Environmental Protection Operations Directorate
Prairie & Northern Region
5019 52nd Street, 4th Floor
P.O. Box 2310
Yellowknife, NT X1A 2P7

ECCC File: 6300 000 004/004
NWB File: 1BR-FTA1828

May 21, 2021

via email at: licensing@nwb-oen.ca

Richard Dwyer,
Manager Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

Dear Richard Dwyer

RE: 1BR-FTA1828 – Transport Canada – Apron LTU, Cambridge Bay Airport, Victoria Island, Nunavut – Abandonment and Restoration Plan and Preliminary Quantitative Risk Assessment

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Nunavut Water Board (NWB) regarding the above-mentioned Abandonment and Restoration Plan and Preliminary Quantitative Risk Assessment (PQRA). You will find our Final Written Submission attached.

ECCC's specialist advice based on our mandate pursuant to the *Canadian Environmental Protection Act* and the pollution prevention provisions of the *Fisheries Act.*

The following comments are provided:

1. Spelling/grammar/editorial

Reference(s):

PQRA, Apron LTU, Cambridge Bay Airport, Victoria Island, NU (2021); 1.0 Introduction, pdf page 9

Comment:

The last sentence of the first paragraph states: "Although environmental assessment work related to the Apron LTU typically includes the Apron excavated area, for the purposes of this PQRA, the Apron excavated area is included in the current scope of work."

ECCC Recommendation(s):

ECCC recommends the Proponent clarify if the sentence is supposed to state that the Apron excavated area is “excluded in the current scope of work.”

2. Aquatic Receptors

Reference(s):

PQRA, Apron LTU, Cambridge Bay Airport, Victoria Island, NU (2021); 5.1 Problem Formulation, 5.1.2.1 Habitat Information and Species at Risk, pdf page 24.

PQRA, Apron LTU, Cambridge Bay Airport, Victoria Island, NU (2021); 5.1 Problem Formulation, 5.1.2.2 Identification of Receptors, Table 5-1: Rationale for the Inclusion/Exclusion of Receptor Types, pdf page 25

Comment:

Section 5.1.2.1 indicates that an unnamed ephemeral water feature is located approximately 200 m north of the Apron LTU, and several freshwater features are located in close proximity to the Site according to Figure 1. However, Table 5-1 only includes the off-site marine aquatic community in Cambridge Bay as a valued ecosystem component.

ECCC Recommendation(s):

ECCC recommends that the potential for a freshwater aquatic community (e.g., plants/invertebrates) from both the ephemeral water feature and any other freshwater bodies present be included in Table 5-1 with rationale supporting the inclusion/exclusion of freshwater aquatic receptors in the ERA.

If freshwater aquatic receptors are included as a valued ecosystem component, subsequent sections of the ERA need updating to include these receptors.

3. Fire Training Area (FTA) Land Treatment Unit (LTU)

References:

PQRA, Apron LTU, Cambridge Bay Airport, Victoria Island, NU (2021); 2.0 Site Characterization, 2.1 Site History, pdf page 11.

PQRA, Apron LTU, Cambridge Bay Airport, Victoria Island, NU (2021); 2.0 Site Characterization, 2.3 Data Used in the PQRA, pdf page 12.

Federal Contaminated Sites Action Plan (FCSAP), 2018. Interim Advice to Federal Custodian Departments for the Management of Federal Sites Containing Perfluorooctane Sulfonate (PFOS) and other Per-and Polyfluoroalkyl Substances (PFAS).

Comment:

It is noted that starting in 2016, soil, groundwater and sump water from the Apron LTU were analyzed for per- and polyfluoroalkyl substances (PFAS) (PQRA, Section 2.1). Data generated from these samples, from the Apron LTU were used in the Preliminary Quantitative Risk Assessment (PQRA) (PQRA, Section 2.3). Given that PFAS are used in aqueous film forming foams (AFFFs), and that these foams are typically used during fire fighting training activities, it is likely that PFAS may be elevated in the environment at some of these training areas (FCSAP, 2018). It is not clear why the PQRA for PFAS was conducted using sample data collected from only the Apron LTU, when the adjacent fire training area (FTA) LTU may have higher concentrations of PFAS.

ECCC Recommendation(s):

The Apron LTU and the FTA LTU are adjacent to one another. If data has been generated from environmental samples collected from the FTA LTU, ECCC recommends comparing PFAS data from the FTA LTU with those used in the Apron LTU PQRA to assess whether the conclusions drawn with respect to PFAS from the Apron LTU PQRA are still valid.

4. PFAS Toxicity

References:

PQRA, Apron LTU, Cambridge Bay Airport, Victoria Island, NU (2021); 5.0 Ecological Risk Assessment, 5.3 Uncertainty Evaluation, 5.3.4. PFAS Toxicity, pdf page 31.

Arctic Monitoring and Assessment Programme (AMAP) Assessment 2016: Chemicals of Emerging Arctic Concern; Chapter 3 Biological and toxicological effects of chemicals of emerging concern.

Comment:

The proponent states that little is known at this time about the toxicity of PFAS to ecological receptors, what is known is limited to only a few substances (e.g. PFOS), and that it is assumed that any toxicological risks associated with exposure to PFAS are acceptable (PQRA, Section 5.3.4). While ECCC recognizes that ecological and human health risk assessments of most PFAS are still in early development (AMAP, 2016), and that toxicity reference values are not well characterized for the majority of PFAS, limited information is provided in the PQRA to justify the claim that toxicological risks associated with exposure to PFAS are acceptable.

ECCC Recommendation(s):

ECCC recommends including more information in the PQRA to justify the claim regarding the uncertainty of PFAS toxicity, especially with respect to PFAS that are detected at elevated concentrations relative to PFOS and PFOA in groundwater, such as, but not limited to PFBA, PFHpA, PFHxS, PFHxA, and PFPeA.

5. Summary and Recommendations

References:

PQRA, Apron LTU, Cambridge Bay Airport, Victoria Island, NU (2021); 7.0 Summary and Recommendations, pdf page 34.

United Nations Stockholm Convention, protecting human health and the environment from persistent organic pollutants. *The new POPs under the Stockholm Convention* (accessed May 19, 2021 at: http://www.pops.int/TheConvention/ThePOPs/TheNewPOPs/tabid/2511/Default.aspx).

Comment:

PFAS in groundwater and sump water were measured and identified as ecological contaminants of potential concern (COPCs) in the ecological risk assessment (ERA), but potential risks to marine aquatic life were concluded to be acceptable for a variety of reasons as summarized in Section 7.0 of the PQRA (PQRA, 2021; direct quotes included below):

- *Given the presence of the liner and the berm within the Apron LTU, it is unlikely that sump waters will be migrating to groundwater or into Cambridge Bay. In addition, once the Apron LTU is decommissioned, water will no longer be accumulating in this area.*
- *Given the size of Cambridge Bay and that Cambridge Bay further connects to the Beaufort Sea, dilution of PFAS would occur.*
- *Groundwater discharge into Cambridge Bay would be limited to the area downgradient of the Apron LTU (approximately 180 m to the south) and mobile aquatic species would not spend their lifetime in this one area.*
- *Although immobile aquatic receptors (e.g. benthic invertebrates) could spend their lifetime in the area of groundwater discharge, the purpose of the ERA is to protect communities/populations of a species.*
- *If groundwater is discharging to Cambridge Bay, this process would be limited to the few months in the summer when the active layer thaws. During the colder months, the active layer would be frozen limiting any groundwater migration towards Cambridge Bay.*

At present, the liner and the berm within the Apron LTU stop sump water from migrating to groundwater or into Cambridge Bay; however, once the Apron LTU is decommissioned and the liner and berm removed, it is unclear as to what will happen to surface water that passes through the decommissioned Apron LTU. Is it expected that contaminated surface water will migrate to groundwater and into Cambridge Bay once the Apron LTU is decommissioned? This potential scenario does not appear to be considered.

With respect to dilution of PFAS into Cambridge Bay and by extension the Beaufort Sea; it is unclear whether this explanation (dilution of PFAS) is provided as a reason for why PFAS contamination is unlikely to be an issue for local marine aquatic life, or whether dilution is

being considered as an approach to discard sump water as part of the decommissioning activities.

It is acknowledged that immobile aquatic receptors (e.g. benthic invertebrates) could spend their lifetime in the area of groundwater discharge, and that the purpose of the ERA is to protect communities/populations of a species, however, no details are provided as to whether bioaccumulation of PFAS in aquatic invertebrates could result in the biomagnification of these compounds in species that occupy higher trophic levels in the marine food web, including avian species at risk (e.g. Red Knot, Red-necked Phalarope, and Buff-breasted Sandpiper).

ECCC Recommendation(s):

Given that certain PFAS, such as PFOS and its related chemistry (added to Annex B of Stockholm Convention, 2009), PFOA and its related chemistry (added to Annex A of Stockholm Convention, 2019), and PFHxS and its related chemistry (proposed for listing under the Stockholm Convention), are COPCs here, ECCC recommends:

(1) That additional details be included with respect to how PFAS will be prevented from migrating to groundwater and into Cambridge Bay once the Apron LTU is decommissioned;

(2) That additional details regarding the removal of sump water and PFAS contaminated soils from the Apron LTU are provided, and that alternative measures to dilution are considered for the removal of PFAS from the Apron LTU (and potentially the FTA LTU);

(3) That additional exposure pathways, such as the consumption of marine invertebrates by higher trophic species, such as avian species at risk (e.g. Red Knot, Red-necked Phalarope, and Buff-breasted Sandpiper), be included in the ecological risk assessment for the Apron LTU.

6. PFAS in Sump Water Relative to Groundwater

References:

PQRA, Apron LTU, Cambridge Bay Airport, Victoria Island, NU (2021); 2.0 Site Characterization, 2.1 Site History, pdf page 11.

PQRA, Apron LTU, Cambridge Bay Airport, Victoria Island, NU (2021); Appendix C Screening Tables, Table C-5 Ecological Screening of Groundwater Analytical Results.

PQRA, Apron LTU, Cambridge Bay Airport, Victoria Island, NU (2021); Appendix C Screening Tables, Table C-6 Ecological Screening of Sump Water Analytical Results.

Comment:

As per site history, PFAS were detected in Apron LTU soil and sump water, and once detected, sump water was recirculated to eliminate discharge to the environment (PQRA, Section 2.1). ECCC notes that maximum PFAS concentrations are elevated in groundwater samples (PQRA, Appendix C, Table C-5) relative to sump water samples (PQRA, Appendix C, Table C-6), however data interpretation is limited to the comparison PFAS concentrations

with environmental guidelines. It is not clear what ramifications, if any, elevated concentrations in groundwater relative to sump water will have on PFAS being released to the marine environment, potential impacts to wildlife receptors, and the long-term objectives at the site (i.e. remediation of soil and decommissioning of Apron LTU).

ECCC Recommendation(s):

ECCC recommends that additional data interpretation be completed to explain differences in PFAS concentrations in measured environmental media (soil, groundwater, sump water) and how the fate of PFAS in these environmental compartments can inform the degree to which PFAS may be entering the marine environment, potential exposure to wildlife receptors, and whether long-term objectives at the site can still be achieved.

7. PFAS in Sump Water

Reference:

Abandonment and Restoration Plan, Cambridge Bay Airport Apron Land Treatment Unit, Version 3, Final Report (2021); 4.0 Final Closure Approach, 4.1 LTU Operation and Soil Sampling Program, 4.1.1 Sampling Plan, page 7.

Comment:

With respect to the remediation of sump water, the final closure approach states that "*sumps will continue to be dewatered as necessary, and the sump water will be discharged over the Apron LTU as the water management strategy until the risk associated with PFAS have been assessed* (Abandonment and Restoration Plan, 2021)." It is unclear whether alternative measures rather than direct discharge to the Apron LTU has been considered. For example, could the sump water have been passed through a passive active carbon filter, rather than being directly discharged?

ECCC Recommendation(s):

ECCC recommends determining the feasibility of utilizing alternative measures, such as passing water through a passive active carbon filter to manage sump water, rather than through direct discharge to the Apron LTU.

If you need more information, please contact Jennifer Sabourin at Jennifer.Sabourin@Canada.ca.

Sincerely,

Jennifer Sabourin
Environmental Assessment Officer
cc: Jody Small, Acting Head, Environmental Assessment North (NT and NU)