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Report to the Subcommittee on Energy and Water Development, Committee on Appropriations, House of Representatives

October 2005

DEPARTMENT OF ENERGY

Improved Guidance, Oversight, and Planning Are Needed to Better Identify Cost-Saving Alternatives for Managing Low-Level Radioactive Waste

GAO-06-94

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Improved Guidance, Oversight, and Planning Are Needed to Better Identify Cost-Saving Alternatives for Managing Low-Level Radioactive Waste

GAO Accountability · Integrity · Reliability

Highlights

Highlights of GAO-06-94, a report to the Subcommittee on Energy and Water Development, Committee on Appropriations, House of Representatives

Why GAO Did This Study

In 2004, the Department of Energy (DOE) disposed of more than 378,000 cubic meters of low-level radioactive waste (LLRW)—contaminated building rubble, soil, and debris. In 2002, DOE directed its sites to use life-cycle cost analysis to manage LLRW. Life-cycle cost analysis examines the total cost of various options to manage LLRW over its life, including its packaging, treatment, transport, and disposal, to identify the lowest-cost alternative. GAO determined whether (1) DOE sites use life-cycle cost analysis to evaluate LLRW management alternatives and (2) DOE has a strategy for cost-effectively managing LLRW departmentwide, including state actions that may affect this strategy.

What GAO Recommends

GAO is making recommendations to better ensure that DOE sites properly use life-cycle cost analysis to evaluate LLRW management options and that DOE successfully develop and implement a DOE-wide LLRW strategic plan. In commenting on the draft report, DOE generally agreed with our conclusions and thanked us for the recommendations, but disagreed with or wanted to clarify certain statements in the draft report and provided technical comments which we incorporated as appropriate.

www.gao.gov/cgi-bin/getrpt?GAO-06-94.

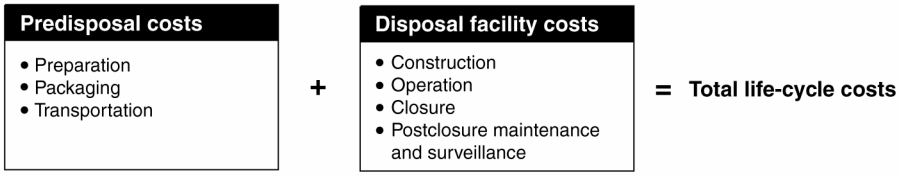
To view the full product, including the scope and methodology, click on the link above. For more information, contact Gene Aloise at (202) 512-3841 or aloisee@gao.gov.

What GAO Found

The six DOE sites we visited, representing more than 70 percent of the LLRW disposed of by DOE during 2003 and 2004, did not consistently use life-cycle cost analysis because of weak DOE guidance and a lack of oversight of contractors' implementation of this guidance. As a result, DOE cannot ensure that lowest-cost LLRW management alternatives are identified, so that managers make decisions that fully weigh costs against noncost factors, such as safety and schedule. For example, DOE contractors at two sites did not consistently consider alternative transportation modes or postclosure maintenance and surveillance costs of disposal sites in their analyses for fiscal year 2004 disposal decisions. GAO also could not always determine how contractors used cost analyses in disposal decisions because of incomplete documentation. While DOE's guidance requires each site to develop the mechanisms necessary to ensure use of life-cycle cost analysis, it does not specify, for example, (1) a systematic, consistent method of analyzing all cost elements to determine the lowest cost, or (2) when analyses should be performed. Also, no such guidance was incorporated into site contracts, and DOE site offices had not evaluated contractors' use of life-cycle cost analysis.

DOE has recognized that its current approach---having each site responsible for developing mechanisms necessary to control costs—may result in cost inefficiencies and may limit its ability to meet departmentwide strategic objectives. As a result, DOE plans to begin implementing a national LLRW disposition strategy by March 2006 to better coordinate disposal efforts—specific schedules have not yet been established for when the strategy will be fully in place. However, DOE faces challenges in developing and implementing this strategy. First, it needs to gather complete data on the amount of LLRW needing disposal. Second, the fact that DOE's multiple program and site offices have differing missions and oversee many contractors presents coordination challenges. For example, one program office dismantled and disposed of a supercompactor used to reduce the volume of large LLRW items without a DOE-wide assessment of LLRW compacting needs and without considering other potential cost-effective uses for the supercompactor that might benefit other DOE sites. Third, DOE faces state actions that have restricted access to disposal facilities, making it more difficult to coordinate and integrate disposal departmentwide.

Cost Elements of LLRW Management



Source: DOE.

Contents

Abbreviations

DOE	Department of Energy
EM	Office of Environmental Management
LLRW	low-level radioactive waste
NNSA	National Nuclear Security Administration

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Accountability * Integrity * Reliability

United States Government Accountability Office
Washington, D.C. 20548

October 31, 2005

The Honorable David L. Hobson
Chairman
The Honorable Peter J. Visclosky
Ranking Minority Member
Subcommittee on Energy and Water Development
Committee on Appropriations
House of Representatives

In fiscal year 2004, the Department of Energy (DOE) disposed of more than 378,000 cubic meters of low-level radioactive waste (LLRW)—enough to fill a football field to the depth of a 19-story building.[1] This waste included radioactively contaminated building rubble, soil, and debris, as well as a small volume of mixed waste, which is LLRW that is further contaminated with chemicals and other hazardous waste.[2] DOE disposes of such waste at two federal facilities—the Hanford Site in Washington State and the Nevada Test Site—and one commercial facility in Utah. Disposal actions at these facilities are in some cases subject to regulation and licensing decisions by the states in which they are located. DOE's Office of Environmental Management (EM) manages the majority of LLRW at multiple sites where the department is cleaning up facilities that were contaminated with radioactivity as a result of, for example, nuclear weapons-related activities. Many factors must be taken into account in managing this waste, including health and safety and the target dates for cleaning up the sites. Cost is also an important factor. In 2000, we reported that DOE spent more than $700 million to manage LLRW from 1997 through 1999.[3]

One tool for evaluating LLRW management costs is life-cycle cost analysis. Such analysis calculates the total cost to manage waste over its life, including cost elements like waste packaging, treatment, transportation, disposal, and monitoring of the disposal site after closure. The analysis is

[1]This volume is only for waste disposed of at off-site locations. Additional LLRW is disposed of at the DOE sites where it is generated.

[2]Throughout this report, references to low-level radioactive waste also include mixed waste, unless otherwise specified.

[3]GAO, *Low-Level Radioactive Wastes: Department of Energy Has Opportunities to Reduce Disposal Costs*, GAO/RCED-00-64 (Washington, D.C.: Apr. 12, 2000).

valuable for comparing the total costs of various waste management options leading up to and including disposal to identify the most cost-effective alternative. The results of such analyses can be used in making LLRW management decisions that weigh cost against noncost factors such as safety, health, and schedule. DOE's use of complete, current, and well-documented life-cycle cost analyses in making LLRW management decisions, if properly conducted, is consistent with the intent of DOE Order 430.1B on real property asset management. This order identifies requirements for life-cycle management of real property assets, including DOE land, improvements, facilities, and structures, from planning and acquisition through disposal. The order is relevant to LLRW management because many DOE facilities and structures that are considered real property assets eventually become LLRW through EM cleanup efforts. The proper use of life-cycle cost analysis is also consistent with Office of Management and Budget Circular A-94, which provides guidance on conducting cost-effective analyses of federal programs and projects. Among other things, the circular states that a program is cost-effective if, on the basis of life-cycle cost analysis of competing alternatives, it is determined to have the lowest costs for a given amount of benefits.

Concerned that DOE may be relying too heavily on the Nevada Test Site and Hanford facilities instead of considering other alternatives, such as commercial disposal facilities, the House Committee on Appropriations directed DOE to prepare a cost study analyzing the life-cycle costs of LLRW management alternatives.[4] DOE's life-cycle cost study, sent to Congress in July 2002, specified cost elements to include in life-cycle cost analysis, defined some LLRW management alternatives, and highlighted the potential for finding various cost differences among alternatives, among other things.[5] The study stressed that a thorough evaluation of all life-cycle costs is crucial to identifying the lowest-cost alternative for LLRW management. Although the study recommended that DOE sites consider all life-cycle costs in evaluating alternatives for LLRW management, it cautioned that DOE's data collection and reporting processes needed to be improved to make any departmentwide cost analyses useful.

[4]H.R. Rep. No. 107-112, at 135 (2001). A congressional conference committee later issued a similar directive. H.R. Rep. No. 107-258, at 133 (2001).

[5]Department of Energy, *Report to Congress*, *The Cost of Waste Disposal: Life-Cycle Cost Analysis of Disposal of Department of Energy Low-Level Radioactive Waste at Federal and Commercial Facilities* (Washington, D.C.: July 2002).

In this context, you asked us to determine whether (1) DOE sites use life-cycle cost analysis to evaluate management alternatives for LLRW and (2) DOE has a strategy for cost-effectively managing LLRW disposal departmentwide, including state actions that may affect this strategy.

To determine whether DOE sites use life-cycle cost analysis to evaluate management alternatives for LLRW, we obtained information from DOE and contractor officials using structured interview guides, reviewed agency documents on life-cycle cost analysis requirements and practices, and reviewed analyses prepared at a nonprobability sample of six DOE sites that generate LLRW.[6] In selecting these waste generators for site visits, we used LLRW disposal volumes reported by two disposal facilities—DOE's Nevada Test Site and a commercial disposal facility in Utah—to select three waste generator sites under EM's control: two EM sites that disposed of the largest volume of LLRW in fiscal year 2004—Fernald, Ohio, and Rocky Flats, Colorado—and one EM site with the largest projected volume for fiscal year 2005—Paducah, Kentucky.[7] To provide a DOE-wide perspective, our nonprobability sample also included three waste generator sites under non-EM program offices. Because multiple DOE program activities can exist at a single non-EM site, and comprehensive, departmentwide data on LLRW volumes needing disposal do not exist, we selected our non-EM sites based on (1) the overall disposal volume of LLRW sent to the Nevada Test Site and Envirocare of Utah in fiscal year 2004 and (2) judgments made by DOE officials regarding the amount of newly generated LLRW volumes for which DOE's National Nuclear Security Administration (NNSA) is responsible. These three waste generator sites we visited were the Office of Science's Oak Ridge Reservation and East Tennessee Technology Park, and NNSA's Y-12 Plant—all in Oak Ridge, Tennessee. We assessed the general reliability of the information on LLRW disposal volumes by comparing data provided by waste generators with data from disposal facilities, and determined that this information was reliable enough for selecting sites. In total, the six sites we visited constituted about 70 percent of DOE's LLRW disposal volume for an 18-month period—October 1, 2003, through March 31, 2005.

[6]Results of nonprobability samples cannot be used to make inferences about a population because in a nonprobability sample some elements of the population being studied have no chance or an unknown chance of being selected as part of the sample.

[7]We did not use information on LLRW volumes sent to DOE's Hanford disposal site to select waste generators for site visits. Hanford's disposal site accounted for less than 1 percent of DOE's off-site LLRW disposal volume in fiscal year 2004.

To examine whether DOE has a strategy for integrating DOE-wide disposal operations to ensure cost-effective disposal, we reviewed DOE's draft plan for a national LLRW disposition strategy and used structured interview guides to obtain information from DOE and contractor officials at DOE waste generator sites and disposal facilities. In addition, we spoke with DOE officials from DOE program offices in Washington, D.C, including EM, NNSA, the Office of Science, and the Office of Nuclear Energy, Science and Technology. We also spoke with appropriate DOE and state officials to identify state actions, such as regulatory and court actions, that have affected DOE LLRW disposal options and to determine DOE's response to these actions. We performed our work between June 2004 and August 2005, in accordance with generally accepted government auditing standards.

Results in Brief

The six DOE sites we visited, representing more than 70 percent of the LLRW disposed of by DOE during 2003 and 2004, did not consistently use life-cycle cost analysis to ensure that the lowest-cost LLRW management alternatives are identified because of weaknesses in DOE's guidance for life-cycle cost analysis and a lack of oversight of contractors' implementation of this guidance. Specifically:

- *Cost analyses are not complete, current, or well documented.* The six DOE sites prepared various types of cost analyses in making LLRW management decisions, but these analyses did not always include all life-cycle cost elements or examine alternative courses of action, and were not always current or formally documented. For example, DOE contractors at two sites—Rocky Flats, Colorado, and Paducah, Kentucky—did not consistently consider alternative transportation modes for shipping waste or postclosure maintenance and surveillance costs of disposal sites in their analyses supporting their fiscal year 2004 LLRW disposal decisions. In contrast, the contractor at Fernald, Ohio, prepared cost analyses that included all life-cycle cost elements and examined alternative options. However, Fernald's life-cycle cost analysis, used to justify its 2004 LLRW disposal decisions, was not current—it was over 10 years old and had not been updated to reflect any changes that might have occurred in the costs for packaging, treatment, transportation, or disposal. In other cases, such as at DOE's Rocky Flats site, we could not determine how contractors incorporated cost analyses into their disposal decisions because their documentation was incomplete. Rocky Flats officials told us that disposal decisions were at times based on noncost factors, such as schedule or safety, but

agreed that decisions were not consistently documented to show the rationale for how cost was balanced against other factors.

- *DOE's guidance and contractor oversight are weak.* The cost analysis inconsistencies have occurred, in part, because DOE's guidance on life-cycle cost analysis is incomplete. For example, EM headquarters' July 2002 guidance to site offices on life-cycle cost analysis directed sites to develop mechanisms necessary to establish that its LLRW disposal decisions include the best estimate of full "cradle to grave" costs and analysis of alternatives, but it did not specify (1) a systematic, consistent method of analyzing all cost elements to determine the lowest cost; (2) when or under what circumstances the analysis should be performed; (3) relevant DOE orders, manuals, or other reference materials that could provide consistent direction on life-cycle cost analysis; or (4) how final LLRW management decisions should be documented. Furthermore, DOE site offices were ineffective in overseeing contractors' use of life-cycle cost analysis, which also contributed to ineffective implementation of the guidance. At the sites we visited, neither DOE nor contractors had taken identifiable steps to implement the guidance on life-cycle cost analysis. For example, DOE has not incorporated life-cycle cost analysis guidance into site contracts. When we brought these issues to DOE's attention, EM officials responded that they have relied on the use of incentive-based contracts to ensure contractors are making cost-effective decisions. Incentive-based contracts provide specific incentives for specified performance outcomes, often driven by site-specific goals and objectives in areas such as health, schedule, cost, or other areas, as negotiated between DOE and the contractor. For example, incentive-based contracts might help DOE meet goals such as accelerated cleanup, which may in some cases reduce overall site costs. However, the use of these contracts does not necessarily ensure that contractors identify the lowest-cost waste management alternatives, unless the contract provides this specific focus.

DOE has recognized that its current approach---having each site responsible for developing mechanisms necessary to control costs—may result in cost inefficiencies and could limit its ability to meet departmentwide strategic objectives, such as accelerated waste cleanup and site closure. To overcome these problems, DOE has begun planning a national LLRW disposition strategy to minimize life-cycle costs, among other things. DOE plans to begin implementing this strategy in March 2006, but specific schedules have not yet been established for when the strategy

will be fully in place. The department faces the following challenges in achieving an integrated departmentwide strategy:

- *Collecting basic data on the amounts of LLRW needing disposal by program offices departmentwide.* Although DOE continues to report progress in disposing of LLRW, the LLRW volumes it reports as needing disposal are not complete. DOE officials acknowledge that its databases are outdated and incomplete and do not include all LLRW expected to be generated in the future as part of ongoing environmental cleanup or produced by non-EM generators. Complete information is crucial for developing a national strategy and for holding organizations and individuals responsible and accountable for cost-effectively managing LLRW. EM plans to gather complete information as part of its national disposition strategy.

- *Overseeing LLRW management in a department with a complex organization and multiple missions.* Specifically, DOE's multiple program offices and related site offices have differing missions and oversee a variety of site operating contractors, who manage wastes with many different characteristics. DOE's Oak Ridge site illustrates how this complexity can pose additional challenges for LLRW management. At the Oak Ridge site, DOE has three different program offices, each with its own contractor with differing levels of responsibility for managing or disposing of portions of LLRW. This condition has complicated efforts to dispose of LLRW cost-effectively. For example, in 2004, DOE allowed a contractor to dispose of a supercompactor used to reduce the volume of large pieces of LLRW debris from its gaseous diffusion plant. The decision to dismantle and dispose of this compactor was made without a departmentwide assessment of LLRW volume reduction needs and capabilities, and without fully considering the supercompactor's potential for reducing LLRW volumes and lowering costs for other program offices at Oak Ridge and other sites. Consequently, DOE may have missed a potential cost-saving opportunity because other waste generator sites might have benefited from the use of the supercompactor, such as Paducah, Ketucky, which has 37,000 tons of scrap metal that its current on-site compactor is incapable of crushing, according to the site's senior contractor official responsible for LLRW management.

- *Addressing the impacts of recent state actions.* Over the past 2 years, states' regulatory and legal actions have restricted DOE's access to disposal facilities, which compounds the challenges of coordinating and

integrating disposal efforts departmentwide. For example, the state of Washington has sued to prevent LLRW from other DOE sites from being disposed of at the Hanford facility. Consequently, DOE is incurring increased costs for storage and treatment.

To ensure the cost-effective management and disposal of LLRW, we are recommending that the Secretary of Energy take specific actions to ensure that DOE sites use complete, current, and well-documented life-cycle cost analyses in making LLRW management decisions, and develop and implement a strategy for managing LLRW disposal departmentwide. Overall, DOE generally agreed with our conclusions and thanked us for the recommendations. Specifically, DOE agreed that its sites are not consistently using life-cycle cost analysis in making LLRW management decisions. It also agreed that its current guidance and oversight in the area of life-cycle cost analysis for LLRW management decisions should be strengthened and expressed appreciation for our support of an effective National Disposition Strategy for LLRW management. DOE also provided technical comments on certain statements in the draft report with which it disagreed or wanted to clarify, which we incorporated as appropriate.

Background

Under the LLRW Policy Act of 1980, as amended, the federal government is responsible for the disposal of LLRW owned or generated by DOE.[8] DOE defines LLRW as all radioactive waste that does not fall within other classifications, such as spent (used) nuclear fuel and other high-level waste. Mixed waste is LLRW with hazardous components, such as lead and mercury. LLRW can include material of varying levels of radioactivity, from barely contaminated soil and debris to LLRW with enough radioactivity to require remote handling. LLRW can include items such as contaminated equipment, protective clothing, rags, and packing materials and is managed at multiple sites under a variety of contractors. (See app. I for a list of DOE sites that disposed of the majority of LLRW in fiscal years 2004 and 2005.)

[8]42 U.S.C. § 2021c(b).

DOE sites typically dispose of LLRW at (1) on-site facilities, if suitable capacity is available,[9] (2) DOE's regional disposal facilities at the Hanford Site or the Nevada Test Site, or (3) a commercial facility.[10] The selection of the disposal facility is based partly on the facility's waste acceptance criteria. These criteria specify the allowable types and amounts of radioactive materials, and types of containers acceptable at the disposal facility.

In 2000, we reported that DOE had not developed full life-cycle costs for its disposal facilities or established guidance to ensure that its contractors base their disposal decisions on departmentwide considerations of cost-effectiveness, among other things.[11] We also reported in 2001 that cost analyses concerning the use of DOE's on-site disposal facilities should be periodically updated to take into account changing economic conditions.[12] Subsequently, the House Committee on Appropriations directed DOE to prepare an objective analysis of the life-cycle costs of LLRW disposal for various federal and commercial disposal options.[13] The committee was concerned that DOE needed to include in its life-cycle cost analysis certain cost elements, such as packaging, transportation, disposal, and postclosure maintenance and surveillance.

In response, in its 2002 report to Congress on life-cycle cost analysis of LLRW disposal, DOE listed among its next steps for EM sites to consider the cradle-to-grave costs as they make LLRW management decisions. On July 18, 2002, EM issued guidance directing each site office to develop the mechanisms necessary to ensure that contractors' LLRW disposal decisions include the best estimate of full cradle-to-grave costs and analysis of alternatives. Several other documents on life-cycle cost

[9]Sites with on-site disposal facilities include the Fernald Environmental Management Project (in Ohio), Hanford in Washington, Idaho National Laboratory, Los Alamos National Laboratory in New Mexico, Nevada Test Site, Savannah River Site in South Carolina, and the Oak Ridge site in Tennessee.

[10]Currently, Envirocare of Utah is the primary commercial option available for disposal of DOE's LLRW.

[11]GAO/RCED-00-64.

[12]GAO, *Nuclear Cleanup: DOE Should Reevaluate Waste Disposal Options Before Building New Facilities*, GAO-01-441 (Washington, D.C.: May 2001).

[13]H.R. Rep. No. 107-112, at 135 (2001). A congressional conference committee later issued a similar directive. H.R. Rep. No. 107-258, at 133 (2001).

analyses are also available. For example, DOE has a cost-estimating guide, developed in the mid-1990s, that provides a chapter dedicated to life-cycle cost analysis, including definitions, processes, limitations, common errors made in life-cycle cost analysis, methods, examples, and diagrams.[14] In addition, although not directly applicable to LLRW management, guidance and manuals prepared by other federal agencies for other DOE programs may be useful to the sites in explaining life-cycle cost analysis methods. For example, the National Institute of Standards and Technology has published two documents on life-cycle cost analysis that are applicable to DOE's Federal Energy Management Program.[15]

DOE Sites Do Not Consistently Use Life-Cycle Cost Analysis in Managing LLRW

DOE sites prepare various types of cost analyses in making LLRW management decisions, but these analyses do not consistently use complete, current, or well-documented life-cycle cost analysis to ensure that the lowest-cost LLRW management alternatives are identified. As a result, the decisions the sites make may not take into account the most cost-effective alternative. These inconsistencies have occurred, in large part, because DOE's guidance lacks necessary detail and its oversight of contractor practices is weak.

Site Cost Analyses Are Not Always Complete, Current, or Well Documented

Complete life-cycle cost analysis is cradle to grave and includes all costs associated with the management and disposal of LLRW. As DOE's 2002 report to Congress explained, the costs preceding disposal vary greatly and can be significantly greater than the actual cost of disposal. As a result, DOE concluded it is essential to consider pre-disposal costs as well as disposal costs. Table 1 shows the cost elements of a complete life-cycle cost analysis, according to DOE's 2002 report.

[14]Department of Energy, *Cost Estimating Guide*, DOE G 430.1-1 (Washington, D.C.: Mar. 28, 1997).

[15]A handbook, most recently updated in 1996, helps explain the methodologies used in conducting life-cycle cost analysis. (Department of Commerce, *Life-Cycle Costing Manual for the Federal Energy Management Program*, NIST Handbook 135, 1995 Edition, Washington, D.C.: February 1996). In addition, guidance prepared in April 2005 clarifies how DOE should determine life-cycle costs for energy programs, as required by section 401 of Executive Order 13123. (National Institute of Standards and Technology [Prepared for DOE], Guidance on Life-Cycle Cost Analysis Required by Executive Order 13123, Gaithersburg, Maryland: National Institute of Standards and Technology, April 2005).

Table 1: Cost Elements in Life-Cycle Cost Analysis and Associated Activities

Cost element	Activities
Preparation	The waste generator samples and analyzes the waste to ensure that it will be certified as acceptable to the disposal site—actions also known as waste characterization. The generator is also responsible for treating the waste so that it is in a proper chemical and physical form to meet the disposal facility's acceptance criteria. Treatment can include drying or compaction.
Packaging	The generator is responsible for placing the waste—usually in the form of soil or debris—in containers or in bulk, such as in a railcar. The container type and cost vary with the characteristics of the waste.
Transportation	The generator sends LLRW off-site, usually by truck or rail. According to DOE, truck shipments can cost up to 1.9 times the cost of rail shipments, depending on the packaging method, waste density, and routing.
Disposal	The disposal facility operator receives and disposes of LLRW. Disposal facilities generally incur construction, operation, maintenance, and postclosure costs that they may pass on to waste generators through disposal fees. Postclosure activities are required to protect human health and the environment from hazards remaining after closure, and can include maintaining and repairing closure caps, monitoring environmental contamination, and erecting and maintaining barriers.[a]

Source: DOE.

[a]Typically, DOE disposal facilities do not include past construction or future postclosure costs in their disposal fees because they operate on an annual appropriations basis. In contrast, Envirocare of Utah, a commercial operator, charges disposal fees that recoup such costs.

DOE LLRW generator sites we visited did not always include all life-cycle costs—including the postclosure costs of long-term maintenance and surveillance of the disposal site—and did not always consider alternative actions when deciding on how to manage and dispose of LLRW. For example, despite DOE's guidance to include all disposal costs in its life-cycle cost analyses, DOE contractors at two sites—Rocky Flats, Colorado, and Paducah, Kentucky—did not consistently consider postclosure costs in the analyses supporting their LLRW disposal decisions for fiscal year 2004. In contrast, the contractor at Fernald, Ohio, prepared a life-cycle cost analysis that included estimated postclosure costs for both the Nevada Test Site and for Envirocare of Utah, a commercial disposal facility. Nevada Test Site officials told us they do not include these future costs in their disposal fees because they operate on an annual appropriated funds basis. Nevada Test Site officials estimated that if they were to include postclosure costs in their fee, these costs would add an additional $2.38 per cubic foot of waste

to the fee. Envirocare of Utah, on the other hand, includes the estimated postclosure costs in its disposal fees, as required by the state of Utah.

Costs for certain LLRW activities vary widely among disposal sites and should be considered in preparing life-cycle cost analysis. For example, EM's 2002 report to Congress found that costs for one predisposal cost element—waste characterization—can be higher for wastes shipped to the Nevada Test Site and the Hanford Site for disposal than for wastes sent to Envirocare of Utah. Waste characterization costs for the two DOE sites ranged from $130 to $2,400 per cubic meter, while these same costs ranged from $30 to $880 per cubic meter at Envirocare of Utah. The major factors contributing to this cost differential are (1) required procedures for accepting, handling, and disposing of LLRW with higher levels of radioactivity at the Nevada Test Site and Hanford and (2) the higher cost to the generator of characterizing wastes that are shipped in containers to the Nevada Test Site and Hanford Site for disposal. Although waste characterization is an important element in life-cycle cost analysis, the Rocky Flats contractor did not include the costs of these activities in its cost analysis.

In addition, waste generators do not always include potential lower-cost alternatives when making LLRW decisions. For example, in fiscal year 2004, the Paducah contractor shipped 600 cubic meters of LLRW in trucks to Envirocare of Utah. Although in its preliminary analysis, the site contractor believed that using rail could save 25 percent in transportation costs, contractor officials indicated they did not validate these preliminary assumptions or complete a formal cost analysis of the rail option.

DOE contractors' cost analyses are not always current. Despite DOE's 2002 recommendation that cost estimates should be revisited periodically, one DOE waste generator disposed of large volumes of LLRW in fiscal year 2004 on the basis of cost studies completed several years earlier. Specifically, the contractor at Fernald acknowledged shipping over 100,000 cubic meters of LLRW to Envirocare of Utah in fiscal year 2004, using a cost analysis completed in 1994. This analysis, while considering all life-cycle cost elements, had not been updated during this 10-year period to account for any changes that might have occurred in cost elements, such as changes in disposal rates, costs for packaging, treatment, or transportation. For example, disposal rates charged by Envirocare of Utah can change from year to year, based on price discounts offered for larger LLRW disposal volumes.

We also found that three of the five DOE sites that had expanded on-site facilities since 2002 did not complete an analysis comparing the life-cycle costs of on-site and off-site disposal alternatives. A 2001 congressional conference report requires DOE to perform such an analysis "before proceeding with any new on-site disposal cell."[16] DOE asserts that the report language does not apply to ongoing facility development or expansion. Officials at two sites indicated they did not believe they needed to complete such a life-cycle cost analysis because the expansion of their on-site disposal facility was already accounted for in the initial facility design, completed before 2002. The third site completed a life-cycle cost analysis of LLRW waste streams for its on-site facility. However, site officials did not complete a life-cycle cost analysis of off-site disposal because they assumed that the costs of off-site transportation and disposal would be significant enough to preclude the off-site option. Although the remaining two sites completed life-cycle cost studies comparing on-site and off-site disposal costs, these studies were not submitted to the congressional appropriations committees.

DOE contractors' cost analyses are not always well documented. In some cases, we could not determine how contractors incorporated cost analyses into their disposal decisions because documentation was incomplete. According to DOE and contractor site officials at Rocky Flats, disposal decisions were at times based on noncost factors, such as schedule or safety. For example, a 2003 cost study determined that using trucks to transport building debris to a nearby rail loading area less than 1 mile away would be more cost-effective than extending a rail line to the building. However, contractor officials told us they decided to build a rail extension to the building being demolished because the extra traffic at the site caused by trucks hauling the LLRW to the rail line could endanger the health and safety of the workers. This decision, however, was not documented. Contractor officials at Rocky Flats agreed that such LLRW management decisions were not consistently documented to show the rationale for how cost was balanced against other factors.

[16]H.R. Rep. No. 107-258, at 133 (2001). The five sites expanding their on-site disposal facilities since 2002 included the On-Site Disposal Facility at Fernald (Ohio), the Idaho CERCLA Disposal Facility at the Idaho National Laboratory, the TA-54 On-Site Disposal Facility at the Los Alamos National Laboratory, the Environmental Management Waste Management Facility at Oak Ridge, Tennessee, and the Engineered Trenches at the Savannah River Site in South Carolina.

At other sites, cost analyses were informal and not documented. For example, contractor officials responsible for LLRW disposal at Paducah told us that they made some disposal decisions informally because they believed their knowledge of the factors involved made it unnecessary to complete a formal analysis. In addition, Oak Ridge contractor officials coordinating the removal of LLRW from the site told us they did not complete a formal analysis of disposal options for each waste stream because their contract did not require such an analysis.

DOE's 2002 Guidance Lacks Necessary Detail

DOE sites have not consistently used life-cycle cost analysis, in part because EM's 2002 guidance memo on life-cycle cost analysis lacks the necessary detail for how and when to use it. Consequently, each site was responsible for deciding how to incorporate cost into its LLRW management decisions. For example, although EM's guidance directed sites "to develop mechanisms necessary to establish that its LLRW disposal decisions include the best estimate of full 'cradle to grave' costs and analysis of alternatives," the guidance did not do the following things:

- Lay out a systematic, consistent method for (1) analyzing all cost elements or (2) comparing key alternatives within these cost elements to determine the lowest cost. Consequently, as we found, analyses often did not include cost elements that might have altered a disposal decision.

- Specify when or under what circumstances sites should prepare cost analyses. As we found, some sites did not update their analyses to show that their original LLRW management decisions were still supported by current economic conditions;

- Refer sites to relevant DOE orders, manuals, or other reference materials that could provide consistent direction on life-cycle cost analysis. Such references could include, for example, the DOE order for real property asset management, the DOE manual on preparing life-cycle cost estimates, Office of Management and Budget guidance for completing a cost-effective analysis, and the National Institute of Standards and Technology guidance for completing life-cycle cost analysis, or portions of these documents.

- Lay out how final LLRW management decisions should be documented. For example, the guidance does not explain how sites should weigh disposal costs against noncost factors such as safety and health. As we

found, without adequate documentation at some of the sites we visited, it was difficult for site contractors to justify the decisions they had made.

DOE Has Not Taken Steps to Oversee Contractors' Use of Life-Cycle Cost Analysis, Relying Instead on Incentive-Based Contracts to Ensure Cost-Effective LLRW Decisions

DOE site offices were ineffective in overseeing contractors' use of life-cycle cost analysis, which also contributed to ineffective implementation of the guidance. At the sites we visited, neither DOE nor the contractors had taken identifiable steps to implement the guidance on life-cycle cost analysis.

First, DOE has not incorporated life-cycle cost guidance into contracts. Most of the incentive-based contracts at the sites we visited require contractors to comply with DOE Order 430.1A on life-cycle asset management, which requires the use of life-cycle cost analysis. However, neither that order, nor its successor, DOE Order 430.1B, provide sufficient detail on life-cycle cost analysis definitions, methods, examples, or diagrams that would be useful in preparing such analyses. In contrast, DOE's cost-estimating guide provides a chapter dedicated to life-cycle cost analysis.[17] This chapter includes definitions, processes, limitations, a list of common errors made in life-cycle cost analysis, methods, examples, and diagrams. However, the estimating guide is not explicitly cited in DOE Order 430.1A or 430.1B, or in the site contracts. As a result, the contractor official responsible for controlling LLRW costs at Rocky Flats, for example, could not tell us whether the contractor used DOE's cost-estimating guide, particularly the chapter on life-cycle cost analysis in LLRW management decisions, because he was not familiar with the guide.

Second, DOE field offices have not taken steps to implement guidance or to evaluate contractors' use of life-cycle cost analysis. For example, contractor officials at Paducah were not aware of EM's July 18, 2002, guidance memo on life-cycle cost analysis until we showed a copy to them at the time of our visit. In addition, in October 2002, DOE's Rocky Flats Field Office sent a memo to its contractor, Kaiser-Hill Company, concerning this EM guidance. According to the memo, the department was already aware that the contractor used licensed commercial disposal facilities and that disposal decisions considered technical acceptability, schedule, and cost benefit; the field office therefore concluded that the mechanisms to

[17]DOE G 430.1-1.

establish cost-effective disposal decisions by Kaiser-Hill were already in place and thus satisfied the intent of the EM guidance. However, we found no indication at any of the sites we visited that DOE officials had specifically assessed the contractor's use of life-cycle cost analysis in making LLRW management decisions.

When we brought our concerns to EM officials on the inconsistent use of life-cycle cost analysis at the sites, they responded that EM has relied on the use of incentive-based contracts to ensure contractors are making cost-effective LLRW management decisions, rather than encouraging the use of life-cycle cost analysis. Incentive-based contracts provide specific incentives for specified performance outcomes, often driven by site-specific goals and objectives in areas such as health, safety, schedule, cost, or other areas, as negotiated between DOE and the contractor. We recognize that incentive-based contracts might help DOE meet goals such as accelerated cleanup and that these contracts may, in some cases, reduce overall site costs. However, their use may not necessarily identify lowest-cost waste management alternatives, unless the contract provides this specific focus. Since the department relies on incentive-based contracts, it is critical that the contract's total estimated cost be based on, among other things, life-cycle cost analyses of LLRW management alternatives and that the contract specify the proper use of life-cycle cost analysis.

Without the proper use of life-cycle cost analysis in establishing and overseeing incentive-based contracts, DOE cannot be assured that the contractor has identified the lowest life-cycle cost alternatives for LLRW management. For example, the Rocky Flats contractor, operating under an incentive-based contract, prepared various analyses of transportation alternatives from 2000 to 2003, but these analyses did not comprehensively address sitewide LLRW disposal needs because they were incomplete and not updated. Specifically, two DOE contractor draft studies in 1999 and 2000 indicated that adding rail as an alternative for shipping LLRW from Rocky Flats to off-site disposal facilities could save millions of dollars in transportation costs. Despite this cost-saving potential, the contractor decided in 2000 to rely exclusively on trucks for all Rocky Flats LLRW shipments. Subsequently, in 2002, the contractor analyzed transportation alternatives specifically for shipping certain contaminated LLRW soil off-site. Although the analysis concluded that using rail to transport this soil alone could save up to $216,000, the contractor continued using trucks exclusively in fiscal year 2003 and most of fiscal year 2004 to transport this waste to Envirocare of Utah. In 2003 the contractor determined that the total volume of this LLRW soil would be significantly higher than

previously estimated, further increasing the cost-saving potential of using rail, but nevertheless did not update or formalize the analysis. Instead, the contractor decided to send the soil by rail only after determining that it would use rail for shipping debris from an altogether separate LLRW project at Rocky Flats. In September 2004, the site began to transport the LLRW soil by rail, after it had already sent over 4,200 truck shipments of soil to Utah in fiscal years 2003 and 2004. Use of rail instead of trucks to ship the LLRW soil might have saved the site over $4 million during fiscal year 2004. Comprehensive, complete, and current analyses of transportation alternatives for sitewide LLRW disposal needs might have better identified the lowest-cost transportation alternative, therefore providing an opportunity for reducing LLRW management costs for the site.

In April 2005, as part of our ongoing engagement, we briefed the Subcommittee on Energy and Water Development, House Committee on Appropriations, on the preliminary results of our work. We stated that DOE LLRW generators were not consistently using life-cycle cost analyses in their disposal decisions because of poor guidance and weak oversight. One month later, in its report to accompany the fiscal year 2006 energy and water appropriations bill, the full Appropriations Committee emphasized its intention to have DOE use life-cycle cost analysis in LLRW management decisions. Using our preliminary findings, the committee noted its concern with the department's reliance on incentive-based contracts as a mechanism for ensuring cost-effective decision making rather than using life-cycle cost analyses, as directed.[18]

According to the committee, while contractors should pursue cost-effective cleanup activities at their sites, it is up to the federal management responsible for those contractors to provide guidance and make decisions that benefit the whole DOE complex. As such, the committee directed the Secretary of Energy to report to the committee within 30 days of enactment of the 2006 Energy and Water Development Appropriations Act, on the specific steps the department will take to ensure that contractors use life-cycle cost analysis in considering LLRW options, and that DOE maintains a viable oversight function to oversee the implementation of such guidance. The committee further recommended that a third of EM's budget for

[18]H. R. Rep. No. 109-86, at 147-148 (2005).

managing the cleanup program, or $82,924,000, be withheld until after the Secretary of Energy delivers a report to the committee.[19]

DOE Faces Challenges in Developing a National LLRW Disposition Strategy

To better coordinate disposal efforts among sites and program offices, increase efficiencies, and minimize life-cycle costs, DOE has begun developing a national LLRW disposition strategy. Although DOE expects to begin implementing this strategy by March 2006, specific schedules have not yet been established for when the strategy will be fully in place, and it faces several significant challenges. These include developing a database that can be used to manage LLRW complexwide and overcoming organizational obstacles created by the department's varied missions.

DOE Expects to Begin Implementing a Departmentwide Strategic Plan for Disposing of LLRW in 2006

DOE has recognized that its current approach---having each site responsible for developing mechanisms necessary to control costs—may result in cost inefficiencies and could limit its ability to meet departmentwide strategic objectives, such as accelerated waste cleanup and site closure. To overcome these problems, EM has begun developing a National Disposition Strategy, which it plans to implement in 2006. EM plans to use the strategy to evaluate predisposal, storage, treatment, and disposal options across the department. The focus of the strategy will be on DOE LLRW that is shipped off-site for disposal and on waste for which DOE currently has no treatment or disposal options. EM hopes to make specific recommendations regarding waste without treatment or disposal options, develop a LLRW database, and reduce predisposal costs. To implement a successful strategy, EM expects to integrate sites' waste disposition plans by (1) identifying and quantifying LLRW by waste category and site, (2) developing potential treatment and disposal options, and (3) identifying federal and commercial site capabilities for disposal of LLRW. DOE has not yet established specific schedules for when the strategy will be fully in place.

EM plans to develop this national disposition strategy in two phases. In Phase I, EM will examine those DOE sites that now have significant quantities of EM LLRW, including Oak Ridge, Savannah River, Idaho

[19]H.R. Rep. No. 109-86, at 151 (2005).

National Laboratory, Hanford (including the Office of River Protection),[20] Fernald, Portsmouth (in Ohio), and Paducah (in Kentucky). DOE will also take into account LLRW requiring disposal from fiscal year 2005 to about fiscal year 2035. In Phase II, EM will examine the LLRW managed by other DOE program offices, such as NNSA and the Office of Science. Efforts in Phase II will require considerable coordination among different DOE program offices.

DOE Lacks Departmentwide Data on Its LLRW Inventory

To develop and implement its national strategy for LLRW disposition, DOE needs basic data—both current and forecasted—from individual sites on their disposition plans. However, EM does not have complete data, either for its own sites or for non-EM sites with LLRW. Although DOE continues to report progress in disposing of LLRW, the LLRW volumes it reports as needing disposal are not complete. EM's databases do not include all LLRW expected to be generated in the future as part of ongoing environmental cleanup or waste produced by non-EM generators. This information may be time-consuming and costly to obtain from the different program offices. For example, when we sought information on current and forecasted LLRW volumes from the Office of Science, NNSA, and the Office of Nuclear Energy, Science, and Technology (Nuclear Energy), only the Office of Science provided the requested information. NNSA and Nuclear Energy did not provide this information because, according to officials from each of these program offices, the information was not readily available.

Regarding cost information, EM's 2002 report to Congress recommended that DOE sites consider all life-cycle costs in evaluating alternatives for LLRW management, but it cautioned that DOE's data collection and reporting processes needed to be improved to make any departmentwide cost analyses useful. EM officials stated that they will consider LLRW costs in their National Disposition Strategy. Currently, according to EM, DOE does not have uniform requirements for defining, monitoring, and reporting waste disposal costs, and sites may differ significantly in their protocols for collecting cost information. However, EM agrees that if DOE is to use life-cycle cost analysis to improve the bases for sites' disposal decisions, standardized protocols for collecting and reporting the data would have to be established.

[20]In accordance with 50 U.S.C. § 2622, the Office of River Protection was established in 1998 to manage the Department of Energy's largest, most complex environmental cleanup project: Hanford tank waste retrieval, treatment, and disposal.

DOE recognizes these problems and has begun to develop some information it needs to support the evolving disposition strategy. Specifically, DOE is determining (1) what data it needs; (2) whether it can use the data in existing databases or has to develop a new database; and (3) how these data should be organized in a database.

DOE's Organization and Multiple Missions Pose Challenges to Developing a National Strategy

EM's ability to develop an integrated strategy for managing LLRW is further complicated by the fact that DOE has multiple program and site offices with different missions, and these offices oversee a variety of site contractors who manage waste with many different characteristics.

DOE's experience with the use of a supercompactor at its Oak Ridge site illustrates the difficulty EM faces in developing a waste disposition strategy that covers multiple program offices. At this site, EM and NNSA program offices have their own contractors that are responsible for various activities, including managing or disposing of LLRW. In 1997, DOE awarded BNFL a 6-year fixed-price contract to decontaminate and decommission three buildings once used to enrich uranium at the Oak Ridge gaseous diffusion plant.[21] These buildings comprised more than 4.8 million square feet and housed more than 328 million pounds of material. To dispose of this waste, BNFL had constructed a supercompactor, the largest of its type in the nuclear industry. Using this supercompactor, the contractor was able to reduce the volume of several thousand tons of LLRW by 75 percent and save an estimated $100 million in LLRW management and disposal costs. Despite the supercompactor's potential for reducing LLRW volumes and lowering costs for the other program offices at the Oak Ridge site, the contractor, with the approval of the DOE site office, decided in 2004 to dismantle the supercompactor and ship it as LLRW to Envirocare of Utah for disposal.

According to NNSA officials at the Y-12 Plant, also located at the Oak Ridge site, they have contaminated buildings that need to be dismantled and disposed of, but neither DOE nor the contractor consulted with NNSA officials about the potential use of the supercompactor for NNSA's ongoing compacting needs. Similarly, contractor officials at EM's Paducah Site in Kentucky, which is about 300 miles away, stated that they might have benefited from the use of the supercompactor but were not given the

[21]In 2005, BNFL changed its name to British Nuclear Group of America.

opportunity to consider alternatives to its disposal. For example, Paducah had about 37,000 tons of remaining scrap metal, as of June 26, 2005, that its current on-site compactor is incapable of crushing, according to a contractor official at the Paducah site.

A DOE official at the Oak Ridge site stated that it would probably not be cost-effective to ship debris to the supercompactor from other sites, and the supercompactor could not cost-effectively be relocated. However, neither DOE nor contractor officials provided any documentation of cost analysis to support this statement. Although the dismantling, shipping, and disposal of the supercompactor may have been the correct decision, DOE did not conduct a departmentwide assessment of volume reduction needs and capabilities, and the costs or potential obstacles associated with maintaining or moving the supercompactor under various LLRW management alternatives. Consequently, DOE may have missed a potential cost-saving opportunity. Oak Ridge officials told us that they are currently developing an integrated disposition plan to better coordinate LLRW management activities specifically for the Oak Ridge site. According to DOE, other integrated activities underway at Oak Ridge include, among other things, a pilot program between EM and the Office of Science to dispose of LLRW that needs no further storage or processing.

Litigation and State Actions Can Affect DOE's Waste Management Options

As a result of lawsuits and state regulatory and legislative actions in two states—Washington and Nevada—DOE cannot currently rely on either of its federal disposal facilities—Hanford or the Nevada Test Site—to dispose of mixed LLRW. Consequently, DOE is incurring increased costs for storage and treatment. Texas may provide DOE with new disposal options, but not sooner than December 2007. Specifically:

- In July 2004, Washington state asked a U.S. district court to prohibit DOE from sending LLRW from other DOE sites to Hanford for disposal.[22] DOE voluntarily suspended LLRW shipments pending the court's decision. In May 2005, the court ruled in favor of the state, issuing a preliminary injunction prohibiting DOE from sending LLRW from other sites to Hanford for disposal.[23] In addition, in November

[22]Washington asserted, among other things, that DOE did not comply with the National Environmental Policy Act of 1969 and implementing regulations.

[23]*Washington v. Bodman*, 2005 WL 1130294 (E.D. Wash. May 13, 2005).

2004, Washington state voters passed an initiative, now incorporated in Washington state law, that would prohibit DOE from accepting out-of-state waste until existing waste at Hanford is cleaned up.[24] The scope and constitutionality of the initiative are currently being litigated in federal district court.[25] DOE officials told us that its inability to ship mixed LLRW to Hanford from other states is increasing costs and may delay cleanup and closure plans at several sites. For example, at Rocky Flats, approximately 1,000 cubic meters of mixed LLRW, intended for disposal at Hanford, instead had to be shipped off-site for commercial treatment, temporary storage, and eventual disposal at Envirocare of Utah to avoid delaying site cleanup; the Rocky Flats contractor estimates incremental storage, handling, treatment, and disposal costs of this LLRW may exceed $8 million.

- In Nevada, as of August 2005, DOE was still awaiting approval from state regulators for a permit to dispose of, at the Nevada Test Site, mixed LLRW from other sites.[26] After DOE filed its permit application in December 2000, Nevada objected to DOE's planned method of disposal. DOE is working with the state regulators to achieve a mutually agreeable resolution, and state officials indicate this issue could be resolved by the end of 2005. Until DOE receives this permit, DOE cannot dispose of mixed LLRW generated at other sites at the Nevada Test Site.

- In 2004, the Nevada Attorney General objected to DOE's plan to ship certain LLRW from DOE's Fernald, Ohio, site for disposal at the Nevada Test Site, asserting in a letter to DOE that the plan violated federal law and regulations. Pending a resolution of these issues, DOE signed a $7.5 million contract in April 2005 with a commercial facility in Texas to temporarily store 6,800 cubic meters of this LLRW for up to 2 years.

- Texas may provide DOE with additional storage options. In February 2005, the state approved a license amendment for Waste Control Specialists to enlarge its LLRW storage facility. In addition, the state has

[24]Initiative 297, the Cleanup Priority Act, is now codified in chapter 70.105E of the Revised Code of Washington.

[25]*United States v. Hoffman*, No. CV-04-5128-AAM (E.D. Wash. filed Dec. 1, 2004). The U.S. district court certified questions of state law to the Washington Supreme Court, which issued its ruling on July 28, 2005. *United States v. Hoffman*, 116 P.3d 999 (Wash. 2005).

[26]At the Nevada Test Site, the hazardous components of mixed wastes are regulated by the State of Nevada under the Resource Conservation and Recovery Act of 1976, as amended.

begun a technical review of WCS's application for a LLRW disposal facility license, which could be issued by December 2007.

Conclusions

Given the large volumes of LLRW generated by DOE activities, it is imperative that DOE recognize the importance of life-cycle cost analysis in identifying the most cost-effective alternatives for managing LLRW and then weighing the cost of these alternatives against noncost factors, such as safety and schedule. However, EM's July 2002 guidance on life-cycle cost analysis did not include information on how or when such an analysis should be completed. Moreover, the department has not performed oversight to ensure that contractors are completing life-cycle cost analyses. EM has elected not to encourage the use of life-cycle cost analysis in making LLRW management decisions, relying instead on incentive-based contracts to ensure contractors are making cost-effective decisions. However, we believe that this contract mechanism does not necessarily ensure that contractors identify the lowest-cost LLRW management options. Without complete, well-documented life-cycle cost analysis, EM may be overlooking cost-saving opportunities that could have resulted from pursuing alternative disposal options. Furthermore, this lack of transparency diminishes confidence in DOE's ability to ensure that contractors have considered life-cycle costs, regardless of whether the lowest-cost alternative is selected.

Although DOE has been disposing of LLRW for decades, it still lacks an integrated national strategy for doing so. Such a departmentwide strategy is crucial for ensuring that LLRW management needs throughout DOE are identified and addressed in a cost-effective manner that also meets other departmental goals, such as timely site cleanup. Specifically, an integrated approach could help consolidate similar types of LLRW to obtain economies of scale and lower per-unit disposal costs across the complex. DOE will need to develop basic information on LLRW volumes departmentwide and by program office, and to overcome the challenges posed by DOE's complex organization and multiple missions, and recent state actions.

Recommendations for Executive Action

To promote cost-effective LLRW management, we are recommending that the Secretary of Energy take the following four actions:

- Prepare comprehensive guidance on life-cycle cost analysis that, at a minimum, specifies (1) a systematic, consistent method of analyzing all cost elements or of comparing key alternatives within these cost elements to determine the lowest cost; (2) when and under what circumstances sites should prepare cost analyses; (3) relevant DOE orders, manuals, or other reference materials that should be consulted to provide consistent direction on how and when to perform the analysis; and (4) how final LLRW management decisions should be documented to demonstrate that life-cycle cost factors were adequately weighed against noncost factors, such as safety, health, or schedule.

- Incorporate the revised life-cycle cost guidance into new or existing site contracts or into the departmental orders cited in those contracts.

- Direct DOE to oversee contractors to ensure that site contractor officials properly use life-cycle cost analyses in evaluating LLRW management alternatives.

- Actively promote and monitor the development of a timely, national LLRW management strategy that is based on departmentwide data on LLRW needing disposal, and ensure that the implementation of the strategy is fully carried out.

Agency Comments and Our Evaluation

We provided DOE with a draft of this report for review and comment. Overall, DOE generally agreed with our conclusions and thanked us for the recommendations, but disagreed with or wanted to clarify certain statements in the draft report and provided technical comments, which we incorporated as appropriate. Specifically, DOE agreed that its sites are not consistently using life-cycle cost analysis in making LLRW management decisions. It also agreed that its current guidance and oversight in the area of life-cycle cost analysis for LLRW management decisions should be strengthened and noted that it is currently reevaluating its guidance documents and their implementation. In addition, DOE expressed appreciation for our support of an effective National Disposition Strategy for LLRW management, and expects this strategy to be available by March 2006.

DOE also provided comments on several specific statements in our report. First, DOE disagreed with our statement on the lack of an effective, integrated approach for LLRW management at Oak Ridge and offered examples of integration, which we have incorporated into our report.

Nonetheless, we found that not all LLRW activities at Oak Ridge were integrated into a sitewide LLRW management strategy. For example, NNSA officials told us their future need to decontaminate and decommission numerous buildings on the site had not yet been included in any sitewide LLRW management strategy.

Second, in its technical comments, DOE stated that our discussion of the supercompactor at Oak Ridge was misleading and did not agree that cost savings would have been realized if the supercompactor had been retained and redeployed to another site. We believe that our discussion of the supercompactor is accurate. It was intended to illustrate the difficulty EM faces in developing a waste disposition strategy that covers multiple program offices. In its technical comments, DOE told us that the contractor at Oak Ridge completed a cost analysis and decided that the supercompactor should not be reused. Nevertheless, neither DOE nor contractor officials provided us with any documentation of a cost analysis to support the dismantling and disposition of the supercompactor. DOE also told us that the contractor who owned the supercompactor and Oak Ridge management "openly solicited" other contractors in the complex about potentially reusing the supercompactor but did not find any interest. However, NNSA officials at Oak Ridge told us that neither DOE nor the contractor consulted with them about the potential use of the supercompactor, and the contractor at Paducah told us that it might have benefited from the supercompactor but was not given the opportunity to consider alternatives to its disposal.

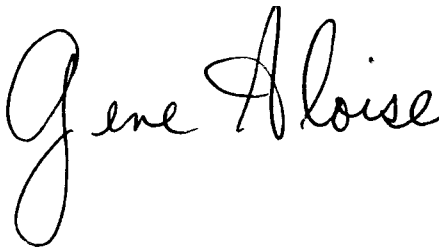
Finally, DOE also stated that the lack of consistency that we found in implementing cost guidance and preparing formal documentation should not be interpreted to mean that the department's waste disposal systems are necessarily inefficient or overly expensive, and asserted that flexibility is needed in the level of detailed cost analysis required. However, we did not conclude that the lack of consistent implementation and the lack of documentation was indicative of an inefficient or overly costly LLRW management system. Rather, we stated that we could not determine how contractors incorporated costs analyses into their disposal decisions because documentation did not exist or was incomplete. Conclusions cannot be drawn about the cost-effectiveness of LLRW management decisions if contractors do not adequately document their decisions for not using life-cycle cost analysis and DOE does not require them to do so. While we would agree that flexibility may be important in determining the level of cost analyses required, we believe this flexibility should be

accompanied by proper documentation to support the level of analysis completed and the degree to which life-cycle cost principles were followed.

DOE's comments on our draft report are presented in appendix II.

We are sending copies of the report to the Secretary of Energy, the Director of the Office of Management and Budget, and appropriate congressional committees. We will make copies available to others on request. In addition, the report will also be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staff have any questions about this report, please call me at (202) 512-3841. Contact points for our Office of Congressional Relations and Public Affairs may be found on the last page of this report. Other staff contributing to this report are listed in Appendix III.



Gene Aloise
Director, Natural Resources
and Environment

Disposed Waste Volume by Major DOE Generator Sites, Fiscal Year 2004 through Second Quarter, Fiscal Year 2005

Waste volume in cubic meters

Generator site/contractor	Total waste disposed off-site, fiscal year 2004	Total waste disposed off-site, October 2004-March 2005	Total waste disposed for 18-month period
Rocky Flats/Kaiser Hill	118,460	63,940	182,400
Fernald/Fluor Fernald	102,343	68,495	170,838
Mound/CH2M Hill, Mound	43,554	55,534	99,088
Oak Ridge ETTP/BNFL	37,502	9,278	46,780
Knolls Atomic Power Laboratory/Nuclear Fuel Services	21,208	3,432	24,640
Oak Ridge Reservation/Bechtel Jacobs	9,658	7,686	17,344
Portsmouth/Bechtel Jacobs	11,038	3,644	14,682
Brookhaven National Lab/ Brookhaven Science Associates	4,199	8,436	12,635
Paducah/Bechtel Jacobs	9,690	268	9,958
Oak Ridge National Laboratory/ University of Tennessee/Battelle	440	4,984	5,424
Ashtabula/RMI Titanium	4,056	0	4,056
West Valley/West Valley Nuclear Services	1,124	2,042	3,166
Oak Ridge Y-12/BWXT	2,485	400	2,885
Remaining generator sites (27)	12,508	5,461	17,969
Total	**378,265**	**233,600**	**611,865**

Source: DOE waste generator sites and EM headquarters.

Note: We identified 40 Department of Energy (DOE) waste generators for the period we examined. We list in this table the 13 generators with the highest volume of waste disposed off-site during this period. These 13 generators accounted for over 97 percent of DOE's low-level radioactive waste (LLRW) volume disposed of off-site for the 18-month period.

Comments from the Department of Energy

Department of Energy
Washington, DC 20585

October 14, 2005

Mr. Gene Aloise
Director
Natural Resources and Environment Team
U.S. Government Accountability Office
Washington, D.C. 20548

Dear Mr. Aloise:

The purpose of this letter is to inform you that my office has reviewed the draft report entitled *Department of Energy: Improved Guidance, Oversight, and Planning Are Needed to Better Identify Cost-Saving Alternatives for Managing Low-Level Radioactive Waste* (GAO-06-94). This letter provides the Department's consolidated comments on the report; it has been coordinated with staff in the Office of Science; Office of Nuclear Energy, Science, and Technology; and the National Nuclear Security Administration.

The information in the report validates our current efforts to improve the integration and management of low-level radioactive waste activities within the Department complex. Thank you for the recommendations provided in the report.

We generally agree with your conclusions that our sites are not consistently using life-cycle cost analyses as they make waste disposal decisions. As you are well aware, cost is an important factor, but not the only factor considered in these decisions. We also acknowledge that our existing guidance and oversight in the area of life-cycle cost analysis for low-level radioactive waste disposal decisions should be strengthened, and we are currently re-evaluating the current guidance documents and their implementation. I especially appreciate your endorsement of our ongoing project to develop a National Disposition Strategy for low-level radioactive waste management. We plan to have the first phase of this Strategy available to the public by the end of March 2006.

The enclosure provides our general and specific comments on the draft report. While we agree with the report's conclusions, we disagree with or wish to clarify many of the specific statements in the draft report. For example, we disagree with the draft report's statements regarding the lack of an effective, integrated approach for low-level radioactive waste management at Oak Ridge and the potential for reuse and disposition of a supercompactor brought to that site under a fixed-price contract. Furthermore, lack of consistency on implementation of cost guidance between sites and formal documentation should not be interpreted to mean the Department's waste disposal systems are necessarily inefficient or

overly expensive. We feel strongly that the nature of the waste disposal options and details of a site's waste management challenge must be considered when determining the level of detailed cost analyses required and plan to revise our guidance to provide such flexibility. I hope our clarification provides you with an improved understanding of the factors we consider in developing and implementing waste management strategies and our overall efforts to address the environmental contamination resultant from the Department's national security legacy.

If you have any questions, please contact Mr. Frank Marcinowski, Deputy Assistant Secretary for Logistics and Waste Disposition Enhancements, within the Office of Environmental Management. He can be reached at (202) 586-0370.

Sincerely,

James A. Rispoli
Assistant Secretary for
Environmental Management

Enclosure

GAO Contact and Staff Acknowledgments

GAO Contact

Gene Aloise (202) 512-3841

Staff Acknowledgments

In addition to the individual named above, Daniel Feehan, Doreen Feldman, Thomas Kingham, Mehrzad Nadji, Omari Norman, Christopher Pacheco, Judy Pagano, Carol Herrnstadt Shulman, and Peter Zwanzig made key contributions to this report.

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