November 26, 2019

Jackie Wells
EA Commitments/Environmental Effects Monitoring Programs Lead
Lower Churchill Project

Dear Jackie,

RE: Headpond Water Sampling Program – Update to November 26, 2019

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 sampling program completed to date.

2.0 SAMPLING PROGRAM

Sampling began on October 14, 2016 in an attempt to capture existing, natural methyl mercury concentrations before any headpond formation. Following re-impoundment in February 2017, sampling has been ongoing for all 11 sample locations (Figure 1) as per WRMD request. As per IEC recommendation, each location is sampled weekly when water temperatures exceed 6^{o}C. When water temperatures are below 6^{o}C, sampling occurs on a bi-weekly basis unless there is a change in water elevation of the Headpond/reservoir by Nalcor which would re-trigger weekly sampling. Water samples have been analyzed for total mercury, dissolved methyl mercury, and total methyl mercury as well as other parameters 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. The inundation to full supply water level (38.5-39 m elevation) began on August 7, 2019 and was completed on September 5, 2019. Water levels at the time of last reported samples within this summary were approximately 38.8 m elevation.

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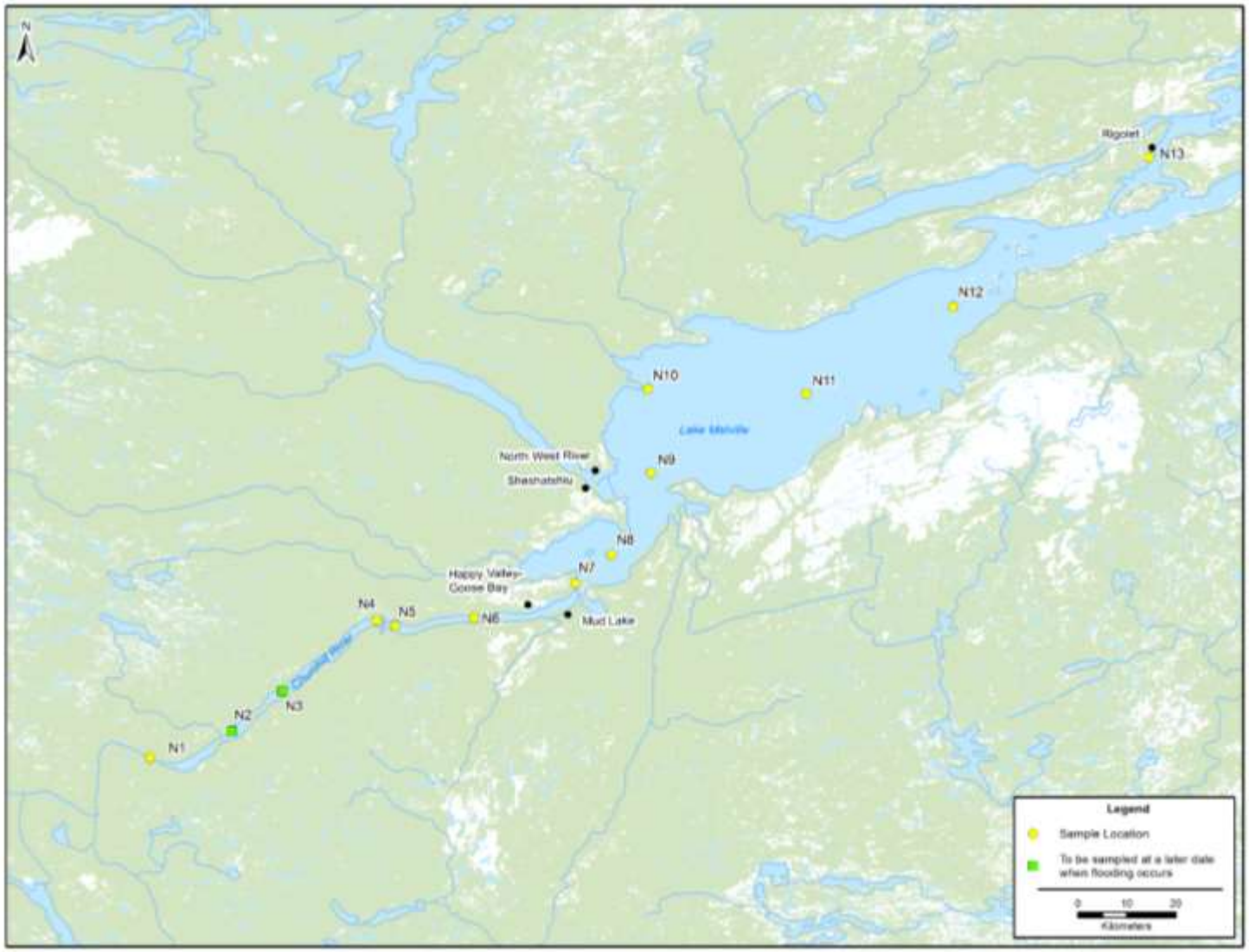

Figure 1: Map of sample locations, Lower Churchill River to Rigolet

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4.0 SUMMARY RESULTS

Sampling has continued throughout, and beyond, initial headpond activity and has continued through reservoir formation to document any potential changes in natural, background methyl mercury in water and any potential changes due to flooding within and downriver of the headpond/reservoir (Table 1).

Table 1: Total number of samples collected from each sample site, up to September 9, 2019

Sample ID (ongoing)	Sample ID (from original plan)	Date of First Sample Collection	Number of Samples Collected
N1	1	Oct. 14, 2016	112
N2	2	Oct. 14, 2016	4
N3	3	Oct. 14, 2016	4
N4	4	Oct. 14, 2016	111
N5	5	Oct. 14, 2016	113
N6	-	Dec 20, 2016	102
N7	7	Oct. 14, 2016	106
N8	-	Dec 20, 2016	87
N9	8	Oct. 14, 2016	77
N10	-	Dec 20, 2016	70
N11	10	Oct. 14, 2016	73
N12	-	Dec 20, 2016	67
N13	11	Oct. 14, 2016	83

Sampling has been ongoing with the last series of mercury samples presented within this summary being collected on September 9, 2019. Ongoing results beyond this date are pending analytical laboratory analysis.

As an example of the results within the dataset, a summary of existing mean monthly total methyl mercury results (with 95% confidence intervals) 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 methyl mercury related 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 and is used to account for natural variability. Figure 3 provides the results of dissolved methylmercury for the same sample sites and times.

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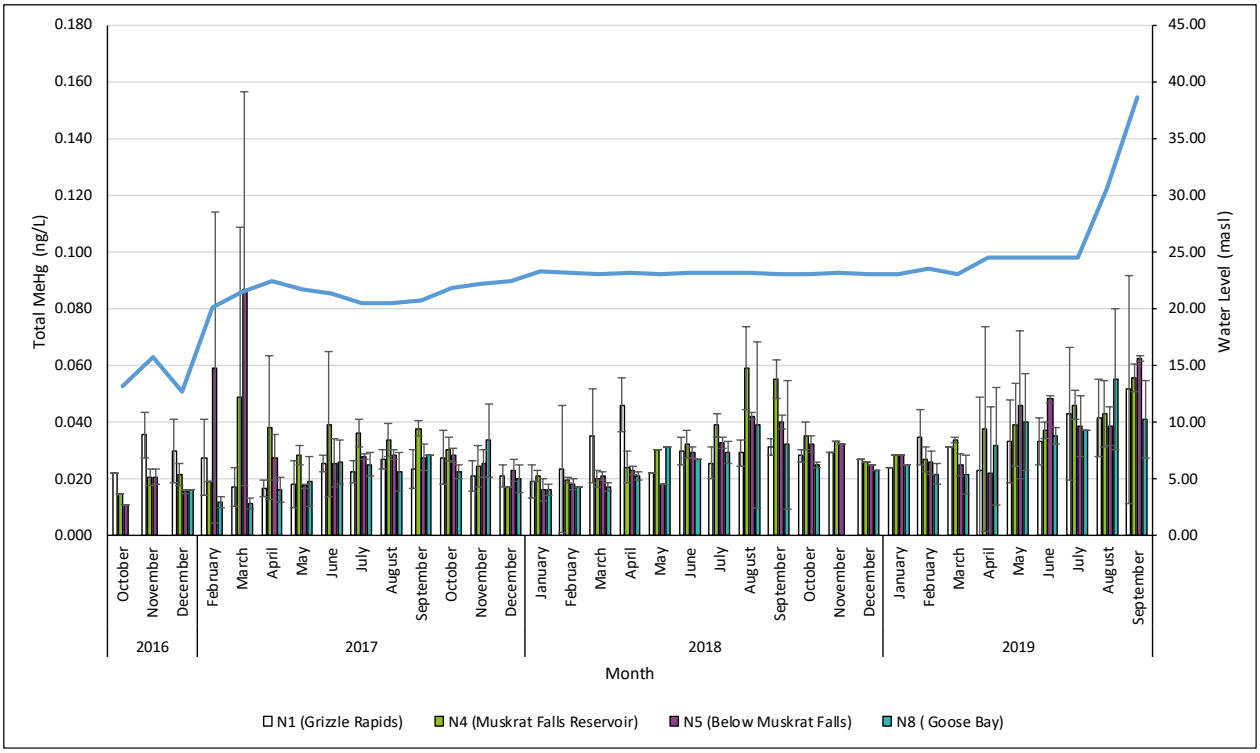

Water elevation data from October 14-November 18, and April has been provided by Environment Canada (Station Number 03OE015). Data post November 18 has been provided by Nalcor. Missing dates have been estimated based on data provided by Nalcor. For calculation purposes, values below MDL are included as the MDL (0.010ng/L)

Figure 2: Mean monthly total methyl mercury concentration (ng/L) at various sample sites. 95% confidence intervals also shown.

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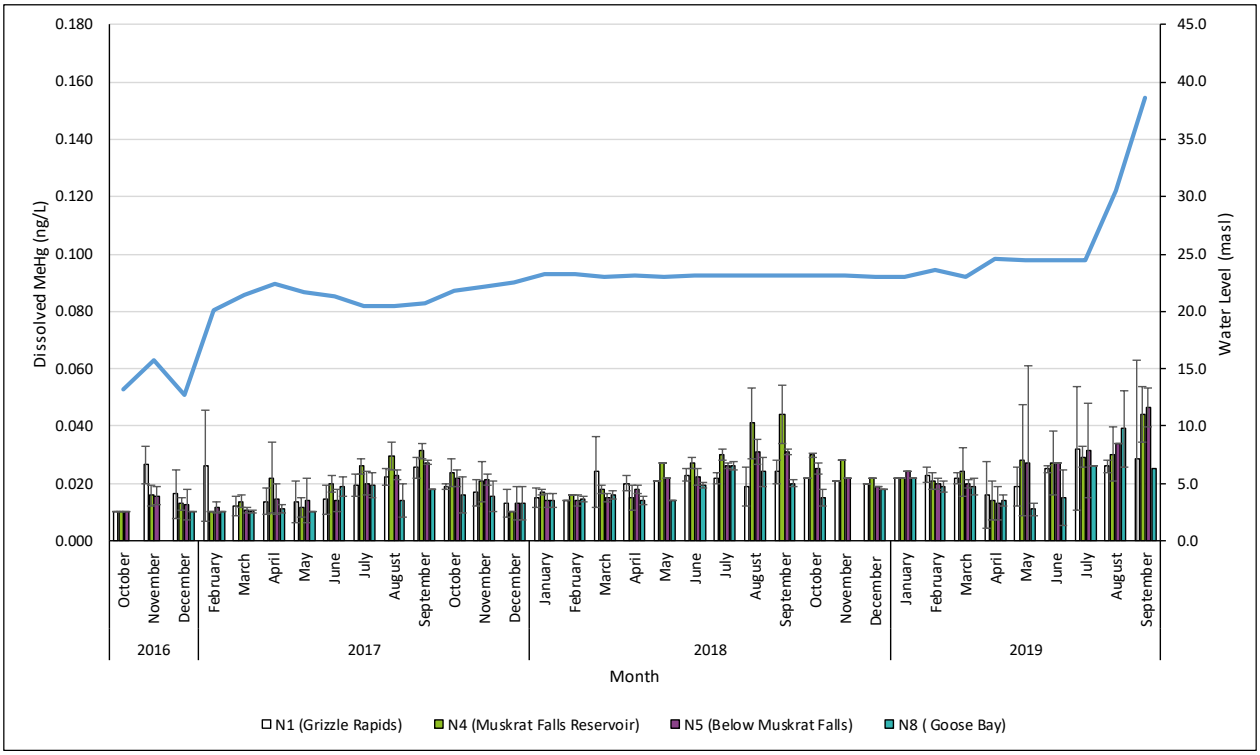

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Figure 3: Mean monthly dissolved methylmercury concentration (ng/L) at various sample sites. 95% confidence intervals also shown.

As noted, these graphs include a select number of representative sites sampled and the accompanying spreadsheet contains all data to date. Higher initial concentrations of total methyl mercury recorded during several sample weeks in early 2017 within N4 (headpond) and N5 (below Muskrat Falls) have been associated with increased total methyl mercury likely bound to particles within suspended sediments; Figure 4 shows Total Suspended Solids (TSS) concentrations. Increases in total mean methyl mercury concentrations at various sample sites occurred during the same weeks as increases in TSS were detected. Dissolved methyl mercury concentrations (Figure 3) during the same sampling times did not show similar increases.

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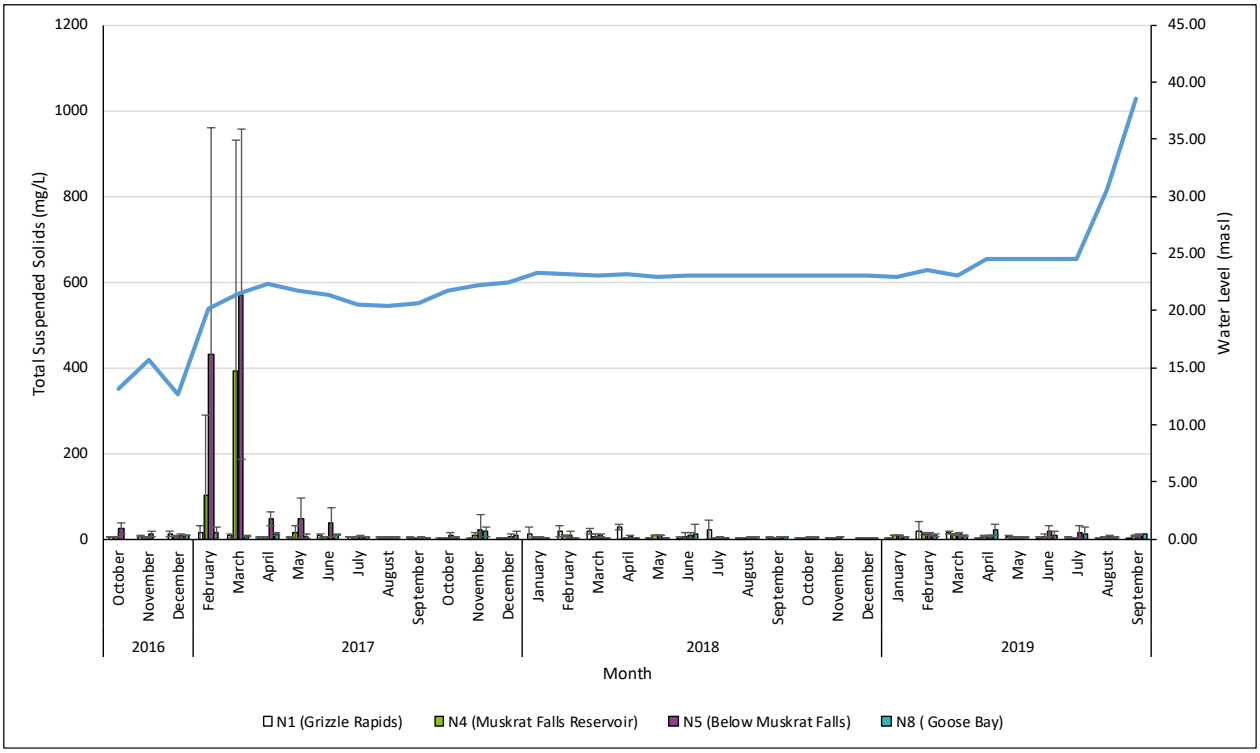

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Figure 4: Mean monthly Total Suspended Solids (TSS) concentration (mg/L) at various sample sites. 95% confidence intervals also shown.

As indicated in the figures, concentrations of total and dissolved methyl mercury measured within sample stations have generally remained low. During the warmer sampling periods (June – September of each year), a slight increasing trend in total and dissolved methylmercury concentrations has been observed within all stations shown in Figures 2 and 3. Highest concentrations have generally been recorded within the headpond station (N4), which was likely caused by increased microbial activity and increased access to flooded material within the headpond. However, these slight increases do not appear to be transported downriver as most concentrations within Goose Bay (N8) have remained similar to those at the upriver control/baseline (N1), particularly dissolved methylmercury. Any cumulative trend in downstream methylmercury concentrations is not evident.

Most total methylmercury concentrations have remained below 0.050 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, it will be provided as quickly as possible.

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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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