

## **Renare Mark 2011**

### **In-Situ remediation – 15 years of remedy on the same site**

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On a site situated close to Copenhagen, Krüger has executed an in-situ remedy for the last 15 years. Different technologies have been used at the site:

Pump and treat combined with oil skimming, Bioslurping, Airsparging and Soil venting have been operated and Cost of Thermal Desorption as source treatment has been evaluated.

The site is contaminated with turpentine (White spirit) caused by a leaking pipe from a underground storage tank. The general geology at the site is 10 m of clay with some sand lenses. Beneath the clay layer 15 m of fairly uniform medium to fine unsaturated sand occurs. The groundwater table is located at 25 m below surface. From 25 to approximately 40 m below surface a sandy aquifer appears. The contamination has spread through the 10 m of clay through the unsaturated zone with NAPL floating on top of the groundwater table.

First step of the remedy was removing free phase NAPL. This was targeted with groundwater pumping and oil skimming. Due to problems with dissolved iron, bioslurping replaced the oil skimming. The dissolved contaminants in the water were treated by Airsparging. The unsaturated sand and the clay layer are treated by two separate soil venting systems.

A total of 20 tons of turpentine was recovered as free phase. 4.5 ton of turpentine has been recovered as soil gas from the clay layer and 22 ton has been recovered from the unsaturated sand.

The presentation will give reflections on the lessons learned at the site e.g. would it have been more economically sound to use a different off gas treatment than GAC. What would have been the cost for short term thermal treatment of the source area in the upper clay instead of maybe 15 – 20 years of soil venting.