

# Cost and Performance Summary Report

## Thermal Desorption at the Sarney Farm Superfund Site

### Amenia, New York

#### Summary Information [1,2,3,6]

The Sarney Farm Superfund Site (Sarney Farm) is located in the town of Amenia in Dutchess County New York, approximately 90 miles north of New York City. The site encompasses 40 acres and includes a five-acre permitted sanitary landfill that operated from 1968 to 1969. During that time, non-permitted industrial wastes and barrels of waste solvents were disposed of in and around the landfill, as well as in trenches around the site. Site inspections conducted by the Dutchess County Health Department (DCHD) in November 1968 and June 1969 confirmed the presence of non-permitted wastes and drums at the site, and the site owner was ordered to cease disposal activities. Results of samples taken by DCHD in 1980 and 1981 indicated that soil and groundwater at the site were contaminated with organics, primarily volatile organic compounds (VOCs). The site was placed on the state's Hazardous Waste Sites Inventory in 1980 and on the National Priorities List in 1986.

The Remedial Investigation (RI) for the site, conducted between 1986 and 1990, identified four possible disposal areas at the site: Areas 1 and 2 located in the northern pasture, Area 3 located southwest of the northern pasture, and Area 4 located in the woods northeast of the northern pasture. From 1987 to 1989, EPA conducted a Superfund removal/treatment action to reduce the concentrations of organics in soils at the site. *In situ* soil washing was performed in Areas 1 and 2. The leachate from these areas was allowed to flow through Area 3. The leachate was then collected at the treatment facility and treated using aeration. According to EPA, concentrations of VOCs in the treated effluent from the aeration unit were below detectable levels. EPA indicated that soil washing was not performed in Area 4 because the technology was not believed to be well suited for the site conditions in that area.

In May 1990, additional sampling conducted as part of the RI showed that the remaining soil VOC contamination at the site was localized in Areas 2 and 4. Area 2 was approximately 80 feet long and 30 feet wide. Area 4 was approximately 100 feet long and 20 feet wide. Approximately 40 drums (intact and crushed) were buried within these two areas.

A Record of Decision (ROD) was signed for the site in September 1990. For Areas 2 and 4, the ROD specified removal and off-site disposal of drums, excavation of surrounding contaminated soil, and on-site treatment of contaminated soil using low temperature thermal desorption. No further action was specified for Areas 1

and 3, based on the results of the May 1990 sampling event. In addition, no further action was specified for groundwater based on EPA's determination that natural attenuation would reduce the concentrations of contamination in the site aquifer to acceptable levels over a period of approximately 30 years. The ROD required long-term monitoring of groundwater at the site.

Removal of drums, which were disposed of off-site, was completed in March 1995. Excavation and on-site thermal treatment of soil was performed from August through December 1997 by Williams Environmental Services, Inc. (Williams). A total of 10,514 tons of soil were treated during this application.

CERCLIS ID Number:	NJD980535165
Type of Action:	Remedial
Lead:	PRP Lead/Federal Oversight

#### Timeline [1,2]

October 1987 to 1989	Removal/treatment action conducted
September 27, 1990	ROD signed addressing soil and groundwater contamination
July 1997	Site mobilization
August to November 1997	Soil excavation
August 22 to December 2, 1997	Thermal treatment of contaminated soil
September 3-4, 1997	LTTD demonstration test
May to July 1998	Site restoration

#### Factors That Affected Cost or Performance of Treatment [1,4]

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

**Matrix Characteristics [1,7]**

Parameter	Value
Soil Classification:	primarily coarse sand with small amounts of clay and silt
Clay Content and/or Particle Size Distribution:	Sieve size >1 inch - 100% by weight Sieve size 1/4 inch - 86% by weight Sieve size No. 200 - 38.7% by weight
Moisture Content:	<25%
Organic Content:	4% by weight
pH:	7.7
Bulk Density:	108 lbs/ft <sup>3</sup> (at 15.9% moisture)

**Operating Parameters [1,2,7]**

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

Operating Parameter	Value
Residence Time	15 to 20 minutes
System Throughput	27 tons/hr (average rate)
Soil Exit Temperature	650 to 750°F
Thermal Desorber Exit Gas Temperature	350°F
Thermal Oxidizer Exit Gas Temperature	>1,700°F
Baghouse Differential Pressure	0.25 inches w.c. (minimum)

**Treatment Technology Description [1,2,6,7]**

The thermal treatment system used for this application was a low temperature thermal desorption (LTTD) system owned by Williams. The system included four main units housed on trailers - a desorber unit that consisted of a direct-heated rotary kiln, feed belt, thermal desorber burner, and discharge screw conveyor; a baghouse unit that included a baghouse dust collector, baghouse discharge conveyor, dust transfer conveyor, induced draft damper and fan; a thermal oxidizer unit; and a control unit that housed the controls, data logger, and analyzers. Additional equipment included a feed processing unit, generator, and stacking conveyor. In addition, water was imported from off-site because of a lack of availability of utility services and the poor quality of groundwater at the site.

Contaminated soil was screened to remove cobbles and rocks greater than 2 inches in length. Initially, the oversize debris was decontaminated and used as backfill. However, because of the large quantity of rocks encountered in the excavated soil, a rock crusher was brought on-site. Crushed rocks were blended with the contaminated soil and processed through the LTTD.

Soil was processed at an average rate of 27 tons per hour, with the maximum daily quantity treated of 284 tons. Because of local permit constraints, the LTTD unit was operated 10 to 11 hours per day, five days a week, rather than 24 hours per day, seven days a week.

**Performance Information [1,6,7]**

The ROD specified initial soil cleanup levels based on a 10<sup>-6</sup> risk level, and that the results of modeling (risk-based and soil-to-groundwater modeling) performed during the remedial design phase would be used to derive the final soil cleanup levels. The soil cleanup levels for seven contaminants of concern (COCs) were:

- 1,2-dichloroethane - 0.1 mg/kg
- 2-butanone - 0.3 mg/kg
- 4-methyl-2-pentanone - 1.0 mg/kg
- chloroform - 0.3 mg/kg
- toluene - 1.5 mg/kg
- trichloroethene - 0.2 mg/kg
- total xylenes - 7.0 mg/kg

The results of the demonstration test performed in September 1997 showed that the average destruction removal efficiency (DRE) was greater than the 99.99% required by NYSDEC, and that the unit met the required air emissions criteria (carbon monoxide, oxygen, and particulates). The state approved the continued operation of the unit based on these results.

Treated soil samples were collected and analyzed at a frequency of one sample per approximately 108 tons treated, for a total of 97 samples during this application. Matched data for untreated soil samples was not available.

All treated soil met the cleanup goals for the seven COCs on the first pass through the system. While specific performance data

were not provided for all 97 samples, Table 1 presents data that were provided for treated soil samples collected from September to November 1997. These data show concentrations of COCs in all samples were not detected or below the detection level. Treated soil was backfilled on-site.

**Table 1 - Performance Data for Sarney Farm (mg/kg) [1]**

Analyte	Clean-up Goal	1997								
		8/29	9/17	9/29	10/6	10/15	10/24	10/29	11/10	11/18
chloroform	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-butanone	0.3	ND	ND	ND	BDL (0.008)	ND	ND	ND	ND	ND
trichloroethene	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-methy-2-pentanone	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
toluene	1.5	ND	ND	ND	BDL (0.004)	0.018	BDL (0.004)	BDL (0.002)	0.016	ND
total xylenes	7.0	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND - Not detected

BDL - Results were below detection limit, but above zero; (estimated value)

#### Performance Data Quality [1]

All sampling was conducted in accordance with the Field Sampling Protocol and Quality Assurance Project Plan. Analysis of samples were completed using EPA's quality control Level III, and third-party data validation was performed on the laboratory data. Results met all quality control requirements and no deviations were noted.

#### Cost Information [5,6,7]

Cost information was provided by ESE, the prime contractor for the project, and Williams, the thermal desorption subcontractor/vendor for the project. Cost data reflect actual costs for the project.

The total project cost reported by the prime contractor ESE was \$2,918,600, including \$1,932,300 in costs for the thermal treatment application and \$986,300 in other project costs such as excavation, compliance sampling, disposal of residuals and miscellaneous costs. Thermal treatment costs of \$1,932,300 included \$745,600 in capital costs and \$1,186,700 in operating and maintenance costs, or \$184 per ton based on 10,514 tons of soil treated. Table 2 presents a summary of these costs, which include those of the subcontractor, Williams.

**Table 2 - Actual Project Costs [5,6]**

Cost Category/Element	Cost (1998 \$ Basis)
<b>1. Capital Cost for Technology</b>	
Technology mobilization, setup, and demobilization	189,000
Planning and preparation	177,500
Site work - preparation/restoration	47,300
Equipment and appurtenances	258,000
Startup and testing	43,800
Other	30,000
<i>TOTAL CAPITAL COSTS</i>	745,600
<b>2. O&amp;M for Technology</b>	
Labor	357,200
Materials	181,800
Utilities and fuel	370,000
Equipment ownership, rental, or lease	168,000
Performance testing and analysis	43,800
Other (includes nonprocess equipment overhead and health and safety)	65,900
<i>TOTAL OPERATION AND MAINTENANCE COSTS</i>	1,186,700
<b>3. Other Technology-Specific Costs</b>	
Compliance testing and analysis	273,500
Soil, sludge, and debris excavation, collection, and control	231,000
Disposal of residues	175,000
<b>4. Other Project Costs</b>	
<b>Total cost</b>	2,918,600
<b>Total cost for calculating unit cost</b>	1,932,300
<b>Quantity treated</b>	10,514 tons (7,300 cubic yards)
<b>Calculated unit cost</b>	184 per ton (265 per cubic yard)
<b>Basis for quantity treated</b>	quantity of soil treated in thermal desorber

In addition, the costs provided by the subcontractor Williams for their portion of the project were \$1,887,432 for the total project, including \$1,365,155 in costs for the thermal treatment application and \$522,277 in other project costs. Williams' thermal treatment costs of \$1,365,155 included \$305,775 in capital costs and \$1,059,380 in operating and maintenance costs.

---

**Observations and Lessons Learned [6,7]**

The LTTD treated 10,514 tons of soil contaminated with VOCs to below cleanup goals in about three months at a unit cost of \$184 per ton. All soil was treated to below the cleanup goals on the first pass, with no re-treatment required.

According to ESE, local permit constraints limited LTTD operation to daylight hours (about 10 to 11 hours per day), five days per week. Had the unit been allowed to operate 24 hours per day, seven days per week, the thermal treatment likely could be completed at a lower cost.

According to Williams, this project was performed without the benefit of existing site utilities. Electricity was provided using an on-site generator; water was imported to the site on a daily basis using a tank truck; and soil was quenched using treated water from the excavation.

---

**Contact Information**

For more information about this application, please contact:

**EPA Remedial Project Manager (RPM):**

Kevin Willis\*  
EPA Region 2  
290 Broadway, 19<sup>th</sup> Floor  
New York, NY 10007  
Telephone: (212) 637-4252  
Fax: (212) 637-3966  
E-mail: willis.kevin@epa.gov

**Vendor:**

Mark A. Fleri, P.E.\*  
Project Manager  
Williams Environmental Services, Inc.  
2075 West Park Place  
Stone Mountain, GA 30087  
Telephone: (800) 247-4030  
Fax: (770) 879-4831  
E-mail: mfleri@wmsgrpintl.com

**Prime Contractor:**

Jim Bannon  
ESE  
410 Amherst Street, Suite 100  
Nashua, NH 03063  
Telephone: (603) 889-3737  
Fax: (603) 880-6111  
E-mail: jpbannon@mactec.com

\* Indicates primary contact for this application

---

**References**

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

1. EPA. Remedial Action Report for Sarney Farm Superfund Site. August 1998.
2. Williams Environmental Services, Inc. Low Temperature Thermal Desorption Work Plan, Sarney Farm Superfund Site, Amenia, New York. June 20, 1997.
3. EPA. 1990. Record of Decision. Sarney Farm, Dutchess County, New York. September 27.
4. EPA. 1999. National Priority Site Fact Sheet. Sarney Farm New York. January 28.
5. Jim Bannon, ESE. Facsimile to Richard Weisman, Tetra Tech EM Inc., Cost Data for Sarney Farm Project. October 3, 2000.
6. Jim Bannon, ESE. Facsimile to Richard Weisman, Tetra Tech EM Inc., Comments on Draft Report for Sarney Farm. December 13, 2000.
7. Mark Fleri, Williams Environmental Services. Facsimile to Richard Weisman, Tetra Tech EM Inc., Comments on Draft Report for Sarney Farm. December 6, 2000.

---

**Acknowledgments**

This report was prepared for the U.S. Environmental Protection Agency's Office of Solid Waste and Emergency Response, Technology Innovation Office. Assistance was provided by Tetra Tech EM Inc. under EPA Contract No. 68-W-99-003.