

Assessment and Remediation of a Historical Pipeline Release: Tools, Techniques and Technologies applied to In-situ/Ex-situ Soil and Groundwater Remediation

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In 1977, a significant pipeline release occurred along a 24 inch transmission pipeline now operated by Kinder Morgan Canada. The release occurred near the town of Carvel, Alberta approximately 70 km west of Edmonton. Hydrophobic soils, natural phenols (200 times criteria), shallow groundwater, time related contaminant fate complications, and buried organic soils were a few of the challenges faced during remediation of this site.

Extensive assessment using various techniques that included hydrogeologic isolation and ultraviolet induced fluorescence (UVIF) technology lead to significant regulator involvement, remediation field trials and an eventual combination of in-situ/ex-situ remediation solutions for the site. Approximately 12,000 m³ (18,000 tonnes) of impacted soil was identified during the assessment. In addition to traditional assessment techniques, assessment technologies included the use of UVIF to vertically and horizontally delineate the soil contamination plume. Gas Chromatograph Mass Spectrometer (GCMS) scans of soils were completed to determine contaminant fate in relation to the source material, point of release and time since the release. These technologies helped appropriately identify and delineate the compounds associated the spill event and establish site specific criteria.

The initial groundwater assessment found that groundwater contamination was contained within the soil plume with the exception of total phenols. Additional hydro-geologically isolated wells were installed. Groundwater for the area was modeled to support the theory that total phenols were a result of natural buried organic material rather than a result of the pipeline release.

Based on the assessment results, site specific remediation criteria were determined and several in-situ/ex-situ remediation options were considered including thermal desorption, on-site ex-situ bio-remediation, in-situ chemical oxidation, ex-situ chemical oxidation, bio-venting and a risk based approach. Based on a comparison of these available

technologies, a field trial was completed to assess the feasibility of ex-situ chemical oxidation and in-situ bio-venting.

Final site closure is expected in early 2009 using a combination of the ex-situ and in-situ remediation techniques currently being applied. Remediation of this historical spill demonstrates the value of a staged approach to significant soil and groundwater impacts and the collection of sufficient background information related to supporting site specific criteria and the eventual remediation of impacted material.

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Mr. Neil Reid received his B.Sc. from Laurentian University, in Biochemistry and a Master of Science (M.Sc.) in Applied Ecology from the University of Alberta, Edmonton. Mr. Reid is a Soil Scientist with EBA's Environmental Practice in Edmonton, Alberta. He has experience in a wide range of projects relating to soil science, reclamation, remediation, environmental site assessment, and vegetation research. Mr. Reid has worked in the oil and gas and mining sectors in Alberta, British Columbia, Saskatchewan and Ontario and has specialized in soil and groundwater remediation with a focus on remote and northern sites.

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