Drycleaner Site Profiles

Ineeda Cleaners - 13th & Main, Hutchinson, KS

Site Description

The Ineeda Laundry and Drycleaners (Ineeda) is located in a commercial district bounded by residential areas. Contamination likely occurred through leaking sewer lines and surface wastewater disposal. It is likely that surface-disposed wastewater infiltrated directly into the subsurface and/or followed surface drainage to nearby "burp basins," recharge basins that handle storm water runoff. Assessment activites began in 1996 and remediation was implemented in 1998.

Site Hydrogeology

Depth to ground water: 14 ft bgs

Lithology/subsurface geology:
Silty clay, surface-5 ft bgs;
Sandy clay, 5-7 ft bgs;
Sand, fine-grained graded to coarse, 7-56 ft bgs with discontinuous thin clayey lenses.

Conductivity: 517-771 ft/day

Gradient: 0.001 ft/ft

Groundwater Contamination

DNAPLs Present: Yes

Contaminants present: perchloroethylene (PCE), trichloroethylene (TCE), cis 1,2-dichloroethylene (cis 1,2-DCE)

Highest contaminant concentrations:: 4,400 µg/L (PCE), 382 µg/L (TCE), 134 µg/L (cis 1,2-DCE)

Deepest significant ground-water contamination: 56 ft bgs

Plume size: 900 ft wide and extends 2.5 miles to the southeast.

Soil Contamination

Contaminants present: PCE, TCE

Highest contaminant concentrations 24,000 µg/kg (PCE), 241 µg/kg (TCE)

Description of Remediation Scenario

Cleanup Goals: Remediate groundwater to below U.S.EPA MCLs; clean up soil to below KDHE RSK levels: 180 µg/kg (PCE), 200 µg/kg (TCE)

Technologies Used:
Soil Vapor Extraction (SVE)
Ozone Air Sparge

Any other technologies used:

Why technology or technologies selected: The KVA C-Sparger was chosen for a long-term full-scale pilot to test the effectiveness of ozone air sparging. The KVA C-Sparger touted low utility costs and simple operation. KDHE also included an enhanced SVE system to address vadose zone contamination. The geology was receptive to the use of an agressive SVE system.

Date Implemented: August 1998

Final remediation design: Three KVA C-Sparger wells surrounded the main groundwater contamination area. The system utilized ozone injection in a dual spargepoint well. Seven SVE wells were installed targeting hot spots throughout the site, including along sewer lines. The SVE system included a regenerative blower with a design capacity of 350 scfm at 25 inches of water.

Results

Groundwater concentrations were not significantly reduced during the operation of the KVA system. KDHE has experienced many maintenance problems with the system which may be responsible for the lack of reduced concentrations. The SVE system has reduced effluent concentrations up to 80%; however, rebound studies have shown a need to continue operating the system. Utilities and buildings remain a physical barrier for more effective remediation. KDHE is likely to consider alternative technologies to try and speed up the remediation process. A downgradient containment system is also in the works.

Costs

Site assessment: $58,500

Design and implementation: $100,900

O&M: $61,700

Total costs (only completed sites):

Lessons Learned

1. The KVA C-Sparger system had extensive maintenance problems. KVA has replaced some parts, but KDHE also had to spend significant funds to repair the system. More durable and ozone-compatible parts are a necessity. The utility costs were very low; however, the additional maintenance negated the benefit of these lower costs.

2. The City of Hutchinson utilizes a storm sewer system that allows direct infiltration of storm runoff water into the subsurface via "burp basins." This system caused a rise in the local groundwater table whenever a large rainfall event occurred. This caused the SVE wells to pull water, filling up the SVE knockout tank very quickly.
3. KDHE was able to use the drycleaners' on-site maintenance personnel to watch for system alarms. The personnel would then call KDHE or our contractor to report the shut-down. Working with on-site personnel saved a lot of down time.
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Site Specific References

Not Provided

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Drycleaner Site Profiles

Swift Cleaners , Jacksonville, FL

Site Description

This is an active PCE drycleaning facility has been operating since 1971. The site is located in a commercial/residential setting. The nearest water supply well is located approximately 0.25 mile south-southwest of the site. The contaminant source areas are outside the service door where spent filters were stored, the soils beneath the building floor slab around the drycleaning machine and a former sanitary sewer line leak.

Site Hydrogeology

Depth to ground water: 3-14 ft bgs

Lithology/subsurface geology: Silty, very fine to fine-grained sands, surface- 45 ft bgs; Clayey, very fine-grained sand with clayey sand lenses 45-65 ft;
Limestone interbedded with clay 65-80 ft bgs

Conductivity: 12-15 ft/day (surficial sands)

Gradient: 0.0043 ft/ft (surficial sands)

Groundwater Contamination

DNAPLs Present: Yes

Contaminants present: PCE, TCE

Highest contaminant concentrations: PCE -10,000 ug/L, TCE -24 ug/L

Deepest significant ground-water contamination: PCE at 50 ft bgs

Plume size: 300 ft x 1,000 ft

Soil Contamination

Contaminants present: PCE

Highest contaminant concentrations PCE at 40 mg/kg

Description of Remediation Scenario

Cleanup Goals: Groundwater- Maximum Contaminant Levels (MCLs): PCE= 3.0 ug/L, TCE= 3.0 ug/L

Soils- Leachability based Soil Cleanup Target Levels (SCTLs): PCE= 0.03 mg/kg

Technologies Used:
Chemical Oxidation/Reduction
Soil Vapor Extraction (SVE)

Any other technologies used:

Why was technology or technologies selected:
Soil vapor extraction is a cost-effective technology to remove VOCs from unsaturated permeable sediments. In situ chemical oxidation was selected because of the high contaminant concentrations, active migration of contaminants off-site, and the high aquifer permeability
Date Implemented: 1999 (Pilot Test); 2000 (SVE Construction); 2001-2002 (3 chemical oxidation injections)

Final remediation design: A pilot test was conducted within the source area in July, 1999.
The pilot test consisted of 3 injections.
Treatment Area (pilot test): 2,500 ft2
Number of Injection Wells: 6 clusters (2 wells each), Screen Depth: 30-40 ft and 40-45 ft
Quantity (per well):Catalyst 200-400 gal; Oxidizer 300-800 gal
Concentration: 25% Hydrogen Peroxide- Reduced to 12.5% in the shallow wells for the 2nd and 3rd injections.
Radius of influence: 7.5 ft
Avg. Injection Rate: 7 gpm (initial injection), 3.5 gpm in (subsequent injections)

Full-scale groundwater remediation will consist of: 1) in-situ chemical oxidation with hydrogen peroxide for the contaminant source area and the plume above Natural Attenuation Default Source Concentrations (NADSC) (e.g. 300 µg /L PCE); and 2) monitored natural attenuation for the plume below NADSC's. Remediation design includes 4 phases. Phase I focused on two areas, IA and IB. Three full scale injections have been completed for these areas. Initial injection was in December, 2000. Below are specifications:

Phase I-Area IA:
Treatment Area: 2,500 ft2 (pilot test area)
Number of wells: 7 new, 5 existing
Screen Depth: 35 - 45 ft.
Injections (per well): 2
Quantity (per well): Approximately 400 gallons of catalyst, 600 gallons of oxidizer.
Concentration: 14% Hydrogen Peroxide
Radius of influence: 7.5 ft

Phase I-Area IB:
Treatment Area: 2,000 ft2 (downgradient of IA)
Wells: 13 new, Screen Depth: 35-45 ft
Injections (per well): 2
Quantity (per well): Approximately 400 gallons of catalyst, 400-600 gallons of oxidizer
Concentration: 14% - 15% Hydrogen Peroxide
Radius of influence: 7.5 ft

Upon completion of the first two full-scale injections in areas IA and IB a third injection was conducted. The thrid injection was conducted in April 2002 and consisted of 11 select injection wells from both areas of IA and IB.
Thrid injection (Phase IA and IB)
Number of injection wells: 11
Quantity (per well): Approximately 400 gallons of catalyst, 600 gallons of oxidizer
Concentration: 15% Hydrogen Peroxide
Radius of influence: 7.5 ft

The SVE system for full-scale soil remediation consists of five 12-ft vapor extraction wells. The design radius of influence is 15 ft with a design flow rate of 27 cfm. System startup was in December, 2000.

Results

Results achieved to date::

Results of the pilot test were mixed, with concentrations decreasing in some areas and increasing significantly in a few areas.

Results following the first and second injections for areas IA and IB indicated the following:
First quarter sampling results indicated that PCE concentrations within phase 1A and IB were reduced to levels below 200 ug/l. However, following the second quarter of monitoring, concentrations in several wells had increased to levels at or above baseline concentrations. Monitoring well MW040 (located within the suspected source area) had a PCE concentration of 1,050 ug/l during the baseline sampling event. Following the first quarter of monitoring concentrations in this well were reduced to 24 ug/l, however; after 6 months of monitoring concentrations had increased to 1,420 ug/l.

A third injection was conducted to address the areas within phase IA and IB that continued to show contaminant rebound. Five of nine wells sampled after one month showed an increase in PCE concentration. However, overall PCE concentrations have declined since the baseline-sampling event.

Subsequent remediation efforts will be conducted in three additional phases (II through IV) proceeding downgradient. The well locations will be based on the baseline DPT data as well as monitoring data.

Costs

Site assessment: $ 164,000

Design and implementation: $110,000 (pilot test)
$118,000 (SVE construction)
$245,000 (3 full-scale injections)

O&M:
O&M: $20,000 (per year-soil)
$23,000 (per year- groundwater)

Total costs (only completed sites):

Lessons Learned

1. Recommend complete delineation of underground utilities prior to injection activities. Use of geophysical survey (GPR and electrical methods) is very useful to ensure that underground utilities are not encountered during direct push operations.
2. Inform all property owners concerning the extent of injection activities and coordinate with site property owners to ensure uninterrupted access to the property.
3. Ensure all wells around the injection well are tightly capped prior to H2O2 injection

Site Specific References

1. HLA Contamination Assessment Report-12/97-Addendum-10/98
2. ARG, Inc. Oxy-Cat Pilot Test Summary Report-5/00
3. HLA SVE System Startup Report-6/11/01
4. HLA Remedial Action Plan-7/00 -Modification-3/01
5. Harding ESE Chemical Oxidation Injection Data Report-6/1/01 and 6/21/01
6. Harding ESE Year 1, Annual SVE System O&M and In-Situ Chemical Oxidation Status Report 6/12/02

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