

Cost and Performance Summary Report: Thermal Desorption at Naval Air Station Cecil Field, Site 17, OU 2 Jacksonville, Florida

Summary Information [1, 2, 4, 6]

Naval Air Station (NAS) Cecil Field, established in 1941, provides facilities, services, and material support for the operation and maintenance of naval weapons, aircraft, and other units of the operating forces. NAS Cecil Field's responsibilities have included operation of fuel storage facilities, performance of aircraft maintenance, maintenance and operation of engine repair facilities and test cells for turbojet engines, and support for special weapons systems. NAS Cecil Field, recently identified for closure under the Base Realignment and Closure (BRAC) program, is located 14 miles southwest of Jacksonville, Florida, primarily in Duval County.

NAS Cecil Field includes several operable units (OU) and contaminated sites, including Site 17 in OU 2. Site 17 reportedly was used for two or three years during the late 1960s and early 1970s for the disposal of waste fuel and oil, possibly including oil contaminated with solvents and paints. The wastes were transported to the site in small tank trucks, bowlers, and 55-gallon drums, and emptied into a pit approximately 50 feet in diameter and 3 to 4 feet deep. While in the pit, the wastes either evaporated or percolated into the ground.

Soil at Site 17 was found to be contaminated with petroleum products and chlorinated solvents. Specific contaminants identified in the soil at Site 17 included benzene, toluene, ethylbenzene, and xylenes (BTEX) and methylene chloride. During a 1991 remedial investigation, methylene chloride was detected in soil borings at concentrations as high as 58 milligrams per kilogram (mg/kg). During a 1995 feasibility study, volatile organic compounds (VOCs), semivolatiles, and inorganics were detected in both surface and subsurface soil samples. In subsurface soil samples, BTEX constituents were detected as high as 14 mg/kg for xylenes. In addition, a number of semivolatiles were detected in the subsurface, including 1,2-dichlorobenzene as high as 18 mg/kg, naphthalene as high as 19 mg/kg, and 2-methylnaphthalene as high as 47 mg/kg.

In September 1994, EPA signed an interim Record of Decision (ROD) for Site 17. The ROD specified that soil at Site 17 be excavated and treated by thermal desorption.

A total of 11,768 tons of contaminated soil was excavated from Site 17 and treated on site by a thermal desorption system. The period of performance for the thermal desorption treatment was June 19 to September 25, 1995. During that three-month period, the desorber had a cumulative run time of approximately 800 hours.

CERCLIS ID Number:	FL5170022474
Lead:	Southern Division, Naval Facilities Engineering Command

Timeline [2]

September 30, 1994	Interim ROD signed
January 1, 1995	Contractor mobilizes to the site
April 13, 1995	Contractor begins to excavate and stockpile contaminated soil
June 19 - September 25, 1995	Thermal desorption system operated
October 23, 1995	Contractor hydromulches Site 17
October 27, 1995	Final site inspection conducted

Factors That Affected Cost or Performance of Treatment [4, 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:	Sand and silty sand
Clay Content and/or Particle Size Distribution:	2% medium sand, 88% fine sand, 10% silt and clay (typical site soils)
Moisture Content:	20% (average natural moisture content)
pH:	Not available
Oil and Grease:	Not available
Bulk Density:	90 lbs/ft ³ for dry site soils
Lower Explosive Limit:	Not available

Treatment Technology Description [1, 2, 6]

The thermal desorption unit used at Site 17 was a mobile unit provided by Dustcoating, Inc. of Maple Plain, Minnesota. The unit, a propane-fired Gencor Model 232 rotary drum dryer modified to thermally process contaminated soil, was mounted on two trailers. The unit consisted of a 60-inch-diameter-by-20-foot-long rotary dryer with burner (direct-fired), a primary collector baghouse, and an afterburner system. The nominal system throughput for this unit was 25-50 tons/hour; the actual system throughput during this application was 17 tons/hour. The desorber treated contaminated soil at approximately 825 °F with an average residence time of 3.5 minutes. An afterburner operated at a temperature of at least 1,500 °F with a retention time of approximately two seconds to destroy organic compounds in the off-gas.

Before treatment in the desorber, soil was excavated from the disposal pit from four to eight feet below ground surface and stockpiled on a 30-millimeter (mil) high-density polyethylene (HDPE) liner. The liner was configured so that contaminated water excavated with the soil, including entrained groundwater, would flow back into the pit at Site 17, thereby reducing the moisture content in the soil before the soil was transferred to the desorber unit. The stockpiled soil also was covered with a plastic liner to protect the soil from rainfall and to direct storm water into the pit at Site 17. The water that collected in the pit at Site 17 was transported through a pipe to the wastewater treatment facility (WWTF) at Cecil Field for treatment.

After treatment, the excavation at Site 17 was backfilled with both treated and clean soil, and the site was graded for proper drainage. At the completion of grading, all areas that had been disturbed were re-seeded. Solid wastes generated as part of the application, such as personal protective equipment (PPE), plastic sheeting material, and construction material and debris, were placed in roll-off bins and transported off site to a landfill permitted under RCRA Subtitle D. A final site inspection was conducted on October 27, 1995.

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

Operating Parameters

Operating Parameter	Value
Residence Time:	3.5 minutes
System Throughput:	17 tons/hour
Soil Temperature:	825 °F

Performance Information [2, 3, 6]

Operation of the thermal desorption unit was permitted by the state of Florida under Permit No. 31-16-0345-01. The permit included conditions for particulate emissions of 0.04 grains per dry standard cubic foot (gr/dscf). In addition, the Florida Administrative Code (FAC) required the collection and analysis of samples of soil collected before treatment and samples of soil collected after treatment, with analysis of those samples for total recoverable petroleum hydrocarbons (TRPH), volatile organic halocarbons (VOH), volatile organic aromatic compounds, and total metals. Analyses of metals were required to comply with the FAC concentration limits for Soil Thermal Treatment Facilities.

According to the EPA Remedial Project Manager (RPM), the cleanup goal identified for soil at Site 17 was a TRPH level of 50 mg/kg provided that total polycyclic aromatic hydrocarbons (PAH) were less than 1 mg/kg and total VOHs were less than 50 mg/kg.

At Site 17, 21 pre-treatment soil samples from the soil stockpiles and 115 post-treatment soil samples were collected and analyzed. However, results from specific samples were not provided.

Throughout the system operation, post-treatment soil samples were collected hourly and composited over an eight-operational-hour (maximum) time interval. Five post-treatment samples did

not meet the cleanup goal of 50 mg/kg TRPH. As a result, five batches of soil (724.5 tons, or approximately 6% of the total) required re-treatment. All samples of the re-treated soil met the cleanup goals. According to the EPA RPM, no specific operational problems were identified as causing the failure to meet the cleanup goals on the first pass; however, the contractor suspects that this was caused by elevated levels of moisture in the soil.

A comparison of material input and output from the desorber was not completed because matched untreated/treated soil samples were not collected. Untreated (i.e., before-treatment) samples were collected from soil stockpiles and treated (i.e., post-treatment) samples were composited from the material exiting the desorber.

The thermal desorption unit was tested for particulate emissions on July 12, 1995 (3 weeks after startup), and was found to have emissions greater than the permitted limit of 0.04 gr/dscf (the actual emission level was not provided). This circumstance was believed to be the result of a pinhole leak in one of the bags in the primary collector baghouse. The bag was repaired, and when the unit was tested again on August 3, 1995, it met the emission limit, with an actual emission of 0.005 gr/dscf.

Performance Data Quality [2]

Quality assurance/quality control (QA/QC) activities for this application included use of EPA-approved test methods. Methods 8020, 9073, and 8010 were used for analysis of pre-burn and post-burn samples. The Response Action Contract (RAC) contractor noted that the subcontract for the laboratory that performed analyses at the beginning of this application, Geological Environmental and Oceanographic Services, Inc. (GEOS), was terminated because of QA problems (these problems were not specified). Environmental Conservation Laboratories performed the remainder of the analyses; no problems were noted about the work performed by this organization.

Cost Information [2, 6]

The original award cost for remedial activities at Site 17 was \$1,539,689. However, four changes in scope increased the total cost to \$1,946,122. The changes covered activities associated with site work and preparation, and included relocation of the thermal desorption unit at Cecil Field; addition of a water pipeline to transport water to the Cecil Field WWTF; addition of water filtration equipment; and addition of other water management equipment. No additional detail was provided on the specific elements included under equipment and appurtenances.

The Navy requested relocation of the unit to Site 3, which required clearing, grading, installation of a water disposal system and a liner. A water pipeline was installed from Site 3 to the WWTF to allow storm water overflow from Site 3 to be pumped to the WWTF. A second pipeline was added to allow clean water from the WWTF to be pumped to Site 3. Both pipelines were 3-inch HDPE fusion-welded pipes. Water filtration equipment, including in-line sand filters, a bag filter, a cyclone, and larger capacity pumps were installed to control Total Suspended Solids (TSS). Increased quantities of storm water and groundwater from Site 3 and Site 17 had resulted in TSS concentrations above acceptable levels at the WWTF. Additional water management equipment was required to handle increased storm water runoff and groundwater levels that resulted from excessive precipitation. Temporary measures included installation of FRAC tanks for Site 17 water storage, and construction of a berm around the Site 17 excavation perimeter to contain storm water. As a result of a hurricane threat, the Site 17 excavation was backfilled on an expedited and emergency overtime basis.

As shown below, a detailed breakdown of project costs was not provided. For example, information was not provided on the portion of the total project cost that was expended for excavation of soil or disposal of treatment residuals. The total cost of \$1,946,122 represents a unit cost of \$165 per ton of soil treated for treatment of 11,768 tons of contaminated soil at Site 17.

In addition, the vendor of the thermal desorption treatment for this application has filed a lawsuit seeking to recover an additional \$500,000 in costs allegedly resulting from unanticipated down time that was not caused by the treatment vendor. No additional information on the status of the lawsuit was provided.

Actual Project Costs

Cost Element	Cost (\$ in 1995)
Excavation (of soil)	Included in total
Capital	
Site Work and Preparation	
- Locate thermal unit to Site 3	150,000
- Pipeline, Site 3 to WWTF	15,127
- Water filtration equipment	11,526
- Water management - FRAC tanks, pipeline from Site 17 to Site 3 sump, berm around Site 17, backfill/hurricane preparation	229,780
Equipment and Appurtenances	1,539,689
Capital Subtotal	1,946,122
Operation & Maintenance	Included with capital
Disposal of Residuals	Included with capital
Analytical (related to compliance monitoring, not technology performance)	0
Total Project Cost	1,946,122

management plan was not necessary for the site. During the remedial activity, storm water collected within the bermed area at Site 17 and created a “lake” at the excavation. According to personnel at Cecil Field and at Bechtel, that condition could have been avoided if treated soil had been used as backfill in the excavation at Site 17 as soon as the soil had been determined acceptable for use as backfill. In addition, on two occasions, storm water discharges from Site 17 to the NAS Cecil Field WWTP caused the WWTP to exceed its limits under the National Pollutant Discharge Elimination System (NPDES) for biochemical oxygen demand.

According to the EPA RPM, conducting operations 24-hours a day was the most efficient way to operate since it takes approximately four hours to bring the unit up to operating temperature from a cold start.

The vendor of the thermal desorption technology mobilized on this site before completing all necessary paperwork and permits and notifications required by the state of Florida. In addition, in its first stack test, the desorption unit failed to meet the particulate limit established for the application. According to the Navy’s contractor, those events delayed the application of the thermal desorption unit and temporarily ceased operation of the technology.

Contact Information

For more information about this application, please contact:

EPA Remedial Project Manager:

Debbie Vaughn-Wright *
 U.S. EPA Region 4
 61 Forsyth Street, SW
 Atlanta, GA 30303-3104
 Telephone: (404) 562-8539
 Facsimile: (404) 562-8518
 E-mail: vaughn-wright.debbie@epamail.epa.gov

Navy Point of Contact:

Mark Davidson
 Southern Division, Naval Facilities Engineering Command
 (SOUTHNAVFACENGCOM)
 North Charleston, SC 29419-9010
 Telephone: (843) 820-5526
 E-mail: medavidson@esdsouth.navfac.navy.mil

Observations and Lessons Learned [1, 2, 6]

Several innovations were incorporated into this remedial activity. According to the RAC contractor (Bechtel Environmental, Inc.), 24-hour operations were conducted to help meet tight schedules, an innovative design for the stockpile area was used to provide cost savings, and Bechtel used one of its subsidiaries (Bechtel Leasing, Inc.) to provide much of the equipment to the Navy at a lower cost than otherwise would have been available. In addition, Bechtel worked with the Navy to minimize disturbance of wetlands adjacent to the remediated area, and to ensure that the remedial work did not interfere with flight operations at the base.

The effort involved in managing storm water at the site was more extensive than had been estimated. Several measures (discussed in the cost section) were taken to control storm water, resulting in an increase in costs of about \$250,000. The Navy decided before September 1994 that a storm water

Response Action Contractor:

Fred Seale
Project Manager
Bechtel Environmental, Inc.
Quarters E, G Avenue
P.O. Box 171
Jacksonville, FL 32215
Telephone: (904) 779-8900
Facsimile: (904) 779-8999

Thermal Desorption Vendor:

Larry D. Johnson
Dustcoating, Inc.
6925 D'Chene Lane
Maple Plain, MN 55359
Telephone: (612) 479-1593

* Primary contact for this application

References

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

1. Installation Restoration, Environmental Division, NAS Cecil Field and Bechtel Environmental, Inc., Jacksonville, Florida. 1996. *Construction Completion Information for Site 17, Naval Air Station Cecil Field, Jacksonville, Florida*. Prepared for Department of the Navy, Southern Division, Naval Facilities Engineering Command, under Contract No. N62467-93-D-0936. August.
2. ABB Environmental Services, Inc. 1996. *Remedial Action Report, Site 17 Source Control, Naval Air Station Cecil Field, Jacksonville, Florida, Unit Identification Code: N60200, Contract No.: N62467-89-D-0317/090*. Prepared for Department of the Navy, Southern Division, Naval Facilities Engineering Command, Mark Davidson, Code 1879, Engineer in Charge. September.
3. U.S. EPA. 1997. *Innovative Treatment Technologies Database, Annual Status Report (Eighth Edition)*. August.
4. EPA. 1994. *Interim Record of Decision, Naval Air Station Cecil Field, Site 17, O.U. 2, EPA/ROD/R04-94/190*. September 30.

5. EPA. 1994. *Declaration for the Interim Record of Decision, Naval Air Station Cecil Field, O.U. 2, EPA/ROD/R04-94/196*. September 30.
6. Deborah A. Vaughn-Wright, Regional Project Manager, EPA Region 4. 1998. Letter to Richard Weisman, Tetra Tech. Response to Request for Additional Information, Naval Air Station Cecil Field, Site 17, OU 2. April 14.

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-W5-0055.