



**Supporting Documentation
Request for Amendment
IA to Operate and Reclaim Elmworth Energy Brine Pond
(KC#1)**

DATE: March 10, 2009
SUBJECT: Elmworth Energy Corporation
Application for Amendment to Industrial Approval No. 2008-064245
OUR FILE: 07-8198-0300

Dillon Consulting Limited (Dillon), on behalf of Elmworth Energy (Elmworth) is requesting an amendment to the **Industrial Approval to Operate and Reclaim – Elmworth Energy Brine Pond Natural Gas Exploration – Kennetcook, Hants County Approval No. 2008-064245** issued by Nova Scotia Environment and dated November 18, 2008. The request applies to two specific items identified under Section 8 of the Approval:

- a) The Approval Holder shall not discharge brine, wastewater or wastewater sludge from the Site and into the Environment; and,
- c) Wastewater (i.e., brine) and wastewater sludge shall be removed from the pond and directed to a facility approved to handle the waste.

The following is a summation of pertinent information contained within the Application for Approval (dated September 3, 2008):

- The Pond was originally constructed to store fresh water required to complete (frac) the well (KC#1) and formation water returned during the fracturing process. It has a 10,000 m³ capacity and is equipped with a HPDE liner.
- The drill pad around the Pond is bermed.
- Geologically, the Pond site is blanketed by low permeable till.
- Localized wetlands, and generally poor surface drainage is characteristic of the area. The nearest water course (Burns Brook) is roughly 100 m off the southeast corner of the site. Eventual surface water discharge is into the Kennetcook River, over 3 km from the site.
- The nearest groundwater supply (local wells) is approximately 1 km from the site.
- The brine water itself exhibits a high total dissolved solids (TDS) load, primarily due to a high concentration of chloride (~25-50,000 mg/L) and sodium. The levels of iron and manganese are also elevated relative to Freshwater Aquatic Life Guidelines. Organic compounds were present in trace concentrations only.

As stipulated in the Approval to Operate, the water level in the Pond has been gauged on a monthly basis to ensure that a minimum of 1 m free board is maintained. There has been no further addition of brine water into the Pond.

Currently, the Pond surface is covered by a thick (1 m) layer of ice. Core samples taken by Newalta Corporation (Newalta) indicate that the ice contains approximately 1000 mg/L chloride. Iron is non-detect. These conditions have warranted Elmworth to consider a proposal by Newalta to temporarily manage the Pond water by a method referred to as *Freeze Thaw Evaporation (FTE)*. This method of treatment has successfully been used at a number of sites in

Western Canada and the states. The Newalta proposal involves retaining excavators to remove the ice layer (extended arms allowing access to the middle of the Pond without causing damage to the liner). The ice will be placed in the center of the site where it will thaw and infiltrate into the surface. Presumably, the water will undergo significant dilution as it makes its way through the upper aquifer. The existing berms will be enhanced (as necessary) to prevent overland flow.