

Cost and Performance Summary Report

Thermal Desorption at the T.H. Agriculture and Nutrition Site, OU2, Albany, GA

Summary Information [1, 2, 5]

The T. H. Agriculture and Nutrition (THAN) site, in Albany Georgia, operated from the 1950s until 1982 to formulate and package pesticides. Operations at the site resulted in contamination to soil and groundwater and the site was listed on the National Priorities List in 1989. During the remedial investigation, samples of soil and groundwater were collected from the property adjacent to the parcel owned by the THAN company. This property was the site of a former pesticide formulation and packaging facility (operated from 1964 to the 1970s), and was owned by Larry Jones (Jones Property). The groundwater plume from the THAN parcel had migrated beneath the Jones Property, and soil at the 5-acre Jones Property was found to be contaminated with pesticides and metals. A welding supply store is currently operating on the Jones Property.

EPA divided the THAN site into two operable units (OU). OU1 addresses soil and groundwater from the original THAN site (western parcel). OU2 addresses soil contamination at the Jones Property (eastern parcel). This report addresses the remediation of OU2.

A record of decision (ROD) for OU2 was signed in 1996. The ROD specified excavation of contaminated soil and treatment using low temperature thermal desorption. Contaminants found in soil at the Jones Property included organochlorine and organophosphorus pesticides including DDT, toxaphene, methyl parathion, and ethylene dibromide, as well as inorganics.

From October to November 1999, a total of 10,400 tons of soil at THAN OU2 were treated using low temperature thermal desorption.

CERCLIS ID Number:	GAD042101261
Type of Action:	Remedial
Lead:	PRP Lead

Timeline [1]

April 26, 1996	ROD signed for OU2
October to November 1999	Thermal desorption treatment performed

Factors That Affected Cost or Performance of Treatment

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

Matrix Characteristics [1]

Parameter	Value
Soil Classification:	Not Available
Clay Content and/or Particle Size Distribution:	Not Available
Moisture Content:	15%
Organic Content:	Not Available
pH:	Not Available
Bulk Density:	Not Available

Treatment Technology Description [1]

The thermal treatment system used for this application was a low temperature thermal desorption (LTTD) system owned by Williams Environmental Services, Inc. The system included a feed system, rotary dryer, baghouse, wet quench, air mix chamber, and granulated activated carbon beds. The countercurrent rotary dryer, approximately 31 feet long and 6.5 feet in diameter, was direct-fired using a 32 million BTU/hr burner.

Prior to treatment, excavated soil was screened using a PowerScreen with materials screened to 2 inches in diameter.

Off-gas from the desorber was passed through a baghouse to remove particulates. The baghouse was equipped with 5,300 square feet of polyimide bags and was operated using a pressure transducer to determine the baghouse differential pressure and the pulsing sequence. After particulates were removed, off-gases were quenched. Initial cooling of the off-gas was performed using flash evaporation of water in a spray tower quench chamber. Recycled quench water was injected through spray nozzles at about 45 gallons per minute to cool the gases to 175°F. Gases from the quench tower were then passed through a mist eliminator, then cooled to 140°F in an on-line mix chamber where ambient air was added. Gases from the mix chamber were sent to the induced draft (ID) fan. Because the gases were close to saturation temperature, they were reheated to approximately 150°F prior to being sent to the carbon beds - two US Filter/Westates carbon beds, each filled with 20,000 pounds of activated carbon.

The treated soil from the desorber was combined with baghouse dust and water was added to the solid material. The soil was then sent to a belt conveyor, which discharged the soil to a soil stacking area. Treated soil was then sent to a verification holding area for sampling.

Operating Parameters [1]

Listed below are the key operating parameter for the LTTD system used at THAN OU2.

Operating Parameter	Value
Residence Time	Not Available
System Throughput	17.3 tons of soil/hr (maximum) 15 tons of soil/hr (average)
Soil Exit Temperature	975°F
Thermal Desorber Exit Gas Temperature	510°F (maximum)
Baghouse Differential Pressure	1 inch w.c. (minimum)

Performance Information [1,3,6]

Table 1 presents the cleanup goals identified for the contaminants of concern at the site.

Table 1 - Cleanup Goals for Contaminants of Concern [1]

Contaminant	Cleanup Goal (mg/kg)
DDT	94
Toxaphene	29
Methyl Parathion	17
Ethylene Dibromide	0.006

The maximum stack gas total hydrocarbon (THC) levels were limited to 118 ppmv. In addition, the emissions had to meet state ambient air concentration levels for organic emissions. Samples from the carbon bed influent and effluent were collected every 200 hours of operation and used to determine if the removal efficiency of the carbon beds was >90%.

Shakedown Period

Shakedown operations for the LTTD system were performed in three phases: (1) verification that the mechanical and electrical systems were operating properly, (2) clean soil shakedown to demonstrate that the LTTD was ready to process contaminated soil and to establish a baseline THC level in the stack gas, and (3) contaminated soil shakedown to establish a contaminated soil feed rate.

A performance test for the LTTD system used at OU2 was not required. Williams presented data to EPA and the state that demonstrated that the THAN OU2 system was functionally equivalent to the THAN OU1 system. Therefore, data from the THAN OU1 performance test was used to establish operating parameters in lieu of conducting a performance test at THAN OU2. Details of the functional equivalency demonstration are provided in Reference 1.

Full-Scale Operation

Full-scale operations were conducted from October to mid-November 1999. During this time, a total of 10,424 tons of soil were treated in 18 batches.

Table 2 presents a summary of the treated soil data for THAN OU2. With the exception of one batch, all soil met the cleanup goals after initial treatment in the thermal desorber. The 1,600 tons of soil in Batch #3 initially did not meet the cleanup goal for methyl parathion, with a concentration of 150 mg/kg. The batch was retreated and the soil met the cleanup goals. Treated soil was backfilled on site.

Table 2 - Treated Soil Concentrations (mg/kg) [4]

Batch #	Toxaphene	DDT	Ethylene Dibromide	Methyl Parathion
Cleanup Goal	29	94	0.006	17
1	<0.160	<0.0033	<0.0047	<0.0033
2	<0.170	<0.0033	<0.0047	<0.005
3	<0.170	<0.0033	<0.0049	150.5
4	<0.170	<0.0033	<0.0048	<0.005
5	<0.170	<0.0033	<0.0047	<0.0033
6	<0.170	<0.0033	<0.0047	<0.0033
7	<0.170	<0.0033	<0.0049	<0.0033
8	<0.170	<0.0033	<0.0045	<0.0033
9	<0.170	<0.0033	<0.005	<0.0033
10	<0.250	<0.005	<0.005	0.010
11	<0.250	<0.005	<0.049	0.016
12	<0.170	<0.0033	<0.0033	<0.005
13	<0.170	<0.0033	<0.005	<0.0033
14	<0.160	<0.0033	<0.005	<0.0049
15	<0.170	<0.0033	<0.0047	<0.0033
16	<0.170	<0.0033	<0.0045	<0.0033
17	<0.170	<0.0033	<0.0045	<0.0033
18	<0.170	<0.0033	<0.005	<0.0033

There were no exceedances of the state ambient air limits. Results of analyses of the removal efficiency of the carbon beds, based on results of SUMMA canister sampling, indicated that changeout of the carbon beds was not necessary.

Performance Data Quality [1]

No exceptions to established quality assurance/quality control (QA/QC) procedures were noted in the available references.

Cost Information [3]

Cost information was provided by Williams, the thermal desorption vendor, and reflect actual costs for the project, as shown in Table 3.

Observations and Lessons Learned [1]

LTTD treated 10,424 tons of pesticide-contaminated soil to below cleanup goals in less than two months. The cost for thermal desorption at this site was \$1,058,230 or \$102 per ton of soil treated.

The vendor demonstrated functional equivalency of the LTTD system used at THAN OU2 with the LTTD system used at THAN OU1, eliminating the need for a performance test.

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Table 3 - Actual Project Costs [1]

Cost Category/Element	Cost (1999 \$ Basis)
1. Capital Cost for Technology	
Technology mobilization, setup, and demobilization	441,135
Planning and preparation	33,077
Site work - preparation/restoration	91,972
Equipment and appurtenances	
Startup and testing	
Other	
<i>TOTAL CAPITAL COSTS</i>	566,184
2. O&M for Technology	
Labor	
Materials	
Utilities and fuel	
Equipment ownership, rental, or lease	
Performance testing and analysis	
Other (includes nonprocess equipment overhead and health and safety)	
<i>TOTAL OPERATION AND MAINTENANCE COSTS</i>	492,046
3. Other Technology-Specific Costs	
Compliance testing and analysis	
Soil, sludge, and debris excavation, collection, and control	151,778
Disposal of residues	23,900
4. Other Project Costs (flashing, ambient air monitoring, carbon changeout prep)	71,984
Total cost	1,305,892
Total cost for calculating unit cost	1,058,230
Quantity treated	10,424 tons
Calculated unit cost	102/ton
Basis for quantity treated	Soil treated

References

The following references were used in the preparation of this report.

- Williams Environmental Services, Inc. THAN OU2 Case Study - Low Temperature Thermal Desorption of Pesticide-Contaminated Soils. September 19, 2001.
- U.S. EPA Record of Decision, THAN OU2, April 26, 1996.
- Telephone conversation between Marl Fleri, Williams Environmental Services, Inc. and Richard Weisman, Tetra Tech EM Inc, THAN OU2 cost and performance data. February 1, 2001.
- Williams Environmental Services, Inc, Treated Soil Data for THAN OU2, October and November 1999.
- U.S. EPA. T H Agricultural & Nutrition Company Superfund Site Case Study Report. March 1995.
- Email from Humber Guzman, EPA Region 4, to Kelly Madalinski, OSRTI, regarding thermal desorption at the THAN OU2 site. September 28, 2004.

Acknowledgments

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