Richard Dwyer 2AM-MEA0815

From: Larry Connell [lconnell@agnico-eagle.com]
Sent: Friday, September 12, 2008 5:41 PM
To: Richard Dwyer; Andrew Keim; <Hartman Stephen; Liu, Amy; Wilson,Anne [Yel]; chad.harden@EC.GC.CA; Cooper, Gary; Luis Manzo
Cc: Louise Grondin; Ryan Vanengen; Gary Mann; Denis Gourde; Eric M. Lamontagne; Martin Bergeron; Stéphane Robert; Rachel Gould
Subject: RE: Meadowbank East Dike Construction - Chitosan Bench Test results & Field Test Plans
Follow Up Flag: Follow up
Flag Status: Purple

Sorry all – forgot the attachments with my first email

From: Larry Connell
Sent: Friday, September 12, 2008 2:36 PM
To: 'Richard Dwyer'; 'Andrew Keim'; '<Hartman Stephen'; 'Liu, Amy'; 'Wilson,Anne [Yel]'; 'chad.harden@ec.gc.ca'; 'Cooper, Gary'; Luis Manzo
Cc: Louise Grondin; Ryan Vanengen; 'Gary Mann'; Denis Gourde; Eric M. Lamontagne; Martin Bergeron; Stéphane Robert; Rachel Gould
Subject: Meadowbank East Dike Construction - Chitosan Bench Test results & Field Test Plans

All:

As indicated in my earlier email of this week we have had two technicians from KI Environmental on site bench testing the use of Chitosan to flocculate suspended solids from the water column within the stretch of water between the East Dike and the turbidity barrier on the impoundment side of the dike. The bench test results were conducted on two samples:

- The standing water within this area; and
- A sample of water taken within this area after the settled solids had been stirred up back into suspension

I have attached a copy of the first report on this testing from KI Environmental. The results from the bench scale test are quite encouraging with significant removal of TSS within 24 hours of settling time. Based on these results it is our intent to proceed to a field test within this same area of water starting next Monday. Note that it may take about 1.5 to 2 days to make the application. Our strategy for monitoring turbidity and measuring residual Chitosan lactate in the water column is as follows:

Turbidity: Conduct turbidity monitoring, surface to bottom at 4 stations (opposite to our routine stations, but inside the silt curtain) prior to application, after 4 hours (end of day), beginning of day 2 and end of application at day 2. We will conduct a further round of sampling 1 day after application (day 3 morning and afternoon). This is in addition to routine monitoring outside of the silt curtain.

Chitosan Lactate: KI will monitor Chitosan lactate concentrations at the same 4 locations at surface and from within 1 m of bottom at twice per day. If the application takes 2 days, we will have 4 stations x 2 depths x 4 time periods = 32 measurements. We will do a third round of monitoring, consistent with turbidity profiling on day 3, one day after application.

We'll keep track of wind speed and direction...and hope for calm weather.

Regards,

Larry Connell, P.Eng.
Regional Manager: Environment, Social and Government Affairs

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From: Larry Connell
Sent: Friday, August 22, 2008 10:40 AM
To: Richard Dwyer; Andrew Keim; <Hartman Stephen; Liu, Amy; Wilson,Anne [Yel]; chad.harden@ec.gc.ca
Cc: Louise Grondin; Ryan Vanengen; Gary Mann; Denis Gourde; Eric M. Lamontagne; Martin Bergeron; Stéphane Robert
Subject: Meadowbank East Dike Construction TSS and Turbidity Issue Update

All:

We are continuing to experience problems with turbidity levels within Second Portage Lake associated with the construction of the East Dike. High winds on Tuesday night appeared to have dissipated the highly turbid water located at depth at SE3 and NE1. Follow-up sampling found these zones reforming later in the afternoon (and again Thursday morning).

A distinct plume was visible on the upstream side in association with the southern section of the SE turbidity barrier. While the really high turbidity values associated with the deep zone were not encountered on Thursday, both SE2 and SE3 had higher values in the upper water column than normally encountered. At first we thought that this might be due to mixing of the deep turbid water into the upper water column. However, that would unlikely result in the clear plume line that was observed. Rather, the plume is more likely due to activities in the work zone or to water moving through the work zone. This is supported by paired sampling conducted inside/outside the curtain near SE2 (units NTU, not mg/L):

Depth	Inside(4.8m)	Outside(4.5m)
0m	251	234
1m	255	242
2m	255	263
3m	249	263
4m	259	331

These results (which are approximately 60 mg/L TSS and exceed the 24-hr trigger) show little containment within the barrier. Despite implementing some mitigative measures, the East Dike work area continues to be a source of sediment to Second Portage Lake (SPL). TSS levels in SPL have exceeded NWB A License levels at at least one station since Aug 9 and continue to deteriorate (now virtually all stations fail the 7-day TSS trigger). We have subsequently completed the rockfill component of the East Dike from the south at Portage Island to the north shore thus now closing off the impoundment arm of Second Portage Lake from the remainder of the lake.

AEM continues to take all reasonably possible actions to address this sediment issue. We are currently implementing the following actions to address this situation:

- We are installing a low permeability plastic membrane barrier along the upstream

face of the East Dike inside the turbidity barrier to enhance the prevention of sediment being able to leave the dike rockfill during cutoff trench excavation.

- We are completing the West Channel Dike to prevent the circulation of water from Third Portage Lake into the impoundment arm of Second Portage Lake to reduce and ultimately eliminate the flow of water from the impoundment arm through the East Dike construction zone into the remainder of Second Portage Lake. We anticipate having this flow cut off within the next 48 hours.
- We are scouring for additional turbidity barrier to install additional cutoff barriers on the upstream side of the East Dike.
- We have been testing coagulants and flocculants in the lab to determine an optimized mix that can enhance the settling rate of the sediment within the water column. We have had success in a mix of Alum, Magnafloc 10 and Sodium Silicate. The relative concentrations within the water column for these settling agents are 200 ppm Alum, 2 ppm Magnafloc 10 and 150 ppm Sodium Silicate. The net impact on water pH is nil. This combination was very effective in the lab in rapidly knocking down the suspended sediment. We did the initial test work at LaRonde using samples of water taken from the Meadowbank site and followed this up by having a flocculant specialist come to site and confirm and optimize the addition rates on fresh samples taken from within the East Dike work zone. We have yet field tested this mix and need to open further dialogue with Environment Canada on the pros and cons of applying this coagulant/flocculant mix to the East Dike zone because it is will be within a natural lake setting. We have arranged to have a small supply of these chemicals air freighted to Meadowbank early next week in preparation for a field test pending outcome of our discussions with Environment Canada.

We have asked Azimuth to develop a further monitoring program to assess the potential impact and consequence of these sediment releases into Second Portage Lake to help answer the question: What has the impact been on the Second Portage Lake ecosystem? We will provide further updates as this situation evolves.

Larry Connell, P.Eng.
Regional Manager: Environment, Social and Government Affairs

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From: Ryan Vanengen
Sent: Thursday, August 21, 2008 4:12 PM
To: Larry Connell
Subject: FW: TSS Update - August 21

From: Gary Mann [mailto:GMann@azimuthgroup.ca]
Sent: Thursday, August 21, 2008 6:09 PM
To: Eric M. Lamontagne; Ryan Vanengen; gaston.blanchette@snclavalin.com; Denis Gourde
Cc: Randy Baker; Ryan Hill
Subject: TSS Update - August 21

Gentlemen:

Attached are the most recent results for the routine stations and a time series graph for select stations.

Please let me know if you have any questions,

Gary

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