

November 8, 2019

To:
The Minister of the Environment
Nova Scotia

Dear Sir /Madam,

I am writing this letter to raise my concerns in relation to the Focus Report on Northern Pulp's Proposed Replacement Effluent Treatment Facility Project.

My name is Dr. Margaret (Maggie) Morrison. I am a veterinarian who recently retired from the Canadian Food Inspection Agency. I studied at the University of Guelph, at the Ontario Veterinary College (OVC). Prior to receiving my Doctor of Veterinary Medicine (DVM) degree, I also received a Masters of Science (M.Sc.) in veterinary epidemiology. Epidemiology is the study of factors affecting health and well-being in populations, and there is a strong emphasis on statistical methods and analyses.

I live on the Northumberland Strait in Prince Edward Island, and have family and friends who work in the lobster industry, so the health of this body of water is very important to all of us. This is why I am very concerned about the significant damage which could occur to the Strait, should Northern Pulp be approved to dump effluent into it. And I believe there are significant gaps in the information provided, which do not effectively address the potential detrimental effects.

Given the size of the the report, I decided to focus specifically on Point 9.1 of the Terms of Reference; specifically:

Complete baseline studies for fish and shellfish tissue (via chemical analysis) of representative key marine species important for commercial, recreational and Aboriginal fisheries in the vicinity of the proposed effluent pipeline and diffuser location.

I also wish to reference Section 12(da) of the Nova Scotia Environmental Assessment Regulations:

12. All of the following information shall be considered by the Minister in formulating a decision under subsection 34(1) of the Act:

...

(da) whether environmental baseline information submitted under subclause 9(1A)(b)(x) for the undertaking is sufficient for predicting adverse effects or environmental effects related to the undertaking; ...

As I reviewed the information provided in Appendix 9.1, I believe the baseline chemical analysis data provided are **NOT** sufficient to be used for predicting or detecting any adverse effects of the proposed effluent, given the very small sample sizes (number (n) = 5; sometimes, only n = 2). In addition, any estimate of a population parameter must also include a measurement of the amount of variability (e.g.

variance, standard deviation, standard error of the mean, confidence interval) in the sample values, and these are missing from the presented data. (Note: The formulas used to calculate the required sample size to estimate a population parameter require the input of this measure of variability in the population.)

Also, estimation of a population parameter through sampling must also ensure that the sampled animals are truly representative of the population. Often there are factors, both intrinsic to the animal (e.g. age, gender, size, metabolic rate) and extrinsic to it (e.g. temperature, environmental conditions, water salinity), that may affect the parameter being estimated. In these situations, more detailed sampling procedures must be taken, to address these sources of variability, and sub-population specific estimates may be required.

Reference:

1. **Sergeant, E.; Perkins, N. 2015. Epidemiology for field veterinarians: An introduction. Chapter 8: Sampling populations. CABI, Oxfordshire, UK. ISBN-13: 978 1 84593 691 4 (paperback).**
2. **Any statistics textbook.**

For example: Given that we are looking at poikilotherm (cold blooded) species, I would argue that it would be important to collect adequate samples from these species both in the warmest temperatures (when their metabolisms would be highest) and the coldest temperatures (when their metabolisms are slowest), because the differences in metabolic rates could result in different levels of accumulation of toxins, and subsequent deleterious effects.

(Please note: As I scanned other parts of the report, there were other instances where either the number of samples were not adequate in number (e.g. Section 4.1 - Caribou Harbour water samples - number of samples = 6), or were not even listed, or where potential sources of variability in the estimated parameters (e.g. temperature) were not considered in the sample collection plan.)

Given the lack of adequate baseline data in Appendix 9.1 (and likely in other sections, but not enough time to fully document them), I believe that **Northern Pulp's submission has not provided the Minister with the required data to enable the proper and rapid identification of negative impacts of the proposed effluent on the important marine species residing in the Northumberland Strait. This contravenes the requirements set out in Section 12 (da) of the Nova Scotia Environment Assessment Regulations.**

Given the above, I strongly request that the Minister reject the proposed project, as there are too many potential risks that have not been adequately addressed.

Thank you for the opportunity to voice my concerns with this project. Please contact me if you have any questions about my submission.