May 23, 2017

Peter Madden
Regulatory Compliance Lead
Lower Churchill Project

Dear Peter,

RE: Headpond Water and Sediment Sampling Program – May 23, 2017 Update

1.0 INTRODUCTION

In order to provide additional monitoring coverage of possible changes in methyl mercury concentrations in water during headpond formation, the provincial government requested an additional sampling program be implemented by Nalcor. Nalcor provided a program description to government and engaged Amec Foster Wheeler to implement the sampling program. This memo provides an update on information regarding the headpond water and sediment sampling program related to additional results; sample location and headpond activities since the memo provided on May 10, 2017.

2.0 SAMPLING PROGRAM

Sampling began on October 14, 2016 to capture existing, natural methyl mercury concentrations before any headpond formation. Following re-impoundment in February 2017, a weekly sampling regime has been ongoing for all 11 sample locations (Figure 1) as per WRMD request. Water and sediment samples have been analyzed for total mercury, dissolved methyl mercury, and total methyl mercury as well as other parameters that are known to affect methyl mercury generation and transport.

3.0 HEADPOND FORMATION

Headpond formation was initiated again in early February 2017, with the first set of impoundment samples being collected February 6, 2017. Water levels are currently around 21.5m elevation.

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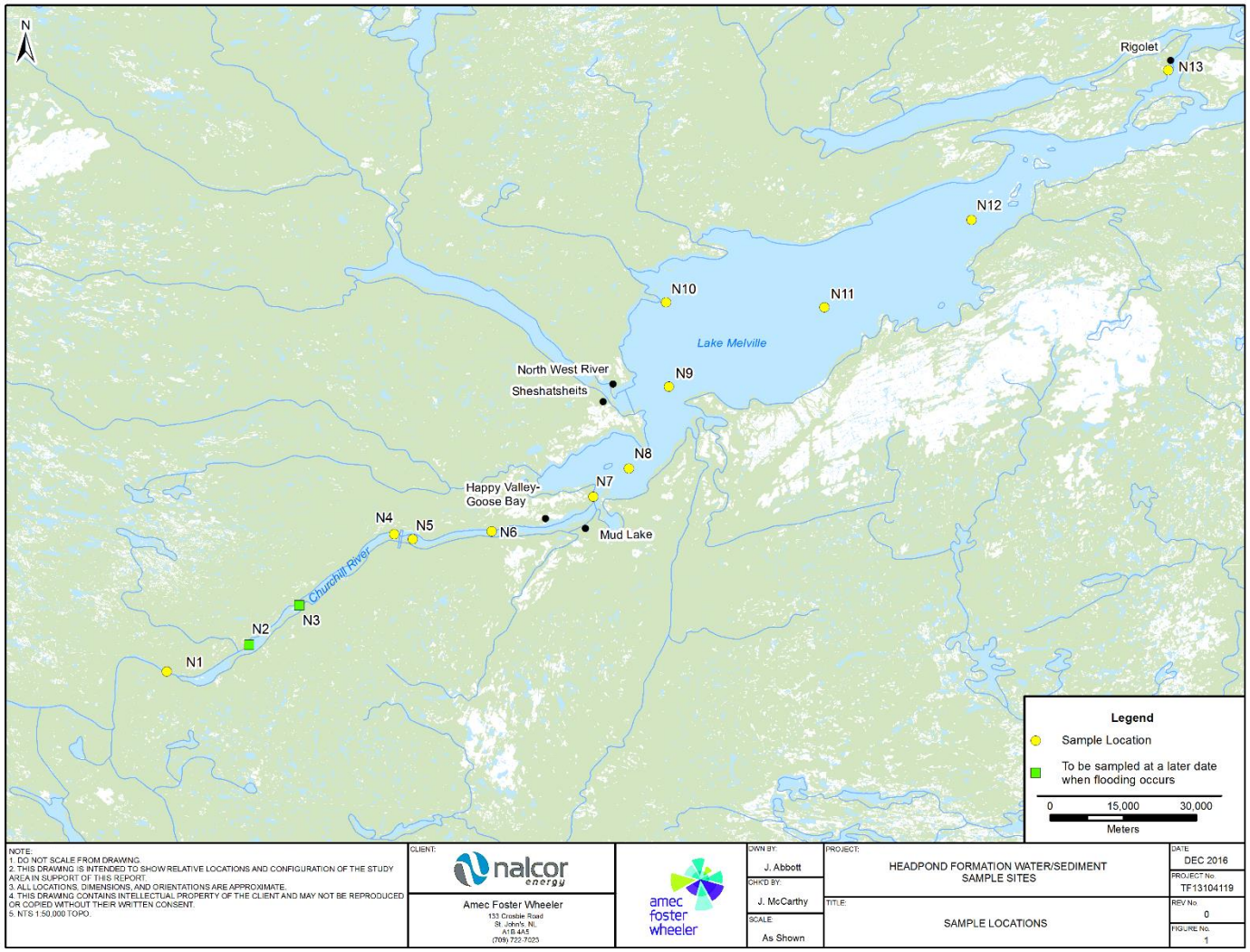

Figure 1: Map of sample locations, Lower Churchill River to Rigolet

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4.0 SUMMARY RESULTS

Sampling has continued throughout, and beyond, recent headpond activity to document any potential changes in natural, background methyl mercury in water and any potential changes due to flooding (Table 1). Each sample location is currently sampled on a weekly basis.

Table 1: Total number of samples collected from each sample site, as of April 30 2017

Sample ID (ongoing)	Sample ID (from original plan)	Date of First Sample Collection	Number of Samples Collected
N1	1	Oct. 14, 2016	26
N2[1]	2	Oct. 14, 2016	2
N3[1]	3	Oct. 14, 2016	2
N4	4	Oct. 14, 2016	26
N5	5	Oct. 14, 2016	26
N6	-	Dec 20, 2016	14
N7	7	Oct. 14, 2016	20
N8	-	Dec 20, 2016	12
N9	8	Oct. 14, 2016	20
N10	-	Dec 20, 2016	13
N11	10	Oct. 14, 2016	21
N12	-	Dec 20, 2016	13
N13	11	Oct. 14, 2016	20

[1] Sample sites located above headpond elevation will be completed upon reservoir formation

Sampling has continued to date with the last series of samples collected on May 16, 2017 (the results of which are pending from the analytical laboratory). As an example of the datasets, a summary of existing total methylmercury results from several sample sites is provided in Figure 2. Site N5 is located directly downstream of Muskrat Falls and N8 (Goose Bay) is the first sample site within the Goose Bay / Lake Melville estuary downstream of the lower Churchill River. Site N8 was added to the sampling regime on the week of December 20, 2016. These sites would be anticipated to be the first to show any indication of downstream increases or transport in total methylmercury due to flooding. Also shown are the results for the upriver control site (Grizzle Rapids – Site N1 in Figure 1) which is located upstream of any reservoir influence. Figure 3 provides the results of dissolved methylmercury for the same sample sites and times.

As shown in Figure 2, there did not appear to be any increase in total methylmercury concentrations in water due to the initial inundation and flushing of the headpond in November; however, water samples after headpond re-formation in February indicated an increase at both Sites N4 and N5 at the time when water levels had stabilized (around the week of February 28, 2017). The values within the reservoir area (Site N4) quickly returned to background but those below Muskrat Falls (Site N5) remained above background on four separate occasions before subsequently returning to background.

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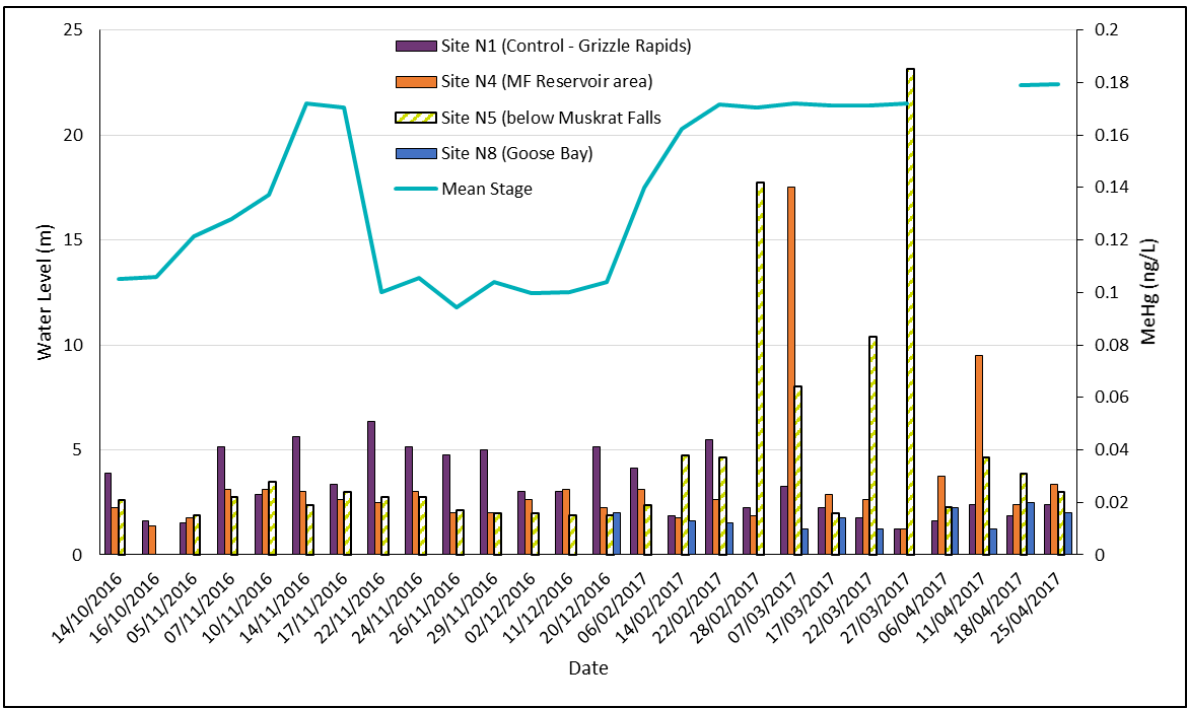
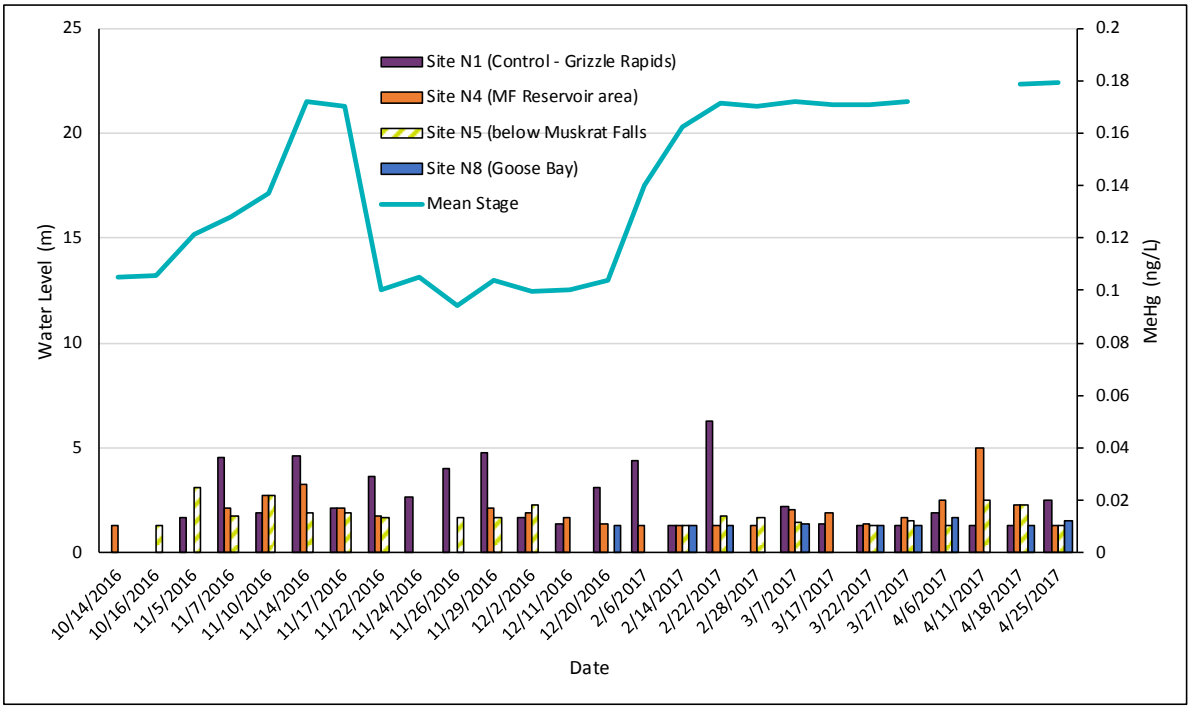


Water elevation data from October 14-November 18, and April has been provided by Environment Canada (Station Number 03OE015). Data post November 18 has been provided by Nalcor. Missing dates have been estimated based on data provided by Nalcor.

Figure 2: Total methylmercury concentration (ng/L) at various sample sites



Water elevation data from October 14-November 18, and April has been provided by Environment Canada (Station Number 03OE015). Data post November 18 has been provided by Nalcor. Missing dates have been estimated based on data provided by Nalcor.

Figure 3: Dissolved methylmercury concentration (ng/L) at various sample sites

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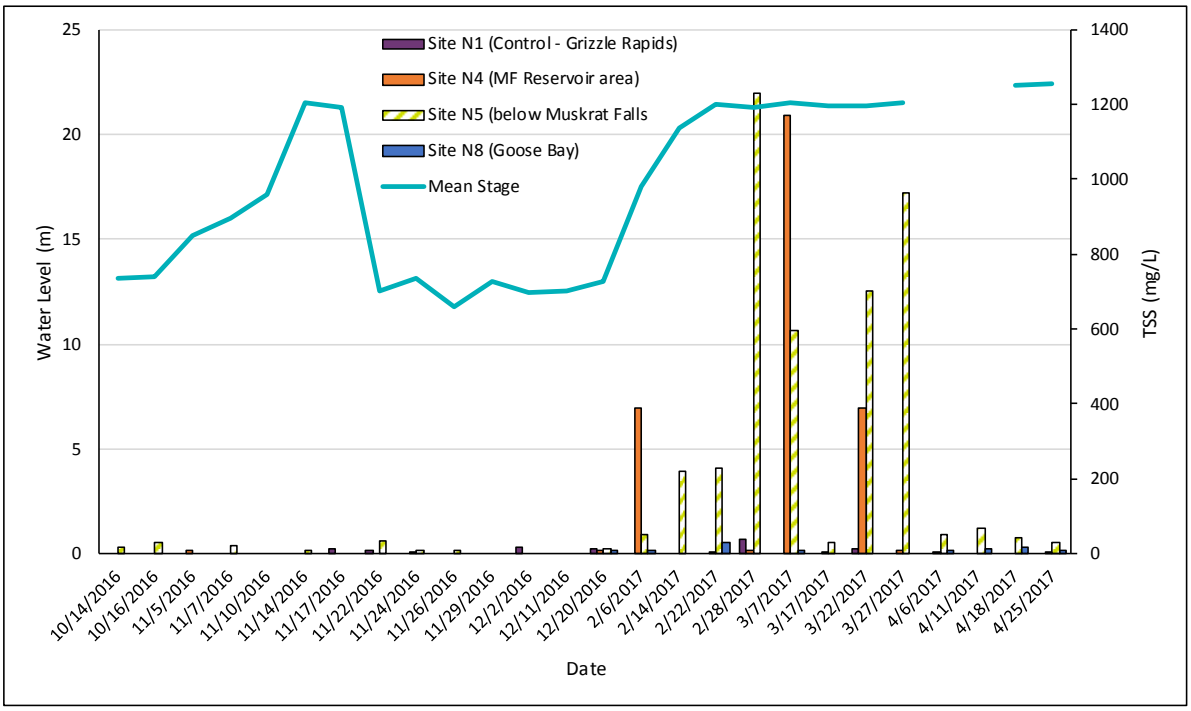
Total methylmercury in Goose Bay has not shown any increases above background. Dissolved methylmercury (see Figure 3) measured during the same events also did not show any change from background, indicating that a general increase in methylmercury formation through bacterial activity was unlikely and that increases seen at sites N4 and N5 are likely due to increased TSS and mercury bound to particles.

A cursory comparison between TSS values (see Figure 4) and total methylmercury show a similar pattern of increase at Sites N4 and N5 during dates when total methylmercury increases were measured and a subsequent decrease on the week of April 6, 2017. No such increase in TSS was measured further downstream within Goose Bay. It is uncertain at this time, pending further analysis, whether increases of TSS are associated with headpond formation or natural conditions; for example, whether the ice rose at the base of Muskrat Falls is continuing to scour bottom sediments or whether erosion within or downstream of the reservoir may be occurring but this will continue to be monitored closely as ice break up continues. Ongoing monitoring and statistical analysis will also assist in determining the duration of any increases.



Water elevation data from October 14-November 18, and April has been provided by Environment Canada (Station Number 03OE015). Data post November 18 has been provided by Nalcor. Missing dates have been estimated based on data provided by Nalcor.

Figure 4: Total Suspended Sediment (TSS) concentration (mg/L) at various sample sites

As shown, concentrations of total and dissolved methylmercury measured within the headpond, directly below Muskrat Falls, as well as Goose Bay have generally remained within the range of background. During a period of several weeks, some total methylmercury samples rose within sites N4 (MF Reservoir area)

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and N5 (below Muskrat Falls); however, concentrations did not show a similar pattern farther downstream (N8 – Goose Bay). The highest concentration of total methylmercury measured to date is 0.185 ng/L at the site below Muskrat Falls (N5) and this concentration was not sustained for any duration. Most total methylmercury concentrations have remained below 0.05 ng/L. The lab's accredited detection limit for both total and dissolved methylmercury is 0.010 ng/l. All results to date for all parameters tested have been provided to Nalcor and government and are available. As more data becomes available, statistical analysis of all sites will be conducted.

If you have any questions, or require any further information, please feel free to contact me at your convenience.

Yours sincerely,

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