

Surfactant Enhanced In-Situ Chemical Oxidation Treatment of MGP Contaminants



Field application of the VeruTEK surfactant-chemical oxidant mixture. VeruTek's chemical oxidation process will be evaluated for its effectiveness in cleanup of contaminated soil and groundwater at former manufactured gas plant sites.

- Evaluate the VeruTEK Surfactant- Enhanced In-Situ Chemical Oxidation process for cleanup of MGP site soil and groundwater contamination
- Evaluate laboratory bench-scale test results versus pilot-scale performance in the field
- Determine fate of VOC & PAH concentrations, soil type and coal tar post-treatment
- Examine potential to eliminate latent effects of treatment such as contaminant rebound, fate of surfactant and oxidant, soil property changes, microbial changes, and time necessary to establish re-equilibrium

In-situ chemical oxidation has been shown to be an effective approach for treating volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) in lightly contaminated soil and groundwater at former manufactured gas plant (MGP) sites. However, caution is needed for two major reasons: 1) oxidation processes take place predominantly in the aqueous phase not the non-aqueous phase where the majority of contaminant mass resides; and 2) soil heterogeneity can cause inadequate contact between the oxidants and contaminants, thereby reducing treatment performance in the field. Surfactant-enhanced *In Situ* Chemical Oxidation (SISCO™) provides much greater contact through creation of micelles that allow greater chemical contact between the contaminants in the non-aqueous phase and the oxidant. However, many important questions need to be addressed, such as the range of concentrations that can be treated; effect of soil type; presence of light non-aqueous phase liquids (LNAPL) or dense non-aqueous phase liquids (DNAPL); and potential latent effects (including concentration rebound, fate of oxidant & surfactant, soil property changes, microbial changes, and

time necessary to establish re-equilibrium). The goal of this project is to address certain technical uncertainties in order for utility project managers, regulators, and future property developers to understand the benefits and limitations to reduce the uncertainty of this technology.

Value

This study will combine the efforts of five or more utilities to address the effectiveness of VeruTEK technology for contaminated soil from a variety of MGP sites with different physical and chemical characteristics. Depending upon funding available, the study may involve both laboratory and pilot scale research at selected host utility sites. The results can be used by regulatory agencies in order to understand, evaluate, and approve remediation project designs and by utility project managers to reduce uncertainty in achieving final treatment goals.

Drivers and Trends

Many MGP contaminated sites are in locations where conventional dig and haul methods will not work, such as under buildings or roadways and at depths where excavation is impracticable or infeasible. In those cases, in-situ methods may provide methods of treatment not available otherwise.

Project Summary

Both laboratory and pilot test methods will be used to evaluate treatment success with MGP contaminated site soils using the VeruTEK's S-ISCO™ technology. The technology will be tested to determine the effect of ranges of concentrations and soil properties that may impact treatment performance. Various methods used to assess performance will also be evaluated. Significant emphasis will be placed on coal tar and VOC/PAH destruction, migration of treatment chemicals into heterogeneous soils and potential latent effects following treatment.

VeruTEK's Coelution Technologies® S-ISCO™ provides treatment that has the potential to enable rapid removal of contaminants and residual NAPLs from soils and groundwater. The S-ISCO® process uses the groundwater to move chemicals that will destroy contaminants to where they are located in the soil.

Deliverables

- Report discussing lessons learned regarding the benefits and challenges of implementing the technology
- Bench-scale and site demonstrations utilizing the VeruTEK's S-ISCO™ oxidation technology on MGP coal tar-impacted soils and groundwater

Project Cost

The estimated cost to complete this project is \$250,000 over two years. Companies that fund any EPRI membership program can use Tailored Collaboration (TC) funds for up to half their contribution. For each TC participant, the minimum cost for participating in this project is \$25,000, with \$25,000 matched by EPRI, for a total of at least \$50,000. Companies that have not purchased any EPRI program may co-fund this project for a minimum of \$50,000 or \$25,000 for each of two years. Participation for two consecutive years is encouraged.

Project Status and Schedule

This project is expected to start in 2nd quarter, 2009 with a final report in 2010.

Who Should Join

Companies responsible for remediation of former MGP sites would benefit from this project.

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

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