95 Wellington Street W
Suite 1010
P.O. Box 44
Toronto, Ontario
M5J 2N7
416-628-0216

Sent by Email

January 30, 2018

Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU
X0B 1J0

Re: December 2017 – 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 INAC.

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 3 at the end of this report.

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

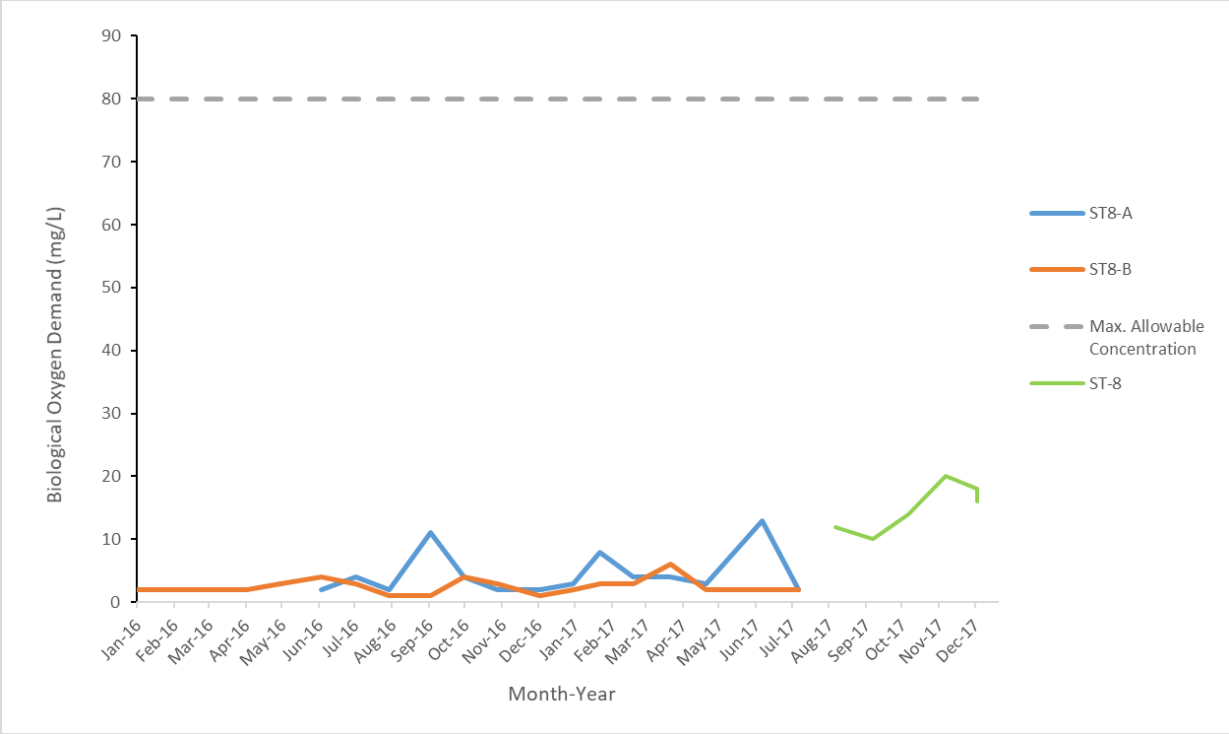
Water quality sampling was conducted in December at monitoring stations identified in Schedule J of the licence (ST-1 through ST-13, TL-1 through TL-12). Water quality samples were not collected for monitoring stations that were inactive during the month being reported (e.g., facilities that had not 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 and no exceedances were observed. Results of this monitoring are attached to the report in Appendix A.

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

Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) were subsequently observed to be elevated at monitoring station ST8, although results for these parameters were below the effluent quality limits outlined in Part G of the licence. As part of TMAC's adaptive management strategy, trouble shooting, additional monitoring and repairs continued on the wastewater treatment plant by the wastewater treatment operator throughout December. The elevations can be attributed to degraded treatment performance in one of the two treatment units due to regular wear and tear on the filter membrane cassettes. The malfunctioning cassette was isolated and new cassettes have been sourced through the manufacturer for replacement.

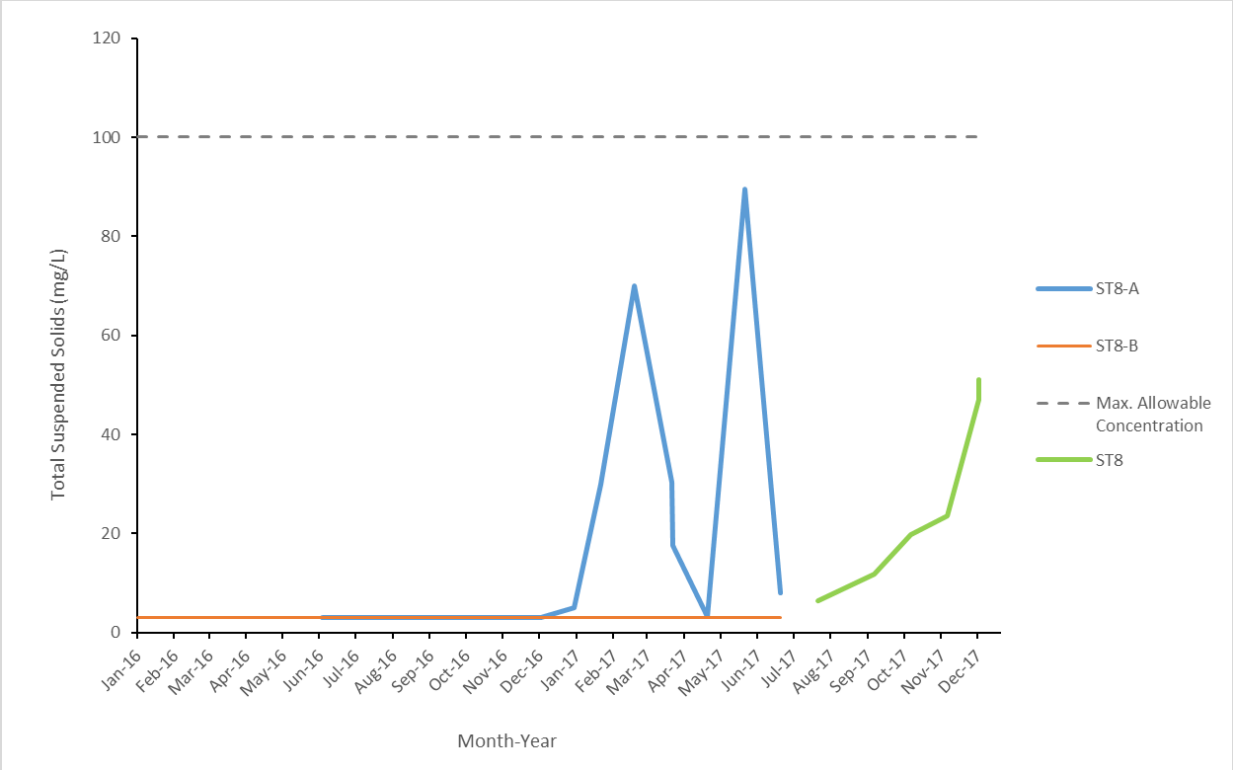
A visual inspection of the backfilled stopes underground was conducted in December to identify seepage from the stopes. Four stopes have been backfilled at this time; one seep that was identified during the August inspection was observed to be flowing during the December inspection. A flow measurement could not be completed due to the low volume of this seep. A sample and duplicate were collected at this location (TL-11) and submitted for analysis. Results for TSS and some total metals parameters are higher in the initial sample than in the duplicate. It is believed that sediments may have been disturbed during collection of this sample due to the low volume, which resulted in the elevated results. Results of this sampling are provided in Appendix A. No seepage was identified at the other three backfilled stopes.

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, December 2017

Facility	Station Code	Discharge Volume (m^3)	Exceedances of Discharge Criteria	Discharge Location	Licence Reference
Sedimentation Pond	ST-1	0	0	Tailings Impoundment Area	Part G Item 22
Pollution Control Pond #1	ST-2	0	N/A	Tailings Impoundment Area	Part G Item 22
Landfill Sump	ST-3	0	0	Facility not constructed	Part G Item 24 (a, b, g)
Landfarm Sump	ST-4	0	0	Tundra Discharge 13W 432450 7559600	Part G Item 24 (c, d, g)
Doris Tank Farm	ST-5	0	0	Tundra Discharge 13W 432960 7559270	Part G Item 24 (e, f, g)
Rob Bay 5ML Tank Farm	ST-6a	0	0	Tundra Discharge 13W 432973 7563440	Part G Item 24 (e, f, g)
Rob Bay Three 5ML Tank Farm	ST-6b	0	0	Tundra Discharge 13W 432730 7563200	Part G Item 24 (e, f, g)
Wastewater Treatment Plant, Effluent	ST-8	917	0	Tundra Discharge 13W 432933 7559057	Part G Item 23(b-d)
Wastewater Treatment Plant, Sewage Sludge	N/A	20.0	N/A	Tailings Impoundment Area	Part J Item 12 (g)
Reagent and Cyanide Storage Facility Sump	ST-11	0	0	Tailings Impoundment Area	Part G Item 23 (a)
Pollution Control Pond #2	ST-13	0	0	Facility not constructed	Part G Item 22
Mine Water Discharge	TL-12	0	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.

Table 2. Discharge from TIA to Doris Creek, December 2017

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
October	0	0	0
November	0	0	0
December	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 for the Tailings Impoundment Area to Doris Creek this month.

Table 3. Water usage, December 2017

Month	Windy Lake (ST-7A)				Doris Lake (ST-7)				Mine Inflow	Total Usage
	Domestic Water* (m^3)	Surface Exploration (m^3)	Industrial Usage** (m^3)	Dust Suppression (m^3)	Domestic Water* (m^3)	Surface Exploration (m^3)	Industrial Usage** (m^3)	Dust Suppression (m^3)	Industrial Usage ^ (m^3)	
January	849	0	15	0	0	0	0	0	0	864
February	801	0	0	0	0	0	0	0	0	801
March	925	1	0	0	0	0	32	0	0	958
April	873	0	2	0	0	0	608	0	0	1,483
May	892	0	3	0	0	0	512	32	0	1,439
June	946	0	1	0	0	0	26	982	0	1,955
July	844	0	7	0	0	0	0	1,308	0	2,159
August	849	0	0	0	0	0	34	1,736	0	2,619
September	814	0	0	0	0	0	1	287	0	1,102
October	889	0	0	0	0	0	16	0	0	905
November	849	0	0	0	0	0	9	0	436	1,294
December	950	0	0	0	0	0	0	0	667	1,617
Annual Total	10,481	1	28	0	0	0	1,238	4,345	1,103	17,196
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.

^ Mine inflow of groundwater from development in the Doris Connector zone is currently being recycled into underground sumps for use in mining activities. These volumes have been calculated based on weekly flow measurements collected at the Doris Connector face and is reported as Industrial Usage. No mine inflow is being discharged to the Tailings Impoundment Area at this time.

December Ice Road Development: 0m^3. Cumulative total for Ice Road Development in 2017: 16m^3.

Table 4. Volume of Reclaim Water from the TIA, December 2017

Month	Reclaim Water (m^3) *
January	31,200
February	94,080
March	107,880
April	100,800
May	107,880
June	104,400
July	81,721
August	96,586
September	92,016
October	92,181
November	93,089
December	93,990
Annual Cumulative	**1,088,293**

* As per Part J Item 11(d)

Between January and November 2017, discrepancies were identified for the reported volumes of waste rock stored on the temporary waste rock pile, the volumes of waste rock returned underground and the volume of void space available for backfill. This was attributed to human error in determining the calculations of these numbers by staff and have since been corrected. Table 5 below provides the corrected volumes for waste rock management and available void space for 2017. Table 6 provides a comparison of volumes that were reported between January-November 2017 and the corrected values for that time.

Table 5. Waste Rock and Process Volumes, December 2017

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	-	-	-	-	398,967	-	525,203	187,573	-	-	-
January	24,810	0	0	24,810	423,777	31,885	557,088	198,960	2,020	600	0
February	22,584	1,392	0	21,192	444,969	29,469	586,557	209,485	6,174	5,927	247
March	25,355	5,060	0	20,295	465,264	31,491	618,048	220,731	11,177	10,970	207
April	23,436	11,226	0	12,210	477,474	18,396	636,444	227,301	19,058	17,761	1,297
May	24,341	7,660	0	16,681	494,155	24,634	661,078	236,099	20,867	20,408	449
June	22,189	4,320	0	17,869	512,024	23,996	685,074	244,669	20,662	19,860	796
July	19,121	11,960	1,680	7,161	517,505	8,734	693,808	248,388	18,464	17,645	812
August	19,264	1,380	1,380	17,884	534,009	25,158	718,965	257,866	23,995	23,075	913
September	17,326	12,920	0	4,406	538,415	19,411	738,377	264,799	17,337	16,681	655
October	18,786	16,792	0	1,994	540,409	11,491	749,868	268,903	23,557	22,601	956
November	20,131	22,216	0	0	540,409	12,254	762,122	273,279	19,930	19,006	918
December	23,315	20,840	0	2,475	542,884	12,552	774,674	277,762	26,075	24,954	1,083
Cumulative Total	260,658	115,766	3,060	146,977	542,884	249,471	774,674	277,762	209,316	199,488	8,333

* 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 6. Comparison of Previously Reported Values and Corrected Values for Waste Rock Management and Void Space, January-December 2017

Month	Waste Rock Stored Temporary Waste Rock Pile (tonnes)	Moved to Temporary Waste Rock Pile (tonnes)	Waste Rock Returned Underground (tonnes)	Returned Underground from Temporary Waste Rock Pile (tonnes)	Volume of Void Space Created Underground (tonnes)	Volume Created from Mining Activities (tonnes)	Volume of Void Space Created Underground (m^3)	Volume Created from Mining Activities (m^3)
January	24,811	24,810	0	0	-	31,885	-	11,267
February	22,584	21,192	1,392	0	-	29,469	-	10,413
March	23,917	20,295	5,060	0	618,048 *	31,491	220,731 *	11,128
April	23,437	12,210	11,226	0	-162	18,396	-58	6,500
May	24,341	16,681	7,660	0	4,269	24,634	1,525	8,705
June	22,189	17,869	4,320	0	25,491	23,996	9,104	8,479
July	19,121	7,161	11,960	1,680	-5,711	8,734	-2,040	3,086
August	8,164	17,884	1,380	1,380	27,180	25,158	9,707	8,890
September	17,326	4,406	12,920	0	23,451	19,411	8,375	6,859
October	20,613	1,994	16,792	0	-4,664	11,491	-1,666	4,061
November	20,668	0	22,216	0	-10,342	12,254	-3,694	4,330

Corrected values presented in grey.
*Initial void space calculation in March 2017.

Table 7. Doris Lake Water Level (ST-12), December 2017

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	21.783	21.833	21.810	0.049	-	21.425
February	21.804	21.862	21.831	0.058	0.022	21.425
March	21.814	21.869	21.837	0.055	0.006	21.425
April	21.827	21.864	21.850	0.037	0.013	21.425
May	21.845	22.375	21.929	0.530	0.079	21.425
June	22.114	22.407	22.235	0.293	0.306	21.425
July	21.761	22.067	21.886	0.306	-0.349	21.425
August	21.708	21.757	21.732	0.049	-0.154	21.425
September	21.706	21.773	21.751	0.067	0.019	21.425
October	21.708	21.767	21.734	0.059	-0.017	21.346
November	21.671	21.706	21.685	0.035	-0.049	21.346
December	21.674	21.679	21.676	0.005	-0.009	21.346

* Low action level trigger is relative to the average water level value (September 10-30, 2016/2017) measured in Doris Lake. Low action level trigger (-0.42 m) outlined in Section 5.4 of the Doris Aquatic Effects Monitoring Plan, August 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.

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 December. 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 2017.

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 December 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

No incidents pertaining to this license occurred during the month of December.

Should there be any questions regarding this monthly report, please contact Oliver Curran at Oliver.Curran@tmacresource.com.

Yours sincerely,

Oliver Curran
Vice President, Environmental Affairs
Hope Bay Project
(416) 628-0216

cc. Eva Paul, Water Resources Officer, INAC

Figure 3. 2AM-DOH-1323 SNP Monitoring Locations