January 13, 2024

Attention: Richard Dwyer (Nunavut Water Board)

To: Karén Kharatyan (karen.kharatyan@nwb-oen.ca), Richard Dwyer (richard.dwyer@nwb-oen.ca), and Robert Hunter (robert.hunter@nwb-oen.ca), Nidhi Singh (nidhi.singh@nwb-oen.ca)

VIA EMAIL

Subject: **Eureka High Arctic Weather Station - Type A Water Licence (8AC-EUR2331)**

Response to CIRNAC and GN-ENV Comment Letters dated December 3, 2024, regarding the ECCC Request to use Site Specific Target Levels for Remediation, submitted June 26, 2024;

Dear Richard Dwyer,

On June 26, 2024, Environment and Climate Change Canada (ECCC) submitted a request to apply Site Specific Target Levels (SSTLs) for soil to ensure compliance with the Water Licence Part E, Item 17 for the Eureka High Arctic Weather Station (HAWS). Following a public consultation period, responses were received by ECCC from Fisheries and Oceans Canada (DFO), Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), and Government of Nunavut's Department of Environment (GN-ENV). On October 16th and 24th, ECCC met with CIRNAC and GN-ENV respectively, to discuss and provide additional guidance / support on the intended CCME Tier 3 Approach and SSTL derivation for application at the Eureka HAWS and to address concerns raised in the response letters. Subsequently, on November 15th, 2024, ECCC provided a detailed formal written response to specifically address each comment and concern raised by CIRNAC and GN-ENV. ECCC received brief response letters from CIRNAC and GN-ENV on December 3rd, 2024, in response to our November submission.

This letter summarizes ECCC's approach for remediation of Petroleum Hydrocarbon (PHC) impacted soils at the Eureka HAWS. We believe the supporting information and evidence provided to date and within the following paragraphs strongly and scientifically demonstrates that our approach provides the best path forward for the protection of environmental health at Eureka now and in years to come.

Landfarm Remedial Strategy for Eureka HAWS

In 2021, prior to the adoption and approval of the Remedial Action Plan (RAP), ECCC retained soil chemists from the National Research Council to conduct a PHC Biodegradation Feasibility Study to ensure that landfarming of PHC impacted soils would be successful at Eureka (Eureka PHC Biodegradation Feasibility Report, NRC, December 2021, D. Juke, k. Callender, D. Manno), given the extreme Arctic conditions. A laboratory-based study, using soils

gathered at various areas at Eureka, determined that landfarming could be successfully applied to treat PHC impacted soils at Eureka if this work was done in conjunction with commercial soil additives and amendments. The 2023 Remedial Action Plan (Updated Remedial Action Plan at the Eureka High Arctic Weather Station, Nunavut, March 2023, DOJV.) presented and recommended landfarming as the best remedial strategy for addressing PHC impacted soil at Eureka HAWS. The Landfarm was approved by the Nunavut Planning Commission (NPC) and Nunavut Impact Review Board (NIRB) on February 22, 2021.

CCME Tier 3 Approach

Tier 1 – Feasibility **-** ECCC has applied the CCME Tier 3 risk-based approach in the development of SSTLs for application at the Eureka HAWS. We believe that the generic Tier 1 guideline-based approach is not appropriate for application at Eureka, as site conditions are unique, and exposure pathways, contaminants, receptors and other site characteristics differ significantly from the assumptions used to develop the generic Tier 1 environmental quality standards and guidelines. It should be noted that irrespective of which Tier is considered, the high level of environmental and human health protection required at each Tier is the same (Canada-Wide Standards for PHCs in Soil, CCME, Rev. Jan. 2008).

Limitations for application of the CCME Tier 1 guidelines-based approach include:

- The incorporation of a vast range of generic land uses, including agricultural, residential/parkland, and commercial/industrial scenarios. For the residential/parkland guidelines that were applied at the Eureka HAWS in the screening step, it assumes that a human is living at the site year-around and has a backyard garden. This scenario is entirely irrelevant at Eureka given the extreme Arctic conditions and the commercial/industrial site use. Furthermore, Tier 1 assumes generic exposure pathways that do not align with the specific environmental and operational nature of the weather station. For example, residential/parkland or recreational land use is irrelevant due to the absence of permanent residents or outdoor recreational activities and toddler exposure.

- Tier 1 assessments rely on standard southern ecological receptors that may not represent the specific Arctic flora and fauna and habitat present at Eureka.

Tier 3 - Application

The proposed application of SSTLs at the Eureka HAWS is based on the CCME guidance for a Tier 3 risked-based approach (RBA) (CCME, *Guidance Document on the Management of Contaminated Sites in Canada*, 1997, pg. 25) and the Federal Contaminated Sites Decision-Making Framework (*https://www.canada.ca/en/environment-climate-change/services/federal-contaminated-sites/decision-making-framework/step-7-develop-remediation-strategy.html;* Step 7). The use of Tier 3 RBA to derive SSTLs is widely accepted as a feasible method for addressing impacted sites across Canada. As an example, the remediation of DND Distance Early Warning (DEW) Line sites in many parts of Nunavut also utilizes a CCME Tier-3 RBA. The Abandoned Military Site Remediation Protocol Vol 1 sets the criteria for light PHC F2 at 11,000 mg/kg based on Human Health, when > 30m from a waterway. The current project is proposing 7,800 mg/kg for F1 and 4,100 mg/kg for F2 at Eureka, which are consistent.

In application of reference information provided within the above paragraph, a Tier 3 RBA can be applied when:

> "…site conditions are unique or particularly sensitive and would limit the effectiveness of generic criteria, a risk assessment approach may be used to determine if the existing contamination/site conditions represent a risk. … if costs of remediating to guideline levels are too high, if the site is particularly large and complex, if the environmental impacts of using available remediation techniques are unacceptable…a risk assessment may be warranted."

ECCC has carefully considered the application of the Tier 3 RBA in respect of unique site conditions within a heightened ecologically sensitive Arctic environment. In addition, the application of generic criteria and the remedial strategy (dig and dump) associated with achieving a Tier 1 based remediation guideline does not consider a holistic approach to Site remediation, since:

- It would be doubtful that soil treatment within the landfarm could achieve Tier 1 guidelines in a reasonable timeframe and as such removal and potential shipment of soils not meeting Tier 1 guidelines to the south would release a massive amount of GHG emissions and contribute to further climate change.

- The sheer volume of soils to be removed from the site to meet Tier 1 levels would predictably leave an expansive and detrimental scar in the landscape of the Eureka HAWS, which would be far greater than if the proposed Tier 3 SSTLs were applied at the site to address the 10,000 m^3 of soil currently estimated to require treatment. Creation and restoration of such a large disturbance to meet Tier 1 guidelines would first require extensive excavation. Subsequent backfilling from area borrow sources or grading into the surrounding area, would further contribute an unnecessary disturbance of the Arctic environment. Leaving the excavation open is not and option, as that would increase site liability, while creating irreversible damage on the sensitive permafrost conditions. Wildlife presence and natural restoration by already sparsely populated native plants would take an excessive number of years to recover due to larger than necessary terrain disturbance and cold Arctic temperatures.

- The cost associated with remediation to anything other than Tier 3 guidelines would be prohibitively expensive, as the cost of shipping the native Eureka soils to a landfill in the south of Canada alone makes this option not feasible. Furthermore, soil staging, transport south and final disposal comes with extreme logistical concerns and elevated environmental and health and safety risks making this option impractical and potentially unachievable.

We strongly believe that for the reasons stated above, the risk assessment and application of Tier 3 guidelines proposed by ECCC is the most viable option for addressing PHC impacted soils at the Eureka HAWS in consideration of the whole picture of current and future impacts to the environment, logistics, health and safety and costs.

HHERA Development and Guidance Documents

It should be clearly noted that the Human Health and Environmental Risk Assessment (HHERA) conducted for the site was developed taking into account the unique and sensitive

ecosystem of the Eureka HAWS. The HHERA was a comprehensive assessment focused on determining the potential for contaminants of concern (CoC) to impact site-specific receptors. The HHERA utilized site-specific environmental data, modelling, and lines of evidence to make defensible conclusions. Disregarding the HHERA process is akin to disregarding the scientific basis that was used to develop the generic wide-sweeping ultra conservative Tier 1 guidelines.

To further reinforce ECCC's Tier 3 RBA is the guidance document developed by the Government of Nunavut entitled: Environmental Guideline for Management of Contaminated Sites. This guidance document similar to the Federal Contaminated Sites Decision-Making Framework (DMF) and the CCME Guidance Document on the Management of Contaminated Sites in Canada which indicates that a Tier 3 risk-based approach is both endorsed and recommended for remediation in Nunavut for remote areas where off-site removal of soil costs are prohibitive and where site-specific conditions, receptors, and exposure pathways differ significantly from those assumed in the development of the generic environmental quality standards and guidelines (Government of Nunavut, December 2014. Pg 21). In accordance with the listed guidance above, Tier 3 guidelines are most certainly applicable to Eureka not only because off-site removal of soil would be prohibitively expensive but would also cause other significant impacts such as larger excavations, damage to permafrost, requirement for more backfill, and more GHG production in the process. Using Tier 3 RBA to drive the remediation is a much more sustainable approach for contaminated site management in the Arctic environment than applying generic guidelines

Johnny's Hole – Placement of soils which meet SSTLs

The placement in Johnny's Hole is proposed as part of the RAP for soils with PHC concentrations which meet SSTLs. This soil would either originate from treatment at the Landfarm which has reduced the PHC concentrations to meet the SSTLs, or material that has been excavated for infrastructure projects and meets SSTLs but exceeds Tier 1 levels.

The remediated soils will be tested prior to removal from the landfarm to ensure they meet the SSTLs and as such do not represent a risk to human or environmental health. The below SSTL soils when placed in the unlined Johnny's Hole area will be graded to ensure that site restoration matches the surrounding slope and vegetative landscape minimizing any potential erosional concerns. Additionally, it is anticipated that natural attenuation will further reduce PHC concentrations as the amendments added to soils while in the landfarm will continue to promote aerobic and anaerobic degradation of PHC concentrations, even after soil treatment, removal from the landfarm, and final placement at Johnny's Hole.

To address potential concerns that migration of unacceptable concentrations of CoCs could occur from remediated soils placed at Johnny's Hole, an adaptive management program will be established. Given the location of the site in the high Artic, it is not anticipated that a significant groundwater transport pathway is present because of the shallow depth to permafrost. Meltwater or rain on Johnny's Hole would instead remain in the shallow active layer / seasonal surface aquifer with little movement due to is generally flat topography and short non-frozen period.

An environmental monitoring program, including erosion and vegetation monitoring and analytical analysis of both soils and surface water will be implemented. To establish a pre-remediation point of reference, any pre-established limited vegetation in the vicinity surrounding Jonny's Hole will be further documented and baseline concentrations of potential

CoCs in both soil and surface water concentrations established. After the remediated soils with concentrations below SSTLs are placed in Johnny's Hole, surrounding conditions will be monitored, through vegetation and slope / erosion inspections and environmental sampling of soil and surface water downgradient of Johnny's Hole.

Site observations and analytical results from the environmental monitoring program will be presented within the annual report and distributed to the NWB, which may be shared with CIRNAC and GN-ENV, upon request. If concerns (foreseen/unforeseen) are noted during the post remediation monitoring period, contingency / mitigative measures can be reviewed to address concerns. Modifications to the post remediation portion of the RAP could be considered, developed and implemented, through engagement with NWB, CIRNAC and GN-ENV.

Conclusion

ECCC are actively remediating the PHC contamination at the Eureka HAWS using the best tools and widely acceptable science-based approaches, while upholding all permitting and licensing requirements. ECCC has been responsibly assessing and managing the contamination using well-established and industry-accepted practices through completion of environmental site assessments (ESAs), a remedial option analysis (ROA), a site specific HHERA, and a resulting site-wide RAP. We have also constructed lined temporary holding cells, with the construction program underway for the landfarm, designed to implement the goals of the RAP, slated for implementation in 2025.

Based on the information provided in this letter and previously submitted documents and in consideration of meetings, presentations, discussions and letter correspondence from all parties, ECCC seeks to obtain licensing approval from NWB for the following:

1. That the SSTLs developed (using the Tier 3 CCME Approach) are appropriate as the remediation objectives at the Eureka HAWS and will be included within the Water License.

2. That the Eureka HAWS Updated RAP (2023) meets the requirements of the Water Licence,

3. That SSTLs can be applied at Johnny's Hole.

4. At Johnny's Hole, ECCC will implement an annual soil and water monitoring program to track pre and post environmental conditions. This work will allow discussion of potential or actual concerns, identified through execution of this monitoring program, CIRNAC and/or GN-ENV. Implementation of mitigative measures, will occur if deemed appropriate.

ECCC believes that its approach to addressing environmental concerns at the Eureka HAWS is protective of human and environmental health and strives to ensure that not only its legal obligations, but moral obligations are met by safeguarding the natural environment from future

harm. We look forward to receiving the requested supports and approvals so that we can move forward on the next phases of the RAP for the Eureka Site.

Sincerely,

Mark Konecny