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January 30, 2017

Licensing
Nunavut Water Board
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Re: December 2016 – 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.

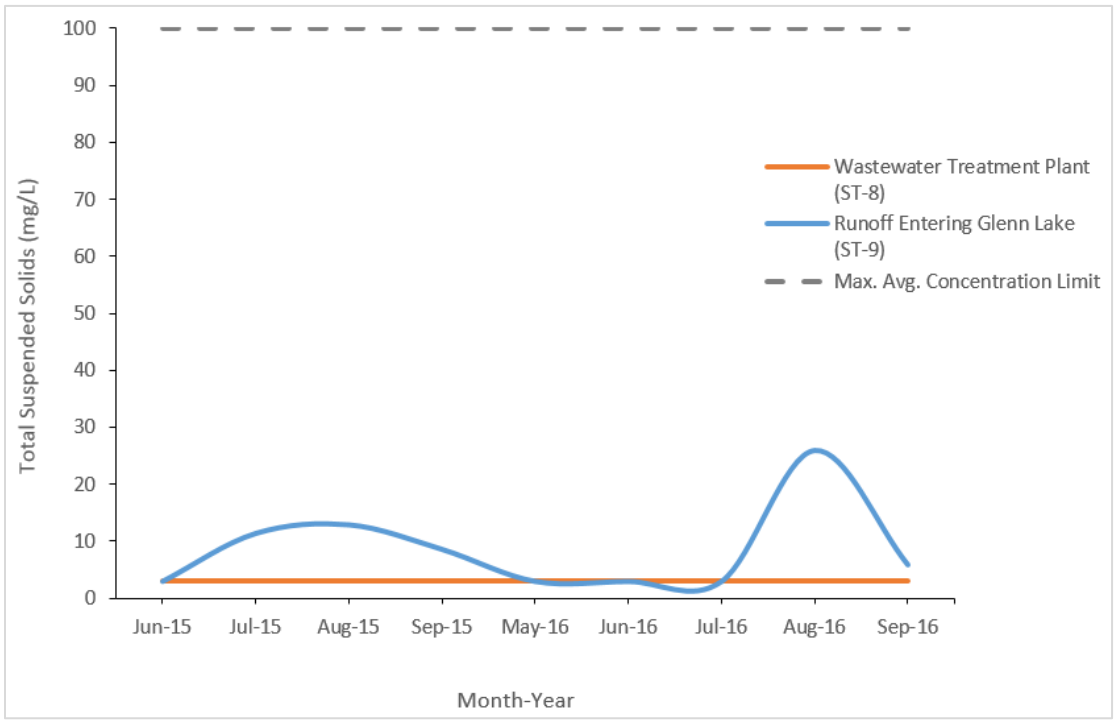
During the subject period of this report the focus of activities at Doris North was underground mining, construction, processing plant commissioning, water management and environmental compliance. Sampling locations monitored under this licence (seasonally or when facilities are operational) are provided 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). Results of this monitoring are provided in Appendix A.

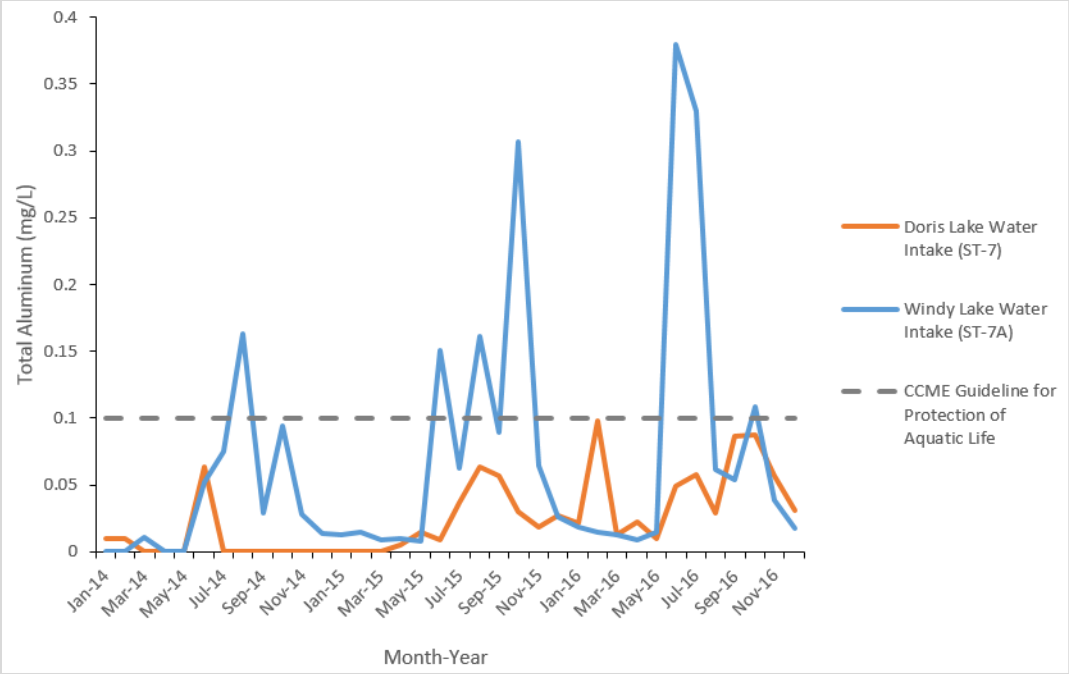
Figures 1 and 2 illustrate effluent quality characteristics for parameters of interest at select monitoring stations.

Figure 1. TSS Results for Wastewater Treatment Plant Discharge and Downstream Runoff Entering Glenn Lake Consistently Below Allowable Discharge Criteria, 2015-2016



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

Figure 2. Natural variability in Aluminum Concentrations in Doris Lake (ST-7) and Windy Lake (ST-7A) in Comparison to CCME Water Quality Guideline for the Protection of Aquatic Life, 2014-2016



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

Table 1. Effluent discharge, December 2016

Facility	Station Code	Discharge Volume (m^3)	Exceedances of Discharge Criteria	Discharge Location	Licence Reference
Sedimentation Pond	ST-1	0	N/A	Tailings Impoundment Area	Part G Item 22
Pollution Control Pond	ST-2	0	N/A	Tailings Impoundment Area	Part G Item 22
Landfill Sump	ST-3	0	0	Facility not constructed	Part G Item 23 (a-b, g)
Landfarm Sump	ST-4	0	0	Sedimentation Control Pond	Part G Item 23 (c-d, g)
Doris Tank Farm	ST-5	0	0	Sedimentation Control Pond	Part G Item 23 (e-f, g)
Rob Bay 5ML Tank Farm	ST-6a	0	0	Sedimentation Control Pond	Part G Item 23 (e-f, g)
Rob Bay Three 5ML Tank Farm	ST-6b	0	0	Sedimentation Control Pond	Part G Item 23 (e-f, g)
Wastewater Treatment Plant, Effluent	ST-8	778	0	Tundra Discharge 13W 432933 7559057	Part G Item 4 (a-d)
Wastewater Treatment Plant, Sewage	N/A	2.89	N/A	Incinerated	Part J Item 12 (g)
Reagent and Cyanide Storage Facility Sump	ST-11	0	N/A	Tailings Impoundment Area	Part G Item 22
Pollution Control Pond	ST-13	0	N/A	Facility not constructed	Part G Item 22
Effluent from Process Plant	TL-5	0	N/A	Tailings Impoundment Area	
Mine Water Discharge	TL-12	0	N/A	Facility not constructed	

Notification of planned discharges from facilities listed in Schedule J of this licence was provided to the Inspector on May 3, 2016 as per Part G Item 1.

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

Table 2. Discharge from TIA to Doris Creek, December 2016

Month	Number of days of discharge	Discharge Volume (m^3)	Exceedances of Discharge Criteria*
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 2016

	Usage by Water Source (m^3)		Total Usage (m^3)	
Water Usage	Windy Lake (ST-7A)	Doris Lake (ST-7)	Monthly	Annual Cumulative
Domestic Water*	795	0	795	8,438
Doris Surface Exploration Drilling	0	0	0	334
All Other Industrial Water Use**	0	1,700	1,700	4,952
Dust Suppression	0	0	0	4,916
Total	**795**	**1,700**	**2,495**	**18,640**
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, mill commissioning, concrete batching, etc.

No water was applied for ice road development during the month. In total, 1,068 m^3 of water has been applied in 2016 for ice road development. These quantities are not included in the usage indicated in Table 3.

Table 4. Volume of Reclaim Water from the TIA, December 2016

Month	Reclaim Water * (m^3) (m^3)
December	0
Annual Cumulative	**0**

* As per Part J Item 11(d)

Table 5. Waste Rock and Process Volumes, December 2016

Material	Waste Rock Stored Temporary Waste Rock Pile (tonnes)*	Waste Rock Returned Underground * (tonnes)	Dry Tailings Placed in TIA** (tonnes)	Dry Cyanide Leach Tailings Placed Underground** (tonnes)	Quantity of Ore Processed** (tonnes)
Monthly Total	21,581	0	0	0	0
Cumulative Total	**398,967**	**0**	**0**	**0**	**0**

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

** As per Part J Item 12. Daily disposal volumes of dry tailings and cyanide leach tailings are presented in Appendix B.

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

During Operations, monthly assessments will be conducted of the water balance and water quality model. Prior to entering Operations, this assessment is conducted annually and a summary provided in the Annual Report.

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))

Monitoring was not conducted on the Diversion Berm this month due to freezing conditions.

Waste Management (Part G Item 12)

A campaign was initiated in December to utilize empty cargo planes to backhaul non-hazardous waste from the Hope Bay mine site. A total of 24 drums, or 10,786 lbs of kitchen grease was removed from site for disposal in cooperation with KBL Environmental.

Incident Reporting

December 15, 2016 – Spill #16-427. On December 15, 2016 the uninterruptable power supply (UPS) tied into the wastewater treatment plant (WWTP) control system faulted out. This fault caused the control system for the WWTP to run on the UPS battery power until the battery had drained. Once the battery had drained, the control system went offline causing an estimated 1.5 m^3 of wastewater to be released to the camp pad surface from an overflow of the raw sewage tank. A sump pump was put in place to recover wastewater and to prevent further spillage to the camp pad. A portion of the impacted area was located beneath the wastewater treatment facility containers which was not accessible for clean-up and recovery efforts. Contaminated materials that were accessible were removed and contaminated crush below was excavated. Lime was placed on the impacted areas to prevent the development of odors and pathogens during warmer months. The impacted area where contaminated materials were unable to be recovered is inaccessible to either humans or wildlife. TMAC internally reviewed the incident and identified the following mitigation factors to prevent the likelihood of a similar occurrence in the future: 1) operator training to recognize input errors on a UPS system and resetting the unit; and 2) verification of UPS and circuit integrity.

Should there be any questions regarding this monthly report, please contact John Roberts.
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Yours sincerely,

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Hope Bay Project
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cc. Eva Paul, Water Resources Officer, INAC

Appendix A: Water Quality Monitoring Program Results

Water quality samples were not collected for facilities that have not yet been constructed (ST-3, ST-11 and ST-13) or for facilities where no discharge occurred during the month (ST-1, ST-2, ST-4, ST-5, ST-6a, ST-6b, ST-9 and TL-1 through TL-12). No runoff from facilities occurred, therefore no samples were collected under monitoring station ST-10 (Part D Item 18).

Table 6. Water Intake Facilities, Doris Lake (ST7) and Windy Lake (ST7a), December 2016

		Sample ID	ST7-20DEC16	ST7A-06DEC16
		ALS ID	L1872232-1	L1866791-1
		Date Sampled	12/20/2016 7:30	06/12/2016 8:15
Parameter	**Units**	**Detection Limit**	**Water**	**Water**
Hardness (as CaCO3)	mg/L	0.5	49	78.4
pH	pH	0.1	7.45	7.99
Total Suspended Solids	mg/L	3	3.2	<3.0
Ammonia, Total (as N)	mg/L	0.005	0.0367	0.0061
Nitrate (as N)	mg/L	0.005	<0.0050	<0.0050
Nitrite (as N)	mg/L	0.001	<0.0010	<0.0010
Orthophosphate-Dissolved (as P)	mg/L	0.001	<0.0010	<0.0010
Phosphorus (P)-Total	mg/L	0.002	0.0207	0.0022
Cyanide, Total	mg/L	0.005	<0.0050	<0.0050
Cyanide, Free	mg/L	0.005	<0.0050	<0.0050
MPN-Fecal Coliform [1]	MPN/100mL	1	<1	<1*
Aluminum (Al)-Total	mg/L	0.005	0.0314	0.0181
Antimony (Sb)-Total	mg/L	0.0005	<0.00050	<0.00050
Arsenic (As)-Total	mg/L	0.0005	<0.00050	<0.00050
Barium (Ba)-Total	mg/L	0.02	<0.020	<0.020
Beryllium (Be)-Total	mg/L	0.001	<0.0010	<0.0010
Boron (B)-Total	mg/L	0.1	<0.10	<0.10
Cadmium (Cd)-Total	mg/L	0.000005	<0.0000050	0.0000078
Calcium (Ca)-Total	mg/L	0.1	8.65	13.2
Chromium (Cr)-Total	mg/L	0.001	<0.0010	<0.0010
Cobalt (Co)-Total	mg/L	0.0003	<0.00030	<0.00030
Copper (Cu)-Total	mg/L	0.001	0.0018	0.0012
Iron (Fe)-Total	mg/L	0.03	0.066	0.048
Lead (Pb)-Total	mg/L	0.0005	0.00258	<0.00050
Lithium (Li)-Total	mg/L	0.001	0.0036	0.0034
Magnesium (Mg)-Total	mg/L	0.1	6.65	11.0
Manganese (Mn)-Total	mg/L	0.0003	0.00523	0.00134
Mercury (Hg)-Total	mg/L	0.000005	0.0000077	<0.0000050
Molybdenum (Mo)-Total	mg/L	0.001	<0.0010	<0.0010
Nickel (Ni)-Total	mg/L	0.001	<0.0010	<0.0010
Potassium (K)-Total	mg/L	2	2.1	4.1
Selenium (Se)-Total	mg/L	0.00005	0.000052	<0.000050
Silver (Ag)-Total	mg/L	0.00002	<0.000020	<0.000020
Sodium (Na)-Total	mg/L	2	30.2	57.9
Thallium (Tl)-Total	mg/L	0.0002	<0.00020	<0.00020
Tin (Sn)-Total	mg/L	0.0005	<0.00050	<0.00050
Titanium (Ti)-Total	mg/L	0.01	<0.010	<0.010
Uranium (U)-Total	mg/L	0.0002	<0.00020	<0.00020
Vanadium (V)-Total	mg/L	0.0005	<0.00050	<0.00050
Zinc (Zn)-Total	mg/L	0.005	0.0128	<0.0050
Biochemical Oxygen Demand	mg/L	2	3	<2.0
Oil and Grease	mg/L	5	<5.0	<5.0
Oil And Grease (Visible Sheen)		n/a	No	No

* Results on Lab Work Order L1851835-1 for Potable Water Station PDC10 (same location as ST-7a)

[1] Analytical methodology used by laboratory to determine Fecal coliform concentrations has changed. Results now presented as Most Probable Number per 100mL (MPN/100mL).

Table 7. Wastewater Treatment Plant (ST-8a, ST-8b), December 2016

		Sample ID	ST8A-13DEC16	ST8B-13DEC16	Part G Item 3(b)
		ALS ID	L1869474-1	L1869474-2	Maximum Average Concentration (mg/L)
		Date Sampled	13/12/2016 8:00	13/12/2016 8:05	
Parameter	Units	Detection Limit	Water	Water	
Biochemical Oxygen Demand (BOD5)	mg/L	2	2.0	<2.0	80
Fecal Coliforms [1]	MPN/100mL	1	<1	<1	10,000
Oil and Grease	mg/L	5	<5.0	<5.0	5
Oil And Grease (Visible Sheen)			NO	NO	No Visible Sheen
pH	pH units	0.1	7.55	7.46	6-9
Total Suspended Solids	mg/L	3	<3.0	<3.0	100

Bold/shading indicates exceedance of Part G Item 3(b) Maximum Allowable Concentration. No exceedances observed.

[1] Analytical methodology used by laboratory to determine Fecal coliform concentrations has changed. Results now presented as Most Probable Number per 100mL (MPN/100mL).

Table 8. Doris Lake Water Level (ST-12), December 2016

Minimum Water Level (masl)	Maximum Water Level (masl)	Mean Water Level (masl)	Water Level Change (masl)	Low Action Level Trigger (masl)
21.787	21.807	21.801	0.020	21.425

* Low action level trigger is relative to the average water level value (September 10-30, 2016) 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.

Appendix B: Disposal of Tailings and Cyanide Leach Residue

Table 9. Volumes of Tailings and Cyanide Leach Residue Disposal

Date	Dry Tailings Placed in TIA* (tonnes)	Dry Cyanide Leach Tailings Placed Underground* (tonnes)
Dec-01	0	0
Dec-02	0	0
Dec-03	0	0
Dec-04	0	0
Dec-05	0	0
Dec-06	0	0
Dec-07	0	0
Dec-08	0	0
Dec-09	0	0
Dec-10	0	0
Dec-11	0	0
Dec-12	0	0
Dec-13	0	0
Dec-14	0	0
Dec-15	0	0
Dec-16	0	0
Dec-17	0	0
Dec-18	0	0
Dec-19	0	0
Dec-20	0	0
Dec-21	0	0
Dec-22	0	0
Dec-23	0	0
Dec-24	0	0
Dec-25	0	0
Dec-26	0	0
Dec-27	0	0
Dec-28	0	0
Dec-29	0	0
Dec-30	0	0
Dec-31	0	0
Total	**0**	**0**

* As per Part J Item 12(a, b)

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