline, there are only standards for free cyanide for freshwater aquatic life (5 µg/l or 0.005 mg/L). Therefore the BC Environmental Management Act for Contaminated Sites Regulations (CSR), Schedule 6- Generic Numerical Water standards were utilized as it contains standards for both Total (Drinking Water: 200 mg/L) and WAD cyanide (Aquatic Life: 50 mg/L-freshwater or 10 mg/L for marine/estuary). Therefore the water licence criteria for Total Cyanide in effluent are utilized to evaluate the results from the testing on recovered water samples.

5.0 SITE WORK

5.1 Site Safety

In accordance with AEM's policies, Tetra Tech EBA staff completed AEM's online site orientation and safety training. Pre-job hazard assessments were completed prior to going in the field, and were updated with a field-level assessment once on site. In conjunction with AEM, Tetra Tech EBA completed a job hazard analysis form (See Appendix D) prior to conducting any field work. Each day, Tetra Tech EBA, AEM, and the driller conducted a safety meeting prior to drilling and completed a Safe Work Form, which was updated and signed daily. Tetra Tech EBA participated in the staff safety meetings at the beginning of the program with various mine manager representatives to go over the job hazard analysis and to review the scope of the project. Prior to drilling, the electrical and water lines were located on site. During the course of the work, Tetra Tech EBA met with the electrical supervisor to confirm holes located near the buildings and that when drilling near electrical lines, the power to these lines were locked out and tagged out.

For the geotechnical QA/QC work, Tetra Tech EBA staff completed AEM's online site orientation and safety training. Pre-job hazard assessments were completed prior to going in the field, and were updated with a field-level assessment once on site.

5.2 Soil Sampling Program

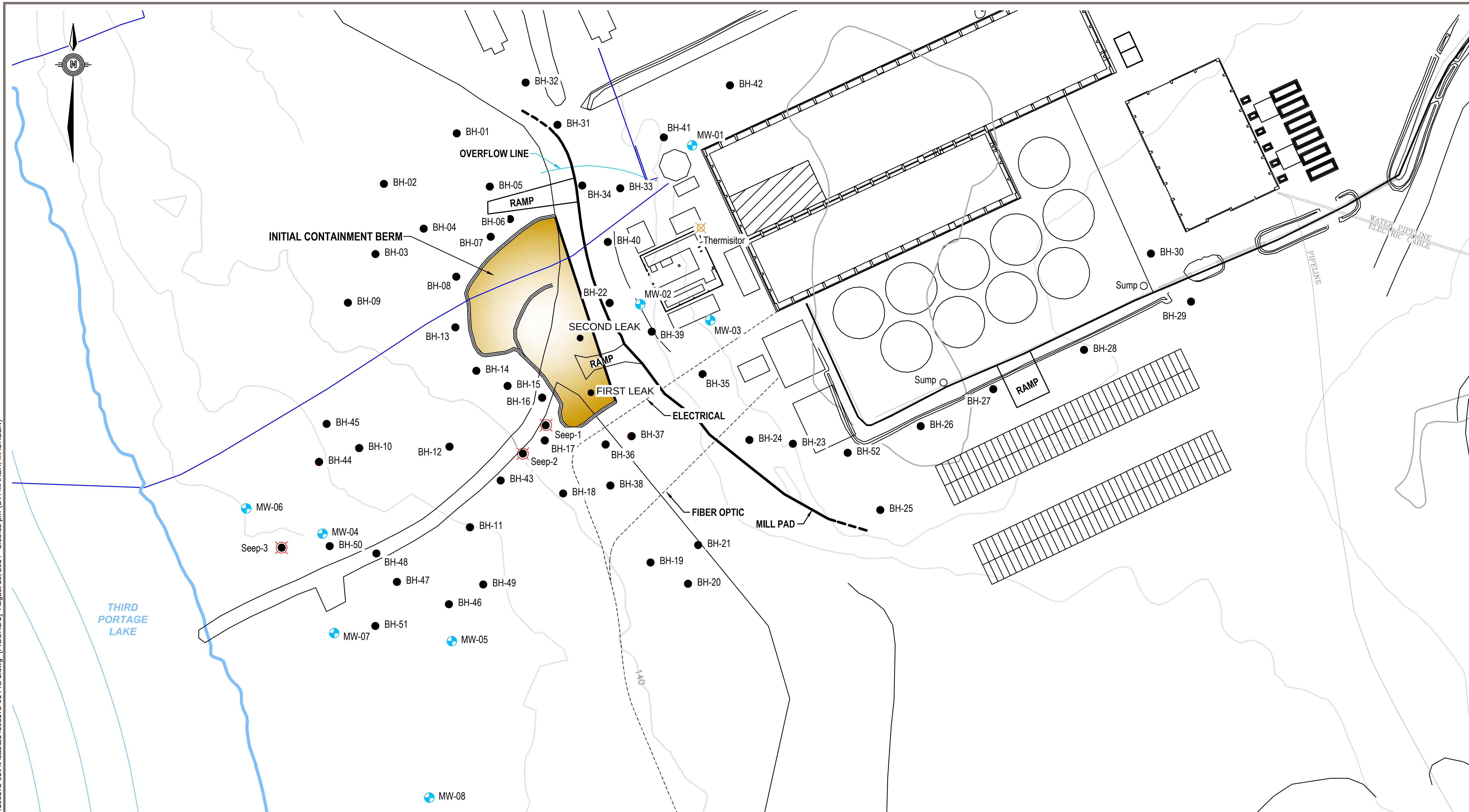
Prior to the drilling program, Tetra Tech EBA completed a walkthrough of the site with an AEM employee to explain where the leaks originated and where the water was originally coming out of the pad. After the walkthrough it was decided to begin drilling in front of the Assay Lab first then continue to drill on either side of the Assay Lab. Photos were taken throughout the drilling program (Photos 1-8).

A total of 52 boreholes were drilled in various areas (Figure 2). All holes were drilled using a downhole hammer-air rotary drill without water. Samples were collected from the drill using either plywood or a metal pan and then scooped into plastic bags using a metal spoon. After the collection of each sample, the pans, spoon, and plywood were brushed off to minimize cross contamination. In addition, before drilling each hole, the drill was purged using compressed air to clean off the drill bit. When moving from a known contaminated site on the pad to the tundra, the drill rod and drill bit were exchanged for clean rods and drill bits.

All borehole locations had the total depth recorded, and depth of refusal. The colour of the cuttings was noted at some, but not all borehole locations, during the drilling program. Cuttings collected from the pad were grey in colour, while cuttings collected from the native terrain downslope of the mill pad were brown to reddish brown in colour. There were some locations on the pad where soil samples could not be collected due to voids in the rockfill materials used to construct the pad or underneath the pad.

Soil samples were placed into plastic Ziploc bags supplied by the laboratory, stored in an insulated cooler and kept cold for transport to Maxxam Analytics International Corporation in Montreal, Quebec. Holding times for all soil samples were within acceptable limits. The temperature of the samples upon being received by the laboratory was below 4°C. No samples were broken or lost during transport.

A total of 92 samples were analyzed for Total and WAD cyanide and 8 samples were analyzed for soil pH.



Q:\Edmonton\Drafting\PROJECTS\E141\E14103172-01\A\Acad\E14103172-01 FIG 2.dwg [FIGURE 2] August 18, 2014 - 2:53:32 pm (BY: MARSH, MAUREEN)

LEGEND

- GROUNDWATER MONITORING WELL
- SEEP SAMPLE (ICE AT SURFACE CYANIDE DETECTED)
- BOREHOLE LOCATION
- BOREHOLE LOCATION(CYANIDE DETECTED)
- THERMISITOR CABLE

0 50m

Scale: 1:1,250 @ 11"x17"

NOTES
SEEP 3 HAD LOW LEVELS OF CYANIDE
(CNTOT = 0.192 ppm CNWAD = 0.033 ppm)

CLIENT

AGNICO-EAGLE

TETRA TECH EBA

Meadowbank Assay Road Seepage
Meadowbank, NU

BOREHOLE AND MONITORING WELL LOCATIONS

PROJECT NO.	DWN	CKD	REV
E14103172-01	TK/MM	TH	0

OFFICE	DATE
EDM	August 2014

Figure 2

5.3 Water Sampling Program

Where possible, ice or water samples were collected during drilling and placed into plastic containers for analysis. Samples were stored in an insulated cooler and were kept cold for transport to Multi-Lab Direct in Val-d'Or Quebec. A total of seven samples were sent to Multi-Lab Direct for analysis of Total Cyanide and WAD Cyanide. All water/ice samples were maintained below 4°C. An additional sample was taken at the same time for each of the seven water/ice samples and submitted to the Assay Lab on site for analysis of WAD Cyanide.

In addition to the sampled boreholes, eight (8) monitoring wells were installed, three (3) on the pad and five (5) in the natural terrain downslope of the mill pad. Monitoring wells were completed with 2" PVC solid pipe with a slotted screen at the bottom. These screens vary in depth, depending on the borehole depth (See Appendix B). The screen was surrounded by a silica sand filter pack followed by bentonite to grade. There were no metal coverings placed on the wells at the time of installation. After installation, no water samples could be obtained at the time of the investigation, due to frozen ground conditions.

5.4 Thermistor Cable

A thermistor cable was installed to 15.5 mbgs behind the Assay Lab near old monitoring wells 201, 202, and 203. The thermistor cable was completed with a 3" PVC solid pipe with caps at the bottom and top. The inside of the PVC pipe was filled with fine crushed gravel to the top of the PVC pipe. Readings were taken at the time of installation and every few days afterwards to determine the ground temperature. Appendix E presents the measured ground temperature and the calibration for the thermistor cable.

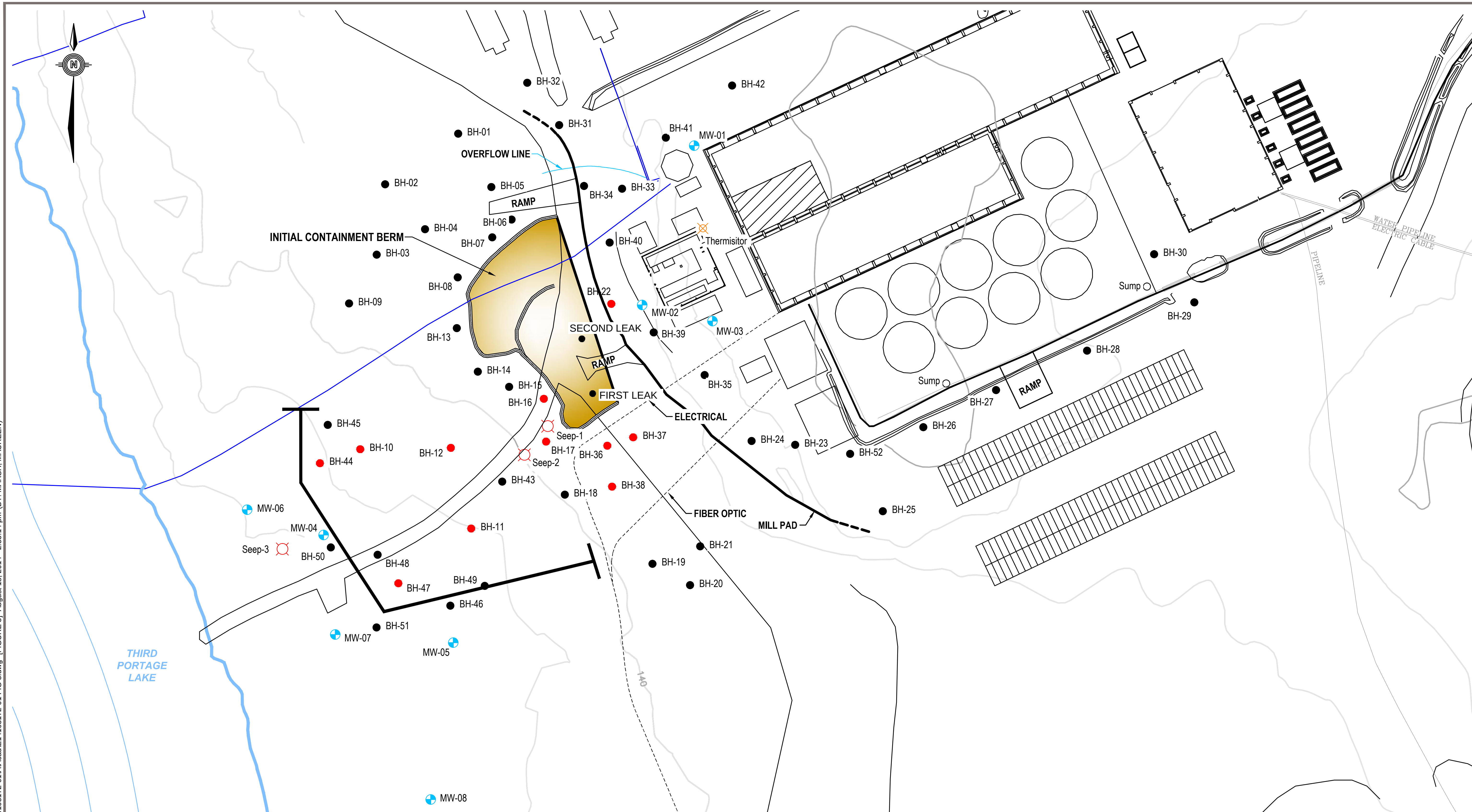
6.0 DESIGN AND CONSTRUCTION OF THE INTERCEPTION TRENCH

6.1 Interception Trench Location, Design and As-Built Construction

The interception trench design was developed by AEM with consultation by Tetra Tech EBA. The trench was located to minimize disturbance to the natural terrain, act as a barrier between detected cyanide and the lake, while staying at least 30 m away from Third Portage Lake. The approximate location of the interception trench is shown on Figure 3.

The initial design was to have a culvert within a rockfill mound and seacan placed on top for housing pumping equipment. The idea was to allow permafrost to aggrade into the bentonite material, providing a secondary impermeable boundary if water was allowed to pool in the collection area and started to slowly seep through the bentonite. This design was altered with input from Tetra Tech EBA and AEM, since the trench was over-blasted, and if the collection area was covered by rockfill to the original ground level, there was potential that the permafrost would aggrade too high and potentially freeze any pooled water before it could be pumped out. As a result, AEM committed that any pooled water in the collection area will be immediately pumped out to limit the possibility of long term pooling and seeping through the bentonite material, therefore the rockfill mound and seacan were abandoned.

Construction of the interception trench generally followed the intended design with a few changes made to "field-fit" to site conditions. As-built drawings provided by AEM are presented in Appendix C.



LEGEND

- GROUNDWATER MONITORING WELL
- SEEP SAMPLE (ICE AT SURFACE CYANIDE DETECTED)
- BOREHOLE LOCATION
- BOREHOLE LOCATION(CYANIDE DETECTED)
- THERMISITOR CABLE
- INTERCEPTION TRENCH

0 50m

Scale: 1:1,250 @ 11"x17"

NOTES
SEEP 3 HAD LOW LEVELS OF CYANIDE
(CNTOT = 0.192 ppm CNWAD = 0.033 ppm)

CLIENT
AGNICO-EAGLE

TETRA TECH EBA

Meadowbank Assay Road Seepage
Meadowbank, NU

INTERCEPTION TRENCH LOCATION

PROJECT NO.	DWN	CKD	REV
E14103172-01	TK/MM	TH	0
OFFICE	DATE		
EDM	August 2014		

Figure 3

Q:\Edmonton\Drafting\PROJECTS\E141\E14103172-01\Acad\E14103172-01 FIG 3.dwg [FIGURE 3] August 18, 2014 - 2:55:14 pm (BY: MARSH, MAUREEN)

The AEM design for the interception trench utilizes shallow ditches and a sump. To mitigate anticipated thaw in permafrost conditions, the final design for the interception trench includes significant over excavation and replacement with thaw stable materials, and a cut-off system keyed in deep enough below the ditch or sump bottom to be below the depth of anticipated thaw. However, to insure thermal stability, it will be essential that water not be allowed to pond in the ditches or sump for longer than 1 day.

6.1.1 Interception Trench Preparation

The excavation of blast debris from the interception trench was ongoing when Tetra Tech EBA arrived on site on April 24, 2014. Excavation was carried out with a Caterpillar (CAT) 365 excavator positioned parallel to the trench. Excavation removed the bulk of the blast material down to refusal on bedrock. The contractor was directed to remove all smaller rock fragments and unsound rock that remained at the bottom of the interception trench with the smaller CAT 345 backhoe equipped with a small (1 m wide) bucket fitted with “duck teeth”. Almost the entire excavation was located within sound bedrock. The bottom of the trench was somewhat irregular as a result of the inaccuracies of blasting. Photos 9 and 10 show the interception trench after the initial removal of blast material and after final cleaning, respectively.

6.1.2 Geotextile Placement

Geotextile was placed on the downstream slope of the interception trench under observation of Tetra Tech EBA. The geotextile was placed with a minimum panel overlap of 300 mm, and with approximately 1000 mm tied in at the top of the downstream slope. Photo 11 shows the geotextile on the downstream slope as it is being tied in.

6.1.3 20 mm Aggregate/8% Bentonite Material Placement

Bottom of Interception Trench

A mixture of 20 mm crushed aggregate with 8% bentonite (bentonite material) was placed on the bottom of the interception trench following inspection by Tetra Tech EBA. The bentonite material was compacted using a Wacker DPU 5045H Vibrating Plate with a minimum of four passes per lift; compaction activities are shown in Photo 12.

The aggregate/bentonite material was first placed to fill in the low (over-blasted) areas of the interception trench. Lift thicknesses between 200 and 300 mm were used. The bottom of the interception trench was built up in this manner until the desired thicknesses and grades were reached, as measured by the on-site surveyor. To meet the design intent, a minimum bentonite material thickness of 500 mm above the bedrock and minimum grades of 1.5 percent towards the collection area were achieved.

Downstream (Lake Side) Slope

Bentonite material was placed on the downstream slope of the trench in two lifts (300 mm and 200 mm) and compacted with the CAT 365 excavator bucket for a total thickness of 500 mm. Photo 13 shows the CAT 365 excavator compacting two lifts of bentonite material on the downstream slope.

Upstream (Mill side) Slope

Bentonite material was placed along the upstream slope to direct any flowing subsurface water (most likely flowing in the active layer at the overburden/bedrock contact) into the interception trench. Compaction was carried out with the CAT 365 excavator bucket. The contractor was directed to ensure there was no gap or “gutter” between the upstream wall and bentonite material. Care was taken so that the top of the bentonite material was below the overburden/bedrock contact. Photos 13 to 16 show bentonite placement on the upstream slope.

6.1.4 150 mm and Rock Fill Material Placement

The placement of the 150 mm and Rock Fill material was done after Tetra Tech EBA had left the site. This stage was not as crucial to the performance of the interception trench as the bentonite material placement. Photo 17 shows the interception trench at completion, photos courtesy of AEM.

6.1.5 Testing of 20 mm Crushed Aggregate/8% Bentonite Material

One sample (sample 1) of bentonite material was subjected to constant head hydraulic conductivity testing in Tetra Tech EBA's Edmonton laboratory in accordance with ASTM D5084. To get a sample representative of in-situ conditions, the sample was taken directly out of the bottom of the interception trench as the contractor was placing the bentonite material. In-situ moisture content prior to testing was 3.7%, moisture content after testing was 12.7%, with an average dry density of 1875 kg/m^3. The hydraulic conductivity of the bentonite material was determined to be 2.2 x 10^{-5} cm/s, which is adequate to minimize water seepage out of the interception trench. Detailed constant head hydraulic conductivity test results are presented in Appendix F.

7.0 RESULTS AND DISCUSSIONS

The results of the 2014 Meadowbank Mine Assay Seepage Environmental Site Assessment are presented in the following section and in Tables 1 to 3. The laboratory reports are in Appendix A.

7.1 Soil

Natural Terrain

There were a total of 62 soil samples submitted for analysis of Total and WAD Cyanide from the boreholes drilled in the natural terrain downslope of the mill pad. Of those 62 samples, there were 17 samples where Total Cyanide was detected, with values ranging from 0.5 to 51 mg/kg. When compared to the British Columbia (BC) Environmental Management Act: Contaminated Sites Regulations for Urban Park (Wildlands), Schedule 5, only one location (BH-38, 51 mg/kg) was greater than the BC guidelines (50 mg/kg) for Total Cyanide.

For WAD Cyanide, there were only three samples where WAD Cyanide was detected, with values ranging from 0.9 to 3 mg/kg. All of these samples were below the British Columbia (BC) Environmental Management Act: Contaminated Sites Regulations for Urban Park (Wildlands), Schedule 5 (10 mg/kg).

The pH of the soil on the tundra ranged from 6.89 to 7.20, which meets applicable guidelines.

Mill Pad

There were a total of 30 soil samples submitted for analysis of Total and WAD Cyanide from boreholes drilled through the pad. Of those 30 samples, there was one sample (BH-22, 1.7 mg/kg) where Total Cyanide was detected. No WAD Cyanide was detected. Water was observed in BH-22 and MW-02, which was located in front of the Assay Lab.

The pH of the material on the pad ranged from 8.58 to 9.38 which is greater than the applicable guidelines. This material is created mainly of crushed blast rock, which would have been pulverized during drilling. In gold mines there are issues with having waste rock having low pH causing acid drainage, thus having higher than neutral pH values is better than lower pH values. Therefore, the pH values observed in the pad should not be a concern.

7.2 Water

Natural Terrain

There were a total of 6 water (ice) samples submitted for analysis of Total and WAD Cyanide from the natural terrain downslope of the mill pad. Total and WAD Cyanide was detected at all six sample locations. Total Cyanide was detected with values ranging from 0.192 to 2.23 ppm. The Water Licence No. 2AM-MEA0815 provides effluent discharge for Total Cyanide at 0.5 ppm for maximum average concentration and 1.0 pm for maximum allowable grab sample concentration. Using this value as a guideline, all samples analyzed, except Seep 3, exceed the water License for Total Cyanide. Seep 3 is located approximately 30 m from the edge of the lake, where cyanide was detected.

The Water Licence No. 2AM-MEA0815 does not have effluent discharge values for WAD Cyanide. Using the BC guidelines as a guide, none of the water samples exceeded the BC guidelines to protect freshwater aquatic life (50 ppm).

Mill Pad

There was one water sample (BH-22) submitted for analysis of Total and WAD Cyanide from boreholes drilled in the pad. The Total Cyanide detected was 24.59 ppm and WAD Cyanide was 10.6 ppm. The Total Cyanide exceeds the effluent discharge established in the Water Licence No. 2AM-MEA0815.

Monitoring well MW-02 did contain water, but no sample was collected, as it was adjacent to BH-22.

7.3 Ground Temperature

Regular readings have been obtained from the thermistor cable between March 5, 2014 and June 16, 2014 to determine changes in the ground temperature regime and determine the thickness of the active layer. The active layer depth is approximately 1.5 mbgs and ground temperature at the depth of zero annual amplitude (approximately 12 mbgs) is -2.0°C.

8.0 CONCLUSIONS AND RECOMMENDATIONS

During this investigation cyanide was detected at a depth of 1.68 mbgs near the location where the seep was initially identified. Down gradient of the initial containment, cyanide was detected to depths of 0.7 mbgs. Cyanide was not detected approximately 60 m from the lake (BH-47) in the soil, but was found at low levels in water (ice) that accumulated on the surface (Seep 3). Seep 3 is located about 30 m from the lakes edge and had low levels of cyanide (Total cyanide- 0.192 mg/L; WAD cyanide-0.033 mg/L). This information suggests that the cyanide initially infiltrated into the soil close to the initial seepage area; however further away from the seepage cyanide may have accumulated in the topsoil with little infiltration into the mineral soil (till overburden) or bedrock.

It was decided that the interception trench be installed between Seep 3 and BH-47. The decision for the location of the interception trench was based on the premise to minimize disturbance to the natural terrain, and act as a barrier between detected cyanide and the lake, while staying at least 30 m away from Third Portage Lake. An interception trench at this location should prevent cyanide contamination reaching Third Portage Lake. It is recommended that any pooled water within the collection area of the interception trench be pumped out immediately.

In order to remove the source of contaminant, AEM has taken steps to repair/reseal the containment systems that have been identified to be leaking and lead to the seepage. The main area of concern was the CIP tank containment system, which has been repaired. A ground temperature cable (thermistor cable) was installed near the mill to determine the ground thermal regime. The fact that the mill pad has refrozen and there is only a thin active layer in the pad indicates that the repairs to the containment system have been effective in limiting seepage to the point that the ground has refrozen as significant continued seepage would likely preclude freezing.

AEM has currently established a Freshet Action Plan (April 2014), which outlines protocols AEM will take to monitor the interception trench and sampling protocols. AEM will conduct daily inspections of the pumping, collection systems and perimeter area and will record all pumped volumes of water from the interception trench. Any of the water collected will be pumped to the mill and discharged with the tailings to the tailings storage facility (TSF). The sampling program in this action plan states that on a monthly basis AEM will submit water samples to Multi Lab for analysis of Free Cyanide, Total Cyanide, Copper and Iron from the interception trench, monitoring wells 14MW04, 14MW05, 14MW06, 14MW07, and 14MW08, the original containment area and Third Portage Lake. AEM will collect waters twice a week from the area within the original containment berm, the interception trench, and monitoring wells 14MW02, 14MW03, 14MW08, 201, 202, and 203 to be submitted to the AEM on-site lab for WAD cyanide analysis.

After reviewing the information from this Environmental Site Assessment and AEM's Freshet Action Plan (April 2014), the following recommendations apply:

- Continue to sample water ponding within the original containment berm, interception trench, Third Portage Lake and monitoring wells 14MW01 to 14MW08, 201, 202 and 203, if water is present and not frozen, for analysis by Multi Lab of Free and Total cyanide, Copper, and Iron;
- In monitoring wells with known detected cyanide, collect and submit water samples to Multi Lab once in the spring and fall for analysis of ammonium, nitrate/nitrite, and pH. The purpose for the ammonium and nitrate/nitrite is that these compounds increase with the biodegradation of cyanide;
- If water is ponding down gradient of the interception trench, water samples should be collected and submitted to Multi Lab for analysis of Free and Total cyanide, Copper, and Iron;
- During the investigation no seep (water) samples or soil samples were collected within 30 m of the lake. Cyanide was detected at Seep 3, thus further sampling should be conducted down gradient of the trench in the soil and water. Water should be analyzed by Multi Lab for Free and Total Cyanide, Copper, and Iron, while soils should be analyzed for Free and Total cyanide;
- Depending on the results of the soil samples collected and potentially ponded water samples collected within 30 m of Third Portage Lake then sediment samples should be collected from the shore of Third Portage Lake. These sediment samples should be analyzed by Multi Lab for Free and Total Cyanide, Copper and Iron.
- AEM should install sumps inside the original containment berm to aid in the collection of water. This water can be pumped up to the mill and discharged to the TSF. This should improve collection of water in the spring near the mill pad;
- If not already complete, AEM should continue with the repairs to the secondary containment systems within the mill to ensure seepage sources are eliminated; and
- Collect additional soil samples on the northeast side of the mill in the direction of Tear Drop Lake to confirm if any cyanide travelled in that direction. If water is observed in the boreholes during this recommended investigation a well should be installed.

The following soil sampling recommendations should be implemented at closure of the mine:

- Soil samples should be collected for Free cyanide in the areas where known cyanide was detected, as free cyanide was not analyzed in this investigation. These areas should be delineated in order to produce a remedial action plan, if needed;

9.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech EBA Inc.

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PERMIT TO PRACTICE
TETRA TECH EBA INC.
Signature
Date August 19, 2014
PERMIT NUMBER: P 018
NT/NU Association of Professional Engineers and Geoscientists

REFERENCES

Agnico Eagle, November 2013, Preliminary AEM Report – Assay Road Seepage

British Columbia Ministry of Environment. 2014. Environmental Management Act: Contaminated Sites Regulations, Schedule 4 Generic Numerical Soil Standards. Updated January 27,2014

British Columbia Ministry of Environment. 2014. Environmental Management Act: Contaminated Sites Regulations, Schedule 6 Generic Numerical Water Standards. Updated January 27,2014

CCME (Canadian Council of Ministers of the Environment), September 2007, Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, Chapter 7. In: Canadian Environmental Quality Guidelines, CCME, 1999. Winnipeg, MB.

CCME (Canadian Council of Ministers of the Environment). 2007. Canadian water quality guidelines for the protection of aquatic life: summary table. Update 7.1, December 2007. In: Canadian Environmental Quality Guidelines, 1999, CCME, Winnipeg, MB.

CCME. 1999. Canadian Soil Quality Guidelines for Protection of Environmental and Human Health: Cyanide (Free) 1997. In. Canadian Environmental and Quality Guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg

Cumberland Resources Ltd. 2005. Meadowbank Gold Project. Baseline Physical Ecosystem Report.

Golder Associates. 2008. 2007 Till Core Material Investigation and Laboratory Testing, Meadowbank Gold Project. Job No: 07-1413-0047/4000

Government of Canada. Baker Lake A Nunavut-Weather. http://climate.weather.gc.ca/climateData/monthlydata_e.html?timeframe=3&Prov=NU&StationID=1709&mlyRange=1946-01-01|2012-12-01&Year=2000&Month=01&Day=01. Acquired March 25, 2014.

Government of Nunavut. 2009. Environmental Guideline for Contaminated Site Remediation. Department of Environment's Environmental Protection Division. Revised March 2009

Lottermoser, Bernd. 2007. Mine Wastes: Characterization, Treatment and Environmental Impacts 2nd Edition. Springer

TABLES

Table 1: Analytical Results Tundra Soil - AEM- Meadowbank Assay Seepage

Parameters	Units	Guidelines	Downgradient of the Assay Lab															
		Wildland/ Urban Park	BH-01	BH-02	BH-03	BH-04	BH-05	BH-06	BH-07	BH-08	BH-09	BH-10	BH-11		BH-12		BH-13	BH-14
			40-60	0-44	40-60	0-39	0-45	40-75	40-60	40-60	40-52	0-40	0-40	40-62	0-40	40-70	40-70	40-70
pH[2]		6 to 8								6.91			7.20					
Total Cyanide[1]	mg/kg	50	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	13	30	0.6	1.5	1.4	<0.5	<0.5
WAD Cyanide[1]	mg/kg	10	<0.5	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Moisture Content	%	NG	20	56	14	16	15	18	12	13	6.6	17	25	15	16	6.9	5.6	4.4
Laboratory Identification No.			X63656	X63657	X63658	X63659	X63660	X63661	X63662	X63663	X63664	X63665	X63666	X63667	X63668	X68074	X63669	X68075

Parameters	Units	Guidelines	Downgradient of the Assay Lab															
		Wildland/ Urban Park	BH-14	BH-15		BH-16			BH-17				BH-18		BH-19	BH-20	BH-21	BH-36
			70-112	40-70	70-100	0-40	70-100	100-140	40-70	70-100	100-140	140-168	40-70	70-100	40-59	40-70	70-90	40-70
pH[2]		6 to 8							7.12				6.89				7.93	
Total Cyanide[1]	mg/kg	50	<0.5	<0.5	<0.5	1.9	14	0.6	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	27
WAD Cyanide[1]	mg/kg	10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3
Moisture Content	%	NG	4.2	14	9.4	11	7.9	8.2	12	9.9	7.0	3.8	13	12	3.7	6.8	2.9	9.4
Laboratory Identification No.			X63670	X63671	X68076	X68077	X63672	X68078	X63673	X68079	X68080	X63674	X63683	X68081	X63684	X63685	X63686	X68105

Parameters	Units	Guidelines	Downgradient of the Assay Lab															
		Urban Park (Wildland)	BH-36		BH-37		BH-38	BH-43			BH-44		BH-45	BH-46		BH-47	BH-48	
			70-100	100-129	40-70	70-109	0-29	0-40	70-100	100-121	40-70	70-94	40-52	40-70	100-139	0-41	40-70	100-140
pH[2]		6 to 8																
Total Cyanide[1]	mg/kg	50	1.7	0.9	1	0.9	**51**	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	4	<0.5	<0.5
WAD Cyanide[1]	mg/kg	10	<0.5	<0.5	1.2	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Moisture Content	%	NG	6.3	7.4	13	6.0	30	41	6.9	9.9	9.9	6.4	16	7.6	5.6	19	9.4	7.3
Laboratory Identification No.			X68106	X68107	X68114	X68115	X68116	X71668	X71669	X71670	X71671	X71672	X71673	X71674	X71675	X71676	X71677	X71678

Parameters	Units	Guidelines	Downgradient of the Assay Lab								Monitoring Wells					
		Urban Park (Wildland)	BH-49		BH-50			BH-51			MW-04	MW-05	MW-06	MW-07	MW-08	
			40-70	70-100	0-40	70-100	100-133	0-40	70-100	100-133	70-91	70-100	70-122	40-70	40-70	70-100
pH[2]		6 to 8														
Total Cyanide[1]	mg/kg	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
WAD Cyanide[1]	mg/kg	10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Moisture Content	%	NG	6.0	5.5	19	7.7	6.3	22	9.0	4.4	7.6	8.4	8.0	16	9.1	6.2
Laboratory Identification No.			X71679	X71680	X71681	X71682	X71683	X71684	X71685	X71686	X71690	X71691	X71692	X71693	X71694	X71695

Notes:

[1] Environmental Management Act: Contaminated Sites Regulations, British Columbia (updated January 31, 2014); Urban Park (Wildlands). The BC guidelines are in µg/g which are equal to mg/kg

[2] Environmental Guidelines for Contaminated Site Remediation, Nunavut. Wildland

Blank-Not analyzed

NG- No Guideline

Bold - Greater than the referenced guideline

(shaded) Cyanide Detected

Table 2: Analytical Results for Mill Pad Soil - AEM- Meadowbank Assay Seepage

Parameters	Units	Guidelines	North of Mill			Northwest of Assay Lab				In Front of Assay Lab					Southwest of Assay Lab			
		Urban Park (Wildland)	BH-41		BH-42	BH-33		BH-34		BH-40		BH-22	BH-39		BH-35		BH-23	BH-24
			300-350	400-450	300-350	300-350	400-450	300-350	500-577	400-450	550-645	500-550	300-350	400-450	300-350	400-450	450-500	400-450
pH[2]		6 to 8														**9.28**		
Total Cyanide[1]	mg/kg	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
WAD Cyanide[1]	mg/kg	10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Moisture Content	%	NG	7.2	0.8	1.1	14	2.7	4.8	5.2	12	4.5	16	3.6	3.0	3.2	3.4	0.8	2.3
Laboratory Identification No.			X68121	X68122	X68123	X68099	X68100	X68101	X68102	X68119	X68120	X63687	X68117	X68118	X68103	X68104	X68082	X68083

Parameters	Units	Guidelines	Southwest of Assay Lab		Southwest side of Tanks								Northwest of Tanks		Monitoring Wells	
		Urban Park (Wildland)	BH-24	BH-52	BH-25			BH-26	BH-27	BH-28	BH-29		BH-30		MW-01	MW-03
			500-530	300-350	250-300	400-450	500-530	400-450	500-550	500-550	300-350	500-550	400-450	550-690	400-450	400-450
pH[2]		6 to 8			**9.30**						**8.58**			**9.38**		
Total Cyanide[1]	mg/kg	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
WAD Cyanide[1]	mg/kg	10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Moisture Content	%	NG	1.2	0.3	1.9	0.8	0.5	0.8	0.2	0.8	1.0	0.3	3.3	1.0	2.2	2.4
Laboratory Identification No.			X68088	X71687	X68089	X68090	X68091	X68092	X68093	X68094	X68095	X68096	X68097	X68098	X71688	X71689

Notes:

[1] Environmental Management Act: Contaminated Sites Regulations, British Columbia (updated January 31, 2014); Urban Park (Wildlands). The BC guidelines are in µg/g which are equal to mg/kg

[2] Environmental Guidelines for Contaminated Site Remediation, Nunavut, Wildland

Blank-Not analyzed

Bold - Greater than the referenced guideline

Cyanide Detected

Table 3: Water/Ice Analytical Results - AEM - Meadowbank Assay Seepage

Parameters	Unit	Guidelines			In Front of Assay Lab	Downgradient of Assay Lab-Tundra					
		Drinking Water [1]	Aquatic Life [1]	Licence No. 2AM-MEA0815	BH-22	BH-36	Seep 1	Seep 2	BH-11	BH-47	Seep 3
Total Cyanide[2]	mg/L	200	NG	0.5 (1.0)[4]	**24.59**	**2.23**	**2.31**	**1.59**	**1.76**	**1.05**	0.192
WAD Cyanide[2]	mg/L	NG	50	NG	10.6	0.644	0.944	0.935	1.48	0.101	0.033
WAD Cyanide[3]	mg/L	NG	50	NG		1.31	1.05	0.883	4.91	0.237	0.544
Laboratory Identification No.					V-32663	V-32719	V-32716	V-32717	V-32662	V-32758	V-32718

Notes:

[1] Environmental Management Act: Contaminated Sites Regulations, British Columbia (updated January 31, 2014); Schedule 6 Generic Numerical Water Standards

[2] Multi-lab Direct Analytical Results

[3] Meadowbank Assay Lab Analytical Results

[4] Maximum Average Concentration (Maximum Allowable Grab Sample Concentration)

Blank-Not analyzed

Bold = Greater than the referenced guideline or Water License

(shaded) Cyanide Detected

PHOTOGRAPHS

Photo 1	Southwest view of the downhole hammer-air rotary drill drilling BH-18
Photo 2	Metal containers underneath the curtain of the drill to collect soil samples
Photo 3	Ice (~12 cm thick) located at BH-11.
Photo 4	Northwest view of drill, drilling BH-39 in front of the Assay Lab
Photo 5	View from MW-04 facing northeast towards the Assay Lab
Photo 6	Northwest view of the location for the three old wells (201, 202, and 203) located in the tires and the location of the thermistor cable just southeast of the tires. This area is located between the Assay Lab and the Mill.
Photo 7	View of the North side of the Mill, illustrating the location of monitoring well MW01 behind the two cement blocks
Photo 8	View on the south side of the tank farm drilling BH-27
Photo 9	West End of Interception Trench Facing Northwest, Trench Bottom Prior to Cleaning
Photo 10	West End of Interception Trench Facing Northwest, Trench Bottom after Cleaning, Contractors Laying Geotextile on Downstream Slope
Photo 11	East End of Interception Trench Facing Northeast, Geotextile Placement with Overlap and Tie-in at Top
Photo 12	West End of Interception Trench Facing North, Contractor Filling in and Compacting Low Areas
Photo 13	West End of Interception Trench Facing Northwest, Background: CAT 365 Excavator Bucket Compacting Two Lifts of Bentonite Material on Downstream Slope. Foreground: Two Lifts of Bentonite Material Visible
Photo 14	West End of Interception Trench Facing Southeast, CAT 365 Excavator Bucket Compacting Upstream Bentonite Material Slope below the Bedrock Contact
Photo 15	East End of Interception Trench Facing Northwest, Bentonite Material on Upstream Slope below Bedrock Contact
Photo 16	West End of Interception Trench Facing Northwest, Completed Bentonite Placement
Photo 17	East End of Interception Trench Facing Southwest, Completed Interception Trench Covered in Rockfill (Photo courtesy AEM)

Photo 1: Southwest view of the down hole air hammer drill drilling BH-18.

Photo 2: Metal containers underneath the curtain of the drill to collect soil samples.

Photo 3: Ice (~12 cm thick) located at BH-11.

Photo 4: Northwest view of drill, drilling BH-39 in front of the Assay Lab.

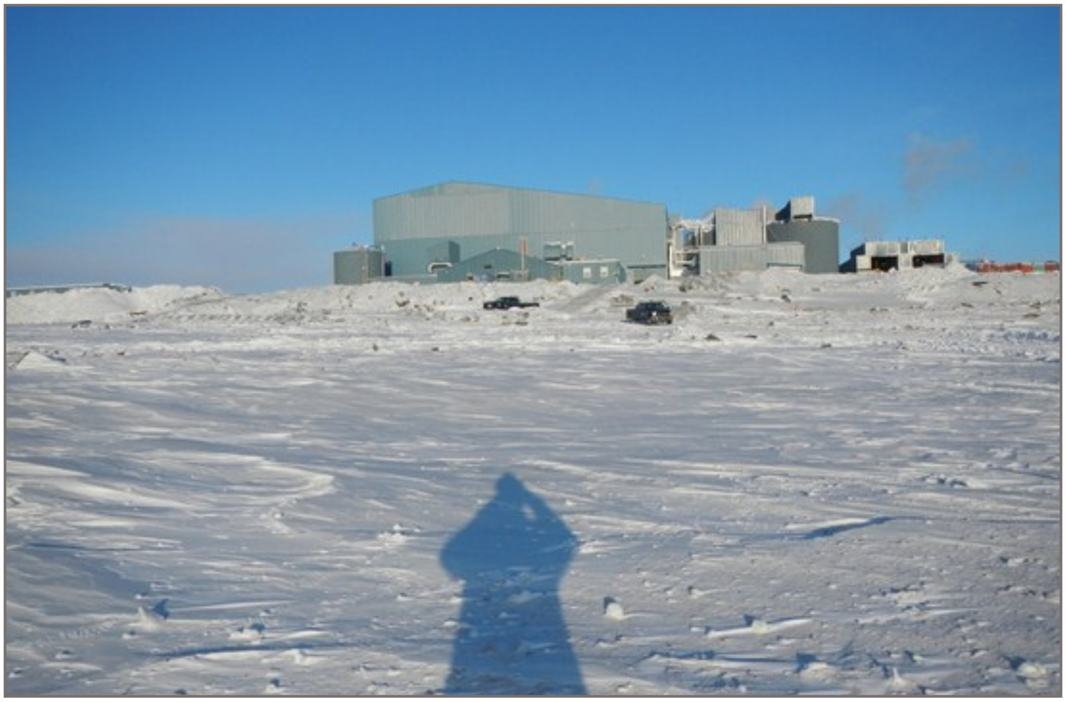

Photo 5: View from MW-04 facing northeast towards the Assay Lab.

Photo 6: Northwest view of the location for the three old wells (201, 202, and 203) located in the tires and the location of the thermistor cable just southeast of the tires. This area is located between the Assay Lab and the Mill.

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Photo 8: View on the south side of the tank farm drilling BH-27.

Photo 9: West End of Interception Trench Facing Northwest
Trench Bottom Prior to Cleaning

Photo 10: West End of Interception Trench Facing Northwest
Trench Bottom after Cleaning. Contractors Laying Geotextile on Downstream Slope

Photo 11: East End of Interception Trench Facing Northeast
Geotextile Placement with Overlap and Tie-in at Top

Photo 12: West End of Interception Trench Facing North
Contractor Filling in and Compacting Low Areas

Photo 13: West End of Interception Trench Facing Northwest
Background: CAT 365 Excavator Bucket Compacting Two Lifts of Bentonite Material on Downstream Slope. Foreground: Two Lifts of Bentonite Material Visible

Photo 14: West End of Interception Trench Facing Southeast
CAT 365 Excavator Bucket Compacting Upstream Bentonite Material Slope Below the Bedrock Contact

Photo 15: East End of Interception Trench Facing Northwest
Bentonite Material on Upstream Slope Below Bedrock Contact

Photo 16: West End of Interception Trench Facing Northwest
Completed Bentonite Placement