

**Information Note**  
**Department of Municipal Affairs and Environment**

**Title:** Results of the Methylmercury Monitoring Program at Muskrat Falls

**Issue:** This note was prepared to provide commentary on methylmercury monitoring data starting Oct. 14, 2016 and continuing present. The monitoring is being conducted in the Churchill River and Lake Melville to observe the effect of impoundment of water at the Muskrat Falls Reservoir. This note was prepared at the initiative of the Department.

**Background and Current Status:**

- A surface water quality monitoring plan for methylmercury was first conceived in September 2016. The purpose was to obtain a comprehensive record of methylmercury concentrations before, during and after reservoir impoundment at Muskrat Falls. The plan included an upstream (unaffected) location, sampling points in the reservoir and then downstream in the Churchill River and throughout Lake Melville. Associated chemical water quality parameters such as suspended solids, dissolved organic carbon, and others were included.
- A plan was formulated by the Water Resources Management Division and consultation occurred with the Nunatsiavut Government, the Innu Nation, and the NunatuKavut Community Council. When the IEAC was officially agreed to by the provincial government and the three Indigenous groups on October 26, initial water sampling had already begun. Further revisions to the plan were made and Nalcor was formally ordered to carry it out in a Minister's letter dated Dec. 6, 2016.
- The plan is available for public viewing at a website dedicated to this issue at: [http://www.mae.gov.nl.ca/methylmercury\\_mrf.html](http://www.mae.gov.nl.ca/methylmercury_mrf.html). This site displays the results of the methylmercury monitoring in raw data format as well as a series of graphical displays. Data is updated as soon as it becomes available.
- The current data set includes 162 sediment samples with 4 parameters and 654 water samples with 19 laboratory and 6 in-situ parameters. Sampling at the up to 13 sampling sites is done weekly, weather conditions permitting. Some sites have multiple samples for surface, mid and bottom water samples. See attached map.
- Nalcor commissioned Azimuth Consulting Group Partnership to prepare a technical memorandum entitled "*Relationship between Muskrat Falls Elevation and Mercury Concentrations, Lower Churchill River Oct 2016 - Sept 2017*". This Nov. 6, 2017 report is posted for public viewing at: <https://muskratfalls.nalcorenergy.com/environment/generation/methylmercury-monitoring/>. It updates an earlier similar report from May 2017.

**Analysis:**

- All monitoring stations demonstrated a clear seasonal increase in both total and dissolved methylmercury between June and September. Temporary impoundment in November 2016 and re-flooding in mid-February 2017 did not produce a clear increased methylmercury signal until May 2017. Dissolved methylmercury in the water column from June to September was slightly higher in the reservoir compared to upstream. On the attached map this refers to N4 (reservoir) vs N1 (upstream).

- Downstream from the reservoir the magnitude of change in methylmercury relative to the upstream station is even smaller. The first station immediately downstream of the reservoir N5 and the upstream station are very similar over time. The next two stations downstream from there, N6 and N7, have suggestions of slightly higher methylmercury but the differences are very small (less than 0.003 ng/l).
- At the last downstream station before Goose Bay/Lake Melville, N8, there was only a seasonal trend similar to the upstream station. In other words, there was no apparent increase in methylmercury that can be attributed to export from the impoundment.
- Although the impoundment to date at roughly elevation 22.5 m is only about 27% of the full future impoundment to elevation 39 m, these very small methylmercury increases in the reservoir and no increases downstream do not agree with predictions made by Calder et al, 2016. That study predicted riverine methylmercury increases of about 10 times the baseline and a 2.6 times (260%) mean methylmercury increase in the estuary, Lake Melville.
- Because the ambient methylmercury concentrations are very close to the Flett Laboratory method detection limit (MDL of 0.01 ng/l), various quality assurance / quality control procedures were used to demonstrate that the laboratory met data quality objectives. This was important because the methylmercury results were only within 1.5 to 2.5 times the laboratory MDL. Many results in Lake Melville are reported as MDL.
- The IEAC oversight committee, and in particular the scientific sub-committee, have examined the monitoring plan and the current data and have made a few recommendations for refinement of the plan. The changes include use of lower detection limits for total mercury and a few other parameters, a reduction of weekly sampling to semi-monthly (two times per month) when water temperatures are below 6°C and while there are no water level increases. The resources saved using reduced sampling and laboratory analysis can be used to strengthen monitoring of fish and zooplankton.
- These suggested changes are acceptable to government because recent improvements in technology allow for lower detection limits for total mercury and it was observed in the data that there was little methylmercury production during the colder winter months, especially if water levels are stable.

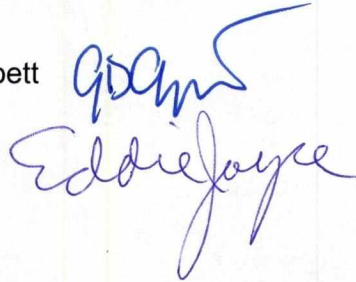
**Action Being Taken:**

- An official amendment to the monitoring plan to reflect the recommendations of the IEAC has been drafted and will be posted as an addendum to the original monitoring plan. Notwithstanding, Nalcor and the labs have already incorporated those refinements.
- Methylmercury monitoring under this plan will continue.
- This monitoring is a first step in making predictions about how the biota and ultimately the country food supply might be affected by any methylmercury production in the Muskrat Falls reservoir. This goes back to the fundamental purpose of the IEAC which is continuing its work to provide answers to this most important question. The IEAC's current proposed research portfolio includes:

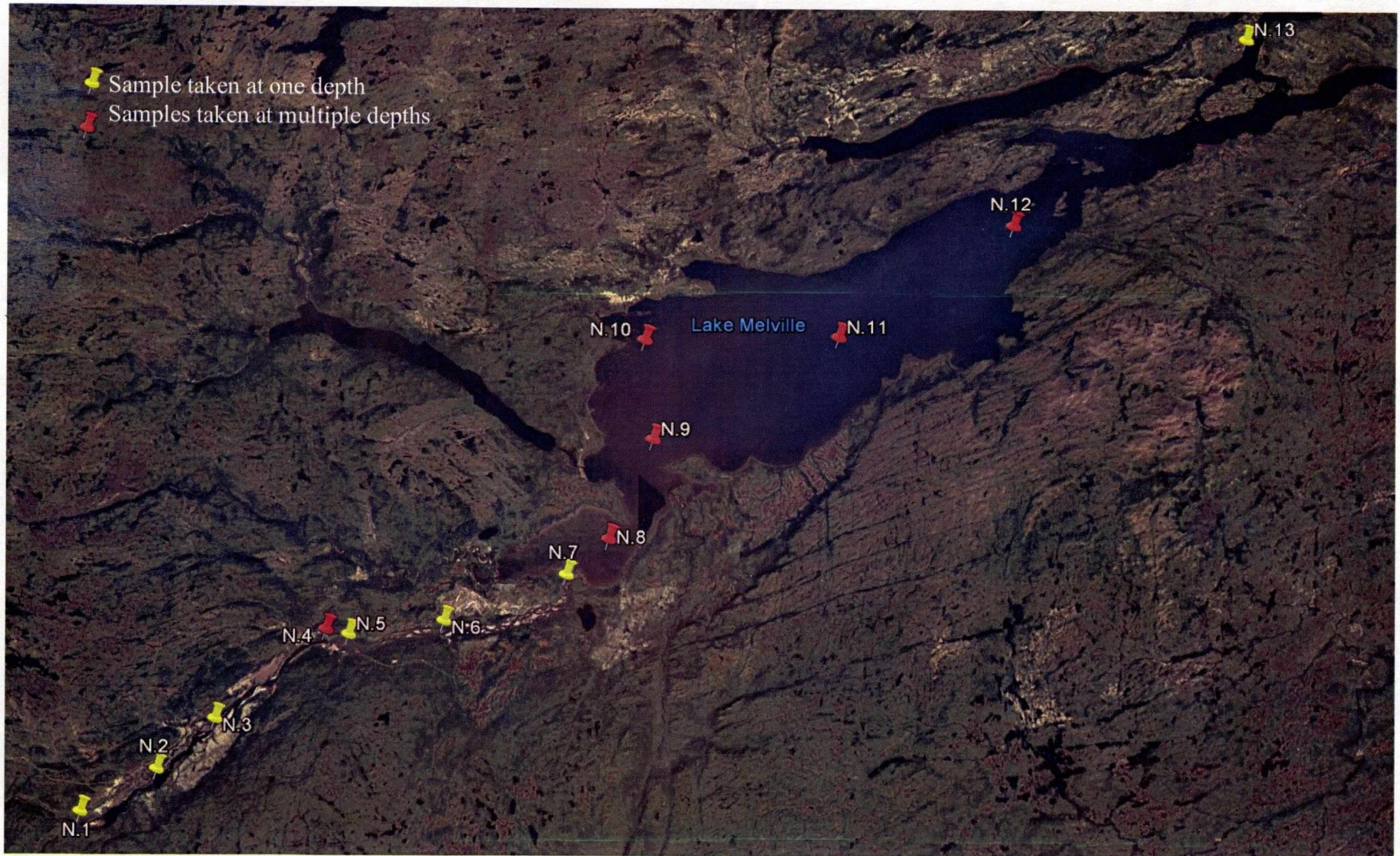
- Methylmercury flux core measurements (determining in a laboratory how much methylmercury is produced by different types of soils from the reservoir area) will be carried out by Harvard University and preliminary results are expected by Dec. 20.
  - Carry out a modelling exercise to evaluate the effect of various methylmercury concentration scenarios on the base of the food chain. No time line set.
  - Data input and independent statistical analysis. This was originally planned for end of November but an update is due beginning of December.
  - Review existing biomonitoring and dietary survey information and develop a scope of work for a larger study to address data gaps. A contract is in place and a report is expected in the new year.
  - Traditional knowledge study. While it was proposed at the Sept. 20 face to face meeting, progress has been limited.
  - An IEAC website is being developed to make the IEAC's work accessible to the public.
- All of these activities are being funded from the IEAC's approved budget.

**Prepared/Approved by:** M. Goebel / J. Chippett  
**Ministerial Approval:**

**December 5, 2017**



**Methylmercury Monitoring Stations in Churchill River and Lake Melville**  
The Muskrat Falls Dam and Reservoir are located just upstream of station N5



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**Prepared/Approved by:** M. Goebel / J. Chippett  
**Reviewed by:** C. Osmond/ K. Stone, Cabinet Secretariat  
**Ministerial Approval:** Received from Hon. Eddie Joyce

**December 7, 2017**

**Cabinet Secretariat Comment:**

This note was prepared at the initiative of MAE.

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