Cost and Performance Summary Report
Thermal Desorption at Industrial Latex Superfund Site, Wallington, New Jersey

Summary Information [1, 2, 5]

The Industrial Latex Superfund Site, in Wallington, Bergen County, New Jersey was used to manufacture natural and synthetic rubber compounds and chemical adhesives from 1951 to 1983. Solvents used in the manufacturing process included volatile organic compounds (VOCs) such as acetone, heptane, hexane, methyl ethyl ketone, and methylene chloride, as well as PCBs. The 9.67 acre site is located in a mixed residential-industrial area.

During site inspections conducted by the New Jersey Department of Environmental Protection (NJDEP), leaking drums of various chemical compounds were found at the site. In addition, wastes containing VOCs and PCBs were found to have been disposed of in a sanitary septic system on site. From 1986-87, EPA conducted a removal action with more than 1,200 drums and 22 underground storage tanks removed from the site. An expanded site inspection, conducted from 1987 to 1988, found extensive contamination throughout the property. The site was added to the Superfund National Priorities List (NPL) in March 1989.

A remedial investigation (RI), conducted from September 1988 to June 1992, determined that approximately 32,000 cubic yards of soil on the site and 2,700 cubic yards of soil and sediment in a drainage canal adjacent to the site were contaminated with PCB Aroclor 1260; semivolatile organic organic compounds (SVOCs) such as bis (2-ethylhexyl) phthalate (BEHP), 3,3'-dichlorobenzidene, and polyclic aromatic hydrocarbons (PAHs); and metals such as antimony and arsenic. The highest concentrations measured were for PCB Aroclor 1260 at 4,000 mg/kg, BEHP at 280 mg/kg, and antimony at 12.6 mg/kg. In addition, the onsite buildings were found to be contaminated and approximately 600 buried drums were found.

A Record of Decision (ROD) for Operable Unit (OU) 1 was issued in September 1992 that addressed contaminated soils and sediments, buildings and equipment, drums, septic system, and hardened latex material. In the ROD, thermal desorption was selected for treatment of the contaminated soils. An Explanation of Significant Differences (ESD) was signed in April 1996 that revised the soil cleanup goals (see discussion below under Performance Information). The ROD noted that a groundwater study was inconclusive, and that additional investigation would be needed. Subsequently, a ROD addressing groundwater was signed in September 2001 which stated that no action was necessary.

This report addresses the thermal desorption treatment performed at the site. Soil was excavated from approximately 30 areas at the site, to a maximum depth of 14 feet. A total of 53,685 cubic yards of soil contaminated with PCBs and other SVOCs were treated in this application.

EPA ID Number:	NJD981178411
Type of Action:	Remedial
Lead:	Fund-lead
Oversight:	EPA and U.S. Army Corps of Engineers (USACE)

Timeline [1,3]

Date(s)	Activity
9/30/92	ROD signed
4/26/96	ESD signed
3/1/99 - 4/16/99	Thermal desorption unit demonstration/performance test performed
4/28/99 - 6/6/00	Thermal desorption performed
6/7/00 - 6/13/00	Thermal desorption unit decontamination and demobilization

Factors that Affected Technology Cost or Performance [3, 6]

Listed below are the key matrix characteristics for this technology and the values measured for each during site characterization.

Matrix Characteristics

Parameter	Value
Soil Classification:	Clay/silt
Clay Content and/or Particle Size Distribution:	15-20% clay
Moisture Content:	15-20%
Organic Content:	0.5-3%
pH:	7
Bulk Density:	1.6 tons/cubic yard

Treatment Technology Description [3, 6]

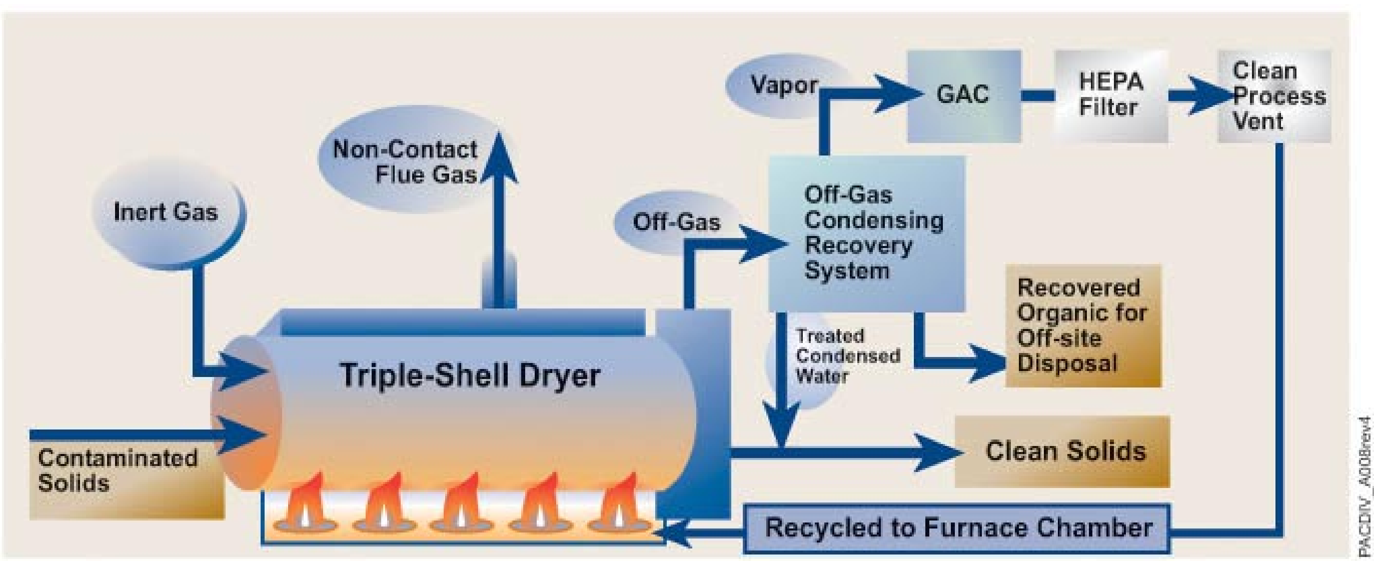
The thermal desorption unit was a "triple-shell dryer", a rotating cylindrical kiln with two concentric cylindrical chambers used to supply indirect heat at 40 million BTU/hr. Major components of the treatment system, including the dryer, was manufactured by Tarmac Industries of Tonganoxie, Kansas. Information was not provided about the heat source and how it was applied to soil. Figure 1 shows a schematic of the triple-shell dryer system used at the Industrial Latex site.

The system processed an average of approximately 225 tons of soil per day, with a typical soil exit temperature of 900 ºF. Prior to being fed to the dryer, soil was screened to remove material greater than 2 inches in diameter. Screened soil was loaded into a mass flow feeder and transferred to the dryer using conventional material handling equipment. Following treatment in the dryer, soil was transferred to an auger for conditioning with water and conveyed to soil bins for temporary storage.

Off gases from the desorber were treated using a scrubber, venturi, and spray tower, followed by a vapor-phase granular activated carbon (GAC) filter unit and a high-efficiency particulate air (HEPA) filter. The system included an automatic waste feed shutoff (AWFSO) that monitored parameters including high off gas temperature, low scrubber flow, excess off gas emissions, high scrubber temperature, high dryer pressure, and high oxygen content.

Blowdown from off-gas treatment was used as a conditioner to re-hydrate treated soil. Water collected from the scrubber, venturi, and spray tower was passed through a clarifier and filter press to separate oils and solids from the aqueous phase. Liquid blowdown from the off-gas treatment system was further treated using aqueous-phase carbon and used to condition and re-hydrate the treated soil.

Figure 1. Schematic of Triple-Shell Dryer System [6]



Treated soil was used to backfill excavated areas, followed by compaction to more than 90%. Filter cake from the filter press was disposed of at an off-site Resource Conservation and Recovery Act (RCRA) hazardous waste landfill.

Prior to full-scale operation, a demonstration/performance test was performed. This included testing for process oxygen concentrations, stack flow rate, equivalent destruction removal efficiency (DRE), oxidation of organics, and other operational parameters. Operational problems identified during the performance test included elevated levels of particulate emissions at the stack. To address this issue, the HEPA filter housing was modified using a positive pressure seat, and a damper was installed at the base of the stack to maintain the combustion chamber under positive pressure.

The system was operated at full-scale for approximately 14 months, operating 7 days/week, 24 hrs/day. Maintenance was performed an average of once every two weeks, however this frequency increased near the end of the project because the overall system had been operated longer than anticipated during design. Overall, the system was operational approximately 74% of this 14 month time period.

Operating Parameters [3, 6]

Listed below are the key operating parameters for this technology and the values measured for each.

Operating Parameter	Value
Residence Time	60 minutes
System Throughput	225.1 tons/day (average)
Soil Exit Temperature	900 °F (typical)
Total Operational Time	7,047.4 hours
Heat Input	40 million BTU/hr
Atmosphere Inside Dryer	Less than 4% Oxygen

Performance Information [1, 2, 3, 4]

Table 1 shows the remedial goals for the Industrial Latex site. These goals were based on a residential future reuse scenario. If extractable metals were found present at an elevated concentration, the soil was to be stabilized prior to backfilling.

The ROD had established remedial goals for 14 constituents, however after the ROD was signed, it was determined that 10 of these constituents were present at concentrations below local background levels or were not site related, and the ESD eliminated the remedial goals for the 10 constituents. These 10 constituents consisted of PAHs, pesticides, and metals.

Table 1: Remedial Goals [2]

Constituent	Remedial Goal (mg/kg)
PCBs	1
BEHP	46
3,3'-Dichlorobenzidene	1.4
Arsenic	20

An air quality permit was established for this application that included action levels for ambient air at site boundary locations. This application also had a water discharge permit.

From April 1989 to June 2000, a total of 53,685 cubic yards of contaminated soil were treated using thermal desorption. The treated soil was placed into 250 cubic yard bins (260 stockpiles total) and one composite sample was collected from each bin and analyzed for PCBs, SVOCs, and arsenic. The only analytical data available for treated soil is for the weighted average results from across all treated soil storage bins. No data were provided for constituents before treatment or for extractable metals in soils. Table 2 shows the weighted average of analytical results for treated soil from the storage bins. As shown, the average results met the cleanup goals for PCBs, BEHP, 3,3'-dichlorobenzidene, and arsenic. Over the course of the cleanup, 16 of the 260 stockpiles of treated soil (approximately 6%) were retreated because they did not meet the remedial goal. The residual PCB concentrations in the treated soil was the driver for retreatment in all 16 stockpiles.

Table 2: Sampling Results for Treated Soil - Weighted Average [3]

Parameter	Sampling Frequency	Analytical Method	Concentration in Treated Soil (mg/kg)
PCBs	1 sample per 250 cubic yards	8082	0.16
SVOCs	1 sample per 250 cubic yards	8270C	0.37 for BEHP; Not detected for 3,3'-Dichloro-benzidene
Arsenic	1 sample per 250 cubic yards	7060A	1.63

As part of the thermal desorption activities, air monitoring was performed to assess concentrations at nearby community locations/site boundaries and to project personnel. The air monitoring focused primarily on PCBs, SVOCs, and some VOCs. The technology provider reported that the system met the action levels for ambient air at site boundaries during the remedial activities at the site.

Cost Information [3, 4]

The actual cost for treating 53,685 cubic yards of soil was approximately $15,700,000, corresponding to a calculated unit cost of $292 per cubic yard of soil treated. Table 3 provides a summary of the actual costs broken down as capital costs (including operation and maintenance) for items directly associated with treatment, other technology-specific costs (e.g., excavation and disposal), and other project costs (other activities at the site not associated with treatment).

The work was performed under two fixed price contracts issued by the USACE-Kansas City District (DACW41-98-d-9005, DO 005; and DACW41-99-D-9003, TO 003). These two contracts, including more than 40 specific contract line items, were for a combined cost of approximately $24,000,000.

Observations and Lessons Learned [3]

Thermal desorption was used to treat more than 53,000 cubic yards of soil contaminated with PCBs and other SVOCs to below remedial goals over a period of approximately 14 months.

The technology provider indicated that efforts made to work with the local community helped to make the project successful. These efforts included holding an "open house" before treatment began, addressing concerns that came up during treatment (such as unusual odors, truck noise, and truck traffic), and performing extensive ambient air monitoring, such as at a nearby school.

During the demonstration/performance test, elevated levels of particulate emissions were identified and the HEPA filter housing was modified. This modification reduced particulate emissions to within permitted levels.

Contact Information

EPA RPM:
Stephanie Vaughn
EPA Region 2
290 Broadway
New York, NY 10007
Telephone: (212) 637-3914
E-mail: vaughn.stephanie@epa.gov

Technology Provider:
Stanley Wojinski
Environmental Chemical Corporation
999-18th Street, Suite 2350
Denver, CO 80202
Telephone: (303) 298-7607
E-mail: swojinski@ecc.net

References

1. EPA. 1992. Record of Decision, Industrial Latex Corp., OU 1, Wallington Borough, NJ. EPA R-02-R92-185. September 30.

2. EPA. 1996. Explanation of Significant Differences, Industrial Latex Corp., OU 1, Wallington Borough, NJ. April 26.

3. Environmental Chemical Corporation. 2001. Final Remedial Action Report, Industrial Latex Superfund Site, Phase II Soil Remediation, Bergen County, NJ. Prepared for USACE, Philadelphia District. Modified September.

4. Environmental Chemical Corporation. 2002. Project Description for LTTD at Industrial Latex Superfund Site (internal document). December 4.

5. Stephanie Vaughn, EPA. 2003. Comments on Draft Case Study Report. E-mail. May 28.

6. Stanley Wojinski, ECC. 2003. Comments on Draft Case Study Report. E-mail. June 6.

Acknowledgments

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Table 3: Actual Project Costs [3, 4]

Cost Category/Element	Cost (2001 $ Basis)
1. Capital Cost for Technology	
Technology mobilization, setup, and demobilization	479,799
Planning and preparation	59,756
Site work - preparation/restoration	637,360
Equipment and appurtenances	9,580,365
Startup and testing	616,616
Other	4,291,979
TOTAL CAPITAL COSTS	15,665,875
2. O&M for Technology	
Labor	
Materials	
Utilities and fuel	
Equipment ownership, rental, or lease	
Performance testing and analysis	
Other	
TOTAL OPERATION AND MAINTENANCE COSTS	(included with capital cost)
3. Other Technology-Specific Costs	
Compliance testing and analysis	
Soil, sludge, and debris excavation, collection, and control	3,213,306
Disposal of residues (disposal of soil treatment process waste, TSCA/RCRA material; demolition material, drums, debris	4,131,432
4. Other Project Costs (demolition, test pit, wetlands, right-of-way, railroad, freon cylinder, additional mods)	1,194,915
Total cost	24,205,528
Total cost for calculating unit cost	15,665,875
Quantity treated	53,685 cubic yards of soil
Calculated unit cost	$292/cubic yard
Basis for quantity treated	soil treated