Thermal in-situ remediation – a sustainable choice

Maiken Faurbye[1], Max Jensen[1] Kirsten Rügge[2], Steffen Griepke Nielsen[2], Gorm Heron[3], Ralph Baker[3], Peder Johansen[4], Lone Tolstrup Karlby[4]

[1]Krüger, Gladsaxe, Denmark, [2]NIRAS A/S, Allerød, Denmark, [3]TerraTherm, Inc., Keene, USA, [4]Capital Region of Denmark, Hillerød, Denmark
maf@kruger.dk

Abstract:
In Reerslev, Denmark a hotspot of about 10 tonnes of chlorinated solvents is present in a low permeability clay layer. The hotspot causes a serious risk for the local groundwater resource, which is one of the most important in Denmark and supplies water to 50,000 homes in the capital area.

The thermal in-situ remediation method In-Situ Thermal Desorption (ISTD) has been chosen to remediate the hotspot. Prior to choosing ISTD for source removal at the site it was shown that hotspot remediation by short-term thermal technologies will not only be the most cost-effective but also the most sustainable solution at the Reerslev site.

Less use of resources than by long-term operation
Ahead of designing the thermal project, assessments of cost-effectiveness, environmental pros and cons and potential success rate were made. Furthermore an unbiased Life Cycle Assessment (LCA) was made to compare alternative methods according to environmental parameters such as waste, resource consumption, global warming and remediation efficiency.

In both analyses, in-situ thermal treatment was compared to excavation and to long-term soil vapor extraction (SVE) solutions. Both assessments showed that the environmental impact of carrying out a total excavation of the contaminated area would be at least at the same order of magnitude as would thermal remediation methods. Moreover, both analyses showed that long-term SVE would be associated with a lot more critical impact on the environment compared to the thermal solution.

In addition to the environmental benefits of the thermal solution at the Reerslev site, other advantages will be gained by choosing a predictable and rapid method of site closure. Achieving a high certainty of success within a short timeframe is environmentally as well as socially responsible.

High rate of success means no waste of resources
The low permeability geology and the location of the area adjacent to residential houses and a historic cemetery left only a few realistic remediation alternatives at the site. In addition very strict clean-up criteria were essential to reach the objective of eliminating the groundwater risk.

Risk assessment calculations had shown that a large contaminant mass removal itself would not reach the goal of eliminating the risk to the valuable groundwater aquifer below the site.

To reach the goal of the remediation, all DNAPL at the site has to be removed and the post-treatment soil concentrations of chlorinated solvents had to be less than 1 mg/kg in the entire treatment area. An unsuccessful or inadequate remediation, in this context would be worthless and would simply waste resources. Recent use of the ISTD technology at similar sites in Denmark and the US has shown that the outcome is very predictable, and that the remediation goals can be met.

Presentation at the GreenRemediation Conference

At the GreenRemediation Conference, considerations leading to the choice of in-situ thermal remediation at the Reerslev site will be introduced. Since the thermal remediation is expected to be terminated by the end of October 2009 some results from the remediation might be presented also.