



U.S. Department of Energy  
Office of Inspector General  
Office of Audit Services

# Audit Report

## Treatment of Mixed Incinerable Waste

DOE/IG-0588

March 2003



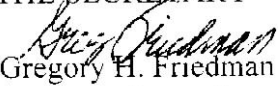
## Department of Energy

Washington, DC 20585

March 3, 2003

### MEMORANDUM FOR THE SECRETARY

FROM:

  
Gregory H. Friedman  
Inspector General

SUBJECT:

INFORMATION: Audit Report on "Treatment of Mixed Incinerable Waste"

### BACKGROUND

The Department of Energy estimates that about 11,000 cubic meters of mixed incinerable solid waste will require treatment and disposal through 2010. The two major resources available for treatment of this waste are the Toxic Substances Control Act (TSCA) Incinerator and the Vacuum-Assisted Thermal Desorption (VTD) System, both located in Oak Ridge, Tennessee. The Department-owned TSCA Incinerator is the only incinerator in the country permitted to burn mixed waste contaminated with polychlorinated biphenyls. The contractor-owned VTD System uses heat to separate contaminants from mixed waste without incineration. During Fiscal Year (FY) 2002, the Department spent about \$13 million to burn mixed waste in the TSCA Incinerator, and about \$6.3 million to treat mixed waste in the VTD System.

The objective of this audit was to determine whether the Department was treating its mixed incinerable solid waste in an expeditious and cost-effective manner.

### RESULTS OF AUDIT

Our review disclosed significant inefficiencies in the treatment and storage of the Department's mixed incinerable waste. Specifically:

- The TSCA Incinerator, in FY 2002, was only used at 31 percent of demonstrated capacity;
- The VTD System, for the first nine months of 2002, utilized only 55 percent of its capacity to process mixed incinerable waste; and,
- Seven Departmental sites continued to store 2.5 million pounds of incinerable waste locally despite underutilized treatment facilities.

Further, notwithstanding the current availability of underutilized incineration capacity, the Department approved the establishment of an additional treatment facility in Utah, which requires a considerable financial investment.

There are inherent health and safety risks associated with the handling and storage of hazardous and radioactive materials. Thus, it is advantageous to treat these materials in the most expeditious and cost effective possible manner. Based on our finding that existing facilities were



significantly underutilized, we concluded that the Department was not doing all that it could to minimize the risk of processing the materials. Furthermore, we concluded that better utilization of existing treatment facilities could result in the avoidance of \$45 million in unnecessary costs over the next four years. Our report includes a number of specific recommendations intended to assist (1) the Office of Environmental Management in managing the treatment of mixed incinerable waste as a complex-wide activity, and (2) the Oak Ridge Operations Office in more effectively managing the TSCA Incinerator.

The audit findings are consistent with the Department's February 2002 *Top-to-Bottom Review*, which discussed significant challenges facing the overall cleanup effort. In particular, the review team noted that Environmental Management's cleanup strategy could benefit from a greater emphasis on risk prioritization. The report also cited the need for system-wide programmatic approaches to cleanup that would help to eliminate costly duplication and local inefficiencies.

### MANAGEMENT REACTION

Management concurred with our finding and recommendations and initiated corrective actions.

Attachment

cc: Deputy Secretary  
Under Secretary for Energy, Science and Environment  
Assistant Secretary for Environmental Management  
Manager, Oak Ridge Operations Office

# TREATMENT OF MIXED INCINERABLE WASTE

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## **USE OF TREATMENT RESOURCES**

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### **Waste Stored Rather Than Treated**

We found the Department of Energy (Department) was not treating its mixed incinerable solid waste expeditiously or cost-effectively. Specifically, the Department:

- Did not fully utilize the Toxic Substances Control Act (TSCA) Incinerator or the Vacuum-Assisted Thermal Desorption (VTD) System;
- Stored about 2.5 million pounds of incinerable waste at seven sites rather than treating the waste in Oak Ridge; and,
- Approved development of an additional VTD treatment facility in Utah, even though existing facilities were underutilized in Oak Ridge.

### TSCA Incinerator Operations

The TSCA Incinerator is operated under a fixed-price subcontract to Bechtel Jacobs Company, LLC (Bechtel Jacobs), the Department's management and integration contractor for the East Tennessee Technology Park (ETTP). In Fiscal Year (FY) 2002, the incinerator was used to treat only about 174,000 pounds of solid waste. This is about 48 percent of the minimum amount specified in the subcontract (360,000 pounds), and 31 percent of the incinerator's demonstrated capacity (560,000 pounds). Further, the burn rate is likely to diminish in the future because Bechtel Jacobs has completed treatment of the Oak Ridge Reservation's mixed incinerable solid waste inventory and shipments from other sites have been delayed.

Under the terms of the subcontract, the fixed price for the incineration of a minimum of 360,000 pounds of solid waste<sup>1</sup> declines annually from \$8.5 million in 2000 to \$6.1 million in 2006. If the burn rate reaches 360,000 pounds per year, the treatment price is approximately \$2 per pound for every pound above the threshold. At this rate, incineration is the Department's least-cost alternative for treating mixed incinerable waste.

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<sup>1</sup>The subcontract also requires the treatment of 720,000 pounds of liquid waste each year.

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The Office of Inspector General issued two prior reports dealing with the inefficient operation of the TSCA Incinerator. Our report on *Waste Incineration at the Oak Ridge Reservation* (DOE/IG-0451, August 1999), disclosed that the Department did not operate the incinerator at the capacity permitted by the State of Tennessee or at the "attainable" capacity. Also, our *Audit of Subcontracting for Environmental Management Projects at the Oak Ridge Reservation* (ER-L-02-04, July 2002), disclosed that although minimum burn requirements were not met, the Department paid over \$700,000 in overtime wages and performance-based incentives for waste incineration. At the time, we urged the Department to closely scrutinize such costs and incentive fees. During the current audit, however, we noted that the Department continues to pay additional costs and incentive fees for TSCA Incinerator operations even though the subcontract's minimum burn requirements still have not been met. In fact, between FY 2000 and FY 2002, the Department paid the subcontractor \$809,600 for upward price adjustments and is planning to pay Bechtel Jacobs \$1.5 million in incentive fees related to incinerator operations.

#### VTD System Operations

Bechtel Jacobs also has an agreement with East Tennessee Materials and Energy Corporation (Materials and Energy Corporation) to treat mixed incinerable waste with the VTD System at the ETTP. While the VTD System has the capacity to treat 156,000 pounds of waste per month, the Department treated only about 86,000 pounds per month between January and September 2002. Only three percent of the treated waste came from generators outside the Oak Ridge Reservation.

Materials and Energy Corporation offers volume discounts, and the subcontract can be used by all Department sites nation-wide. Prices vary, depending on the level of toxicity and volume of waste to be treated. Overall, the VTD System, like the TSCA Incinerator, represents a cost-effective means of waste treatment that the Department has, thus far, not used to capacity.

#### Waste Storage

A recent Department study justified the continued operation of the TSCA Incinerator through 2006 because the potential demand for incineration, primarily from sites outside Oak Ridge, far exceeded treatment capacity. However, instead of shipping the waste to Oak Ridge for treatment, seven sites have stored about 2.5 million pounds of incinerable waste locally. Also, some of the sites have stored their

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waste for several years. For example, the Hanford Site has stored incinerable waste for as long as 16 years. The seven sites and their current inventories of mixed incinerable solid waste are:

<u>Site</u>	<u>Inventory in Thousands of Pounds</u>
Hanford	790
Paducah	709
Fernald	463
Savannah River	270
Portsmouth	248
Idaho	45
Rocky Flats	<u>9</u>
Total	<u>2,534</u>

#### New Treatment Facility

Even though existing treatment facilities were underutilized, the Department approved development of an additional VTD facility in Utah. The Department plans to use the new facility to treat about 1,300 drums of waste from the Fernald site. Development of the new facility is estimated to cost the Department about \$3 million. Approval of such a facility appears inconsistent with the underutilization of existing facilities we noted, as well as with conclusions Environmental Management reached in its 2001 report on *Ensuring Viable Treatment Paths for DOE Incinerable Waste*. Environmental Management's report stated that existing thermal desorption treatment capacity far exceeded the estimated demand through 2006.

Fernald management stated that the new treatment facility was justified because the Materials and Energy Corporation's VTD System had not yet demonstrated the ability to treat certain types of incinerable waste from the Fernald site. However, the technologies are almost identical between the VTD System and the planned new facility. Also, most of the Fernald site's incinerable waste could be treated using the TSCA Incinerator.

#### **Program Management Improvements**

The Department did not maximize the use of existing treatment resources because the Office of Environmental Management did not manage the treatment of mixed incinerable solid waste as a complex-wide activity, and the Oak Ridge Operations Office (Operations Office) did not effectively manage the TSCA Incinerator.

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### Complex-Wide Program Management

Environmental Management does not have an integrated, comprehensive plan for the treatment of mixed incinerable solid waste. Environmental Management's current organizational structure places the responsibility for decisions regarding the treatment of incinerable waste at the field office level. However, field managers are, understandably, making decisions based on their own site's interests rather than the complex as a whole. For example, the decision to build an additional thermal desorption system in Utah, despite existing capabilities in Tennessee, was, according to a responsible Department official, based primarily on the Fernald site's desire to obtain a subcontractor that assures Fernald a prioritized treatment schedule. The subcontract for the new facility states that the Fernald site's waste will be given "...first priority over all other customers for treatment..." While this requirement ensures that the Fernald site's waste will be treated first, it does not consider the cost-effectiveness of the procurement nor the risk related to other sites' wastes.

Another example of the need for complex-wide management involves scheduling shipments of waste for treatment at the VTD System in Oak Ridge. Currently, the individual sites determine their own shipping schedules, and ship waste without taking Department-wide shipping priorities into account. As a result, about 67 percent of the Department's waste treated at the VTD System from January through September 2002 was shipped during the last three months. If shipments had been coordinated and scheduled more evenly, it is likely that more waste could have been treated during the year.

### Management of the TSCA Incinerator

Also, the Operations Office did not effectively manage the TSCA Incinerator operations. Specifically, it did not attempt to remove unnecessary administrative barriers to waste treatment, nor did it require Bechtel Jacobs to operate the incinerator at or near the demonstrated capacity. Although there is no regulatory requirement to do so, the Operations Office submits its annual burn plan to the Tennessee Department of Environment and Conservation (TDEC) and waits for approval before offsite wastes are sent to the incinerator for treatment. This results in substantial delays since the TDEC does not approve the burn plan in a timely manner. For example, the FY 2002 burn plan was submitted to the TDEC on October 9, 2001, and was not approved until February 28, 2002. The TDEC cited issues such as the equity of funding and cleanup levels among Department sites – not



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technical or environmental compliance issues – as reasons for the delay in approving the burn plan. These unnecessary, lengthy delays have discouraged offsite users from sending wastes to the TSCA Incinerator for treatment.

Further, the TSCA Incinerator should be operational around 70 percent of the time, considering downtime for maintenance and calibrations. However, between 2000 and 2002, the incinerator was operational only about 40 percent of the time. Because the incinerator is the Department's most economical source of treating mixed incinerable solid waste, reducing system downtime is crucial to obtaining users' confidence in the treatment process and maximizing system capabilities.

### **Health and Safety Risks and Unnecessary Costs**

Unless it maximizes the use of its treatment capabilities, the Department risks subjecting its workers and the public to unnecessary health and safety hazards. Between 2000 and 2002, the Department could have treated an additional 1.6 million pounds of solid waste had the TSCA Incinerator and VTD System operated at its demonstrated capacity. Storing the waste is inherently more dangerous than treating it because there are more opportunities for inadvertent exposure, leakage, or other problems. Also, based on costs incurred at three Department sites, we estimated the Department incurred at least \$8.5 million in unnecessary storage costs over the last three years.

Additionally, if the TSCA Incinerator operational inefficiencies are not resolved and the new treatment facility is fully deployed, the Department could spend \$48 million in unnecessary treatment and storage costs by 2006. Because the incinerator operates under a fixed-price subcontract, operating at less than capacity results in increased unit costs and lost treatment opportunities. For example, in FY 2002 the unit rate for treatment of waste at the TSCA Incinerator was \$17 per pound; however, had the subcontractor operated the incinerator at its demonstrated capacity, the unit rate would have averaged about \$10.52 per pound. Thus, the Department did not effectively use \$13 million in treatment funds because the TSCA Incinerator did not operate at full capacity between FY 2000 and FY 2002. Further, should the current trend continue, the Department could miss the opportunity to treat 1.5 million pounds of waste and incur an additional \$45 million in unnecessary treatment and storage costs between FY 2003 and FY 2006. Finally, the Department could avoid up to \$3 million in unnecessary costs by terminating its plan to develop an additional VTD System and using existing treatment facilities instead.

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## RECOMMENDATIONS

We recommend that the Assistant Secretary for Environmental Management:

1. Establish an integrated complex-wide mixed incinerable waste treatment program to ensure optimal use of treatment facilities; and,
2. Ensure that Fernald wastes cannot be treated at existing facilities before investing \$3 million to develop a new treatment facility.

We recommend that the Manager, Oak Ridge Operations Office:

1. Effectively manage the TSCA Incinerator by requiring operation at or near the demonstrated capacity, with less than 30 percent downtime;
2. Restructure Bechtel Jacobs' performance incentives to ensure that incentive fees are tied to cost-effective utilization of the TSCA Incinerator; and,
3. Work with TDEC to review the TSCA Incinerator burn plan approval process for ways to expedite the process while maintaining compliance with all health, safety and regulatory requirements.

## MANAGEMENT REACTION

Management concurred with the report's finding and recommendations. Specifically, the Assistant Secretary for Environmental Management has initiated reviews to look at business practices and general efficiencies in waste management and committed to work with the TDEC to assure the burn plan approval process is timely. Also, the Department requested the National Academy of Sciences to review how it could make more effective use of existing capabilities and facilities.

With respect to the TSCA Incinerator, the Department stated that TDEC has delayed the receipt of out-of-state waste in the past through delays in the burn plan approval, but the process has improved. The 2003 Burn Plan was submitted to TDEC in late summer, and they provided their timely approval in early fall. The Department will continue to work with TDEC to assure that the approval process is timely and maintains compliance with all health, safety, and regulatory requirements. While management's written comments did not address the first two recommendations related to the Oak Ridge Operations

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Office, subsequent discussions were held with EM to clarify the Department's position. Based on these discussions, management agreed to take corrective action. Specifically, once the burn plan was approved by TDEC, the Department committed to use the plan to evaluate alternative operating strategies to ensure efficient treatment of the approved waste volumes, including potential changes to the subcontract structure and performance incentives. We have included management's written comments in their entirety as Appendix 3.

**AUDITOR COMMENTS**

We appreciate management's commitment to correcting the deficiencies and noted the actions initiated by the Assistant Secretary for Environmental Management to increase efficiency. If all recommendations are implemented successfully, the Department should significantly reduce its waste volumes, waste treatment costs, and the risks associated with waste storage.

### PRIOR REPORTS

- *Utilization of the Department's Low-Level Waste Disposal Facilities* (DOE/IG-0505, May 2001). The Department did not adequately utilize existing low-level waste disposal capacity at the Hanford Site or Nevada Test Site. Instead, the Department stored large amounts of waste at generator sites or disposed of the waste at commercial disposal sites. This occurred because the Department did not have a comprehensive approach to maximize waste disposal.
- *Waste Incineration at the Oak Ridge Reservation* (DOE/IG-0451, August 1999). The Department did not operate the TSCA Incinerator at the capacity permitted by the State of Tennessee or at the "attainable" capacity. Contributing factors included 1) the majority of on-site waste was not characterized for the development of an effective burn plan, and 2) the State of Tennessee restricted incineration of out-of-state waste. Furthermore, waste could be treated more economically at commercial facilities once these treatment options come on-line.
- *Waste Incineration at the Savannah River Site* (DOE/IG-0453, October 1999). Westinghouse was not operating the Consolidated Incinerator Facility (CIF) at its permitted capacity. The CIF was operated at about 8 percent of capacity in FYs 1997 and 1998, and Westinghouse planned to operate the CIF at 32 percent of capacity or less in FY 1999 and beyond. This occurred because the Department designed the CIF to incinerate more waste than the Site had available for treatment.
- *Waste Incineration at the Idaho National Engineering and Environmental Laboratory* (DOE/IG-0454, December 1999). The Department did not operate the incinerator at the capacity permitted by the State of Idaho or at the "attainable" capacity. Two factors contributed to the shortfall in actual operations relative to the capacity of the incinerator. Specifically, operations were limited because the downtime between incineration campaigns was excessive and the majority of on-site waste was not sorted, segregated, and characterized for incineration.

## Appendix 2

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### OBJECTIVE

The objective of this audit was to determine whether the Department was treating its mixed incinerable solid waste in an expeditious and cost-effective manner.

### SCOPE

The audit was performed from June to October 2002 at the Oak Ridge Reservation in Oak Ridge, Tennessee; Fernald Environmental Management Project near Ross, Ohio; and Environmental Management Headquarters in Washington, D.C. The scope of the audit included the Department's treatment of mixed incinerable solid waste activities from FY 2000 through FY 2002. Because less than 10 percent of the total mixed incinerable waste inventory is liquid, our review was limited to solid waste streams.

### METHODOLOGY

To accomplish the audit objective, we:

- Obtained and reviewed applicable Department directives for the treatment of mixed incinerable waste;
- Discussed with Office of Environmental Management officials alternative management methods for the treatment of the Department's mixed incinerable solid waste;
- Obtained mixed incinerable solid waste inventory information from seven of the Department's generator sites;
- Interviewed contractor personnel from the Department's existing treatment facilities and determined treatment capacity;
- Reviewed production data from treatment facilities to determine quantities of waste treated;
- Determined the Department's cost to operate the TSCA Incinerator from FY 2000 through FY 2002; and,
- Determined the cost of storing mixed incinerable waste at Fernald, Hanford, and Portsmouth.

The audit was conducted in accordance with generally accepted Government auditing standards for performance audits and included tests of internal controls and compliance with laws and regulations to the extent necessary to satisfy the audit objective. Because our review was limited, it would not necessarily have disclosed all internal control

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deficiencies that may have existed at the time of our audit. Because only a limited amount of computer-processed data was used during the audit, we did not conduct a reliability assessment of computer-processed data.

Finally, we assessed the Department's compliance with the Government Performance and Results Act of 1993. The Department's Annual Performance Plans for FYs 2000 through 2002 contained performance measures based on treating and disposing of specific waste volumes and waste streams from its sites. The Department met its FY 2000 and 2001 performance objectives for mixed waste treatment and disposal; however, the Department did not carry out its strategy for integrating waste treatment facilities to maximize efficiency, or reduce environmental risks and costs of operation. In addition, Oak Ridge Operations did not establish adequate performance measures for Bechtel Jacobs' TSCA Incinerator operations.

Department officials waived the exit conference.

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United State Government

Department of Energy

## memorandum

DATE: January 22, 2003  
REPLY  
ATTN OF: EM-22 (L. Suttora, 301-903-7921)  
SUBJECT: Draft Audit Report on "Treatment of Mixed Incinerable Waste"  
TO: Frederick D. Doggett, Deputy Assistant Inspector General for Audit Services

Thank you for the opportunity to review the Office of Inspector General draft audit report, "Treatment of Mixed Incinerable Waste." I agree with the general conclusion that programmatic changes in how our sites access and use the Department of Energy (DOE) and commercial treatment facilities could increase efficiency. The Office of Environmental Management (EM) has chartered a special team to look at business practices and general efficiencies in waste management. One of the efficiencies the team has identified is how our sites access and use DOE and commercial treatment facilities to ensure that those resources are being efficiently used. I expect to have recommendations from this team for programmatic changes to be implemented by the end of fiscal year 2003. I have also requested the National Academy of Sciences to review how we could make more effective use of existing capabilities and facilities for waste characterization, treatment, or disposal.

In your cover memorandum, you pointed out that your findings were consistent with the EM Top-to-Bottom review conducted last year. Risk prioritization and business efficiencies continue to be emphasized in redefining the EM program.

Recommendation two to the Assistant Secretary implied that waste treatment decisions were made without fully taking cost management into consideration. A study of the schedule and cost implications of using the existing treatment facility versus developing a new treatment facility for Fernald wastes will be reviewed. Under the Envirocare vacuum desorption treatment contract, the new facility will begin treating Fernald waste in February 2003; therefore, I will direct my staff, by this memorandum, to complete this analysis by the end of January 2003.

Your last three recommendations concern operations of the TSCA Incinerator at Oak Ridge and Tennessee Department of Environment and Conservation's (TDEC) approval of the burn plan. Operation of the incinerator for the past three years has been mainly controlled by the availability of out-of-state waste. There are no contractual barriers to operation at or near demonstrated capacity. Likewise, the ability of the management and integrating contractor to cost-effectively utilize the incinerator is directly tied to waste availability. Although in the past TDEC has delayed receipt of out-of-state waste through delays in their approval of the burn, I believe that the process has improved. The 2003 Burn Plan was submitted to the State in late summer, and they provided their

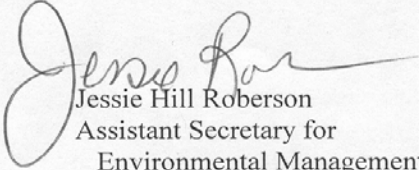
## Appendix 3 (Continued)

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timely approval in early fall. I believe this is due to the commitment the State made to work with DOE to achieve the Accelerated Cleanup Plan for the Oak Ridge Reservation. We will continue to work with the State to assure the approval process is timely and maintains compliance with all health, safety, and regulatory requirements.

If you have any further questions, please contact me at (202) 586-7709 or Ms. Patrice M. Bubar, Associate Deputy Assistant Secretary, Office of Integration and Disposition, at (202) 586-5151.

  
Jessie Hill Roberson  
Assistant Secretary for  
Environmental Management

Attachment



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