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October 31, 2018

Licensing
Nunavut Water Board
P.O. Box 119
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Re: September 2018 – Monthly Monitoring Report for Water Licence 2AM-DOH1323

This report is comprised of monitoring requirements as set out in Part J and Schedule J of water licence 2AM-DOH1323 Amendment 1, and additional requirements from CIRNAC.

During the subject period of this report the focus of activities at Doris North was underground mining, construction, ore processing, water management and environmental compliance. Sampling locations monitored under this licence (seasonally or when facilities are operational) are provided in Figure 6 at the end of this report.

Site Wide Water Quality Monitoring Program (Part J Items 3, 8, and Schedule J)

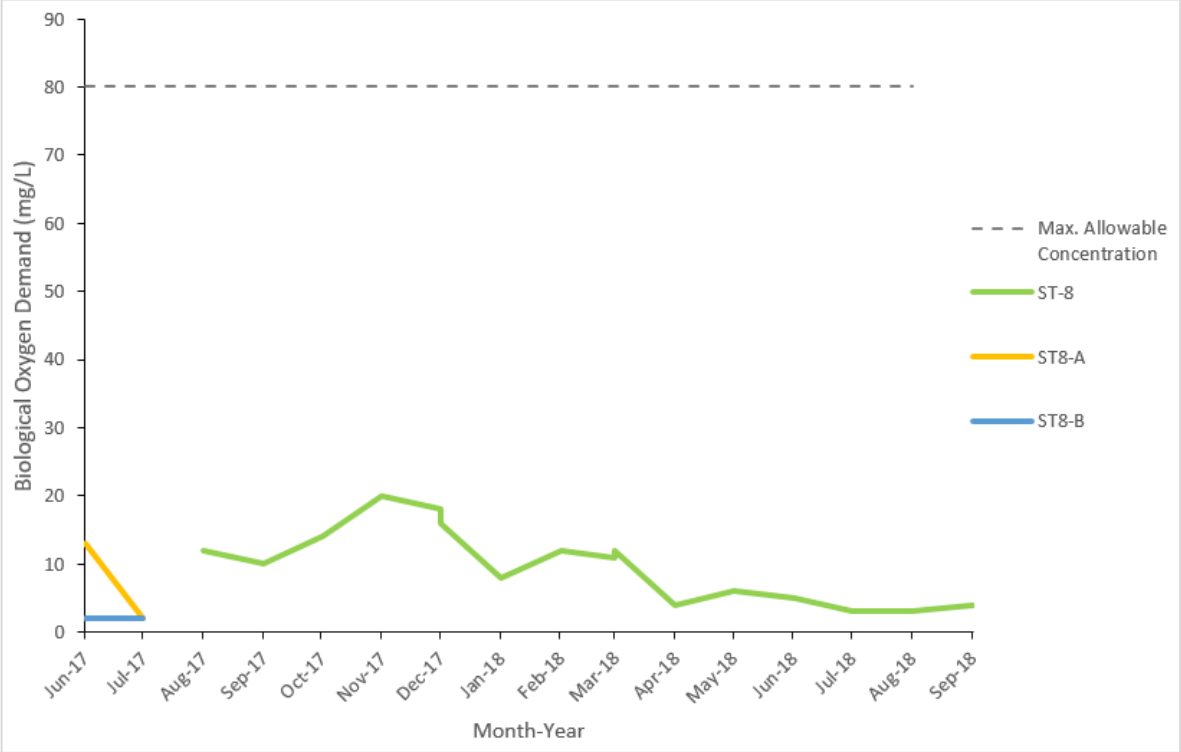
Water quality sampling was conducted in September at monitoring stations identified in Schedule J of the licence (ST-1 through ST-13, TL-1 through TL-12). Water quality samples were not collected for monitoring stations that were inactive during the month being reported (e.g., facilities that had not 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 G 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.

Analytical results for both TL-6 and TL-7 samples collected in September are not included with this submission due to a service backlog with the laboratory utilized to process these particular samples. September analytical results for both monitoring stations will be included in the October 2018 Monthly Monitoring Report.

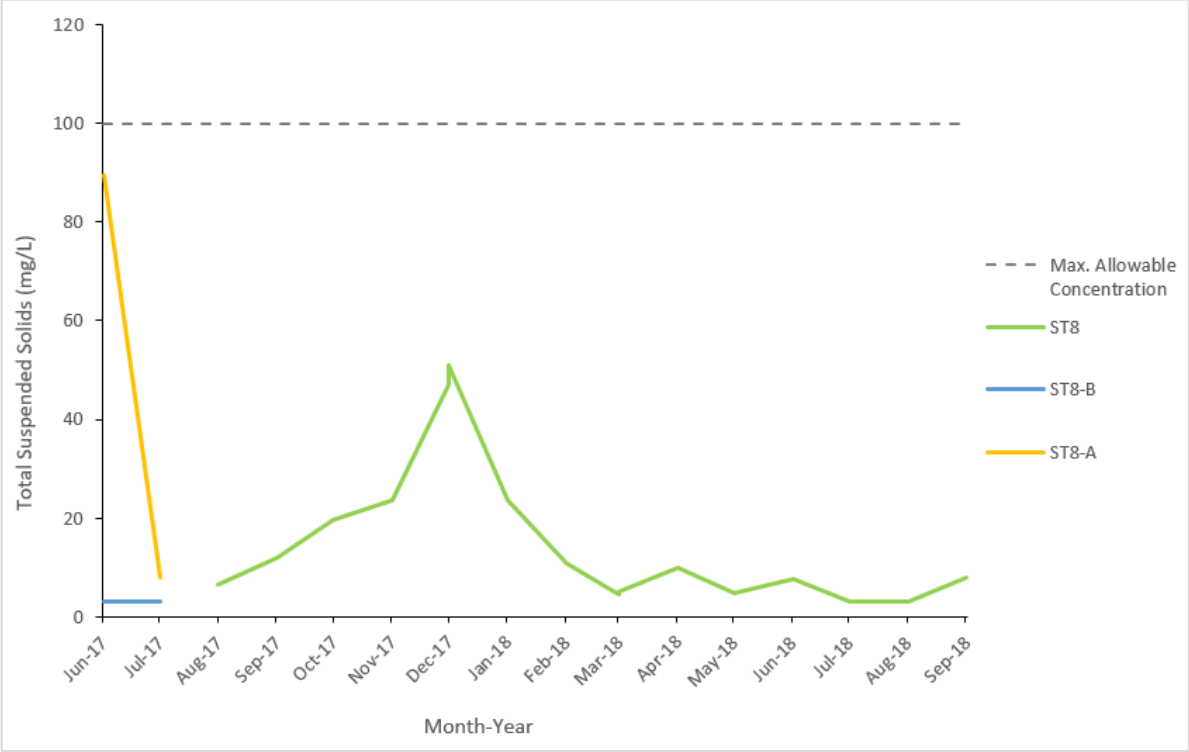
Figure 1 and 2 illustrates effluent quality characteristics for parameters of interest at select monitoring stations.

Figure 1. Biological Oxygen Demand Results Consistently Below Discharge Criteria for Wastewater Treatment Plant (ST8, ST8A, ST8B)



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

Figure 2. Total Suspended Solids Results Consistently Below Discharge Criteria for Wastewater Treatment Plant (ST8, ST8A, ST8B)



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

Flow and Volume Measurements (Part J Items 11, 12, and Schedule J)

Table 1. Effluent discharge, September 2018

Facility	Station Code	Discharge Volume (m^3)	Exceedances of Discharge Criteria	Discharge Location	Licence Reference
Sedimentation Pond	ST-1	17,232	N/A	Tailings Impoundment Area	Schedule J Table 2
Pollution Control Pond #1	ST-2	37	N/A	Tailings Impoundment Area	Schedule J Table 2
Landfill Sump	ST-3	0	0	Facility not constructed	Part G Item 23 (a, b, g)
Landfarm Sump	ST-4	0	0	Tundra Discharge 13W 432450 7559600	Part G Item 23 (c, d, g)
Doris Tank Farm	ST-5	6	0	Tailings Impoundment Area	Part G Item 23 (e, f, g)
Rob Bay 5ML Tank Farm	ST-6a	0	0	Tailings Impoundment Area	Part G Item 23 (e, f, g)
Rob Bay Three 5ML Tank Farm	ST-6b	4	0	Tailings Impoundment Area	Part G Item 23 (e, f, g)
Wastewater Treatment Plant, Effluent	ST-8	1,148	0	Tundra Discharge 13W 432933 7559057	Part G Item 4 (b-d)
Wastewater Treatment Plant, Sewage Sludge	N/A	29.3	N/A	Tailings Impoundment Area	Part J Item 11 (g)
Reagent and Cyanide Storage Facility Sump	ST-11	0	0	Tailings Impoundment Area	Schedule J Table 2
Pollution Control Pond #2	ST-13	0	0	Facility not constructed	Schedule J Table 2
Mine Water Discharge	TL-12	6,771	N/A	Tailings Impoundment Area	Schedule J Table 2

Records of visual monitoring of discharge to tundra are maintained on file as per Part J Item 18.

Note: Mine Water Discharge reported to the Sedimentation Pond in September. Water was pumped from the underground sump to the Sedimentation Pond and to the TIA through the Sedimentation Pond discharge pipeline. Volumes presented for discharge from the Sedimentation Pond include the volume of Mine Water Discharge. The Sedimentation Pond discharge line was shut down on September 18, 2018. At that time, Mine Water Discharge from underground was re-routed through the Mill Tailings Discharge pipeline to the Tailings Impoundment Area.

Table 2. Discharge from TIA to Doris Creek, September 2018

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
April	0	0	0
May	0	0	0
June	0	0	0
July	0	0	0
August	0	0	0
September	0	0	0
Annual Cumulative	**0**	**0**	**0**

* Discharge criteria outlined in Part G Items 29, 30, 31 and Part J Item 8.

A comparison of flows between TL-4 and TL-2 as per Part G Item 32 of the licence was not conducted as no water was discharged from the Tailings Impoundment Area to Doris Creek this month.

Table 3. Water usage, September 2018

Month	Windy Lake (ST-7A)	Doris Lake (ST-7)					Mine Inflow	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)	Industrial Usage ^ (m^3)	
January	1,051	0	0	0	0	119	433	1,603
February	1,277	0	0	34	0	136	0	1,447
March	1,231	0	0	29	0	0	0	1,260
April	1,208	0	0	74	0	0	0	1,282
May	1,224	0	93	46	0	0	0	1,363
June	1,115	0	4	45	669	0	0	1,833
July	1,064	0	0	78	1,863	0	0	3,005
August	1,153	0	0	67	225	0	0	1,445
September	1,144	0	0	114	0	0	0	1,258
Annual Total	10,467	0	97	487	2,757	255	433	14,496
Annual Allowance	**22,995**							**480,000**

* As permitted by water licences 2BE-HOP1222 and 2AM-DOH1323

** Includes industrial uses such as underground drilling, core processing, concrete batching, etc.

^ Discharge of groundwater inflow from mine development in the Doris Connector zone to the Tailings Impoundment Area began in February. Mine water inflow is no longer being recycled into underground sumps for use in mining activities. The volume of inflow discharged to the TIA is presented in Table 1 above.

Table 4. Volume of Reclaim Water from the TIA, September 2018

Month	Reclaim Water (m^3) *
January	82,577
February	69,744
March	78,864
April	74,638
May	76,444
June	69,120
July	66,699
August	71,186
September	65,833
Annual Cumulative	**655,105**

* As per Part J Item 11(d)
Numbers rounded to the nearest cubic meter.

Table 5. Waste Rock and Process Volumes, September 2018

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 Cyanide Leach Tailings Placed Underground** (tonnes)
December Balance	-	-	-	-	542,884	-	774,674	277,762	-	-	-
January	22,951	25,584	0	0	542,884	16,558	791,232	283,676	25,219	23,916	1,304
February	21,415	20,308	0	1,107	543,991	22,438	813,670	291,689	27,036	25,615	1,434
March	27,092	20,360	0	6,732	550,723	24,236	837,906	300,345	31,375	30,366	1,008
April	25,068	17,536	0	7,532	558,255	22,069	859,975	308,227	33,619	32,209	1,403
May	34,829	9,392	0	25,437	583,692	40,314	900,289	322,625	28,869	27,692	1,150
June	26,985	16,856	0	10,129	593,821	31,176	931,465	333,759	25,826	24,527	1,296
July	25,330	17,480	0	7,850	601,671	28,043	959,508	343,774	31,843	30,030	1,453
August	24,420	22,648	0	1,772	603,443	19,571	979,079	350,764	45,276	42,973	2,300
September	29,216	22,424	0	6,792	610,235	34,823	1,013,902	363,201	50,645	48,426	2,219
Cumulative Total	237,306	172,588	0	67,351	610,235	239,228	1,013,902	363,201	299,708	285,754	13,567

* As per Part J Item 11(e, f)

** As per Part J Item 12.

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 dry cyanide leach tailings was returned underground compared to the volume of void space created from new mining activities.

Table 7. Doris Lake Water Level (ST-12), September 2018

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	21.672	21.689	21.679	0.017	0.003	21.346
February	21.674	21.689	21.681	0.015	0.002	21.346
March	21.681	21.694	21.686	0.013	0.005	21.346
April	21.680	21.692	21.687	0.012	0.001	21.346
May	21.703	21.711	21.707	0.008	0.020	21.346
June	21.709	22.389	22.073	0.680	0.366	21.346
July	21.902	22.244	22.063	0.342	-0.010	21.346
August	21.815	21.926	21.861	0.111	-0.202	21.346
September	21.755	21.781	21.764	0.026	-0.097	21.347

* 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.

Note: Water level surveys were performed in June to calibrate the two pressure transducer stations installed in Doris Lake. Based on these surveys there was an adjustment of +2.0cm to the constant added to the data to determine the water elevation. This has resulted in a 2cm step increase between the data from April and May.

Waste Management (Part G Item 12)

Empty cargo aircraft were utilized for waste backhaul from the Doris Camp. Approximately 18 totes (1m^3) of waste oil were transported to KBL Environmental in Yellowknife to arrange for final remediation/disposal.

Summary of Assessments of Water Balance and Water Quality Model (Part G Item 34)

Average monthly water quality, hydrologic, and climatic monitoring data were collected while in operations during September. 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 2018.

Thermal Monitoring (Part J Items 13 and 14)

Thermal monitoring undertaken as per Part J Items 13, 14 and Schedule J is reported in the annual Geotechnical Report.

Doris North Camp Diversion Berm Effectiveness (Part J Item 19(d))

Visual monitoring was conducted during September to evaluate the diversion berm's efficacy of diverting runoff away from the camp pad. The diversion berm was observed to be functioning as per its design purpose.

Incident Reporting

Spill #18-371 – On September 11, 2018 an estimated 30 m^3 of flotation tailings was released to the engineered mine pad surface approximately 200m west of Doris Lake from a flange on the newly commissioned tailings distribution line running from the Doris North mill facility to the Tailings Impoundment Area (TIA). The flotation tailings spill was comprised of approximately 10.5 m^3 of solids and 19.5 m^3 of solution.

The new tailings distribution line was commissioned and put into service on September 9, 2018 approximately 36 hours prior to the spill. A hydrotest was conducted prior to the introduction of tailings to the line to ensure no leaks were present. At approximately 11:45 pm on September 10, 2018 an increase in pressure followed by a sudden decrease in pressure within the tailings distribution line was observed after a pump speed change. An inspection of the tailings distribution line was completed immediately and a leak from a flange on the tailings distribution line was discovered. The mill operation was immediately suspended and the tailings pump was shut down.

Heavy equipment operators were called to the scene to recover the spilled and contaminated materials. A berm was constructed with crushed quarry rock to contain the spill. An excavator was used to excavate the tailings and contaminated materials from the mine pad surface, and a haul truck was used to transport the contaminated materials to the TIA for disposal. Snow and ice on the roadway provided a barrier to the spread of the tailings material and prevented much of the tailings solution from spreading beyond the surface of the road. Tailings and contaminated materials that were not accessible by equipment were hand excavated and disposed of within the TIA.

High winds during the spill event resulted in some windblown tailings being deposited on nearby tundra east of the spill area. The tundra (active layer) was not yet frozen at the time of the spill, which prohibited the use of heavy equipment to recover contaminated snow. This area is within the footprint of the permitted Waste Rock Storage Pad U that is planned for construction during the winter of 2019. Once the tundra has frozen sufficiently to support heavy equipment and prior to construction of this pad, TMAC will scrape the area and dispose of the contaminated materials within the TIA. In the interim, a silt fence was installed downstream of the impacted area to direct any melt water to a water management sump prior to freeze-up.

Root Cause:

- Flange gasket had failed. The gasket and flange were removed from the line and found to have sustained damage due to wear from the tailings solids under high pressure.
- Gaskets were not properly sized for this particular application and were not installed as per the manufacturer's recommendation. A specific torqueing progression is recommended by the flange manufacturer during installation in order to maintain a minimum residual bolt torque. The high initial torque provides seating stress to ensure a no-leak path while the residual bolt torque provides the long-term sealing stress. These flange installations can be used with or without a gasket, however if a gasket is installed it will undergo some compression that will decrease the bolt torque. A 4-hour re-torque is required to achieve the final target torque value when a gasket is used with the installation. Based on the investigation results, the recommendation to complete a 4-hour re-torque was overlooked during the flange and gasket installation, which is believed to be the root cause of the gasket failure and leaking flange.

Corrective Actions:

- All gaskets were removed from flange installations on the tailings distribution line;
- A preventative maintenance program has been established to confirm target residual bolt torque is maintained and re-torque occurs as required;
- Installation of protective flange boxes are on going. These will allow for easy access during winter months and if a flange failure were to occur, may aid in containing the spill to a smaller footprint in the event of high winds;
- Various Leak Detection Systems (LDS) are being investigated and may be installed on the tailings line to improve leak detection capability and decrease response time in the event of a spill.

Refer to Figures 3 through 5 below documenting the spill location, contamination area as well as pre and post cleanup.

Figure 3. Spill #18-371 Overview of spill location

Figure 4. Spill #18-371 Completed spill cleanup

Primary spill location.

Primary spill location reclamation.

Primary spill location.

Primary spill location reclamation.

Primary spill location.

Primary spill location reclamation.

Figure 5. Spill #18-371 Secondary spill location with silt fence installation

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

Yours sincerely,

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cc. Jeremy Fraser, Water Resources Officer, CIRNAC

Figure 6. 2AM-DOH-1323 SNP Monitoring Locations