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April 29, 2019

Licensing
Nunavut Water Board
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Re: March 2019 – Monthly Monitoring Report for Water Licence 2AM-DOH1335

This report is comprised of monitoring requirements as set out in Part I and Schedule I of water licence 2AM-DOH1335 Amendment 2, and additional requirements from CIRNAC.

During the subject period of this report the focus of activities at Doris North was underground and surface mining, construction, ore processing, water management and environmental compliance. No activities were conducted at Madrid under this licence in March.

Sampling locations monitored under this licence (seasonally or when facilities are operational) are provided in Figure 5 at the end of this report. Madrid infrastructure has not yet been constructed. Monitoring locations associated with Madrid infrastructure (MMS) will be established with the Inspector as per Part I Item 3 once these facilities have been constructed.

In March TMAC continued with the Doris Crown Pillar Recovery activities. These activities included underground blasting and removal of waste rock and ore via the underground workings. No surface blasting was conducted in March. Backfilling portions of the crown pillar area continued.

Site Wide Water Quality Monitoring Program (Part I Item 3 and Schedule I)

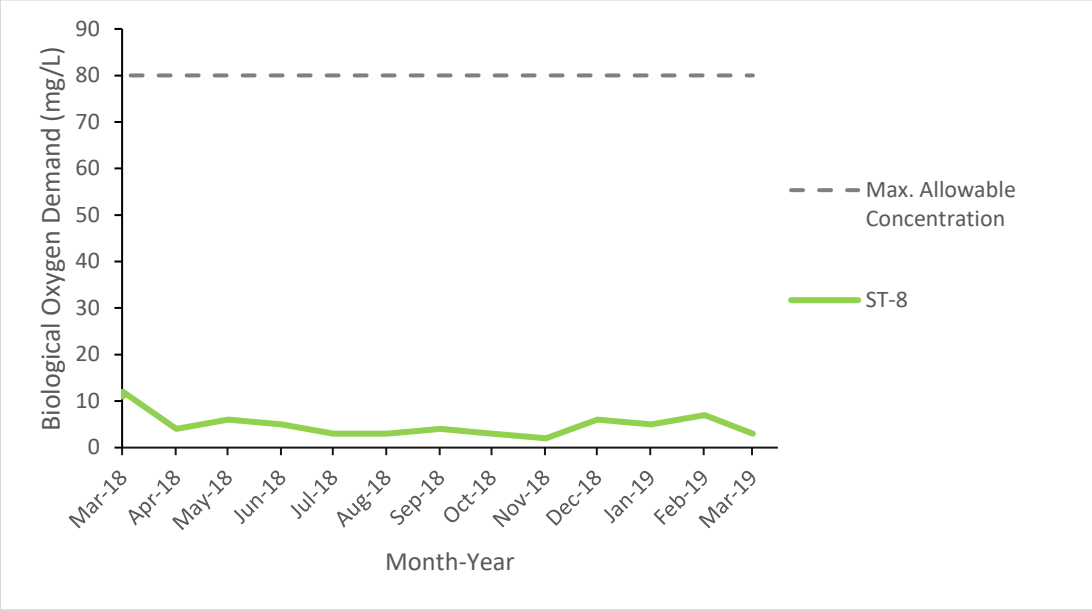
Water quality sampling was conducted in March at monitoring stations identified in Schedule I of the licence (ST-1 through ST-13, TL-1 through TL-12 and MMS-1 through MMS-10). Water quality samples were not collected for monitoring stations that were inactive during the month being reported (e.g., facilities that had not yet been constructed, were frozen during the month, or were not operationally active).

All parameters were compared to the applicable effluent quality limits outlined in Part F of the licence. No exceedances of effluent quality limits were observed in any samples collected this month. Results of all water quality monitoring are provided in Appendix A attached to this report.

Results of the March samples collected at monitoring stations TL-6 and TL-7A were not available at the time of this report due to a delay from the laboratory performing the analysis. Results for this monitoring will be presented in the April monitoring report.

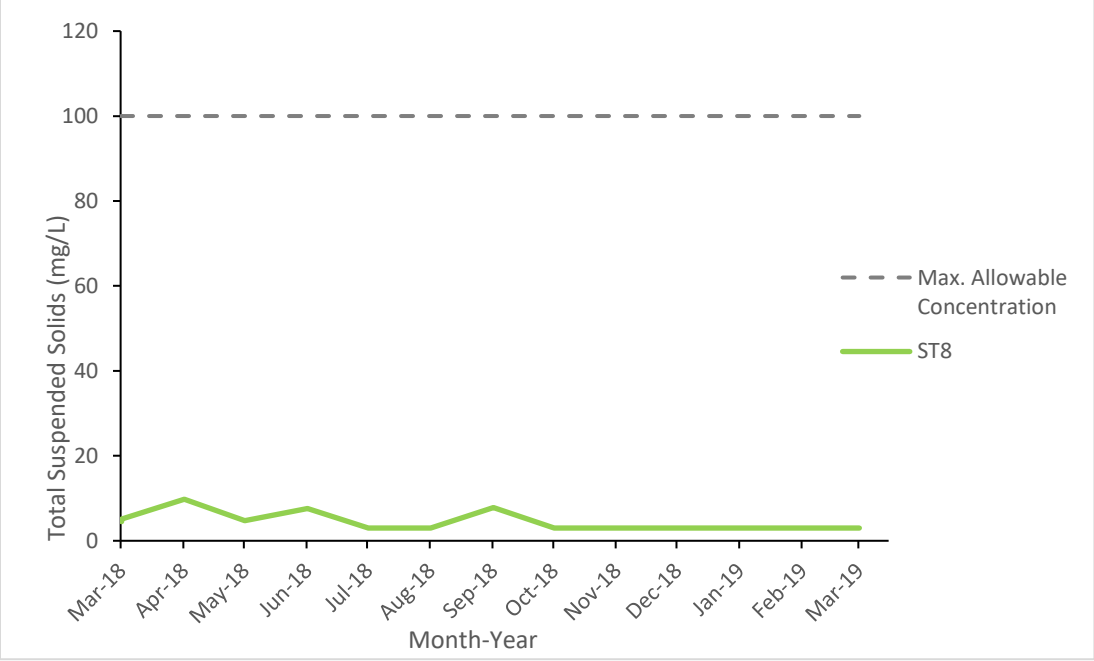
Figure 1 and 2 illustrates effluent quality characteristics for parameters of interest at select monitoring stations.

Figure 1. Biological Oxygen Demand Results Consistently Below Discharge Criteria for Wastewater Treatment Plant (ST8)



Note: Maximum Average Concentration as per Part F Item 4(b).

Figure 2. Total Suspended Solids Results Consistently Below Discharge Criteria for Wastewater Treatment Plant (ST8)



Note: Maximum Average Concentration as per Part F Item 4(b).

Flow and Volume Measurements (Part F, Part I and Schedule I)

Table 1. Effluent discharge, March 2019

Facility	Station Code	Discharge Volume (m^3)	Exceedances of Discharge Criteria	Discharge Location	Licence Reference
Doris Sedimentation Pond	ST-1	0	N/A	Tailings Impoundment Area	Part F Item 17
Doris Contact Water Pond #1	ST-2	0	N/A	Tailings Impoundment Area	Part F Item 17, 18(a)
Non-Hazardous Landfill Sump	ST-3	0	0	Facility not constructed	Part F Item 18(a)
Landfarm Sump	ST-4	0	0	Tundra Discharge 13W 432450 7559600	Part F Item 18(b)
Doris Plant Site Fuel Storage Area	ST-5	0	0	Tundra Discharge	Part F Item 18(b)
Rob Bay Single 5ML Fuel Storage Area	ST-6a	0	0	Tundra Discharge	Part F Item 18(b)
Rob Bay Fuel Storage and Containment Berm	ST-6b	0	0	Tundra Discharge	Part F Item 18(b)
Doris Sewage Treatment Plant, Effluent	ST-8	1,329	0	Tundra Discharge 13W 432933 7559057	Part F Item 5(b-c)
Doris Sewage Treatment Plant, Sludge	N/A	27.4	N/A	Tailings Impoundment Area	Part I Item 5(f)
Doris Reagent and Cyanide Storage Facility Sump	ST-11	0	N/A	Tailings Impoundment Area	Part F Item 17
Doris Contact Water Pond #2	ST-13	0	N/A	Facility not constructed	Part F Item 17
Doris Mine Water Discharge	TL-12	33,823	N/A	Tailings Impoundment Area	
Madrid North Contact Water Pond	MMS-1	0	N/A	Facility not constructed	Part F Item 17, 18(a)
Madrid South Primary Contact Water Pond	MMS-2	0	N/A	Facility not constructed	Part F Item 17, 18(a)
Madrid South Secondary Contact Water Pond	MMS-3	0	N/A	Facility not constructed	Part F Item 17, 18(a)
Madrid South Fuel Storage Facility	MMS-5	0	0	Facility not constructed	Part F Item 18(b)
Madrid Brine Mixing Facility	MMS-6	0	N/A	Facility not constructed	
Madrid North Connector	MMS-7	0	N/A	No mining occurring at this time	
Madrid North Fuel Storage Facility	MMS-8	0	0	Facility not constructed	Part F Item 18(b)
Madrid Mine Water Discharge	MMS-10	0	N/A	Facility not constructed	

Records of visual monitoring of discharge to tundra are maintained on file as per Part I Item 11.

Table 2. Discharge from TIA, March 2019

Month	Number of days of discharge	Discharge Volume (m^3)	Exceedances of Discharge Criteria*
January	0	0	0
February	0	0	0
March	0	0	0
Annual Cumulative	**0**	**0**	**0**

* Discharge criteria as outlined in *Metal and Diamond Mining Effluent Regulations*.
Acute Lethality testing conducted as outlined in Part F Item 22 and Part I Item 14

Table 3. Water usage, March 2019

Month	Windy Lake (ST-7A)	Doris Lake (ST-7)					Total Usage
	Domestic Water (m^3)	Domestic Water (m^3)	Surface Exploration (m^3)	Industrial Usage* (m^3)	Dust Suppression (m^3)	Winter Track (m^3)	
January	1,438	0	0	16	0	432	1,886
February	1,341	0	0	48	0	275	1,664
March	1,403	0	0	77	0	0	1,480
Annual Total	4,182	0	0	141	0	707	5,030
Annual Allowance	**43,800**			**1,930,000**		**60,000**	**2,033,800**

As permitted by water licence 2AM-DOH1335 Part E Item 1 and Part I Item 5(a)(b).
* Includes industrial uses such as mining, core processing, concrete batching, etc.

Table 4. Volume of Reclaim Water from the TIA for Process Water, March 2019

Month	Reclaim Water (m^3) *
January	64,572
February	57,207
March	69,824
Annual Cumulative	**191,603**

* As per Part E Item 5 and Part I Item 5(c)
Numbers rounded to the nearest cubic meter.

Table 5. Waste Rock and Process Volumes, March 2019

Month	Waste Rock Management					Underground Void Space			Ore Processing and Tailings Management		
	Produced from Mining Activity (tonnes)	Backfilled Directly to Underground Stopes (tonnes)	Returned Underground from Temporary Waste Rock Pile* (tonnes)	Moved to Temporary Waste Rock Pile (tonnes)*	Cumulative on Temporary Waste Rock Pile (tonnes)*	Volume Created from Mining Activities (tonnes)	Cumulative Volume Available for Backfill (tonnes)	Cumulative Volume Available for Backfill (m^3)	Quantity of Ore Processed** (tonnes)	Total Dry Tailings Placed in TIA** (tonnes)	Total Dry Detoxified Tailings Placed Underground** (tonnes)
December Balance	-	-	-	-	838,227	-	1,287,608	510,092	-	-	-
January	37,535	29,226	8,326	8,309 ^	838,210	27,861	1,259,747	523,016	45,387	44,133	1,054
February	34,681	29,440	76,020	5,241	767,431	-27,625	1,287,372	540,300	47,479	46,178	1,261
March	35,005	22,895	82,592	12,110	696,949	-31,976	1,319,347	558,377	52,083	50,519	1,576
Cumulative Total	107,221	81,561	166,938	25,660	696,949	-31,740	1,319,347	558,377	144,949	140,830	3,891

* As per Part I Item 5(d)(e)

** As per Part I Item 6

Note: Void space created from mining activities is determined as the sum of the initial void space as calculated in March 2017 and void space created each month from mining activities. A negative volume of void space created in a month indicates that a higher volume of waste rock and detoxified tailings was returned underground compared to the volume of void space created from new mining activities.

Table 7. Doris Lake Water Level (ST-12), March 2019

Month	Minimum Water Level (masl)	Maximum Water Level (masl)	Mean Water Level (masl)	Monthly Water Level Variation (masl)**	Comparison of Mean Water Level from Month to Month (masl)^	Low Action Level Trigger (masl)*
January	21.726	21.747	21.739	0.011	0.019	21.347
February	21.725	21.743	21.736	0.018	-0.003	21.347
March	21.723	21.743	21.733	0.020	-0.003	21.347

As per Part I Item 1 and outlined in the *Hope Bay Project Aquatic Effects Monitoring Plan*.

* Low action level trigger is relative to the average water level value (September 10-30, 2018) measured in Doris Lake. Low action level trigger (-0.42 m) outlined in Section 5.4 of the Doris Aquatic Effects Monitoring Plan, September 2016.

** Monthly Water Level Variation is calculated as the difference between the Maximum Water Level and the Minimum Water Level measured during the month.

^ Comparison of the change in water level from month to month. This value is calculated by subtracting the Mean Water Level of the current month from the Mean Water Level of the previous month (e.g. February Mean Water level - January Mean Water level). A positive value from this calculation indicates a rise in water level since the previous month; a negative value from this calculation indicates a drop in water level since the previous month.

Waste Management (Part F Item 10 and 11)

Empty cargo aircraft were utilized for waste backhaul from the Doris Camp. A total of 19 totes (approximately 19 m^3) of waste oil were transported to KBL Environmental in Yellowknife to arrange for final remediation and/or disposal this month.

Summary of Assessments of Water Balance and Water Quality Model (Part F Item 24 and Part I Item 12 c)

Average monthly water quality, hydrologic, and climatic monitoring data were collected while in operations during March. Data will contribute to the assessment of the water and load balance model, and will be compared to the predicted water quality and elevation within the TIA and will be reported in the annual report for 2019.

Thermal Monitoring (Part I Items 7, 8 and Schedule I)

Thermal monitoring undertaken as per Part I Items 7, 8 and Schedule I is reported in the annual Geotechnical Report.

Site Freshet and Precipitation Conditions (Part I Item 12(d))

Visual monitoring was conducted of the diversion berm and site runoff structures. No issues were identified as these facilities were frozen.

Incident Reporting

Spill #19-101 – On March 10, 2019, a powerhouse operator identified ethylene glycol coolant on the ground beneath one of the powerhouse generator modules while conducting the daily morning inspection. Glycol was found to be leaking out of the radiator cap on the top of the cooling system. The fluid leaked onto the roof of the generator module and some of the coolant flowed over the side of the building onto the crush pad and concrete foundation below.

Failed head gaskets on two of the cylinders had caused oil to pressurize the glycol cooling system. Pressure and volume increased until glycol leaked out of the radiator cap at the top of the system.

The generator was immediately shut down to prevent further release. Absorbent pads were used to clean glycol off the generator module to reduce the amount of spill contacting the ground surface. Contaminated materials were removed from the surface of the pad (spill pads, snow and crush) and taken to the waste management facility to be stored for offsite disposal. A small amount of coolant (estimated to be less than 1L) was inaccessible to the clean-up efforts. This material was located under a sheet of stainless steel that was buried under snow and ice. Figure 3 below shows the area pre- and post-cleanup.

Preventative maintenance is conducted on this generator after every 500 operating hours. The preventative maintenance had been conducted on March 4th, 2019, within the recommended schedule for this equipment at the time of the spill.

The following preventative actions were identified in order to reduce the likelihood of a reoccurrence:

- Continue performing walk around checks twice daily on all generator components to identify potential issues; and
- Continue performing preventative maintenance programs on all generators at the recommended interval (every 500 operating hours).

Figure 3. Spill #19-101 Pre- and Post-Cleanup

Pre-clean up

Post-clean up

Spill #19-103 - On March 11, 2019, a build-up of discoloured ice along the TIA reclaim pipeline was identified. Inspection of the area determined that a leak was occurring from a flange in the reclaim pipeline used to transport reclaim water from the TIA to the Process Plant. An estimated 500-600 L of reclaim water was released to surrounding tundra. No material was released to any waterbody.

It was discovered that the bolts on a flange connecting two sections of pipe together had become loose, allowing the two sections of pipe to separate slightly causing the release.

Snow and ice covering the line was removed to expose the pipe and flange. The loose bolts on the flange were tightened stopping the leak.

A sample of the reclaim water was collected at the time of the release and was below the discharge criteria outlined in Schedule 4 of the *Metal and Diamond Mining Effluent Regulations*. Results of this sample and a sample collected on March 4 prior to the release are presented in Table 8 below. As the sample results met this criteria, no additional efforts were made to excavate frozen reclaim water from the surface of the tundra. Excavation would result in damage to tundra and introduce a risk of future permafrost degradation in the area. Contaminated snow and ice that was hand excavated to expose the reclaim pipeline was disposed of in the Tailings Impoundment Area.

The following corrective actions were identified in order to reduce the likelihood of a reoccurrence:

- Implement routine preventative maintenance program for reclaim water pipeline, including checks of flange bolts and pipe connections; and
- Place delineators at flange locations along reclaim pipeline in summer of 2019 to identify flange locations during winter months and allow effective snow removal at these locations to facilitate inspections.

Table 8. Spill# 19-103 - Results of Reclaim Water (TL1) Samples

Sample ID		TL1	TL1 *	MDMER Schedule 4	
ALS ID		L2239818-1	L2243345-1		
Date Sampled		2019-03-04 16:40	2019-03-11 9:45	Max Monthly Mean	Max Monthly Grab
Parameter	Units	Water	Water		
pH	pH	7.84	8.07	6.0-9.5	
Total Suspended Solids	mg/L	14.7	9.6	15	30
Cyanide, Total	mg/L	0.158	0.155	1	2
Arsenic (As)-Total	mg/L	0.00118	0.00098	0.5	1
Copper (Cu)-Total	mg/L	0.0468	0.0407	0.3	0.6
Lead (Pb)-Total	mg/L	<0.00050	<0.00025	0.2	0.4
Nickel (Ni)-Total	mg/L	0.0094	0.0087	0.5	1
Zinc (Zn)-Total	mg/L	<0.015	<0.015	0.5	1
Ra-226	mg/L	<0.0100		0.37	1.11

* Analysis for radium-226 was omitted in the March 11 sample. Results of sample collected March 4 include analysis or radium-226 and have been included in Table 1 above for reference.

Spill #19-132 - On March 26, 2019, the powerhouse operator responded to an alarm within the powerhouse. It was discovered that generator #5 engine had experienced a catastrophic failure and released oil and glycol on to the deck of the generator module. The ethylene glycol coolant was dripping from the deck of the module and onto the crush pad and concrete foundation below the module.

Absorbent pads were used to contain and absorb the dripping and pooling glycol underneath the module. Contaminated materials were removed from the surface of the

pad (spill pads, snow and crush) and taken to the waste management facility to be stored for offsite disposal. Figure 4 below shows the spill location prior to and after clean-up.

Preventative maintenance is conducted on this generator after every 500 operating hours. The preventative maintenance had been conducted on March 5th, 2019, and the unit was within the recommended schedule at the time of the spill.

The following preventative actions were identified in order to reduce the likelihood of a reoccurrence:

- Continue performing walk around checks twice daily on all generator components to identify potential issues;
- Continue performing preventative maintenance programs on all generators at the recommended interval (every 500 operating hours);
- Prior to placement of a replacement generator, the floor of the module will be inspected and any holes caused by the incident will be repaired; and
- A solution to seal the seams of each generator module enclosure is being investigated in order to contain any spills inside the module from reaching the crush pad and concrete foundation.

Figure 4. Spill #19-132 Pre- and Post-Cleanup

Pre-clean up

Post-clean up

Should there be any questions regarding this monthly report, please contact enviro@tmacresources.com.

Yours sincerely,

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Figure 5. 2AM-DOH1335 SNP Monitoring Locations