



MEADOWBANK DIVISION

Monitoring Program Summary Report

January 2016

Type A Water License 2AM-MEA1525

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SECTION 1 • BACKGROUND

As required under Part I, Item 20 of Type A Water License 2AM-MEA1525, this report documents the water management and monitoring activities at the mine site for the month. This includes water usage, Vault Attenuation Pond discharge water quality, East Dike Seepage discharge water quality, RSF Seepage, Central Dike, Assay Road Seepage, and sewage treatment plant discharge water quality (which is directed to the onsite storm water management pond).

As requested in INAC's Inspection Report dated November 10th 2015, this report also documents the seepage monitoring conducted pursuant to Part I Item 6 and 13.

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

SECTION 2 • WATER MANAGEMENT

2.1 WATER USAGE

Freshwater usage for January 2016 is summarized in Table 2-1 below. The total freshwater consumption for the month was 38,713 m³. The total amount of reclaim water used in the mill for January was 261,513 m³. Reclaim water is supplied by the South Cell TSF.

Table 2-1: Freshwater Usage (m³)

	January
Freshwater Storage Tank	38,578
Emulsion Plant	135
Total	38,713
2016 total	38,713

2.2 WASTE ROCK STORAGE FACILITY SEEPAGE

In January 2016 no water was pumped back to the North Cell TSF from the ST-16, WEP1 and, WEP2 sumps as they were frozen.

AEM continues to complete weekly inspections at RSF and NP-2 Lake. Open water monitoring required under the Freshet Action Plan will resume next spring. Under ice samples were collected at NP-2 in January 2016. Sampling will commence next spring at sumps WEP1 and WEP2 as per NWB water license 2AM-MEA1525.

2.3 CENTRAL DIKE SEEPAGE

In August 2015, AEM developed a Central Dike seepage action plan. The main objectives were to validate that the South Cell TSF is safe to operate and to determine if physical remediation of the Central Dike structure and foundation had to be undertaken. The following studies were completed: seepage modelling and stability analysis, geophysical surveying, seepage flow measurement, mitigation plan assessment, instrumentation data analysis and, water quality modelling. Results show that the South Cell TSF can be operated safely. The Meadowbank Dike Review Board (MDRB) agrees that no physical mitigation work is required and recommends that operations in the South Cell TSF be resumed. In the upcoming months, AEM will conduct seepage modelling studies, compile data from drilling investigations undertaken and, modify its deposition plan according to the investigation's findings. Daily visual inspections will also be completed by the Engineering Department.

In January 2016, 305,344 m³ of water was pumped from the ST-S-5 sump back into the South Cell Tailings Storage Facility.

Sampling was conducted monthly at ST-S-5 and the South Cell TSF (ST-21) as per the requirements of the NWB water license.

2.4 ASSAY ROAD SEEPAGE

In January 2016, no water was pumped or sampled from the well MW-203 back to the mill as there was very low flow. Weekly inspections of the area were conducted this month. Well monitoring for CN downstream of the trench, has also ceased as water in the wells was frozen. Open water monitoring required under the Freshet Action Plan will resume next spring.

2.5 SEEPAGE AND RUNOFF FROM THE LANDFILL

The landfill was inspected weekly and no seepage or runoff was observed.

2.6 SEEPAGE AT PIT WALL AND PIT WALL FREEZE/THAW AND PERMAFROST AGGRADATION

Seepage was observed at four (4) locations in January 2016 at Portage Pit. Ice build-up was present along the south and west walls of Pit E. In Pit A, one ice build-up area was observed along the southeast wall. The seepage rate is low and the Engineering Department is currently working on drilling drainage holes in the Pit E south wall. One (1) sample was collected in January 2016 from drilled holes. No water was collected and pumped out of Portage Pit sumps.

One (1) small area of ice build-up was observed in the Vault Pit along the south wall. No water was collected and pumped out of Vault Pit sump.

The Goose pit mining activities were completed in 2015. Therefore, the seepage in Goose Pit will not jeopardize any mining activity and will contribute to the re-flooding of the pit as per AEM's Water Management Plan. No inspection has been completed in Goose Pit due to health and safety concerns.

2.7 SEWAGE TREATMENT PLANT

One (1) effluent wastewater sample was taken from the onsite sewage treatment plant (STP's) in January 2016.

The Seprotech STP results are shown in Table 2.4.1 below; the LJ-Mix STP results are shown in Table 2.4.2. The discharge results indicate the system is working well. The effluent

is discharged to the stormwater management pond and is pumped to the TSF (2x/year). This water becomes part of the reclaim pond. There is no discharge to the receiving environment.

Table 2.4.1: Seprotech Effluent Results

Parameters	Units	January 4, 2016
Ammonia (NH ₃)	mg N/L	0.52
Ammonia-Nitrogen	mg N/L	39.7
Total Kjeldahl Nitrogen	mg N/L	44
BOD-5	mg/L	27
COD	mg/L	5
Total Suspended Solids	mg/L	20
Nitrate	mg N/L	6.94
Nitrite	mg N/L	1.0
pH*	Units	6.4
Fecal Coliform	UFC/100 mL	600
Total Coliform	UFC/100 mL	5000

*Parameter measured by STP operators

Table 2.4.2: LJ-Mix Effluent Results

Parameters	Units	January 4, 2016
Ammonia	mg N/L	<0.01
Ammonia-Nitrogen	mg N/L	1.6
Total Kjeldahl Nitrogen	mg N/L	5.6
BOD-5	mg/L	11
COD	mg/L	76
Total Suspended Solids	mg/L	26
Nitrate	mg N/L	18.6
Nitrite	mg N/L	0.05
pH*	Units	6.1
Fecal Coliform	UFC/100 mL	6
Total Coliform	UFC/100 mL	< 10,000

*Parameter measured by STP operators

2.8 VAULT ATTENUATION POND EFFLUENT

There was no discharge from the Vault Attenuation Pond into Wally Lake in January 2016. Discharge will resume in spring.

2.9 EAST DIKE SEEPAGE EFFLUENT

Discharge from the East Dike Seepage occurred for the whole month. A total of 14,511 m³ of water was discharged into Second Portage Lake in January 2016.

Four weekly effluent samples were collected at ST-8 in January 2016. TSS results did not exceed the maximum allowable grab sample concentration (30 mg/L) permitted by the Water License, Part F, Item 6. Monitoring results for January 2016 are shown in Table 2.6.1 below.

Table 2.6.1: January 2016 East Dike Seepage Discharge Results

Parameters	Units	5-Jan-16	14-Jan-16	18-Jan-16	25-Jan-16
Total Suspended Solids	mg/L	1	9	1	2

As per NWB 2AM-MEA1525, the maximum average concentration is the average concentration of any four consecutively collected samples taken from the identical sampling location and taken during any given timeframe. In January 2016, TSS results did not exceed the maximum average concentration (15 mg/L) permitted by the Water License, Part F, item 6. The maximum average concentration in January is 10 mg/L and is based on the results in Table 2.6.2 below.

Table 2.6.2: January 2016 Maximum Average Concentration

Parameters	Units	21-Dec-15	29-Dec-15	5-Jan-16	14-Jan-16	Maximum Average Concentration
Total Suspended Solids	mg/L	26	4	1	9	10

Regular sampling pursuant to MMER is also conducted at this location. There have been no exceedances of MMER criteria.

2.10 NON CONTACT WATER

In January 2016, there was no water discharged through the non-contact water diversion ditches as they were frozen.

SECTION 4 • SPILL MANAGEMENT

AEM has developed a thorough internal system of tracking spills on-site. Table 3-1 summarizes the AEM spill reports for January 2016. Fifty-two (52) spills occurred on site and four (4) were reportable to the GN spill hotline. AEM acknowledges that there is an increase in the number of reported spills. An initial assessment has determined that most spills are related to hydraulic oil from broken hoses. All spills reported internally and to regulators are managed appropriately on site according to AEM's spill contingency plan. Spills are contained and cleaned, contaminated material is disposed to the appropriate area (landfarm, TSF if required), and the clean-up actions are monitored closely by the Environment Department. There was no off site impact to any watercourses. The recent spill increase is mainly due to mechanical issues with the equipment due to the cold weather, site conditions and possibly current maintenance procedures. Operators' awareness and pre-operational checking of equipment may also be contributing to the increase in spills. A team of personnel from the Maintenance, Mine operations, Environment, and Strategic Optimization Departments is investigating ways to address this issue. This will include a review of current maintenance practices, operation of the equipment and any other relevant matters the investigation may reveal. An action plan will be developed.

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
Jan 1, 2016	Fuel	5-10L	Pushback parking	Broken fuel hose.	Absorbent pads were used to clean-up the spill. Pads were adequately disposed of in the yellow roll off bin.	No
Jan 1, 2016	High Calcium Quick Lime	400 kg	Lime sea-container, outside by mill door B	Lime bag felt on the ground during transportation with tele handler because of uneven ground. When trying to pick the lime bag back, the handle of the bag ripped and lime spilled on the ground (1/4 of the bag).	Lime on the ground was picked up by the skid steer bucket and remainder was shoveled. The lime was put in the tailings area in mill and washed into the sump. The bag was taped and the rest of the lime was used at the mill.	Yes
Jan 2, 2016	Grey Water	-	Underneath Kitchen	Broken 4" fernco coupling on the steam pot drain p-trap (not enough support on piping) underneath the kitchen (drain for grey water)	The sucker truck was used to remove contaminated soil. The broken coupling was fixed and support was added. On the road, contaminated snow was picked up and brought to the TSF. A containment berm was built.	No
Jan 2, 2016	Hydraulic oil	15L	Vault pit	Haul truck was parked at the same spot for 16	Pads were put on the ground; oil was scrapped	No

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				hrs due to 2 flat tires. It leaked hydraulic oil on the ground due to leaking hose.	and disposed of in a roll off bin.	
Jan 3, 2016	Diesel fuel	10L	Primary crusher, outside by CV19	Skid steer stuck beside CV19. When trying to get free with telehandler, the steel belly pan of the skid steer was punctured by the telehandler fork.	After the skid-steer was removed by site services the rest of the spill was shoveled into pails. They were disposed of in roll off bin.	No
Jan 4, 2016	Coolant	25 L	Vault pit	Broken coolant hose on haul truck.	Contaminated soil was picked up and disposed of in a roll off bin.	No
Jan 4, 2016	Hydraulic oil	2 L	Vault Ring Road East	Auxiliary hydraulic line ruptured on loader.	Contaminated soil was picked up and disposed of in a roll off bin.	No
Jan 5, 2016	Coolant	50 L	Portage Pit E3	Broken coolant hose on loader.	Hose was fixed and contaminated soil was picked up and adequately disposed of.	No
Jan 5, 2016	Coolant	50 L	Vault dump	Broken coolant hose on haul truck.	Hose was fixed and contaminated soil was picked up and adequately disposed of.	No
Jan 5, 2016	Coolant	50 L	Portage Pit E3	Broken coolant hose on loader.	Hose was fixed and contaminated soil was picked up and adequately disposed of.	No
Jan 6, 2016	Hydraulic oil	24 L	Portage Pit E3	Mechanic was working on Rotary Head and broke the hydraulic fitting.	Absorbent pads were used to clean-up the spill. Pads were adequately disposed of in the yellow roll off bin.	No
Jan 7, 2016	Hydraulic oil	75 L	Vault Road/Sana Crusher Intersection	Steering hose broke while operating.	Absorbent pads were used to clean-up the spill. Pads were adequately disposed of in the yellow roll off bin. Contaminated soil was picked up.	No
Jan 7, 2016	Hydraulic oil	25 L	Baker Lake Coldshed	Broken hydraulic hose.	Absorbent pads were used to clean-up the spill. Pads were adequately disposed of in the yellow roll off bin. Contaminated soil was picked up.	No
Jan 8, 2016	Hydraulic oil	70 L	Portage Pit A	Broken hydraulic hose on backhoe.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 9, 2016	Hydraulic oil	20 L	Vault pit	Broken hydraulic hose on loader.	Contaminated soil was picked up and was adequately disposed of in	No

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					yellow roll off bin.	
Jan 12, 2016	Hydraulic Oil	80 L	Portage Pit E3	Broken hydraulic hose on loader	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 13, 2016	Hydraulic oil	83 L	Winter Parking	Broken hydraulic hose on maintenance truck.	Contaminated soil was picked up and brought to the landfarm.	No
Jan 13, 2016	Hydraulic oil	20 L	Portage Pit E4	Broken steering line on grader.	Contaminated soil was picked up and brought to the landfarm.	No
Jan 14, 2016	Hydraulic oil	40 L	Vault pit	Broken hydraulic hose.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 16, 2016	Hydraulic oil	60 L	Vault Pit	Broken hydraulic hose.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 17, 2016	Hydraulic oil	30 L	Vault Pit	Broken hydraulic hose.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 18, 2016	Hydraulic oil	30 L	Goose Dump	Hydraulic hose leaking on dozer.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 19 2016	Hydraulic/Coolant	10L Coolant 4L Hydraulic oil	Vault pit	Coolant hose leaking on loader.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 19 2016	Coolant	50L	Vault Ring Road	Broken coolant hose on haul truck.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 20 2016	Hydraulic oil	30 L	Vault Pit	Broken hydraulic hose on backhoe.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 20 2016	Hydraulic oil	30 L	Vault Pit	Broken hydraulic hose on drill.	Contaminated soil was picked up and brought to the landfarm. Hose was fixed.	No
Jan 20 2016	Hydraulic oil	80 L	Vault Pit	Broken hydraulic hose.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin. Hose was fixed.	No
Jan 20 2016	Coolant	15 L	Portage Pit	Broken coolant hose.	Contaminated soil was picked up and was brought to the landfarm.	No

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Jan 20 2016	Hydraulic oil	8 L	Vault Parking	Broken hydraulic hose.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin. Hose was fixed.	No
Jan 20 2016	Hydraulic oil	45 L	Outside Maintenance shop dome parking	Broken hydraulic hose.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin. Hose was fixed.	No
Jan 21 2016	Coolant	80 L	Vault Pit	Broken coolant hose on backhoe.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin. Hose was fixed.	No
Jan 22 2016	Hydraulic oil	10 L	Vault	Maintenance operations on hydraulic hose.	Absorbent pads were used to clean-up the spill. Pads were adequately disposed of in the yellow roll off bin.	No
Jan 22 2016	Hydraulic oil	20 L	Maintenance Shop	Broken hydraulic hose.	Absorbent pads were used to clean-up the spill. Pads were adequately disposed of in the yellow roll off bin.	No
Jan 23 2016	Hydraulic oil	40 L	Vault pit	Broken hydraulic hose on backhoe.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin. Hose was fixed.	No
Jan 23 2016	Fuel	50 L	Vault pit	Fuel vent plugged up and fuel went on the ground after the shovel was filled up.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 23 2016	Hydraulic oil	30 L	Vault pit	Broken hydraulic hose on backhoe.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin. Hose was fixed.	No
Jan 23 2016	Hydraulic oil	300 L	Pit E3	Broken hydraulic hose on backhoe.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin. Hose was fixed.	Yes
Jan 23 2016	Fuel	30 L	Vault Pit	Blocked vent on drill.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 23 2016	Engine oil	35 L	Maintenance shop	Broken O Ring at engine oil cooler.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No

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Jan 23 2016	Engine oil	20 L	Portage Pit E3	Oil line in engine compartment on Dozer came apart and the engine oil emptied itself on the dump floor.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 24 2016	Hydraulic oil	7 L	Pushback parking	Leaking hydraulic hose on haul truck.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 24 2016	Diesel fuel	150 L	Portage Pit E3	Roll off truck operator backed up in rock puncturing fuel tank.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	Yes
Jan 25 2016	Engine oil	20 L	Vault dump Phase 2	Frozen blow-by pipe on dozer caused overpressure in the engine block that resulted in the oil filler cap being blown out and engine oil to blow out by the filler tube.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 25 2016	Coolant	250 L	Vault dump phase 2	One of the major coolant hoses had a failure and the coolant system flushed on the ground while going uphill on the Vault hauling road.	Contaminated material was contained, collected, and brought to the tailings storage facility.	Yes
Jan 26, 2016	Hydraulic Oil	30 L	Maintenance Shop	Haul truck was parked outside maintenance for repair. A broken seal was the cause of the leak.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 27, 2016	Hydraulic oil	10 L	Vault Camp	Haul truck was parked. A small pool of oil was under the truck when it moved.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 28, 2016	Diesel fuel	3 L	Vault Fuel Farm	While filling bus, the operator overfilled the tank and spilled some diesel fuel on the ground.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 28, 2016	Engine Oil	10 L	Vault Pit	Engine oil leaking.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 29, 2016	Hydraulic oil	70 L	Portage Pit E3	Broken engine oil hose.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 29, 2016	Hydraulic Oil	10 L	Vault Ring Road	Broken hydraulic hose.	Contaminated soil was picked up and was	No

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					adequately disposed of in yellow roll off bin.	
Jan 30, 2016	Coolant	20 L	Pushback parking	Leaking coolant hose.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No
Jan 31, 2016	Hydraulic oil	2 L	Top of Primary Crusher	Maintenance operations on hydraulic hose.	Contaminated soil was picked up and was adequately disposed of in yellow roll off bin.	No