February 1st, 2019

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

Re: Agnico Eagle Mines – Whale Tail Project Responses to Arsenic Water Treatment Plan OMM Report Comments

Dear Mr. Dwyer,

As requested, the following responses are intended to address the comments made in the below letter:

- CIRNAC – January 7, 2019, 2AM-WTP1826 OMM Arsenic Water Treatment Plant

Should you have any questions or require further information, please do not hesitate to contact me.

Best regards,

Marie-Pier Marcil

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1 Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)

1.1 Comment 1

Comment 1: AEM prepared this O&M manual in accordance with the "*Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories, 1996,*" which requires that "*the O&M manual must include a description of how facilities are operated and maintained, how often these tasks are performed and who is responsible for their completion.*" CIRNAC notes, however, that the O&M manual contains only a summary of the operational and maintenance procedures but not an adequate instruction on how the facilities will be operated and maintained for the plant operators to follow. For example, with regard to effluent quality control, section 3.4 of the O&M manual states that "*the Operator will conduct regular inspections of the entire operating system to ensure it operates as intended. Any upset condition will be reported immediately by the Operator and corrective actions will be applied accordingly. The Operator will also record process key values that will allow the process to be optimized and any discrepancies between the process and expected performances to be detected.*" It is not clear, for example, how frequent the entire operating system will need to be inspected by the operator; which areas or aspects of the system will be inspected; what will be considered as an upset condition; whom the operator will report to when an upset condition occurs; who will be responsible for carrying out the corrective actions; and what are the process key values to be recorded by the operator.

CIRNAC recommends that the O&M manual be revised to include a step-by-step instruction on the routine operational and maintenance procedures for the plant operators to follow.

Agnico Eagle's Response:

Below is presented the answer of the comments made by CIRNAC. The day-to-day operation check list are presented as well as the monitoring required for a good performance of the As-WTP. Note that the procedures would be optimized during the commissioning phase of the water treatment plant by the supplier. The OMM have been updated to included the requested information.

A/ Monitoring

To ensure efficiency of As-WTP, samples of water must be collected periodically. Table 1 presents sampling schedule to assess that performance comply with operational target values.

Table 1: Monitoring program for operational efficiency assessment

Parameters	Frequency	Aim
Process follow-up		
Flow rate - volume	Daily	Process performance
TSS feed concentration	Daily	Process performance
Feed turbidity	Daily	Process performance
Feed pH	Daily	Process performance
Treated water turbidity and TSS	Daily	Process performance
Treated water pH	Daily	Process performance
Centrifuge cake solid percentage and volume	Daily	Process performance
Actiflo sludge solid percentage and volume	Daily	Process performance
Regulatory follow-up		
Attenuation Pond (feed of As-WTP) – Group 1*	4 time per year	Licence A
Treated water after As-WTP - Volume	Daily	Licence A
Treated water after As-WTP – Field measurement	Weekly	Licence A
Treated water after As-WTP – Group 1	Weekly	Licence A
Treated water after As-WTP – Group 1 MMER**	4 times per year	Licence A
Treated water after As-WTP - Group 3 MMER toxicity (Rainbow Trout and Daphnia magna)	1 before discharge the monthly	Licence A
Treated water after As-WTP - Group 3 Sub-lethal toxicity	2 times per year	Licence A

* Group 1- pH, turbidity, hardness, alkalinity, ammonia nitrogen, total metals (aluminum, arsenic, barium, cadmium, chloride, chromium, copper, fluoride, iron, lead, manganese, mercury, molybdenum, nickel, nitrite, nitrate, selenium, silver, thallium, zinc) sulphate, TDS, TSS.

** Group 1 MMER - Arsenic, copper, lead, nickel, zinc, total suspended solids, pH, effluent volumes and flow rate of discharge

B/ Day-to-day operation

The Table 2 presents the daily operation of the As-WTP that operator should performed.

Every day, the items 1 to 4 should be performed by the operator to ensure an optimal As-WTP operation. Item 5 of the table 2, will be periodically performed according to the supplier recommendations. This preventive maintenance will allow keeping the As-WTP in good conditions.

Table 2: Routine Operation and Maintenance Checkups

Item	Item	Action	Comments
[1] Process parameter	Flow rate	Daily	-
	Flow rate totalizer	Daily	Volume discharge
	TSS feed concentration	Daily	For chemical adjustment
	Feed turbidity	Daily	For chemical adjustment
	Feed pH	Daily	For chemical adjustment
	Treated water turbidity and TSS	Daily	Quality control
	Treated water pH	Daily	Quality control
	Duration of the operation	Daily	-
	Actiflo sludge solid percentage	Daily	Dewatering performance
	Cake solid percentage	Daily	Dewatering performance
	Volume of sludge per day Actiflo	Daily	Dewatering performance
	Volume of cake per day	Daily	Dewatering performance
[2] Chemical	Security and PPI	Daily	Verify/use PPI and security procedure to manipulate chemical
	Coagulant set point	Daily	Chemical consumption
	Polymer anionic set point	Daily	Chemical consumption
	Polymer cationic set point	Daily	Chemical consumption
	Permanganate set point	Daily	Chemical consumption
	Caustic set point	Daily	Chemical consumption
	Microsand concentration	Daily	Chemical consumption – add micro sand if needed
	Coagulant bag used	Daily	Recharge make down system if required

	Polymer anionic bag used	Daily	Recharge make down system if required
	Polymer cationic bag used	Daily	Recharge make down system if required
	Microsand bag used	Daily	Add sand if concentration too low in the Actiflo
	Permanganate bag used	Daily	Recharge make down system if required
[3] Environment	Weather	Daily	-
	Temperature of water	Daily	-
[4] Mechanical	Complete Visual Inspection before Start-Up	Daily	Complete a good inspection before operating. Ensure that no alarms are active on the PLC. Ensure equipment is in good order, with no leaks and all safety devices are in place.
	Complete Inspection after Start-Up	Daily	Complete a good inspection while in operation. Ensure that no strange noises are audible. Make sure auxiliary equipment (valves & level probe) and PLC operate correctly. Look, Listen, Smell, and Feel.
	Water Flow comparison	Daily	Compare flowmeter VS water level
	Pressure	Daily	Feed and discharge line
	Visual Leak On Piping	Daily	Ensure not water leaks are visible on the piping
	Sump Level	Daily	Empty sump if needed
	Pump and centrifuge Speed	Daily	Verify they are at the appropriate value
	Manual Valve at the pump discharge	Daily	Ensure manual valve is fully open at the pump discharge. Valve must be fully open to avoid premature wear.
	Building	Daily	Ensure the wall exhaust fans are operational. Excess of humidity must be evacuated outside.
	PLC functionality - alarm	Daily	No abnormal operation. Solve each alarm
	Centrifuge operation duration	Daily	-

[5] Maintenance	Lamella cleaning	As needed	Clean lamella when As-WTP is off line
	Hydrocyclone wear part replacement	As needed	According to supplier (approx. 1-2 per year)
	Dosing pump calibration	As needed, monthly approx.	Verify set point VS real flow rate
	Metering pumps, Scraper, mixer, Pump, centrifuge maintenance	Periodically, 2 per year approx.	According to supplier recommendations. Grease several time a year (approx. 3 per months). In case of major maintenance or malfunction, the use standby equipment. Critical spare part will be kept in inventory for process which are not redundant.
	Instrumentation calibration	Periodically – monthly approx.	Turbidity meter, pH meter, According to supplier recommendations
	Instrument cleaning	Periodically – monthly approx.	Turbidity meter, pH meter, According to supplier recommendations
	Pumps, Metering pumps, Scraper, mixer, centrifuge oil change	Every 3 months approx.	According to supplier recommendations
	Winterization	If As-WTP need to be shut down for long period of time.	Flush – drain – clean equipment, dosing skid cleaning, instrumentation (leaning, disconnecting and draining if needed), air network to be purged, shut down power.
	Motor bearing	Every year approx.	Change/reaper according to supplier recommendations

C/ Responsibilities

The operator will report immediately to his supervisor any upset parameters, deficiency and maintenance required. The supervisor will be responsible for contacting the appropriate department:

- *Maintenance crew for maintenance*
- *Process team for any process upset*
- *Environment team for any parameters out of the regulated boundary*
- *Health and safety team for related issues.*