CASE STUDY

SAVING AN ISLAND ECOSYSTEM

Controlling Subsurface Hydrocarbon Migration in the Canadian Arctic

Challenge: Hydrocarbon migration was threatening to contaminate an arctic island and surrounding waters from leakage at the fuel storage tanks of a Cold War era Canadian Arctic radar site. Inhance’s Fluoro-Seal Barrier technology was successfully used, under extreme environmental conditions, to create a subsurface wall that contained the pollution.

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CHALLENGE

A cold war era radar site, which had been intended to provide early detection of missiles fired from the direction of the North Pole, had utilized hydrocarbon fuels for electricity generation, transportation and heating. Environmental audits had detected leaks from the fuel storage tanks into arctic soils. The hydrocarbon concentrations in the soil were measured at levels up to 19,000 ppm with a distribution of readings indicating that the contaminant plume was moving toward the nearby bay.

PROCESS / COLLABORATION

Inhance’s Fluoro-Seal Barrier technology has been shown to make HDPE geomembranes substantially more resistant to hydrocarbon permeation than untreated HDPE liners. The barrier improvement from the treatment against toluene & xylenes permeation was found to be equivalent to the hydrocarbon attenuation of nearly 1 meter of compacted clay behind a standard geomembrane. With proper design and good quality control practices, HDPE liners are also known to provide continuous containment without degradation in low temperature northern environments.

Due to the difficult working conditions related to wet and cold weather at this site, it was recognized that seaming the geomembrane panels could be problematic. However, the surface modification treatment also allowed an adhesive to be used with the HDPE geomembrane, precluding the need to bring in heat seaming equipment. The seam between HDPE liner panels was overlapped by 150 mm and glued using a traditional epoxy adhesive.

The entire construction project employed 2 laborers and 2 equipment operators and took 21 days. In addition, a native Inuit “bear monitor” was employed to prevent personnel from being “approached” by Polar Bears that are indigenous to the area.
SOLUTIONS

The composite geosynthetic containment barrier wall utilizing a permeation-modified HDPE geomembrane from Inhance to control migration of a hydrocarbon contaminant plume was successfully constructed despite a short lead time and very difficult site conditions. As monitoring of the cut-off wall performance continues, the barrier properties of the HDPE liner play a key role in the success of the pollution containment.

KEY BENEFITS

- Fluoro-Seal barrier treatment process greatly reduced permeation and created a subsurface wall that contained the pollutants
- Treated HDPE geomembranes are more resistant to hydrocarbon permeation than untreated HDPE liners allowing more effective containment
- Surface modification treatment used together with the Fluoro-Seal process allowed an adhesive to be used with the geomembrane, eliminating the need for heat seaming equipment.

APPLICATIONS

- Industrial packaging
- Solvents packaging
- Personal care packaging
- Fuel tanks / containers
- Elastomers
- Medical components
- Household products
- Bulk containers
- Pails
- Particulate sensitive products

ADDRESSABLE PACKAGING CONTENTS

- Agricultural chemicals
- Fuels / fuel additives
- Cleaners / degreasers
- Solvents
- Acetone
- D-Limonene
- Terpenes
- Essential oils
- Industrial chemicals
- Electronic chemicals

Inhance Technologies solutions can be applied in a number of industries to improve product performance and sustainability.