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**In-Situ Chemical Oxidation including Ozone/Perzone<sup>®</sup> in the Netherlands Over 5 Years: Review of the SKB Report**

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**Platform Presentation**

In order to improve our understanding of cleanup concepts and options, evaluating experience from other countries is an important part of environmental remediation research. The Netherlands Center for Soil Quality Management and Knowledge Transfer (SKB), has recently prepared a summary document on the use of in-situ chemical oxidation (ISCO) chemical oxidation at several dozen Dutch sites over the past five years. The report presents experiences in the Netherlands with five commonly used oxidants used in in-situ chemical oxidation: Fenton's reagent (liquid), ozone/Perzone<sup>®</sup> (gas/liquid), activated persulfate (solid/solution), ozone (gas) and permanganate (solid/solution). The oxidation potential, according to SKB of these five oxidants is 2,800, 2,800, 2,600, 2,600 and 1,700 mV, respectively. SKB noted that the most favorable ambient factor for ISCO application is highly permeable soils. General findings were that contaminated sites were rapidly remediated (< 5 years) compared to pump-and-treat (> 30 years) and air sparging (< 10 years). ISCO served as a cost effective treatment of source areas. Ozone/Perzone<sup>®</sup> was found particularly effective as a low cost treatment of groundwater plume regions and ozone was favorably applied to unsaturated soils as well. The advantages and limitations of ISCO are discussed in detail, including which soil parameters determine the feasibility of ISCO, the limitations of pollution load, addressing thickness of LNAPL and DNAPL, and the environmental outcome of ISCO remediation. SKB noted the general simplicity of the overall ISCO techniques and the fast degradation of the contaminants as benefits of ISCO. A price per cubic volume of contaminated soil is given for different oxidants based on the Dutch study. SKB remediation decision charts for ISCO will also be discussed.

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