



Terran Corporation - Remediation Technology

Company Overview

Terran is a comprehensive environmental services provider in southwest Ohio assisting commercial and government clients with site investigation, remediation and monitoring activities.

Electrokinetic Remediation

The remediation of clay bearing sites contaminated with chlorinated VOCs is our specialty. By harnessing the thermal and transport effects of DC electric fields in soil, Terran has successfully implemented the largest electrokinetic remediation systems in the US. The “*Lasagna*™” process was developed by General Electric, DuPont and Monsanto scientists specifically to address problem of chlorinated solvent contaminated clay and silt. It uses DC electrical fields to induce electrokinetic transport of pore water and contaminants through vertical treatment walls below the ground surface for efficient in-situ remediation of low permeability soil and heterogeneous soils. The entire system is installed below the surface without excavation or waste disposal issues. To date, Terran has designed and implemented 5 large Lasagna electrokinetic systems to treat TCE and PCE contamination in clayey soils. Our emplacement technology, pictured above, was developed and refined to allow for quick and efficient emplacement of electrodes and treatment materials.

Recent Projects

Working with the Ohio EPA at an active manufacturing facility, Terran recently treated two sites where dense clays were contaminated with TCE. The sites were located under active parking lots and loading docks and the treatment was completed without disruption to product flow. Safety, commerce and remediation goals were all successfully met.

COMPANY DESIGNATIONS

CAGE: 0S0X0

DUNS: 15-067-3895

NAICS CODES

541620 713990

541330 541690

562910 213112

541710 32739

CCR - Active

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The Electrokinetic Experts

*Lasagna*TM Remediation Systems

- Low Voltage (<200v) DC electrical field efficiently moves pore-water and contaminants through any type of soil.
- The electric current heats the soil to a controlled temperature (up to 100°C) which helps breakup and mobilize DNAPL.
- Vertical treatment zones of iron filings intercept and degrade chlorinated organic contaminants as they are mobilized by the current.
- The system is installed entirely below grade except for a rectifier and data system shed. The system is operated and data recorded remotely.
- Lasagna systems are typically operated for 2 years and can be installed in a manner to avoid disruption to operating facilities.
- After operation, the iron filings and steel electrodes remain in place to continue treating any residual contaminants or back diffusion. The rectifier, data system and shed are removed.
- The DC electric field is designed to be contained and it will not interfere with nearby cathodic protection systems.

Large Scale EK Installations include:

1. Paducah Gaseous Diffusion Plant (Paducah, KY)
2. USBI (Huntsville, AL)
3. Quicfrez Site (Fond du Lac, WI)
4. United Technologies Site (Auburn, IN)
5. Ohio Site, 2 Installations (Cambridge, OH)

Terran has also successfully implemented:

Vapor extraction
Risk-based closure

Excavation
Dual phase extraction

Publication Highlights:

- *Use of Large-Scale Electrokinetic and ZVI Treatment for Chlorinated Solvent Remediation at an Active Industrial Facility*, Remediation, Autumn 2014, Wiley Publishing, pp 41-51.
- *Desalinization of Kaolin Soil Using Radial Electromigration and Electroosmosis*, Journal of Hazardous, Toxic, and Radioactive Waste, Volume 17, Number 1, 2013, ASCE, pp 16-20.
- *Desalinization of Field Soil Using Radial Electromigration and Electroosmosis*, Journal of Hazardous, Toxic, and Radioactive Waste, Volume 18, Number 1, 2014, ASCE, pp 83-86.
- *Electrokinetic Remediation Technologies for Polluted Soils, Sediments and Groundwater*, Chapters 27 and 30. 2009, Wiley Publishing, Reddy & Cameselle ed.
- *The Lasagna Technology for In Situ Soil Remediation. 1. Small Field Test*, Environmental Science and Technology, 33,7, 1999, pp 1086-1091.
- *The Lasagna Technology for In Situ Soil Remediation. 2. Large Field Test*, Environmental Science and Technology, 33,7, 1999, pp1092-1099.

