Richard Dwyer

From:	Jim Millard [Jim.Millard@Baffinland.com]
Sent:	Sunday, May 29, 2011 9:18 AM
To:	Ian.Rumbolt@inac-ainc.gc.ca
Cc:	'Salamonie Shoo'; 'David Hohnstein'; Richard Dwyer
Subject:	Discharge of snow melt and stormwater from lined storage facilities at Milne Inlet Camp - Notification
Attachments:	11 05 29 MI OWS Ops Plan.pdf

Good Day Ian,

In accordance with Part D, Section 10 of our Water Licence 2BB-MRY1114, we are notifying you of our intention to commence discharge of stormwater from the lined storage facilities at Milne Inlet Camp, specifically, the Milne Inlet Bulk Fuel Storage Facility (MRY-7). The treatment system to be utilized this year is similar to previous years, with some minor changes to piping, pumps, and additional filtration media to make the system more robust. Discharge from the lined storage facilities will be to the MRY-7 discharge ditch that reports to Milne Inlet, all in accordance with or current Site Water Management and Comprehensive Environmental Monitoring Plans. The attached memo describes the system to be used as well as the sampling and planned analytical programs to support this work.

The high intensity pre-discharge, process, and final effluent sampling that is planned and presented in the attached memo significantly exceeds the requirements of the water licence and will therefore result in a high level of protection for the receiving environment.

Please let me know if you have any questions or comments.

Kind regards,

Jim Millard, M.Sc., P.Geo.
Senior Environmental Superintendent
Mary River Project
Baffinland Iron Mines Corporation
work site tel 403-450-8843

Technical Memorandum

To:	Jim Millard, Baffinland Iron Mines	Project:	TR1111015
From:	Jered Munro, AMEC Dave Ellis, AMEC Matthew Kerwin, AMEC		
Tel:	519-650-7100		
Fax:	519-653-6554		
Date:	May 29, 2011		

Subject: 2011 Operations Support
Milne Inlet OWS Treatment and Discharge Assistance

During the spring of 2010, AMEC was retained by Baffinland Iron Mines (Baffinland) to review and provide recommendations for system enhancements of the Milne Inlet oily water treatment system at the Milne Inlet location. In previous years (2008 and 2009), the existing treatment system was overloaded by the degree of contamination in the stormwater. The system enhancements for the oily water treatment system were subsequently implemented in 2010 and allowed for the discharge of around 1,800 m^3 of high quality effluent. The system enhancements implemented in 2010 provided additional pretreatment upstream of the existing treatment system.

During late 2010 and early 2011, AMEC was once again retained by Baffinland to review the treatment system and provide recommendations for enhancements during the 2011 operating season, based on experience during 2010. The recommended enhancements provided in 2011 were minor in nature and included minor changes related to pumping and piping configuration and the installation of additional filtering capacity.

This technical memorandum identifies the design criteria, oily water treatment system components and functionality, sampling and performance monitoring.

DESIGN CRITERIA

Since 2007, the design criteria required for the effluent from the Milne Inlet Bulk Fuel Storage Facility has been defined by the Nunavut Water Board License (currently licence 2BB-MRY1114 under Part D, Item 20, dated April 5, 2011). The discharge criteria and design influent concentration of stormwater from the fuel facility are presented in Table 1, below.

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Table 1

Parameter	Maximum Concentration of Any Grab Sample (µg/L)	Design Influent Concentration
Benzene	370	Influent below regulatory limit
Toluene	2	15 to 225
Ethylbenzene	90	10 to 160
Lead	1	Influent not Tested
Oil & Grease	15,000 and no visible sheen	200,000

The system is designed for a maximum flow rate of 30 US GPM, with 24/7 operation and a maximum treatable volume of 3,500,000 liters per season. Compliant water is discharged at the MRY-7 location identified in the site water license. An energy dissipater is installed at the discharge location to prevent surface erosion.

OILY WATER SYSTEM UNIT PROCESSES

The oily water system (OWS) removes hydrocarbon and particulate contaminants from the stormwater contained within the Milne Inlet bulk fuel storage containment area. The process flow diagram, PFD-01, at the end of this section contains the layout of the treatment system identified in the following process descriptions. The conceptual basis of the stormwater treatment system does not vary from previous years. The system does not consist of permanent plant infrastructure, but is mobile, in the sense that it is reassembled and commissioned each year at a select location adjacent to the fuel storage facility, and then disassembled and stored at the end of the open water season.

The Milne Inlet OWS contains the following unit processes:

Influent Pump

Annual precipitation is collected in the Milne containment berm and stored for seasonal treatment during the summer months. There are 25 flexible polymeric bladders which have been used to store water collected late in the season until treatment is available during the following discharge season. The water contained within the berm is pumped to the OWS using a 2” submersible pump. The water contained within the temporary storage bladders is forwarded using a 2” air diaphragm pump.

Oil Water Separator

The oil water separator component of the treatment system is a hydrocarbon separation sequence whereby free product is floated to the surface and manually skimmed and captured in a residual tank. The separator consists of four baffled chambers which decrease the velocity. This slows the movement of water and allows for the separation and removal of free product. Free product skimmed from the centre chamber is manually collected via an overflow weir and discharged to a collection tank before being sent to a storage bladder as contaminated raw product to be recycled and used for suitable applications. Discharge water from the system is then sent to a smaller wet well before being pumped into the dissolved air flotation system.

Dissolved Air Floatation

Dissolved air floatation is the second step in the removal of free product which targets smaller droplets of oil and grease. The dissolved air floatation (DAF) system uses a recirculation method whereby air is dissolved into the recirculation stream and released into the water column via depressurization at the tank inlet. This depressurization causes the saturated air to be released from the liquid as micro sized bubbles that attach to the free phase oil and grease. The increased particle size and buoyancy causes the particles to float to the where they are manually skimmed from the surface. The DAF system is manually skimmed using a rigid piece of floatable material (Styrofoam or rigid insulation). The skimmed, oil-rich foam material is sent from the residual hopper via gravity to a collection tank and finally to storage bladders until further treatment can be performed or it is shipped offsite for disposal. Treated water from the DAF system is allowed to flow via gravity to the nano-filtration feed tank. The outlet for the DAF system is an external steel casing with solid PVC piping that controls the tank level of both the DAF system and the nano-filtration feed tank.

Nano-Filtration Feed Tank

The nano-filtration feed tank is designed to ensure that a consistent supply of water is maintained for the modular nano-filtration skids. This tank has been designed to supply water via gravity to the lower berm where the removal of emulsified oils will take place. The nano-filtration feed tank is supplied by two sources of water. The first is the gravity supply from the DAF system. The second is the residual product produced by the modular nano-filtration skids. A small submersible pump is contained within the tank to control the water quality within the NF feed tank. The reject water is combined with the DAF float as residual for further treatment or offsite disposal.

Nano-Filtration Treatment

Three modular nano-filtration skids have been designed and installed to remove emulsified oil and grease from the treated DAF water. Each skid contains 8 fine pore, spiral wound membrane cartridges, designed to produce 10 USGPM of treated water. The total treated effluent produced by the membranes is estimated at 30 USgpm.

Absorbent Clay Media

Absorbent clay media barrels have been incorporated into the system for removal of residual hydrocarbons. The treatment vessels contain PM100 media which is a proprietary blend of activated carbon and clay media specifically designed for hydrocarbon removal. The system contains four vessels in parallel and two in series, which act as a polishing filter for the treated effluent from the nanofiltration process.

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Granular Activated Carbon Media

Granular activated carbon (GAC) is the final treatment process in the system. It is designed to act as a final polishing stage for light end hydrocarbons (benzene, toluene, ethylbenzene). The GAC system contains four treatment vessels in parallel and three barrels in series.

A process flow diagram for the oily water system has been included on the following page.

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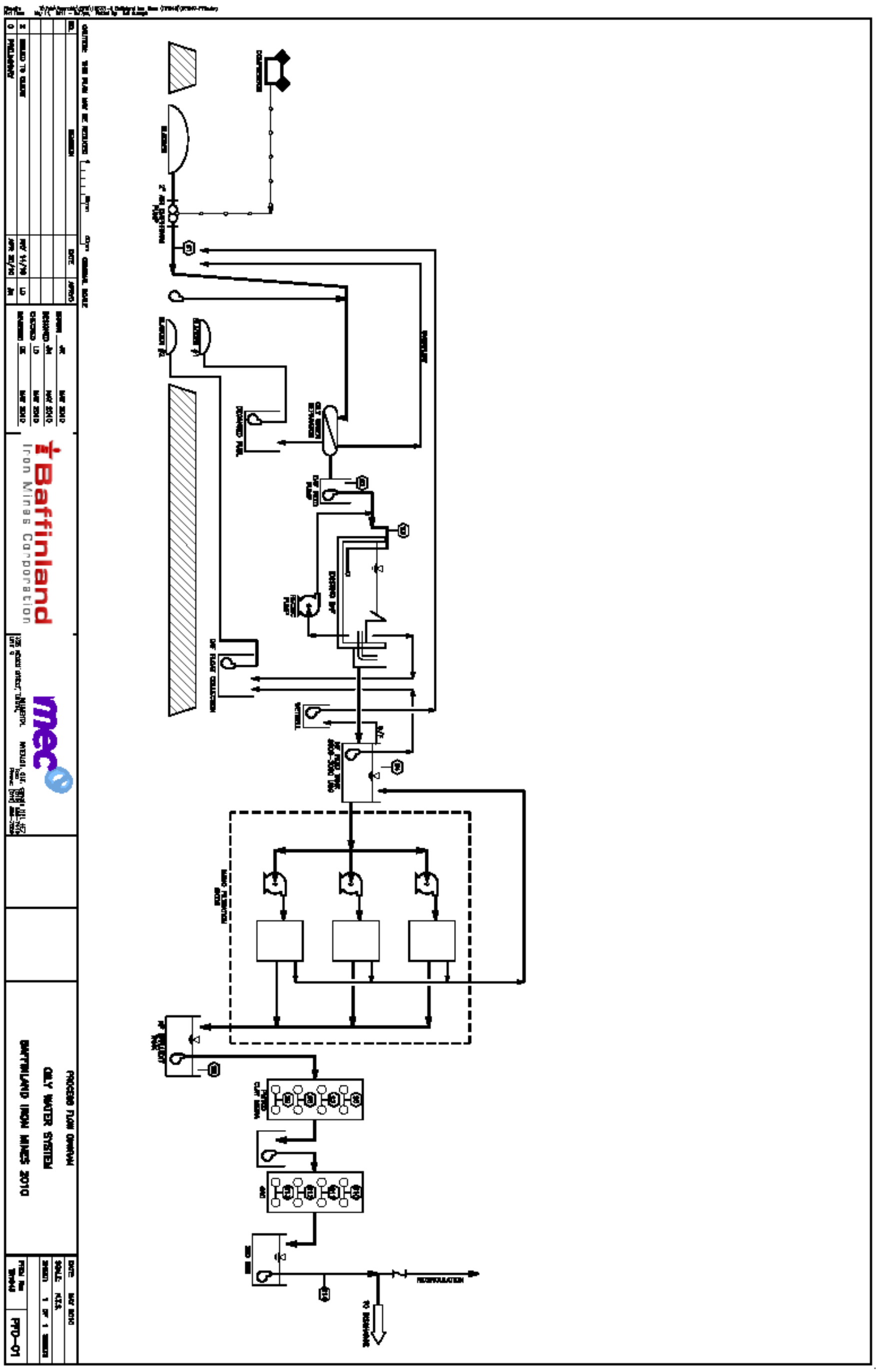
PFD 01 – Milne Inlet Oily Water System.



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SAMPLING AND PERFORMANCE MONITORING

Performance monitoring on the Milne Inlet OWS is composed of validation testing and operation testing. The sample testing points for the system are summarized in Table 2, below.

Table 2 – Milne Inlet OWS sample point locations.

Sampling Points	Description
S1	Inlet to system
S2	O/W Exit - Equalization Tank
S3	DAF Re-Circ at DAF Feed
S4	N/F Feed Tank
S5	N/F Effluent Tank
S6	Exit Clay Train 1 Drum 1
S7	Exit Clay Train 2 Drum 1
S8	Exit Clay Train 3 Drum 1
S9	Exit Clay Train 4 Drum 1
S10	Exit GAC Train 1 Drum 1
S11	Exit GAC Train 2 Drum 1
S12	Exit GAC Train 3 Drum 1
S13	Exit GAC Train 4 Drum 1
S14	Final Discharge

Validation Testing

Validation testing will take place once the system is fully assembled and operational. Validation testing will involve collecting samples from points (S2), (S3), (S4), (S5), and (S14) at four hour intervals for a single 12-hour shift. Sample point (S1) is excluded due to the large amount of variance that is expected before the oil/water separator.

During validation the system will be running in a continuous loop, with discharge back into the containment berm and not to the environment. The samples collected at each location will be analyzed on-site. In addition, these samples will be initially sent to an external laboratory for testing and correlation with the on-site laboratory testing. The final discharge effluent will be sent to an external laboratory for analyses.

Based on the results of the above field and laboratory sampling and analytical program, the operating procedures and action levels for halting discharge will be set.

Full operation with discharge to the natural environment will commence after the analytical results from the external laboratory indicate the system is performing to below the requirements set out in the water license (see Table 1 - Design Criteria).

Operation Process and Final Effluent Sampling and Analyses

Testing will continue daily when the system is operating to ensure performance of the process units and compliance with the water license. Samples will be collected and analyzed at the site for real-time process control purposes, while all compliance samples will be collected and submitted for analyses to an external laboratory.

Samples will be collected from the final effluent (S14) and analyzed both in the field and sent for analyses to an external laboratory. The sampling frequency for external laboratory analyses of final effluent (S14) will be based on flow rate and will correspond to one sample collected per 100,000 L treated and discharged.

Additional process control samples will be collected and testing in the field once per shift for points (S2) through (S5). Samples from the inlet (S1) will be taken three times per location, near the beginning, middle, and end of treatment, and manually composited together. Sample points (S6) through (S13) will be tested once per week.

The results from the field-analyzed samples will be compared to the external laboratory results when they become available to confirm the action levels determined during validation to ensure compliance with the water license. A summary of the proposed operational testing can be found in Table 3, below.

Table 3 – Milne Inlet OWS operational testing summary.

Sampling Schedule	Sampling Points	Description	Times per Shift	Day Shift	Night Shift	Day of Week
As Needed	S1	Inlet to system		x	x	Variable
Shift	S2	O/W Exit - Equalization Tank	x1	x	x	All
	S3	DAF Re-Circ at DAF Feed	x1	x	x	All
	S4	N/F Feed Tank	x1	x	x	All
	S5	N/F Effluent Tank	x1	x	x	All
Weekly	S6	Exit Clay Train 1 Drum 1	x1	x		Monday
	S7	Exit Clay Train 2 Drum 1	x1	x		Monday
	S8	Exit Clay Train 3 Drum 1	x1	x		Monday
	S9	Exit Clay Train 4 Drum 1	x1	x		Monday
	S10	Exit GAC Train 1 Drum 1	x1		x	Monday
	S11	Exit GAC Train 2 Drum 1	x1		x	Monday
	S12	Exit GAC Train 3 Drum 1	x1		x	Monday
	S13	Exit GAC Train 4 Drum 1	x1		x	Monday
4-Hour	S14	Final Discharge	x3	x	x	All

Note: Minor adjustments to field testing schedule will be made in accordance with encountered field conditions and ongoing collected data. The sampling frequency for external laboratory analyses of final effluent (S14) will be based on flow rate and will correspond on average to one sample collected per 100,000 L treated and discharged.