

DOE/IG-0451

AUDIT
REPORT

WASTE INCINERATION
AT THE
OAK RIDGE RESERVATION



AUGUST 1999

U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL
OFFICE OF AUDIT SERVICES

August 13, 1999

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman (Signed)
Inspector General

SUBJECT: INFORMATION: Audit Report on "Waste Incineration at the Oak Ridge
Reservation"

BACKGROUND

The Toxic Substances Control Act (TSCA) Incinerator is located at the East Tennessee Technology Park (ETTP) in Oak Ridge, Tennessee. It is the only incinerator in the Department of Energy (Department) that is permitted to treat TSCA-regulated, radioactively contaminated polychlorinated biphenyl (PCB) waste. The objective of this audit was to determine whether the Department operated the TSCA Incinerator at the capacity permitted by the State of Tennessee.

RESULTS OF AUDIT

The Department did not operate the incinerator at the capacity permitted by the State of Tennessee or at the "attainable" capacity. The "attainable" capacity represented the more realistic burn rate as determined by Bechtel Jacobs, the contractor operating the incinerator.

Several factors contributed to the shortfall in actual operations relative to the capacity of the incinerator. Specifically, we noted that the facility was designed to incinerate more waste than the Oak Ridge Reservation planned to treat. Current operations were limited because (1) the majority of on-site waste was not sufficiently characterized for the development of an effective burn plan, and (2) the State of Tennessee restricted incineration of out-of-state waste until such time as more local waste is treated or disposed of.

Between FYs 1996 and 1998, the Department spent about \$45 million to incinerate 7.7 million pounds of waste. This equates to under 2.6 million pounds per year. Had the Department been more aggressive in incinerating the waste at Oak Ridge, the 7.7 million pounds could have been incinerated in one year rather than three years, at a savings of about \$24 million. The 7.7 million pounds of incinerated waste was well within the 9.2 million pound "attainable" annual burn rate established by the contractor. Furthermore, the audit showed that the waste could be treated more economically at commercial facilities, once these treatment options become available in June 2000. Consequently, we concluded that the Department could treat all of the Oak Ridge Reservation's existing inventory of incinerable waste by June 2000 and close the incinerator at that time. This would be 39 months earlier than planned, and would reduce operating costs by \$39 million.

MANAGEMENT REACTION

Management agreed with the audit finding and recommendations and initiated corrective actions.

Attachment

cc: Deputy Secretary
Under Secretary

WASTE INCINERATION AT THE OAK RIDGE RESERVATION

TABLE OF CONTENTS

Overview

Introduction and Objective	1
Conclusions and Observations.....	1

Operating Capacity

Details of Finding	3
Recommendations and Comments	7

Appendix

Scope and Methodology.....	9
----------------------------	---

Overview

INTRODUCTION AND

The TSCA Incinerator is located at the ETTP in Oak Ridge, Tennessee. It is the only incinerator in the Department that is permitted to treat TSCA-regulated, radioactively contaminated PCB waste. The Department designed the facility to treat PCB waste, radioactive hazardous waste (mixed waste), and waste with low-levels of radioactivity (low-level waste). The incinerator destroys over 99.9999 percent of the TSCA-regulated PCB waste and 99.99 percent of the hazardous waste. The residuals from the incineration process are disposed of at a commercial facility.

The TSCA Incinerator cost \$25.6 million to build and started operating in FY 1991. Bechtel Jacobs Company, LLC (Bechtel Jacobs) currently operates the facility for the Department with a staff of approximately 72 employees. The FY 1999 operating budget for the facility is \$15 million. Bechtel Jacobs plans to subcontract operations of the facility starting in FY 2000.

The Office of Inspector General has not performed any prior audits of the Department's incinerator operations. However, we are currently performing audits at the Consolidated Incinerator Facility at the Savannah River Site and the Waste Experimental Reduction Facility at the Idaho National Engineering and Environmental Laboratory.

The objective of this audit was to determine whether the Department operated the TSCA Incinerator at the capacity permitted by the State of Tennessee.

CONCLUSIONS AND OBSERVATIONS

The Department did not operate the incinerator at the capacity permitted by the State of Tennessee or at the "attainable" capacity. The "attainable" capacity represented the more realistic burn rate as determined by Bechtel Jacobs, the contractor operating the incinerator.

Several factors contributed to the shortfall in actual operations relative to the capacity of the incinerator. Specifically, we noted that the facility was designed to incinerate more waste than the Oak Ridge Reservation planned to treat. Current operations were limited because (1) the majority of on-site waste was not sufficiently characterized for the development of an effective burn plan, and (2) the State of Tennessee restricted incineration of out-of-state waste until such time as more local waste is treated or disposed of.

Between FYs 1996 and 1998, the Department spent about \$45 million to incinerate 7.7 million pounds of waste. This equates to under 2.6 million pounds per year. Had the Department been more aggressive in incinerating the waste at Oak Ridge, the 7.7 million pounds could have been incinerated in one year rather than three years, at a savings of about \$24 million. The 7.7 million pounds of incinerated waste was well within the 9.2 million pound "attainable" annual burn rate established by the contractor. Furthermore, the audit showed that the waste could be treated more economically at commercial facilities, once these treatment options become available in June 2000. Consequently, we concluded that the Department could treat all of the Oak Ridge Reservation's existing inventory of incinerable waste by June 2000 and close the incinerator at that time. This would be 39 months earlier than planned, and would reduce operating costs by \$39 million.

The audit identified issues that management should consider when preparing its yearend assurance memorandum on internal controls.

(Signed)

Office of Inspector General

OPERATING CAPACITY

TSCA Incinerator Is Permitted to Burn 17.3 Million Pounds of Waste Annually

The Department is permitted to operate the TSCA Incinerator at an annual capacity of 17.3 million pounds based on the State of Tennessee's hourly permitted rate of 2,800 pounds. The annual capacity is determined by multiplying the hourly permitted rate by the number of hours the facility is available to operate each year. After adjusting for required maintenance and calibrations, the incinerator is available to operate about 6,163 hours per year.

Although the permitted capacity is 17.3 million pounds, Bechtel Jacobs management believed that a more realistic "attainable" capacity of the incinerator was 1,500 pounds per hour, or 9.2 million pounds per year. The attainable capacity reflects the typical mix of waste available for incineration.

The incinerator was designed to burn four waste streams simultaneously. These include three liquid feeds and one solid feed. Typical wastes include oils, solvents, chemicals, concrete, wood, plastic, graphite, rags, and protective clothing. The amount of waste that can be fed through the incinerator is based on the characteristics of the waste, such as the type of hazardous component, level of radioactivity, and flammability. The characteristics and constituents of the waste may require slower feed rates so that air and water permits are not exceeded.

TSCA Incinerator Was Not Operating at Capacity

The TSCA Incinerator was not operating at either the capacity permitted by the State of Tennessee or the attainable capacity as determined by Bechtel Jacobs management. The following table shows the amount of waste incinerated and the resulting percentages of permitted and attainable capacity used by the facility from FY 1996 through FY 1998:

Use of TSCA Incinerator Capacity			
	1996	1997	1998
Pounds Incinerated (Millions)	3.4	2.5	1.8
Percent of Permitted Capacity Used	20	14	10
Percent of Attainable Capacity Used	37	27	20

The table shows that the incinerator operated at between 10 and 20 percent of its permitted capacity from FY 1996 through FY 1998. Using Bechtel Jacobs' attainable capacity as the benchmark, the facility operated at between 20 and 37 percent of capacity. Thus, regardless of the benchmark used, the incinerator did not operate near capacity.

Contractors generally met the Department's performance expectations even though the incinerator was operated at less than capacity. The Department established performance goals for FYs 1996, 1997, and 1999 requiring that specific amounts of materials be treated at the TSCA Incinerator in support of the Department's Strategic Plan and in accordance with the requirements of the Government Performance and Results Act of 1993. The Department did not establish a performance goal for FY 1998 because the responsibility for incinerator operations was transferred from Lockheed Martin Energy Systems (Energy Systems) to Bechtel Jacobs during the year.

**TSCA Incinerator Operated
Below Capacity for
Several Reasons**

The TSCA Incinerator operated at less than capacity because the incinerator was built to treat more waste than the Oak Ridge Reservation planned to treat. Additionally, recent operations were limited because (1) the majority of on-site waste was not sufficiently characterized for the development of an effective burn plan, and (2) the State of Tennessee restricted the incineration of waste generated by other states.

Incinerator Was Designed to Treat More Waste Than Available

The TSCA Incinerator was built to treat more waste than the Oak Ridge Reservation planned for incineration. The incinerator was originally designed in 1982 to treat 5.6 million pounds of waste per year. The Department estimated that it had 19.4 million pounds of waste in inventory at the Oak Ridge Reservation and the Portsmouth, Paducah, and Fernald sites and that 1.9 million pounds of waste would be generated at the sites annually. The Department revised the estimate in 1985 to 20.1 million pounds of waste in the existing inventory and 2.6 million pounds to be generated annually. Although the estimate of waste to be treated increased only slightly, the Department almost tripled the designed capacity of the incinerator, from 5.6 million to 16.2 million pounds per year.

Management stated that the Department increased the designed capacity of the incinerator so that wastes from other sites could be brought in and treated at the Oak Ridge Reservation. However, management did not have estimates of the amount of waste expected to be shipped from other sites or other documented studies to support the increase in designed capacity.

Most Waste Was Not Sufficiently Characterized

Current incineration activities have been limited because most of the Oak Ridge Reservation's incinerable waste was not fully characterized. Incinerable waste must be fully characterized before a burn plan can be developed for more efficient use of the incinerator. The amount of incinerable waste that was characterized ranged from 14 to 23 percent from FYs 1997 through 1999. For example, there were approximately 6.8 million pounds of incinerable waste in inventory at the beginning of FY 1997. However, only 1.2 million pounds (18 percent) were characterized. According to Bechtel Jacobs personnel responsible for waste characterization, the characterization of incinerable waste was one of several high-priority projects. The contractor had to balance all priorities to meet Site Treatment Plan milestones for all waste. Therefore, only a portion of the incinerable waste was characterized each year.

The lack of characterized waste slowed down the incineration process in two ways. First, occasionally there were no characterized liquid wastes available for incineration. Second, wastes with regulated feed limits, such as fluorine, beryllium, and chromium, could not be blended with other types of waste to increase the feed rate because the types of wastes needed for blending had not yet been characterized. As a result, wastes with slow feed rates sometimes had to be fed alone.

State of Tennessee Restricted the Incineration of Waste Received from Other States

Another factor that has limited the current incineration activities was the fact that the State of Tennessee rejected the Department's 1997 and 1998 TSCA Burn Plans to incinerate waste generated at other Departmental sites. The State of Tennessee determined that more restrictions should be placed on waste received from other sites until the Department treats and disposes of more local waste. Thus, the State of

Tennessee placed greater restrictions on the incineration of waste received from other states until the Department invests substantially more resources to treat and dispose of all types of waste at the Oak Ridge Reservation. As a result, the amount of out-of-state waste treated at the TSCA Incinerator dropped from about 1.4 million pounds in FY 1996 to about 200,000 pounds in FY 1998.

Incineration Costs Were Excessive

The Department incinerated 7.7 million pounds of waste between FYs 1996 and 1998 at a cost of \$45.6 million. Had the Department incinerated waste at the attainable rate, it could have incinerated 7.7 million pounds in less than a year, resulting in a cost avoidance of at least \$24 million.

As of March 31, 1999, the local Oak Ridge Reservation had only 1.4 million pounds of incinerable waste in inventory and planned to generate only about 314,000 pounds annually. Thus, the incinerator cannot be operated at the rate of 9.2 million pounds per year at the present time.

Further, the waste that will be generated in future years could be treated under commercial contracts at rates below the cost of TSCA incineration. The Department has awarded six contracts for the treatment of mixed waste using new technologies. The technologies are to be available for the treatment of waste by June 2000. The cost of treating solid mixed waste will range from \$2.26 to \$6.80 per pound under the new contracts, compared to \$7.56 per pound using the TSCA Incinerator at less than capacity. Also, the cost of treating liquid mixed waste will range from \$3.67 to \$4.58 per pound compared to \$5.67 using the TSCA Incinerator at less than capacity.

Because the waste can be treated more economically at commercial facilities rather than the TSCA Incinerator, the Department should close the incinerator as soon as other treatment options are available. The Department plans to operate the TSCA Incinerator through FY 2003. However, by closing the TSCA Incinerator in June 2000, rather than September 2003, the Department could avoid operating costs of \$39 million.

The TSCA Incinerator must remain open until other treatment options are available. Waste treatment is regulated by the Site Treatment Plan, and the milestones for TSCA incineration must be met or the Department will

RECOMMENDATIONS

We recommend that the Manager, Oak Ridge Operations Office:

1. Require Bechtel Jacobs to characterize the inventory of incinerable waste as soon as possible to facilitate preparation of a burn plan that will allow the TSCA Incinerator to operate more efficiently, and
2. Close the TSCA Incinerator as soon as other treatment options are in place.

MANAGEMENT REACTION

Management agreed with the audit finding and recommendations. Bechtel Jacobs plans to pursue the characterization of available Oak Ridge incinerable wastes to optimize the use of the TSCA Incinerator as well as other treatment alternatives. However, management stated that the report assumes that characterization of the remaining waste in inventory will result in characteristics that will not be restricted by the air and water permits, and therefore, will facilitate the Department's being able to achieve higher feed rates on a consistent basis. Also, management stated that the report did not account for waste streams from out-of-state that relied on the TSCA Incinerator for treatment of waste. Further, management stated that the TSCA Incinerator will need to be operated until proven, cost-effective technologies are brought on-line under the new treatment contracts. These alternative technologies are in various stages of development and are scheduled for demonstration tests using Departmental waste streams in FY 2000.

AUDITOR COMMENTS

We consider management's comments to be responsive. The report states that current incineration activities have been limited because incinerable waste was not fully characterized. The lack of characterization decreases the amount of waste treated since the types of waste needed for blending with difficult waste streams are not available. As a result, wastes requiring slow feed rates are sometimes fed alone. The report does not claim that higher feed rates could be achieved on a continuous basis. The report states that incinerable waste must be fully characterized before a burn plan can be developed for more efficient use of the incinerator.

Unless the State of Tennessee lifts its restriction on waste treated at the TSCA Incinerator, the Department should not rely on the waste that is generated at sites other than the Oak Ridge Reservation to make decisions about the use of the TSCA Incinerator. The amount of

out-of-state waste treated at the TSCA Incinerator was only about 200,000 pounds in FY 1998, and the Department does not expect the State of Tennessee to lift its restrictions in the near future.

We agree that the incinerator will need to stay open until alternative treatment options are in place. The new treatment technologies are to be available by June 2000, at which time the incinerator should be closed.

Appendix

SCOPE

The audit was performed from August 25, 1998, to June 30, 1999 at the Operations Office and the ETTP in Oak Ridge, Tennessee. The scope of the audit included waste incinerated at the TSCA Incinerator from October 1996 through May 1999, as well as plans for waste generated in the future.

METHODOLOGY

To accomplish the audit objective, we:

- Reviewed the operating capacity and waste feed limitations for the TSCA Incinerator;
- Determined the amount of time the incinerator was down for maintenance and calibrations during FYs 1996 through 1998;
- Determined the amount of waste incinerated between FYs 1991 and 1998 and in inventory at the Oak Ridge Reservation as of March 31, 1999;
- Compared FY 1996 through FY 1998 operating levels to (1) the capacity permitted by the State of Tennessee and (2) the attainable capacity as determined by Bechtel Jacobs management; and
- Evaluated the Department's performance expectations and measures for the contractors that operated the TSCA Incinerator between FYs 1996 and 1999.

The audit was performed 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. Accordingly, the assessment included reviews of Departmental and contractor policies and procedures related to the management and control of incineration activities. Because our review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our audit. We assessed the reliability of computer generated data and found that it was reliable.

We held an exit conference with officials from the Oak Ridge Operations Office on August 5, 1999.

CUSTOMER RESPONSE FORM

The Office of Inspector General has a continuing interest in improving the usefulness of its products. We wish to make our reports as responsive as possible to our customers' requirements, and, therefore, ask that you consider sharing your thoughts with us. On the back of this form, you may suggest improvements to enhance the effectiveness of future reports. Please include answers to the following questions if they are applicable to you:

1. What additional background information about the selection, scheduling, scope, or procedures of the audit would have been helpful to the reader in understanding this report?
2. What additional information related to findings and recommendations could have been included in this report to assist management in implementing corrective actions?
3. What format, stylistic, or organizational changes might have made this report's overall message more clear to the reader?
4. What additional actions could the Office of Inspector General have taken on the issues discussed in this report which would have been helpful?

Please include your name and telephone number so that we may contact you should we have any questions about your comments.

Name _____ Date _____

Telephone _____ Organization _____

When you have completed this form, you may telefax it to the Office of Inspector General at (202) 586-0948, or you may mail it to:

Office of Inspector General (IG-1)
Department of Energy
Washington, DC 20585

ATTN: Customer Relations

If you wish to discuss this report or your comments with a staff member of the Office of Inspector General, please contact Wilma Slaughter at (202) 586-1924.

The Office of Inspector General wants to make the distribution of its reports as customer friendly and cost effective as possible. Therefore, this report will be available electronically through the Internet at the following alternative address:

Department of Energy Management and Administration Home Page

<http://www.hr.doe.gov/ig>

or

<http://www.ma.doe.gov>

Your comments would be appreciated and can be provided on the Customer Response Form attached to the report.