



MEADOWBANK DIVISION

Monitoring Program Summary Report
August 2014

Type A Water License 2AM-MEA0815

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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).

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

SECTION 2 • WATER MANAGEMENT

2.1 WATER USAGE

Freshwater usage for August 2014 is summarized in Table 2.1 below. Total freshwater used for the month was 43,548 m³ for a total year to date of 772,486 m³. The total amount of reclaim water used in the mill for August was 235,750 m³.

On July 23rd, 2014 AEM received from the Minister the final approval for the Amendment of Freshwater which permits the withdrawal of 1,870,000 m³ in 2013 and 1,150,000 m³ for the following year. On August 26th, AEM sent the difference to the water use fees full payment for 2013 and 2014 in accordance with the Freshwater Amendment made to the Water License. The payment was made in accordance with NWB letter dated July 23rd.

Table 2-1: Freshwater Usage (m³)

	August
Freshwater Storage Tank	43,394
Emulsion Plant	154
Water Truck	0
Total	43,548
Year to date total	772,486

2.2 WASTE ROCK STORAGE FACILITY SEEPAGE

In August, AEM continued to pump seepage water from ST-16 to the North Cell TSF. During the month, a total of 4,062 m³ was pumped out for a total year to date of 37,434 m³. AEM also completed weekly and after rain event inspections at RSF and NP-2 Lake and weekly monitoring for CN. 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 August, the water in the interception sump and original sump was pumped back to the mill for a total of 5,186 m³ during the month. Year to date pumped volume is 13,007 m³. Weekly and after rain event inspections of the area were conducted in August. Based on well monitoring downstream of the trench, all the water was contain in these containments and did not reach TPL. This was confirmed with near shore sampling in TPL; to date no contaminants (CN) have been detected in the lake. AEM have received the *Meadowbank Mine, Assay Road Seepage Phase 2: Environmental Site Assessment and Engineering QA/QC, TetraTech EBA (2014)* (sent with July monthly report) and presently looking at the recommendation made. 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 August.

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	August 4, 2014
Ammonia	mg N/L	<0.01
Ammonia-Nitrogen	mg N/L	0.92
Total Kjeldahl Nitrogen	mg N/L	6.5
BOD-5	mg/L	2
COD	mg/L	34
Total Suspended Solids	mg/L	4
Nitrate	mg N/L	22.3
Nitrite	mg N/L	0.05
pH*	Units	4.70
Fecal Coliform	UFC/100 mL	0
Total Coliform	UFC/100 mL	1,000

*Parameter measured by STP operators

Table 2.3.2: LJ-Mix Effluent Results

Parameters	Units	August 4, 2014
Ammonia	mg N/L	<0.01
Ammonia-Nitrogen	mg N/L	13.4
Total Kjeldahl Nitrogen	mg N/L	24.4
BOD-5	mg/L	5
COD	mg/L	72
Total Suspended Solids	mg/L	24
Nitrate	mg N/L	33
Nitrite	mg N/L	0.04
pH*	Units	3.80
Fecal Coliform	UFC/100 mL	<4
Total Coliform	UFC/100 mL	2,000

*Parameter measured by STP operators

2.5 PORTAGE ATTENUATION POND EFFLUENT

July 5th, 2014 was the last day of discharge from the Portage Attenuation Pond. AEM does not plan to discharge any more water from the south cell in 2014. Total year to date is 207,813 m³ of water discharged into Third Portage Lake.

2.6 VAULT ATTENUATION POND EFFLUENT

In August, a total of 97,701 m³ of contact water was discharge during the month thru the diffusor for a total year to date (including dewatering water) of 329,101 m³.

Two weekly effluent samples were taken at ST-10 in August. All the results respected the Water License Part F, Item 3 for effluent quality limits except for TSS concentration on August 6th and daphnia toxicity on August 12th.

On July 24th, 2014 AEM began discharging Vault Attenuation Pond contact water for a short duration which ended on August 14th. Prior to discharge, samples were taken on June 30th and confirmed that all regulatory limits would not be exceeded. As required by the Water License Table 2, weekly samples were taken during the three (3) weeks of discharge on July 31st (TSS - 3 mg/L), August 6th (TSS - 57 mg/L) and August 12th (TSS - 4 mg/L), with an average of 21 mg/L over this period of discharge and an average of 30.5 for August only. As part of our internal monitoring to ensure the protection of the receiving environment, AEM also took TSS samples from July 24th to July 28th and August 2nd at our onsite laboratory, which is not accredited but provides AEM real time data for decision making. Results of these sampling were respectively 8 mg/L, 6.4 mg/L, 6 mg/L, 3.6 mg/L, 7 mg/L and 3.6 mg/L (with a monthly average of 5.7mg/L). It is evident from these data that the 57 mg/L, was not representative of the water quality during discharge and was an anomaly caused either by cross contamination or sampling error.

AEM received the August 6th results on August 27th, two (2) weeks after stopping the discharge. Toxicity tests were collected on August 12th, 2 days prior to stopping the discharge and were found to be protective of rainbow trout but were toxic for daphnia (see laboratory certificate on Appendix A). Unfortunately, given the short duration of discharge, it was not possible to conduct another test to validate these exceedances.

Given the water quality chemistry prior to discharge into Wally Lake, the results on July 31st and August 12th, the onsite laboratory results for TSS during discharge, the TSS exceedance is an outlier and with the short duration of the discharge, AEM is confident the aquatic environment was protected. Core receiving environment monitoring in Wally Lake data has been collected and will confirm these findings.

The sample results are shown in Table 2.6.1 below.

Table 2.6.1: ST-10 - Effluent Monitoring

Date Parameters	Units	Max. grab conc.	6-Aug-14	12-Aug-14	Monthly Average	Max. avg. conc.
pH*		6.0-9.0	7.17	7.86	7.52	6.0-9.0
TSS	mg/L	30	57	4	30.5	15
Turbidity*	NTU	15	13.93	2.41	8.17	15
Aluminium	mg/L	3.0	0.993	0.060	0.527	1.5
Dissolved Aluminium	mg/L	2.0	<0.006	0.008	0.007	1.0
Arsenic	mg/L	0.2	0.0011	0.0035	0.0023	0.1
Cadmium	mg/L	0.004	<0.00002	<0.00002	<0.00002	0.002
Copper	mg/L	0.2	0.0087	0.0038	0.0063	0.1
Mercury	mg/L	0.008	<0.00001	<0.00001	<0.00001	0.004
Ammonia nitrogen	mg N/L	40	0.37	0.22	0.295	20
Nickel	mg/L	0.4	0.0039	0.0015	0.0027	0.2
Nitrate	mg N/L	100	1.1	0.2	0.65	50
Lead	mg/L	0.2	0.0011	<0.0003	0.0007	0.1
Phosphorus	mg/L	3.0	0.06	0.03	0.045	1.5
Zinc	mg/L	0.4	0.006	<0.001	0.0035	0.2
Chloride	mg/L	1000	4.5	2.2	3.35	500

*Parameter measured by Environmental Technicians on field

2.7 EAST DIKE SEEPAGE EFFLUENT

East Dike Discharge occurred during the whole month of August. During the month, a total of 22,049 m³ was discharged thru a diffuser into Second Portage Lake for a total year to date of 72,510 m³. Monitoring results are shown in Table 2.7.1 below.

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.

Table 2.7.1: East Dike Seepage Discharge Results

Parameters	Units	6-Aug-14	12-Aug-14	19-Aug-14	26-Aug-14	Average Concentration
Total Suspended Solids	mg/L	7	6	13	7	8.25

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 August 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	August-05-14
Total Suspended Solids	mg/l	1

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

Parameters	Units	August-05-14
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. Six (6) spills occurred on site and three (3) were reportable to the GN spill hotline. 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 Line
2014-08-06	Coolant	10	End of truck shop	Mechanical issues on Haul truck.	Leak was stopped. Contaminated soil cleaned-up and disposed adequately.	No
2014-08-11	Diesel	200	Baker Lake Diesel Refuelling Station	The truck drivers heard a strange sound during the refuelling. He looked and saw nothing. By the time he went to stop the pump, diesel fuel was on the ground.	Stop the pump. Spill absorbents were deployed to absorb fuel. Contaminated soils were picked up and bring to the Landfarm on the Meadowbank Mine Site. Artic Fuel company advised all of his employees to always shut off the pump in first when they hear or see anything wrong.	Yes
2014-08-12	Drill Oil	140	Transit Laydown	Pallet of drill oil tipped during the transport.	All the contaminated material was cleaned-up with the loader and sent to contaminated soil landfarm.	Yes
2014-08-19	Hydraulic oil	5	Road near refer pad	Hydraulic hose failed on equipment.	Call maintenance to plug the leak.	No
2014-08-23	Engine oil	90	Vault Sana Crusher	Engine crankcase rupture.	Cleaned-up of the area and contaminated material disposed adequately.	No
2014-08-25	Copper Sulphate	5	Transit Laydown	During packaging one bag was damage. Once on site when we open the container small amount of copper sulphate leaked out.	Cleaned up contaminated material and brought it to the tailing pond.	Yes

APPENDIX A
Toxicity Results Laboratory Certificates August 12th, 2014

Client : 4299 MULTILAB - VAL-D'OR **Job Number:** B449349
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 : 37263

Description: yellow, translucent, few particles

Sample Collected: Aug 12, 2014 07:30 AM **Sampling Method :** Grab

Sample Collected By: Robin Allard/Marie-Pier Marcil **Volume Received:** 40L

Sample Matrix : WASTE WATER

Sample Number: Z45206-01

Site Collection: ST-10 N 65 04. 11.9

Temp.Upon Arrival: 17 °C **Storage:** 4°C

Sample Received: Aug 14, 2014 10:30 AM **pH:** 7.7 **Dissolved Oxygen:** 9.3 mg/L

Analysis Start : Aug 15, 2014 02:05 PM **Temperature :** 15.2 °C **Sample Conductance:** 80 µS/cm

Concentration	Temperature (°C)	Temperature (°C)	pH (pH)	pH (pH)	Dissolved oxygen (mg/L)	Dissolved oxygen (mg/L)	Conductivity (µS/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	13.8	14.0	7.9	7.8	10.2	9.9	163	0	0	0	0
6.25	13.8	14.1	7.8	7.8	10.1	9.9	135	0	0	0	0
12.5	13.8	13.9	7.8	7.7	10.2	9.9	147	0	0	0	0
25	14.0	13.9	7.7	7.7	10.0	9.7	133	0	0	0	0
50	14.3	14.1	7.7	7.7	9.9	9.7	122	0	0	0	0
100	14.4	14.2	7.8	7.7	9.8	9.7	88	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):

73 mg/l CaCO₃

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 : 0.37 g/L **Photoperiod :** 16 hours 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 Denis Fournier

Culture Temperature : 15 ± 2 °C **Weight (Mean) +- SD :** 0.59 ± 0.13 g **Length (Mean) +- SD :** 3.85 ± 0.29 cm

Culture Water Renewal : 2 liters/min **Weight (Range) :** 0.39 – 0.77 g **Length (Range) :** 3.30 – 4.20 cm

Culture Photoperiod : 16 hours of light; 8 hours of darkness **% Mortality within 7 days :** 0.5%

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

Reference chemical:

Phenol

Test Date:

Aug 14, 2014

Test Endpoint 96 hrs LC50 (95% confidence interval) : 10 (9.0, 12) mg/L

Statistical Method :

Probit

Historical Mean LC50 (warning limits) : 11 (9.1, 13) mg/L

Concentration : 0,4,6,9,13,18 mg/L

Test Method

QUE SOP - 00408. Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout. EPS1/RM/13 - Second Edition. Environment Canada. 2000. (Including Amendments: May 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.

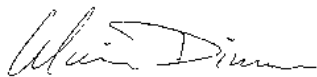
Method Deviations : Aucune

The results contained in this report refer only to the testing of the sample submitted. This report may not be reproduced, except in its entirety, without the written approval of the laboratory.

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

Job Number: B449349
Sample Number: Z45206-01

Analyst : Alain Dionne, Andres Gonzalez, Maxime Thibeault



Verified By : Alain Dionne, B. Sc. Biologist

Date: Aug 29, 2014 09:10 AM

The results contained in this report refer only to the testing of the sample submitted. This report may not be reproduced, except in its entirety, without the written approval of the laboratory.

Client : 4299 MULTILAB - VAL-D'OR

Job Number: B449349

Client Project Name & Number:

No. d'échantillon : Z45206-02

Test Result:

48 hrs LC50 %v/v (95% CL): 58.7 (35.7-162) Statistical Method: Probit

Toxic Units: 1.70

48 hrs EC50 %v/v (95% CL): 58.7 (35.7-162) Statistical Method: Probit

Comment: toxic

Sample Name : 37263

Sample Matrix : WASTE WATER

Description: colorless, translucent, few particles

Sample Prior to Analysis:

Sample Collected: Aug 12, 2014 07:30 AM

Sampling Method : Grab

pH: 7.4

Sample Collected By: Robin Allard/Marie-Pier Marcil

Site Collection: ST-10 N 65 04. 11.9

Temperature : 18.9 °C

Sample Received: Aug 14, 2014 10:30 AM

Volume Received: 1L

Dissolved Oxygen: 9.1 mg/L

Analysis Start : Aug 14, 2014 03:35 PM

Temp.Upon Arrival: 17 °C

Sample Conductance: 88 µS/cm

End : Aug 16, 2014 03:35 PM

Storage: 4°C

Hardness: 43 mg CaCO₃/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	20.6	20.4	7.9	8.0	419	8.9	9.2	0	0	0	0
6.25	20.6	20.4	7.9	8.0	403	8.9	9.1	0	0	0	0
12.5	20.4	20.4	7.9	7.9	377	8.9	9.1	1	10.0	1	10.0
25	20.3	20.5	7.8	7.9	347	8.9	9.1	3	30.0	3	30.0
50	20.2	20.5	7.7	7.9	262	8.9	8.3	5	50.0	5	50.0
100	19.8	20.5	7.5	7.7	93	9.0	8.6	6	60.0	6	60.0

Comments :

Culture/Control/Dilution Water: Dechlorinated municipal Daphnia

Hardness (EDTA Method): 163 mg/l CaCO₃ 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 light; 8 hours of darkness

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

Age at Test Initiation : <24 hres **Average Brood Size :** 30.1

Culture Photoperiod : 16 hours of light; 8 hours of darkness **% Mortality within 7 days :** 4.6

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

Culture Diet Fed twice a day.

Reference chemical: Potassium Dichromate **Test Date:** Aug 13, 2014

Test Endpoint 48 hrs LC50 (95% confidence interval) : 0.22 (0.18, 0.35) 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. Reference Method for Determining Acute Lethality of Effluents to *Daphnia magna*. EPS1/RM/14 - Second Edition. Environment 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

The results contained in this report refer only to the testing of the sample submitted. This report may not be reproduced, except in its entirety, without the written approval of the laboratory.

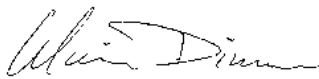
Client : 4299 MULTILAB - VAL-D'OR

Job Number: B449349

Client Project Name & Number:

No. d'échantillon : Z45206-02

Analyst : Alain Dionne, Karine Gauthier , Marie-Pierre Bédard



Verified By : Alain Dionne, B. Sc. Biologist

Date: Aug 29, 2014 09:12 AM