



U.S. Department of Energy
Office of Inspector General
Office of Audits and Inspections

Audit Report

The Department of Energy's Use of
the Environmental Management
Waste Management Facility at the
Oak Ridge Reservation

DOE/IG-0883

April 2013



Department of Energy
Washington, DC 20585

April 9, 2013

MEMORANDUM FOR THE SECRETARY

A handwritten signature in black ink, appearing to read "Greg Friedman".

FROM: Gregory H. Friedman
Inspector General

SUBJECT: INFORMATION: Audit Report on "The Department of Energy's Use of the Environmental Management Waste Management Facility at the Oak Ridge Reservation"

BACKGROUND

The Environmental Management Waste Management Facility (EMWMF) is an above-ground waste disposal facility designed to meet the requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). The Oak Ridge Office of Environmental Management (OREM) manages the Department of Energy's (Department) contract with URS | CH2M Oak Ridge, LLC (UCOR), which has operated EMWMF since August 2011. EMWMF has six disposal cells with a maximum capacity of approximately 2.2 million cubic yards of low-level radioactive waste and mixed waste.

In 2011, a Department study of EMWMF, the *Environmental Management Waste Management Facility 2011 Capacity Assurance Remedial Action Report*, documented an increase of approximately 2 million cubic yards of needed disposal volume. This increase stemmed from the addition of numerous facilities into the Environmental Management cleanup program, a development which according to Department Management has been in discussion for several years prior to 2011. The total capacity needed is expected to exceed 4.2 million cubic yards, including waste already in the facility, future waste and additional clean fill required to mitigate voids. EMWMF is projected to be filled by the end of Fiscal Year (FY) 2017, leaving a deficit capacity of 2 million cubic yards.

Because of the projected capacity deficit and its potential impact on cleanup at the Oak Ridge Reservation, we initiated this audit to determine whether OREM is effectively and efficiently using EMWMF for the disposal of waste being generated by operations at the Oak Ridge Reservation.

CONCLUSIONS AND OBSERVATIONS

OREM had not maximized its use of available capacity at EMWMF, and as a consequence, may incur more than \$14 million in unnecessary disposal costs. Specifically, OREM permitted its

contractors to send minimally contaminated waste¹ to EMWMF that may have otherwise been acceptable for disposal in the sanitary landfill at a much lower cost per unit. For example:

- Contractor officials told us that from FYs 2002 through 2011, they had disposed of 140,000 cubic yards of material (minimally contaminated waste plus required fill) at EMWMF that likely could have been disposed of in the sanitary landfill at a much lower cost per unit; and,
- UCOR had also identified additional, similar material that is scheduled for future disposal in EMWMF. This minimally contaminated waste, when combined with the fill material, will consume as much as 100,000 cubic yards of EMWMF capacity.

The Department had not established site-specific surface authorized limits for determining when certain types of minimally contaminated waste could be disposed of in sanitary landfills rather than in EMWMF. In the absence of such site-specific authorized limits, certain surface-contaminated wastes have been disposed of at EMWMF which potentially could have been safely disposed at sanitary landfills. Maintaining this approach could ultimately and unnecessarily utilize 11 percent of EMWMF's waste disposal capacity. While the overall percentage may not appear significant to some, the use of the conservative approach becomes meaningful when the overall cost is considered – as much as \$14.4 million in unnecessary disposal costs.

During the course of our audit, UCOR recognized the issues we discovered and implemented procedures compliant with Department and landfill permit requirements to allow more waste to be disposed in the sanitary landfill. While this action is helpful, as outlined in the remainder of our report, we believe that additional action to obtain site-specific authorized limits for the surface contaminated materials at the onsite Oak Ridge Reservation landfills is necessary to improve efficiency of waste disposal operations and conserve EMWMF capacity.

Radiological Waste Disposal

OREM's contractors sent minimally contaminated waste to EMWMF that may otherwise be acceptable for disposal in the sanitary landfill. For example, contractor officials told us that they had disposed of at least 43,000 cubic yards of waste in EMWMF that previously had been determined through analysis of its history to be minimally contaminated. With the addition of the fill material needed to adequately compact the waste and fill void spaces in the disposal cell, this resulted in approximately 140,000 cubic yards of capacity expended on waste that likely could have been disposed in the sanitary landfill. Radiological waste determined to be minimally contaminated may be either volumetrically contaminated, meaning contamination is

¹ Although not a formal Department term, for the purposes of this report, "minimally contaminated waste" is defined as waste reasonably expected to be cleared for disposal using only the site-specific authorized volumetric limits already in place at the site, but that had been excluded because the waste acceptance criteria in place at the site required that default surface limits from Department Order 5400.5, *Radiation Protection of the Public and the Environment*, also be met.

incorporated within the material, or surface contaminated, meaning residual radioactivity is found only on the surface of the material, building, equipment or other object and not distributed throughout its volume or mass.

During the course of the audit, UCOR identified an additional 30,000 cubic yards of similarly characterized material that is scheduled for future disposal in EMWMF. Using the fill ratio multiplier provided by UCOR to determine the fill material needed to place this waste in the disposal cell, we calculated that as much as 100,000 cubic yards of EMWMF capacity usage may needlessly be expended on minimally contaminated waste.

Limits and Guidelines for Surface Contaminated Waste

OREM had developed volumetric requirements for disposing of radiological waste in the sanitary landfill. It had not, however, developed site-specific authorized limits for placing surface contaminated waste in the landfill. An authorized limit establishes the level of residual radioactive material within or on property that cannot be exceeded in order to clear that property for unrestricted or restricted release. The purpose of such limits is to provide reasonable assurance that the Department's public radiation dose limit will not be exceeded. These limits must also explicitly state any restrictions or conditions on future use of the property. The authorized limits must be consistent with limits and guidelines established by other applicable Federal and State laws. Specifically, the Department develops and approves the limits and coordinates their implementation with the state to assure that placement of this waste material in a landfill provides protection for the environment and public health, safety and welfare of the citizens of the state.

In the absence of site-specific surface authorized limits that would permit minimally contaminated waste to be placed in the landfill, OREM's contractors historically have interpreted Department Order 5400.5, *Radiation Protection of the Public and the Environment*, to require that a 100 percent radiological survey be performed on the surfaces of all suspect waste prior to placement in the sanitary landfill. This practice often resulted in waste known through sampling to be minimally contaminated to be disposed of in EMWMF. Contractors told us that they took this approach because it was either too difficult or too costly to perform the extensive survey required for disposal in the sanitary landfill. OREM contractors determined that management of the materials as radioactive waste was more cost effective.

During the course of our audit, however, the Department took action to modify this restrictive requirement and reduce the need for costly surveys. Prior to our audit, the then current sanitary landfill waste acceptance criteria had been interpreted to require that, prior to disposal, porous materials, including building debris, meet the authorized limits for both volumetric contaminated waste, as established by OREM, and surface contaminated waste, as prescribed in Department Order 5400.5. As a result of our audit, this potentially unnecessary requirement in the then current landfill waste acceptance criteria was subsequently revised. According to Department officials, Department Order 5400.5 surface contaminations guidelines were designed for the unrestricted release of waste materials to the public, as opposed to permanent disposal in a controlled landfill. As such, both OREM and UCOR officials now believe that certain types of porous material, including some building debris, should be managed under the existing authorized limits for disposal of volumetrically contaminated waste without having to meet

surface contamination limits. According to OREM and UCOR officials, this would allow any waste determined to be only volumetrically contaminated to be disposed in the sanitary landfill under existing OREM requirements.

Increased Disposal Costs

The disposal of minimally contaminated waste in EMWMF caused the Department to incur disposal costs that are higher than necessary. The cost to dispose of waste in EMWMF is at least \$60 more per cubic yard than disposing of waste in the sanitary landfill. In addition to the 140,000 cubic yards of capacity already taken up by minimally contaminated waste, the Department may use up to an additional 100,000 cubic yards of capacity on waste slated for future disposal in EMWMF. When combined, this amounts to as much as \$14.4 million in avoidable disposal costs, including up to \$6 million for one waste stream alone. Department officials informed us that a number of factors beyond cost must be balanced when executing projects in the field, including schedule and safety. However, disposing of minimally contaminated waste at EMWMF unnecessarily utilizes limited space in this special waste disposal facility and will result in its premature filling and closing.

We noted that a number of other sites use or are in the process of evaluating the construction of similar waste disposal facilities that will accept CERCLA waste. The facilities and sites currently in use include the Environmental Restoration Disposal Facility near Richland, Washington and the Idaho CERCLA Disposal Facility near Idaho Falls, Idaho. The Department is also evaluating the construction of additional CERCLA facilities in Portsmouth, Ohio and Paducah, Kentucky to support future cleanup activities at those sites. Activities at these sites may also generate minimally contaminated waste. Therefore, the determination of an optimal disposal path for this type of waste may yield savings similar to those we observed at the Oak Ridge Reservation.

Planned Action

It is noteworthy that during the audit, OREM began working with UCOR to update the waste acceptance criteria for the sanitary landfill to allow for waste to be processed as either volumetric or surface contaminated, as appropriate. Also, while awaiting an update to the waste acceptance criteria, UCOR began processing selected waste streams with approved, less stringent evaluation methods that rely upon the knowledge of the waste's history and statistical sampling protocols. According to UCOR officials, sanitary landfill requirements allow the disposal of waste from a radiological facility based on existing knowledge that the waste is not radiologically contaminated. This knowledge is available for a limited amount of the waste awaiting disposal at the site. Therefore, UCOR implemented a sampling approach to confirm that the waste is not radiologically contaminated. This practice has permitted additional waste to be disposed in the sanitary landfill. However, unless additional limits and guidance are developed, waste will continue to be disposed in EMWMF when the history of the waste is not available.

RECOMMENDATIONS

Our findings in this audit are, in our opinion, consistent with our Management Challenges suggestion to prioritize cleanup efforts to ensure that the riskiest, most important items are

addressed in these lean budget times. Specifically, prioritizing the types of waste that can be placed in EMWMF will help ensure the most efficient use of this valuable and limited resource. Timely implementation of a revised approach is essential to reduce costs and conserve the limited capacity of EMWMF. Additionally, if similar circumstances exist at other sites, implementing this practice beyond the Oak Ridge Reservation could potentially save millions in Department-wide disposal costs. Additional action is necessary to maximize CERCLA waste disposal facilities. Accordingly, we recommend the Senior Advisor for Environmental Management ensure that:

1. Environmental Management assists OREM in the development of implementation criteria and survey protocols for determining when to use surface or volumetric authorized limits for the disposition of waste; and,
2. Environmental Management sites review and evaluate ongoing and future decontamination and decommissioning projects to determine the best path for the disposal of any minimally contaminated waste.

We also recommend that the Manager, Oak Ridge Office of Environmental Management:

3. Develop site-specific authorized limits for surface contaminated waste that maximize the Department's ability to safely and cost effectively dispose of minimally contaminated waste at the onsite sanitary landfill and coordinate the implementation with State of Tennessee officials.

MANAGEMENT AND AUDITOR COMMENTS

Environmental Management generally concurred with the report and its recommendations but requested some clarification to Recommendations 1 and 3, as originally included in a draft of this report. Regarding Recommendation 1, Environmental Management stated that while it agreed with the importance of guidance, it did not believe that additional specific guidance is needed regarding the use of surface and volumetric contamination criteria for waste disposal. We agree that there are many guidance documents available regarding the clearance of personal property. However, we believe assistance is needed for determining which specific waste materials must meet surface activity criteria and which specific waste materials must meet volumetric concentration criteria for disposal at onsite solid waste landfills. While some waste materials generally will be appropriate for characterization using volumetric concentration criteria (e.g., soils), and others generally will be appropriate for characterization using surface activity criteria (e.g., structural steel, sheet metal), still other waste materials may be more difficult to categorize (e.g., porous or semi-porous materials such as concrete rubble or wood pallets). Accordingly, we clarified Recommendation 1 to emphasize that assistance is needed for determining how to implement the guidance that is currently available.

In response to Recommendation 3, Environmental Management agreed with the recommendation in concept but requested a revision. It did not believe that the State of Tennessee should assist in the development of authorized limits at OREM. Rather, Environmental Management believes the limits should be developed by OREM and implementation of these limits should be

coordinated with the state. We have revised the recommendation to request that the implementation of authorized limits for surface contaminated waste be coordinated with State of Tennessee officials.

Environmental Management agreed with Recommendation 2 and stated it they will continue to emphasize the best business practice of strategically planning future decontamination and decommissioning, as well as soil and groundwater remediation projects, to optimize the disposal of resultant waste.

We consider management's comments responsive to our recommendations.

Attachment

cc: Deputy Secretary
Acting Under Secretary of Energy
Acting Under Secretary for Nuclear Security
Senior Advisor for Environmental Management
Chief of Staff

OBJECTIVE, SCOPE AND METHODOLOGY

OBJECTIVE

The objective of this audit was to determine whether the Department of Energy's (Department) Oak Ridge Office of Environmental Management (OREM) is effectively and efficiently using the Environmental Management Waste Management Facility (EMWMF) for the disposal of waste being generated by operations at the Oak Ridge Reservation.

SCOPE

We conducted this audit from May 2011 through March 2013, at OREM in Oak Ridge, Tennessee. The audit scope included waste disposal operations at EMWMF from October 2001 through March 2012.

METHODOLOGY

To accomplish the audit objective, we:

- Reviewed regulations, directives, contract requirements, and performance measures relating to EMWMF;
- Determined the approved capacity of EMWMF, the current capacity and future projections for capacity;
- Evaluated internal controls associated with operating EMWMF;
- Reviewed prior audits and reviews relating to EMWMF; and,
- Held discussions with key Department and contractor officials responsible for EMWMF.

We conducted this performance audit in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe that the evidence obtained provides a reasonable basis for our finding and conclusions. The audit included tests of controls and compliance with laws and regulations necessary to satisfy the audit objective. We also assessed compliance with the *GPRA Modernization Act of 2010*. We examined performance metrics related to the EMWMF and found that OREM had established performance measures as part of its Annual Performance Plan. Because our review was limited, it would not have necessarily disclosed all internal control deficiencies that may have existed at the time of our audit. We did not rely upon computer-processed data to accomplish our audit objective. We held an exit conference with the Director, Office of Disposal Operations, on March 19, 2013.

MANAGEMENT COMMENTS



Department of Energy

Washington, DC 20585

October 2, 2012

MEMORANDUM FOR RICKEY R. HASS
DEPUTY INSPECTOR GENERAL
FOR AUDITS AND INSPECTIONS

FROM:  DAVID HUIZENGA
SENIOR ADVISOR
FOR ENVIRONMENTAL MANAGEMENT

SUBJECT: Draft Audit Report on "The Department of Energy's Use of the Environmental Management Waste Management Facility at the Oak Ridge Reservation, IG-30 A11ET005"

This memorandum responds to the Office of Inspector General (OIG) August 16, 2012, memorandum requesting review and comments on the subject draft audit report. The Office of Environmental Management (EM) appreciates the opportunity to review the report and provide comments to the OIG. The Oak Ridge Office (ORO) and Office of Health, Safety and Security (HSS), which is responsible for the Department's guidance on radiation protection and the application of authorized limits for release of material, also contributed to the detailed comments that are attached. We note that ORO has already taken steps to implement the specific recommendation dealing with disposal at the Oak Ridge Environmental Management Waste Management Facility.

EM fully agrees with the draft OIG report premise that the Department of Energy (DOE) sites should make a proactive risk informed effort to optimize disposal of wastes, especially those generated by environmental cleanup activities and that contain no or very low levels of radioactivity. Through existing and ongoing mechanisms, I will ensure that the EM program continues to highlight opportunities and assist DOE sites to improve project planning and optimize operations of waste disposal facilities.

While the OIG draft report provides valuable observations, it does not appear to acknowledge that there are often numerous technical and programmatic factors that must be considered in planning and executing environmental activities. The unit cost of disposal alone cannot be used as a sole factor in evaluating the overall effectiveness of project implementation.

My office has carefully evaluated the OIG draft report, and EM's response to the draft recommendations follow:

Recommendation 1: The OIG recommends EM ensure specific guidance is provided for determining when to use surface and volumetric contamination criteria for waste disposal.



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EM Response: While EM agrees with the importance of guidance, we disagree with the OIG recommendation that additional specific guidance is needed regarding use of surface and volumetric contamination criteria for waste disposal. HSS is responsible for development of guidance, criteria, and processes, which can be found in DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, and subsequently DOE Order 458.1 (same title) and associated guidance. Other guidance is available on the clearance (i.e., radiological release) of personal property that addresses the usage of authorized limits, conduct of radiological surveys, and similar topics.

Many DOE organizations, including ORO, use authorized limits approaches for both surface and volumetric contaminated material to optimize waste disposal without compromising the health and safety of the public and the environment. Sites such as Paducah, Savannah River, Brookhaven National Laboratory, Los Alamos National Laboratory, and others have approved authorized limits for disposal of waste in landfills.

Although EM and HSS do not plan to develop a new guidance document, HSS plans to update its guidance on clearance and release of property. EM will invite HSS to discuss the application of authorized limits with all DOE sites and programs at the next DOE Low-Level Waste Corporate Board meeting.

Recommendation 2: The OIG recommends EM sites review and evaluate ongoing and future decontamination and decommissioning projects to determine the best path for the disposal of any minimally contaminated waste.

EM Response: EM agrees with this recommendation. Through its project planning, acquisition planning, and programmatic review processes, EM will continue to emphasize the best business practice of strategically planning future decontamination and decommissioning, as well as soil and groundwater remediation projects to optimize disposal of resultant wastes. EM agrees that sites should continue to evaluate all options during all phases of project planning and execution, including authorized limits and commercial disposal options, such as Bulk Survey for Release.

Recommendation 3: The OIG recommends the Manager, ORO, coordinate with the State of Tennessee officials to develop site specific authorized limits for surface contaminated waste to maximize the Department's ability to safely and cost effectively dispose of minimally contaminated waste at the on-site sanitary landfill.

EM Response: In concept, EM agrees with this recommendation, but proposes a revision to it: "Develop landfill waste acceptance criteria based on authorized limits and coordinate the implementation of these criteria with State of Tennessee officials." Authorized limits have been developed and approved by DOE under its Atomic Energy Act authority; the states are preempted from regulating the radioactive material content of the waste. However, as a matter of comity, DOE ORO coordinates with the State of Tennessee in the development and implementation of authorized limits for the Oak Ridge Reservation landfills. Applicable surface activity limits and the process for development of site-specific authorized limits already exist in DOE directives and do not require

development. ORO is already implementing this recommendation by pursuing the development of additional site-specific authorized limits.

If you have any questions, please feel free to contact me or Mr. Frank Marcinowski, Deputy Assistant Secretary for Waste Management, at (202) 586-0370.

Attachment

cc: Mark Whitney, OR
Andrew Wallo, HS-20
Tracy Mustin, EM-2
Alice Williams, EM-2.1
Mark Gilbertson, EM-10
William Levitan, EM-10
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