MELIADINE GOLD PROJECT

MONTHLY ENVIRONMENTAL REPORT: MARCH 2012

PRESENTED TO THE NUNAVUT WATER BOARD

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This monthly report is delivered under water license 2BB-MEL0914, PART J, items 13.

1. The Licensee shall maintain Monitoring Stations at the following locations:

Table 1: Monitoring stations

Monitoring Program Station Number	**Description**	**Status**
MEL-1	Raw water supply intake at Meliadine Lake	Active (volume cubic metres)
MEL-2	Raw water supply intake at Pump Lake	Active (volume cubic metres)
MEL-3	Immediately downstream of old grey water sump prior to effluent entering wetland area, when flow observed	Active
MEL-3a	Immediately downstream of upgraded sump prior to the effluent entering upgraded wetland area, when flow is observed	Active
MEL-4	At a point immediately upstream of the discharge from the wetland area / upgraded wetland area to Meliadine Lake	Active
MEL-5	Point of discharge for the Bermed Fuel Containment Facilities	Active
MEL-6	Point of discharge for the contaminated soil storage	Active
MEL-7	Final effluent discharge from the BIODISK treatment system	Active

2. The Licensee shall measure and record, in cubic metres, the daily quantities of water utilized for camp, drilling and other purposes from all sources.

The consumption of fresh water for the site was **198.9 m^3 /day** for the month of March 2012

3. ***The Licensee shall provide the GPS co-ordinates of all locations where sources of water are utilized for all purposes.*** *In UTM nad 1983*

- Camp water source: East 541943,0 ; North 6989174,0

Table 2: Drilling sources of water

East	North
538065.23	6989462.8
538244.67	6988242.6
538477.94	6988072.14
539994.2	6987596.62
539931.39	6987488.96
540379.99	6987444.11
540640.18	6987210.83
541017	6987336.44
540263.36	6987058.3
542201.3	6986295.69
540039.06	6987255.69

4. ***Licensee shall sample at Monitoring Program Station MEL-3, MEL-3a, MEL-4 and MEL-7, monthly during Sewage treatment, effluent discharge and during periods of flow at the point of entry into Meliadine Lake. Samples shall be analyzed for the following parameters:***

Biochemical Oxygen Demand – BOD_5
Total Suspended Solids
Oil and Grease (and visual)
Fecal Coliforms
pH

- Here are the MEL-7 results for March. To improve the water system treatment plan, many actions were taken. An inspection by a consultant firm was done and many targets of improvement were defined.

Table 3 MEL-7 results

Station STP Out (MEL 7)		March		
Parameters	**Limits**	**06/03/2012**	**15/03/2012**	**29/03/2012**
Ammonia as N		47.3	72.8	103.0
Biochemical Oxygen Demand	80	<6.0	215	11.4
Heterotrophic Plate Count		30.0	>3000	>3000
Nitrate-N		11.7	3.1	16.2
Nitrate and Nitrite as N		<0.050	3.14	18.00
Nitrite-N		x	<0.050	1.8
Oil & Grease-(IR)	5	<1.0	1.5	<2.0
Phosphorus (P)-Total		3.5	22.0	4.1
TKN		x	x	x
Total Suspended Solids	100	98.0	1460	82.0
Trasmitance				
pH	6.5-9	5.9	7.6	7.9
Fecal Coliforms	1000	<3	>110000	230.0
Total Coliforms		<3	>110000	430.0

Here are some of the recommendations did by the consultant to improve our system. We are working on that.

- ***Improve monitoring to keep an historical of interventions.***
- ***Develop an influent characterization program***
  - ***Suggested frequency : 1 time/month***
  - ***Suggested parameters : BOD_5 , COD, TSS, Ptot, TKN, NH_3,FOG***
  - ***Sampling point : EQT outlet or biodisks inlet***
- ***Improve control regarding the management and the use of household cleaning products used by the maintenance staff (awareness, concentration, toxicity, etc.) that can be discharged into the wastewaters collection system;***
- ***Review the procedure for evacuating floating from the kitchen's grease trap. The current tools to collect floating seem unsuitable and difficult to handle. A thinner and lighter screened tool would be more appropriate.***
- ***Maintain the STP's supply rate as constant as possible by avoiding prolonged operation of the influent pumps that may cause a decrease in the system performance (punctual hydraulic overload), mainly in final clarifier and UV disinfection unit. Several short pumping cycles over a day are better than a fewextended cycles.***
- ***Provide a portable turbidimeter for daily monitoring of the effluent quality (see specifications of the proposed equipment in appendix B). Turbidity provides rapid estimation of TSS at the effluent;***
- ***Provide a sludge blanket detector to facilitate and improve the accuracy of accumulated sludge monitoring ;***

- ***Monitor the sludge level in tanks on a weekly basis. This frequency may be revised according to the rate of accumulation observed in the coming months;***
- ***Perform withdrawal of sludge from primary tank at a predetermined fixed frequency (monthly). A sludge volume of 1 m^3/month can be retained as an initial quantity to pump out but will be revised according future measurements and observations. Experience shows that system performance will be enhanced and overall works operation improved by maintaining volume of sludge to an acceptable level in the tanks (≤ 1 m);***
- ***Monitor of sludge blanket at different locations in the new primary tank should be performed after withdrawal to ensure the effectiveness of the operation;***
- ***Given that the system configuration for withdrawing sludge from the LJ-2 primary tank should allow a more efficient and easy withdrawal of sludge than the LJ-1, it is recommended to pump out sludge from the LJ-1 final clarifier towards the LJ-2 primary tank;***
- ***Install a baffle at the inlet of LJ-2 final clarifier to reduce the risk of shorting to the tank's outlet A modification to prevent floating of being carried out to the effluent has already been conducted as part of our intervention.***
- ***Recirculation of the effluent from the biodisk 3rd stage directly to the first stage should be considered. The purpose of this recirculation is to foster a better spreading of the load on the supporting medium, especially when low flow and high concentration; which is currently the case. It also allows extra oxygen in the first stage. The biomass recirculation is currently directed to the entrance of the primary tank, where detention time longer than 24 hours in an anaerobic environment is highly prejudicial to the bacterial flora;***
- ***It is recommended to install a pipe (gravity) between the LJ-2 effluent towards the LJ-1 influent, which would allow operating the two (2) units in serial mode;***
- ***It would be desirable to add an additional opening access above the LJ-2 biodisk (between the two existing) to facilitate observation and measurement of the sludge blanket in the primary tank;***
- ***If the lubrication of biodisk's bearings is required, make sure they're accessible;***

5. ***The Licensee shall, prior to the release of effluent from the Bermed Fuel Containment Facilities at Monitoring Program Station MEL-5 and the contaminated soil storage at MEL-6 for the purpose of demonstrating compliance, sample for the parameters listed under Part D, item 17.***

    - No effluent release in March.

6. The Licensee shall obtain representative samples of the water column below any ice where required under part F, item 7. Monitoring shall include but not limited to the following:

Total Suspended Solids
pH
Electrical Conductivity, and
Total trace Metals as determined by a standard ICP Scan (to include at a minimum, the following elements: Al, Sb, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Mo, Ni, Se, Sn, Sr, Tl, Ti, U, V, Zn), and Trace Arsenic and Mercury.

Here are the analysis results of the samples taken in March.

Table 4: Pump lake results

Parameters	Unit	Limits	Pump Lake (A8) P7 (mid) 03/03/2012	Pump Lake (A8) P7 (mid) 10/03/2012	Pump Lake (A8) P7 (mid) 31/03/2012
Chloride	mg/L		96.3	103	128
Conductivity	umhos/cm		531	575	694
Hardness (as CaCO3)	mg/L		230	258	297
Mercury (Hg)-Total	mg/L	0.000026	<0.000050	<0.000050	<0.000050
Sodium Adsorption Ratio					0.52
Sulfate					17.4
TDS (Calculated from EC)	mg/L				451
Total Suspended Solids	mg/L	10	<5.0	<5.0	13
pH	pH units	6.5-9.0	7.43	7.15	7.1
Aluminum (Al)-Total	mg/L	0.1	<0.0050	0.0097	<0.0050
Antimony (Sb)-Total	mg/L		<0.00020	<0.00020	<0.00020
Arsenic (As)-Total	mg/L	0.005	0.00218	0.00228	0.0021
Barium (Ba)-Total	mg/L		0.0751	0.0828	0.0925
Beryllium (Be)-Total	mg/L		<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Total	mg/L		<0.00020	<0.00020	<0.00020
Boron (B)-Total	mg/L	1.5	<0.010	<0.010	0.011
Cadmium (Cd)-Total	mg/L	Hardness dependent	0.000182	0.000037	0.000026
Calcium (Ca)-Total	mg/L		76.8	83.7	95
Cesium (Cs)-Total	mg/L		<0.00010	<0.00010	<0.00010
Chromium (Cr)-Total	mg/L		<0.0010	<0.0010	<0.0010
Cobalt (Co)-Total	mg/L		<0.00020	<0.00020	<0.00020
Copper (Cu)-Total	mg/L	Hardness dependent	0.0018	0.00187	0.00272
Iron (Fe)-Total	mg/L	0.3	0.2	0.17	0.16
Lead (Pb)-Total	mg/L	Hardness dependent	0.000198	0.0001	0.00145
Lithium (Li)-Total	mg/L		0.0228	0.0197	0.0304
Magnesium (Mg)-Total	mg/L		9.29	11.9	14.4
Manganese (Mn)-Total	mg/L		0.0418	0.0563	0.0462
Molybdenum (Mo)-Total	mg/L		0.00023	0.00027	0.00033
Nickel (Ni)-Total	mg/L	Hardness dependent	<0.0020	0.0028	0.0029
Phosphorus (P)-Total	mg/L		<0.20	<0.20	<0.20
Potassium (K)-Total	mg/L		3.98	4.28	5.2
Rubidium (Rb)-Total	mg/L		0.00422	0.00403	0.00536
Selenium (Se)-Total	mg/L	0.001	0.0073	0.0018	<0.0010
Silicon (Si)-Total	mg/L		2.94	3.57	3.76
Silver (Ag)-Total	mg/L	0.0001	<0.00010	<0.00010	<0.00010
Sodium (Na)-Total	mg/L		13.7	16.8	20.5
Strontium (Sr)-Total	mg/L		0.435	0.452	0.562
Tellurium (Te)-Total	mg/L		<0.00020	<0.00020	<0.00020
Thallium (Tl)-Total	mg/L	0.0008	<0.00010	<0.00010	<0.00010
Thorium (Th)-Total	mg/L		<0.00010	<0.00010	<0.00010
Tin (Sn)-Total	mg/L		<0.00020	<0.00020	<0.00020
Titanium (Ti)-Total	mg/L		0.00029	0.0007	0.0006
Tungsten (W)-Total	mg/L		<0.0010	<0.0010	<0.0010
Uranium (U)-Total	mg/L	0.015	<0.00010	<0.00010	<0.00010
Vanadium (V)-Total	mg/L		<0.00020	<0.00020	<0.00020
Zinc (Zn)-Total	mg/L	0.03	0.0212	0.0073	0.0065
Zirconium (Zr)-Total	mg/L		<0.00040	<0.00040	<0.00040
Oil/Grease-(IR)	mg/L		<1.0	<1.0	

Table 5: Bud lake results

Parameters	Unit	Limits	2012-BUD-03 (initial) 07/03/2012	2012-BUD-03 (mid) 31/03/2012
Chloride	mg/L		66.3	79.6
Conductivity	umhos/cm		427	504
Hardness (as CaCO3)	mg/L		201	198
Mercury (Hg)-Total	mg/L	0.000026	<0.000050	<0.000050
Oil & Grease-(IR)	mg/L		<1.0	
Sodium Adsorption Ratio				0.48
Sulfate	mg/L			14.1
TDS (Calculated from EC)	mg/L			327
Total Suspended Solids	mg/L	10	11	<5.0
pH	pH units	6.5-9.0	7	6.97
Aluminum (Al)-Total	mg/L	0.1	0.0051	0.0057
Antimony (Sb)-Total	mg/L		<0.00020	<0.00020
Arsenic (As)-Total	mg/L	0.005	0.00156	0.00135
Barium (Ba)-Total	mg/L		0.0698	0.0849
Beryllium (Be)-Total	mg/L		0.0002	<0.00020
Bismuth (Bi)-Total	mg/L		<0.00020	<0.00020
Boron (B)-Total	mg/L	1.5	<0.010	<0.010
Cadmium (Cd)-Total	mg/L	Hardness dependent	0.000035	0.000043
Calcium (Ca)-Total	mg/L		67	64
Cesium (Cs)-Total	mg/L		<0.00010	<0.00010
Chromium (Cr)-Total	mg/L		<0.0010	<0.0010
Cobalt (Co)-Total	mg/L		0.00025	0.00042
Copper (Cu)-Total	mg/L	Hardness dependent	0.0017	0.00214
Iron (Fe)-Total	mg/L	0.3	0.2	0.32
Lead (Pb)-Total	mg/L	Hardness dependent	<0.000090	0.000204
Lithium (Li)-Total	mg/L		0.0169	0.0222
Magnesium (Mg)-Total	mg/L		8.16	9.34
Manganese (Mn)-Total	mg/L		0.323	0.452
Molybdenum (Mo)-Total	mg/L		<0.00020	0.00026
Nickel (Ni)-Total	mg/L	Hardness dependent	0.0027	0.0026
Phosphorus (P)-Total	mg/L		<0.20	<0.20
Potassium (K)-Total	mg/L		3.43	3.68
Rubidium (Rb)-Total	mg/L		0.00332	0.00429
Selenium (Se)-Total	mg/L	0.001	0.0016	<0.0010
Silicon (Si)-Total	mg/L		2.41	2.07
Silver (Ag)-Total	mg/L	0.0001	<0.00010	<0.00010
Sodium (Na)-Total	mg/L		14.6	15.4
Strontium (Sr)-Total	mg/L		0.335	0.465
Tellurium (Te)-Total	mg/L		<0.00020	<0.00020
Thallium (Tl)-Total	mg/L	0.0008	<0.00010	<0.00010
Thorium (Th)-Total	mg/L		<0.00010	<0.00010
Tin (Sn)-Total	mg/L		<0.00020	<0.00020
Titanium (Ti)-Total	mg/L		0.00042	0.00047
Tungsten (W)-Total	mg/L		<0.0010	<0.0010
Uranium (U)-Total	mg/L	0.015	<0.00010	<0.00010
Vanadium (V)-Total	mg/L		<0.00020	<0.00020
Zinc (Zn)-Total	mg/L	0.03	0.0063	0.0081
Zirconium (Zr)-Total	mg/L		<0.00040	<0.00040

Table 6: Woody lake results

Parameters	Unit	Limits	2012-Woody-04 (initial) 07/03/2012	2012-Woody-04 (Mid) 31/03/2012
Chloride	mg/L		86.9	95.2
Conductivity	umhos/cm		506	523
Hardness (as CaCO3)	mg/L		216	219
Mercury (Hg)-Total	mg/L	0.000026	<0.000050	<0.000050
Oil & Grease-(IR)	mg/L		<1.0	
Sodium Adsorption Ratio				0.37
Sulfate	mg/L			12.2
TDS (Calculated from EC)	mg/L			340
Total Suspended Solids	mg/L	10	<5.0	<5.0
pH	pH units	6.5-9.0	7.03	6.97
Aluminum (Al)-Total	mg/L	0.1	<0.0050	0.0057
Antimony (Sb)-Total	mg/L		<0.00020	<0.00020
Arsenic (As)-Total	mg/L	0.005	0.00173	0.0014
Barium (Ba)-Total	mg/L		0.0761	0.0761
Beryllium (Be)-Total	mg/L		<0.00020	<0.00020
Bismuth (Bi)-Total	mg/L		<0.00020	<0.00020
Boron (B)-Total	mg/L	1.5	<0.010	<0.010
Cadmium (Cd)-Total	mg/L	Hardness dependent	0.000048	0.000048
Calcium (Ca)-Total	mg/L		74.3	74
Cesium (Cs)-Total	mg/L		<0.00010	<0.00010
Chromium (Cr)-Total	mg/L		0.0013	<0.0010
Cobalt (Co)-Total	mg/L		<0.00020	0.00029
Copper (Cu)-Total	mg/L	Hardness dependent	0.00188	0.00162
Iron (Fe)-Total	mg/L	0.3	0.18	0.21
Lead (Pb)-Total	mg/L	Hardness dependent	0.000102	0.000147
Lithium (Li)-Total	mg/L		0.0233	0.027
Magnesium (Mg)-Total	mg/L		7.5	8.22
Manganese (Mn)-Total	mg/L		0.0628	0.115
Molybdenum (Mo)-Total	mg/L		0.00023	0.00022
Nickel (Ni)-Total	mg/L	Hardness dependent	0.0032	0.003
Phosphorus (P)-Total	mg/L		<0.20	<0.20
Potassium (K)-Total	mg/L		3.87	4.11
Rubidium (Rb)-Total	mg/L		0.00368	0.00391
Selenium (Se)-Total	mg/L	0.001	0.0023	<0.0010
Silicon (Si)-Total	mg/L		2.66	2.47
Silver (Ag)-Total	mg/L	0.0001	<0.00010	<0.00010
Sodium (Na)-Total	mg/L		12.2	12.5
Strontium (Sr)-Total	mg/L		0.47	0.56
Tellurium (Te)-Total	mg/L		<0.00020	<0.00020
Thallium (Tl)-Total	mg/L	0.0008	<0.00010	<0.00010
Thorium (Th)-Total	mg/L		<0.00010	<0.00010
Tin (Sn)-Total	mg/L		<0.00020	<0.00020
Titanium (Ti)-Total	mg/L		0.00056	0.0426
Tungsten (W)-Total	mg/L		<0.0010	<0.0010
Uranium (U)-Total	mg/L	0.015	<0.00010	<0.00010
Vanadium (V)-Total	mg/L		0.00027	<0.00020
Zinc (Zn)-Total	mg/L	0.03	0.008	<0.0020
Zirconium (Zr)-Total	mg/L		<0.00040	<0.00040