Resolute Bay Airport Sewage Lagoon Department of Economic Development and Transportation Spill Contingency Plan

Introduction:
The purpose of the Spill Contingency Plan for the sewage lagoon at the Resolute Bay Airport is to provide the facility operators with a methodology that will enable them to safely, quickly and effectively deal with accidental sewage spills caused by a failure of the lagoon berm. Unintended discharge of sewage effluent from a retention lagoon has the potential to cause direct harm marine habitat and indirectly to land-based ecosystems. It is for these reasons that quick response, continued monitoring, and utmost care in how mitigation and repair are carried out are of the utmost importance.

Location, General Historical and Geological context, Vegetation, and Climate:
Resolute Bay Airport is located on the south coast of Cornwallis Island, a part of the Queen Elizabeth Islands, at approximately 74° 43' N Latitude, 94° 58' W Longitude. It is approximately 900 km north of the Arctic Circle. Surficial Geology in the area consists of raised beach deposits of sand and gravel and shattered bedrock from eons of freeze-thaw cycles. The Airport area is on a demarcation between the Allen Bay and Cape Storm Formations. Both of these formations date from the Paleozoic era, consisting of dolomite, dolomitic limestone, limestone, and minor shale and siltstone. The terrain slopes gently towards Allen Bay to the west and Resolute Bay to the south. To the east of the runway the local topography is characterized by steep hills. Resolute Bay is in the zone of continuous permafrost. From most of September through much of July, the ground is typically completely frozen. The depth to permafrost at the airport has been reported to range between approximately 0.5 to 1.4 meters below grade. The average mean annual precipitation is 13 cm. Investigations reveal shallow melt water flow (groundwater flow in the active zone above the permafrost layer) which characterizes the hydrological regime. Vegetation is not varied and sparse, characterized by mosses, lichens, and some species of grass. Winds most often come from the north-northwest at an annual average speed of 21.5 km/hr. Typical high and low mean temperatures for July and January are presented in the table below:

	High (oC)	Low (oC)
July	6.8	1.4
January	-28.4	-35.7

The airport consists of two gravel air strips (a main runway and a cross-wind runway), a gravel apron area, a number of occupied and abandoned buildings and a series of bulk fuel storage tanks (known as the North Camp Tank Farm), above and below grade delivery pipelines. In addition to the existing structures, several former buildings have been demolished or destroyed (some by fire) at the airport. A service road leading from the Hamlet (about 5 km south of the airport), runs parallel to the main runway on the west side of the airport and continues north to a solid waste landfill and a former firefighter training area (currently under remediation), and a sewage lagoon (see Fig. 1 below).

The sewage lagoon is situated about 3 km from the actual Resolute Bay airport facilities and approximately 8 km from the Hamlet of Resolute Bay. The lagoon, a two-celled detention facility, was built sometime in the 1970s, it is believed, by Transport Canada. It was built abutting the large

landfill, also managed by Transport Canada, who, at the time, oversaw the operations of the entire airport site. The relative location of both facilities can be seen in the figure below (lagoon identified by the blue arrow, and the edge of the airport runway indicated by the red arrow).

Fig. 1. Dillon Consulting. Resolute Bay Airport Environmental Baseline Study for Transport Canada, March, 1996

The sewage lagoon was designed by the Canadian Government as an unlined two-cell retention lagoon to service all trucked sewage from all the facilities at and around the airport site, including businesses, government agencies, and residences. At the present time, fewer buildings are serviced, and the approximate annual volume of sewage deposited in the lagoon is 3,640 cubic m, far less than the volume that the lagoon was first intended to treat.

Purpose of this report: This Spill Contingency Report is intended to address procedures to be undertaken in the event of a breach in the berm, causing accidental discharge of effluent into the environment.

The lagoon is located just North-East of the solid waste site (see the enlarged drawing below). Decanting takes place from the lower cell and is designed to be directed to the South-West, through the solid waste site and on to the wetland for further treatment, thence to the ocean outfall.

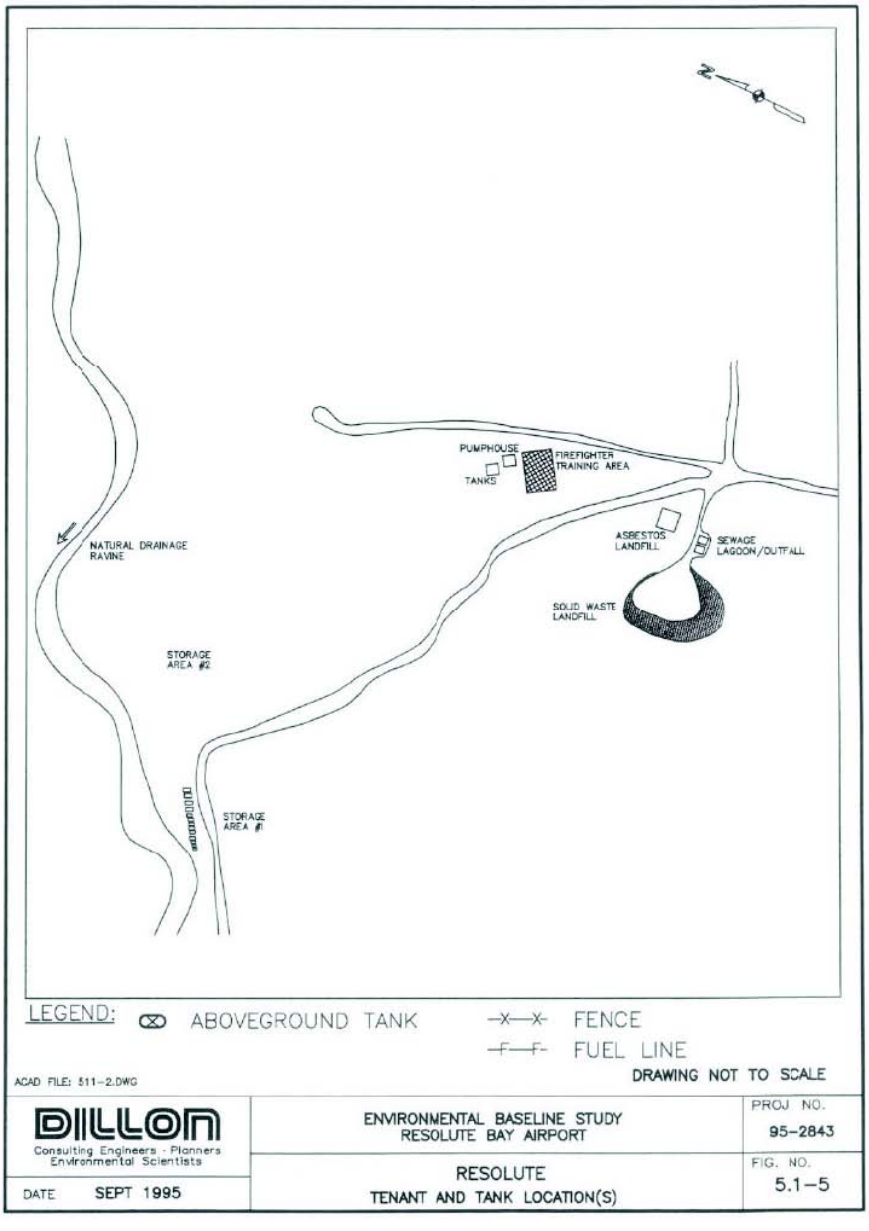

Fig. 2. Dillon Consulting. Resolute Bay Airport Environmental Baseline Study for Transport Canada, March, 1996

From a second Dillon report (1999): "The sewage lagoons are unlined and treatment of the wastewater is accomplished through overland flow to the west and down-gradient of the landfill…Properties for several hundred metres in all other directions from the landfill are currently vacant and have historically been unoccupied."[1]

[1] Dillon Consulting. Resolute Bay Airport Landfill: Environmental Site Investigation for Transport Canada, April, 1999 p. 3

Plan of Action if a Sewage Spill occurs: In the event of a berm breach, causing the unplanned discharge of effluent, the following measures will be taken immediately in order to best protect human health, fish habitat, and the environment:

- The 24-hour Spill Report Line will be called and a spill report filled out and filed (867-920-8130)
- The following government departments and agencies will be notified: -Aboriginal Affairs and Northern Development Canada (AANDC); Water Resources Officer) at: Nunavut District, Iqaluit, NU. Phone: 867-975-4298 Fax: 867-975-6445

  -GN Department of the Environment -GN Department of Community and Government Services (Regional Municipal Planning Engineer)
- Samples of effluent will be taken at the Monitoring Station Number YRB-3 and at the Final Discharge Point as established by the Surveillance Network Program in the Water License, and sent to an approved laboratory for analysis of BOD_5, TSS, and fecal coliform. Laboratory Contact: Caduecon Laboratories
  Caduceon Labs Ottawa
  Phone: 613-526-0123
  Fax: 613-526-1244
  Gord Murphy ; gmurphy@caduceonlabs.com.

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Parameter	Max. Concentration
Fecal Coliforms	1 x 10^6 CFU/dL

These results, along with the estimated volume spilled, will be reported to the above government departments in a written report not more than 30 days after the spill has occurred. The parameters must not exceed those set in the Water Licence:

- The breach will be repaired immediately from nearby stockpiles of compactable granular material, and the leak stopped.

- If, in consultation with the above government departments, a containment berm down-gradient from the spill is deemed necessary, this will be immediately constructed in order to retain the spilled effluent before it enters the marine environment. Included in the decision-making process will be to weigh the potential destruction of the tundra during the containment berm's construction vs the potential threat to the ocean environment. The services of a professional engineer licensed to practice in Nunavut will be retained for this work. The Engineer will provide all required construction specifications and stamped drawings.

- Effluent monitoring will continue on a monthly basis with results sent to the above agencies until the quality of the overland flow is deemed to be within normal parameters.