

Follow Up Report: #19-346 (formerly #19-345) August 19, 2019 Total Suspended Solids (TSS) Exceedance– MEL-26 Discharge Point

The following information is being provided in accordance with MDMER Section 31 and section 38(7) of the Fisheries Act, and relates to spill report #19-346, submitted August 27th 2019, by Agnico Eagle Mines Ltd., Meliadine Division.

Description of Incident:

Table 1: Summary of events following sample collection

Date	Event
19 August 2019	Weekly MDMER sample collected at MDMER FDP MEL-26 during discharge of treated saline water into Melvin Bay, Artic Ocean
23 August 2019	Algae identified in Saline Pond 3
24 August 2019	Chlorine dosing increased at SETP inflow to reduce algal growth
26 August 2019	Technician noted chlorine smell in outflow during sampling Preliminary results determined a TSS exceedance of 53mg/L and 33mg/L (duplicate)
27 August 2019	Final results received showing TSS exceedance, with VSS being a contributing source. SP3 cleaned of sediment and algaecide added to control VSS. Spill Report 19-345 (later changed to 19-346) submitted as per 38(5) of the Fisheries Act and section 24(1) of the MDMER and discharge was stopped at FDP MEL-26.
2 September 2019	Conducted acute lethality testing for stickleback as per MDMER section 31.1
5 September 2019	Preliminary notification submitted to ECCC reporting acute lethality test failure
6 September 2019	ECCC notified of the MDMER section 31.1 acute lethality failure and that increased acute lethality testing would be conducted on September 9, September 23rd and October 7 th , with characterization samples to be taken at the same time for all 3 samples. ECCC was also informed that the lab that Agnico Eagle uses (Harris), based was in Nova Scotia, was in the path of hurricane Dorian. Power failures were expected potentially impacting the analysis (fish availability) and also the reporting.
12 September 2019	Spill Report 2019-345/346 Update submitted. VSS analysis indicated algae to be a contributing factor. Preliminary results of acute lethality testing conducted on September 9, failed. Chlorine suspected to have caused test failure. Discharge to sea ceased
13 September 2019	Preliminary notification submitted to ECCC reporting acute lethality test failure and that discharge had ceased until the chlorine issue could be rectified.

Table 2: Summary of responses to MDMER section 31 conditions

Condition	Response
(a) the name, description and concentration of the deleterious substance deposited;	53mg/L and 33mg/L of TTS
(b) the estimated quantity of the deposit and how the estimate was achieved;	Aug 19 th discharge quantity based on total truckloads offloaded at Mel-26.
(c) the day on which, and hour at which, the deposit occurred;	August 19 th for 24hrs.
(d) the quantity of the deleterious substance that was deposited at a place other than through a final discharge point and the identification of that place, including the location by latitude and longitude and, if applicable, the civic address;	Not applicable. Discharge occurred at authorized discharge point, Mel-26.
(e) the quantity of the deleterious substance that was deposited through a final discharge point and the identification of that discharge point;	Aug 19 th discharge quantity based on total truckloads offloaded at Mel-26.
(f) the name of the receiving body of water, if there is a name, and the location by latitude and longitude where the deleterious substance entered the receiving body of water;	MDMER FDP MEL-26, Melvin Bay, Arctic Ocean. 545955.56 m E, 6963638.39 m N.
(g) the results of the acute lethality tests conducted under subsection 31.1(1) or a statement indicating that acute lethality tests were not conducted but that notification was given under subsection 31.1(2);	<u>2nd Sept 2019</u> 96hr LC ⁵⁰ value = 25.0 (fail) <u>9th Sept 2019</u> 96hr LC ⁵⁰ value = 16.5 (fail)
(h) the circumstances of the deposit, the measures that were taken to mitigate the effects of the deposit and, if the emergency response plan was implemented, details concerning its implementation; and	The emergency response plan was implemented in that environmental staff responded to the exceedance by investigating and mitigating the cause.
(i) the measures that were taken, or that are intended to be taken, to prevent any similar occurrence of an unauthorized deposit.	See corrective measures section.

A weekly effluent sample at the MEL-26 final discharge point (Figure 1) for treated saline water was collected on August 19, 2019. Visually, the sample did not appear to be indicative of high TSS, and the field measurements taken at the time were within the acceptable limits.

Results from this sample were received August 27, 2019, at which time Total Suspended Solids (TSS) analysis showed 53mg/L and 33mg/L on a duplicate sample, which exceeded the limit of 30mg/L for any given grab sample to comply with MDMER Schedule 4 authorized limits.

During the week leading up to August 27th, algae was observed in the SP3 (Figure 2) pond which was thought to have been a major contributor to the high TSS in the MEL-26 sample. Before receiving lab results, BV Labs was contacted and asked to include Volatile Suspended Solids (VSS) analysis to elucidate between organic and inorganic solids. Laboratory analysis showed VSS accounted for approximately 50% of TSS, indicating the TSS exceedance was likely due to algal growth in the sample post-collection.

Table 3: TSS results collected following exceedance

	Lab	Lab	Lab	Field	Field	Lab	Lab	Lab	Lab
Date	19/8/19	19/8/19	19/8/19	23/8/19	23/8/19	24/8/19	24/8/19	26/8/19	26/8/19
Location	Mel-26	Mel-26 Dup	Mel-26 FB	SETP Outflow	SP3 Pond	SETP Outflow	SP3 Pond	SETP Outflow	SP3 Pond
TSS (mg/L)	53	33	<1	5	25	27	110	15	13
VSS (mg/L)	24	16	<1	-	-	13	15	9	8

While investigating the cause of the TSS exceedance, an internal confirmation sample was collected from the SETP outflow 19th August. Technicians noticed the smell of chlorine, suggesting the Saline Effluent Treatment Plant (SETP) was unable to remove the chlorine used in the treatment process. Field readings indicated chlorine was present in Saline Pond 3 (SP3). It was anticipated chlorine levels would be diluted within SP3 following adjustments to the SETP process, and any remaining chlorine would degrade prior to discharge. The Environment Department began conducting in-house testing for TSS and chlorine levels in order to monitor the situation.

An acute toxicology sample was collected September 2nd, and failed on September 5th. Toxicology sampling frequency was increased to include September 9th, September 23rd and October 7th, with characterization samples to be taken at the same time for all three samples. Acute toxicology samples collected on September 9th, failed on September 12th. Discharge to sea was immediately stopped.



Figure 1: Location of the truck offloading station of treated saline water, and the end of the pipe where discharge enters Melvin Bay.



Figure 2: Locations of SETP and SP3.

Spill Response & Cleanup:

In response to the TSS exceedance, VSS analysis was added to determine the source of the TSS. Results showed the source was approximately 1:1 organic to inorganic, indicating algae was a contributing factor. Algaecide was added to SP3 to reduce TSS. The intake pipe was raised approximately 30cm from the bottom of the pond to reduce the quantity of sediment being pumped into tanker trucks, which transport effluent to the discharge point at Itivia. A minimum operating water level was implemented to allow settling within the retention pond.

Chlorine used to eliminate organic TSS in the SETP, appeared to be above target concentration at the outflow to Saline Pond 3. In response, an investigation began to identify why chlorine was not being removed effectively in the SETP process. The suspected cause was failure of the carbon filters. To rectify the issue, daily back flushing was implemented to improve the functionality of the carbon filters. This practice reduced chlorine levels in outflow, however this was not sufficient to prevent the failure of the acute toxicology test, completed September 6th. Further adjustments to the SETP dosing system also proved unsuccessful when acute toxicology tests failed on September 12th.

The discharge to the environment has ceased while operators of the SETP evaluate the performance of the plant. Carbon has been replaced in both Granular Activated Carbon (GAC) Filters. The operators are presently evaluating the existing set points for treatment inflows in addition to the chlorine dosing system. The outflow is being monitored as it discharges to Saline Pond 3. The water being treated during the optimization work is not being discharged to the environment.

Cause of Incident and Corrective Measures

The initial cause of the Total Suspended Solid exceedance was due a combination of high wind agitating sediment and algae in Saline Pond 3. Algae growth is suspected to be the result of nutrient levels. Sediment is suspected to be the result of dust, insufficient filtration, and feed source.

Table 3: Summary of causes and corrective measures

Incident	Corrective measure
TSS exceedance	VSS analysis added to lab analysis to determine organic and inorganic TSS
TSS exceedance due to VSS	Algaecide application in SP3
	Chlorine dosing increased to eliminate organic TSS
TSS exceedance due to sediment	Intake pipe raised to prevent discharge of sediment
Toxicology test failure Sept 6 th due to chlorine	SETP operators adjusted chlorine dosing rate
	Carbon filters back flushed daily
	Field readings collected by environment team in SP3
	SETP operators interviewed to ensure understanding of discharge criteria
	SETP probes calibrated and verified with environment team probes
Toxicology test failure Sept 12 th due to chlorine	Discharge ceased immediately
	Replacement of carbon in filtration system to be completed prior to recommencing discharge