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Alternative Salinity Evaluation; Description and Benefits of an Additional Line of Evidence Accepted by BC Oil and Gas Commission

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BIOGRAPHY

Daniel Gorsic is a professional chemist and a contaminated sites practitioner with 25 years of experience. He is the CEO of SynergyAspen Environmental Inc. SynergyAspen provides contaminated sites, reclamation and natural sciences consulting services in northeast BC and northwest Alberta. SynergyAspen's purpose is to protect and improve the environment. He is passionate about accurately identifying muskeg contamination. This motivated him to work on the project he's presenting.

ABSTRACT

The BC Oil and Gas Commission (OGC) now accepts an Alternative Salinity Evaluation as an additional line of evidence to determine sodium and chloride concentrations in organic soils such as muskeg. This approach can be used for Certificate of Restoration (CoR) applications at Upstream Oil and Gas sites.

An accepted alternative lab method (a modified saturated paste) was recommended by SynergyAspen as a result of a research project funded by BC ORGIS. The alternative lab method measures the salt concentration in muskeg pore water. This departs from the standard saturated paste method that measures salt concentrations in muskeg "soil". The alternative lab method eliminates two major biases as follows:

1. Denominator Bias

   Lab results for the standard saturated paste method are expressed as weight (mg) of contaminant (i.e. sodium or chloride) divided by the dry substrate weight (i.e. muskeg). Let's assume a sample of wet muskeg weighs 1kg, contains 10 mg of sodium, has a water content of 90%, and the density of dry muskeg equals that of water. The reported analytical result would be 10 mg of sodium divided by the weight of dry muskeg (100 mg). The reported analytical result is 100 mg/kg; ten (10) times higher than the actual sodium concentration present in the wet muskeg in the environment.

2. Numerator Bias

   Salt dissolves in water. When muskeg samples are collected, salty water is unintentionally and unavoidably lost. Since the standard saturated paste method reports a ratio of mass (mass of sodium or chloride divided by mass of dry muskeg), salty water lost during sampling can bias low reported lab results. Let's assume 50% of the salty water within a volume of muskeg was lost during sampling (i.e. the lost salty water never made it to the sample jar). The reported mass of sodium reported by the lab would decrease by 50%. The analytical result would therefore be one half (or 50%) of the sodium concentration in the environment.

Using the Alternative Salinity Evaluation line of evidence, industry in BC should use the modified saturated paste method and compare these lab results (reported in mg/L) to new proposed guidelines. The new guidelines are a result of a research project completed by Hemmera funded by BC ORGIS. The modified saturated paste method may avoid unnecessary spending of ten's of millions/year in our BC O&G industry, by avoiding unnecessary delineation and remediation of falsely identified salt contamination in muskeg. This is good for the environment and for environmental budgets.

We will provide an overview of SynergyAspen's research project, an explanation of the Alternative Salinity Evaluation, and benefits of using this line of evidence. The overview includes a "Bill Nye" type demonstration of the two major biases of the standard saturated paste method. The demonstration uses lab beakers, water, table salt and coffee mixing straws to simulate muskeg. As more industry representatives and decision makers understand the two major biases, the easier it may become for broader recognition of the modified saturated paste method.