New Remediation Technology Formed by Combining Two Well Established Remediation Technologies: In Situ Stabilization (ISS) and In Situ Chemical Oxidation (ISCO)

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Background / Objectives: In situ stabilization (ISS) and in situ chemical oxidation (ISCO) are well-established remediation technologies that have been used to treat MGP contaminated sites since the late 1990s. ISS reduces the spread and leachability of contaminants by reducing the soil's hydraulic conductivity, decreasing pore space, and binding some contaminants while provided the desired soil stability. Potential disadvantages of ISS as a remediation method are that the contamination is left in place maintaining environmental liability and that the addition of binders can cause soils to swell (increase in volume), which requires treatment or disposal. Alternatively, ISCO works by reacting with and breaking down organic pollutants and attacks in the first stage more mobile and easily soluble compounds but can be costly at very high contamination levels combined with strict remedial goals. In recent years, a combination of these two technologies has increased in popularity for heavily contaminated, including MGP, sites, after showing a more complete and cost-effective solution as opposed to applying either technology alone. Bench and field data will be presented from two full-scale applications at MGP sites.

Approach / Activities: ISCO/ISS has been evaluated in a series of bench and pilot-scale tests where varying dose combinations of sodium persulfate with different binders were analyzed based on its effect on soil stability, hydraulic conductivity and leaching. This presentation will provide a history of the development of the two technologies, review scientific theory and discuss the limitations of each technology. Data from bench scale experiments and field applications will be presented to illustrate how both concentration and stabilization goals can be achieved in a combined application.

Results / Cost Efficiencies / Lessons Learned: Data show that addition of the oxidizing agent sodium persulfate can make an ISS application more efficient by reducing the total amount of additives (binder + oxidizing agent). This in turn reduces the mass of soil that is displaced and the need for further handling and disposal of excess soil masses. A combined ISCO / ISS strategy can thus result in significant cost and energy savings. Addition of sodium persulfate has also resulted in lower hydraulic conductivity and higher strength compared to soils treated with cement only at a similar dose of cement. Data from field trials will illustrate a reduction in the concentration of more mobile substances such as benzene, naphthalene, and other lighter petroleum products to under exposed action targets, while remaining heavier hydrocarbons were bound with the addition of binders and achieved the targets for reduced leachability.

Biography

Stacey Telesz

Stacey Telesz is the Western Technical Manager at Evonik and has twenty years of experience in the environmental remediation industry. She graduated from Michigan State University with a Bachelor of Science in Civil Engineering. Stacey started her career in helping engineers with technical assistance and design of gas vapor barriers used to prevent vapor intrusion into buildings. She has been with Evonik (formerly PeroxyChem) for over twelve years, where she covers the Western Region helping clients remediate sites with Evonik's broad portfolio of technologies for soil and groundwater remediation. She resides in Newport Beach, CA and helps with clients West of CO including Western Canada.