

Dutch Advanced In Situ Remediation Technologies in Canada; A Success Story on Canadian-Dutch Co-operation in Canada Between Private Solution Providers Supported by both Canadian and Dutch Governments

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Over the past 20 years, a (now fully matured) remediation industry developed in The Netherlands. In a densely populated, highly industrialized nation such as The Netherlands, pressure on land use is high. After all, The Netherlands fills only a small part of the European Union, which at 4,324,782 km² is less than half the size of Canada (9,984,670 km²). However, with a head-count of 491,582,852, the EU is home to almost 15 times as many inhabitants as Canada, which has a population estimated at 33,487,208.

Groundwater Technology has been an active and innovative player in the Dutch soil remediation market over the past 2 decades. A number of advanced in situ remediation solutions were developed to service the market needs.

Responsible governments in civilized and industrialized nations (such as both Canada and The Netherlands) recognize the need to correct environmental impact caused by human activities. Governments invest to promote remediation to be undertaken.

The Dutch Government implements programs to support international expansion of Dutch business. Under one such programme (2g@there), a number of service providers active in soil & groundwater remediation, formed the Netherlands Soil Platform (NSP). NSP established fruitful contacts with (among others) the Canadian national government and various provincial governments.

Groundwater Technology's participation in these programs resulted in an in situ remediation project (focussing on demonstrating the effectiveness of a technological train using a thermal approach combined to an enhanced chemical oxidation process for the rehabilitation of aquifers contaminated by hydrocarbons) with Technorem, Inc (based in Laval, province of Quebec). The demonstration takes place at a site in and owned by the City of Quebec, Quebec.

The site is a 16000 m² former service station site, contaminated with motor fuels and oils. The volume of impacted soils exceeds 12000 m³. The site is located in the urban area of Quebec City.

The site geology is mixed: 3 m of fill on top of 2 – 4 m of silt, with sand below. Groundwater sits at 3 – 4 m below

ground and groundwater flows rapidly towards a nearby river. The site is currently in use as day-care centre

The development project is unique in its financial structure: it is financed in part by both Canadian and Dutch governmental grants, the City of Quebec, by Technorem and Groundwater Technology.

The train of technologies implemented include: heat enhanced extraction (using steam to heat the soil) to rapidly reduce contaminant mass combined with Multi-phase extraction, further mitigation of the environmental impact using advanced in situ chemical oxidation and bioremediation to polish the results.

This presentation is not just about technology, it will also demonstrate the advantages of international cooperation between private companies, both focussing on providing solutions to soil & groundwater contamination issues, benefitting not just both companies, but both nations as well.

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Yvo M.M. Veenis, director of Groundwater Technology BV, has more than 20 years professional experience in the soil and groundwater consulting & remediation industry. Mr Veenis worked on projects in The Netherlands, Belgium, Germany, United Kingdom, France, Italy, Spain and the USA; Mr Veenis holds an MSc in Hydrogeology from the Free University Amsterdam.