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DOE CLEANUP

Status and Future Costs of  
Uranium Mill Tailings  
Program

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Mr. Chairman and Members of the Subcommittee:

We are pleased to participate in this hearing on the Department of Energy's (DOE) fiscal year 1997 budget. Our testimony focuses on one part of DOE's cleanup efforts: the cleanup of contamination that resulted from decades of processing uranium ore as part of the nation's nuclear weapons and energy program. Under the Uranium Mill Tailings Radiation Control Act of 1978, DOE was required to clean up inactive sites, while private owners/operators were required to clean up those sites that were active at the time the law was passed.

Although the act directed that the cleanup of surface contamination be completed by March 1990, the Congress subsequently extended the deadline twice. DOE's authority now expires in September 1996, and DOE is seeking to extend the deadline to 1998. In anticipation of congressional deliberations on reauthorizing the program, we recently examined (1) the status and cost of DOE's cleanup program and (2) factors that could affect the federal government's costs in the future.<sup>1</sup> We are pleased to report our findings to you today, but to provide a context for our discussion, we would like first to present an overview of the larger effort to clean up the weapons complex and some recent observations about the cleanup program's costs.

The huge cost of cleaning up the weapons complex has been a matter of growing concern. DOE is responsible for environmental restoration, waste management, and facility transition and management at 15 major contaminated facilities and more than 100 small facilities in 34 states and territories. These facilities encompass a wide range of environmental problems, including more than 7,000 locations where radioactive or hazardous materials were released into the environment, as well as almost 200 tanks that contain high-level radioactive waste from nuclear weapons production, some of which have leaked or could explode. Over the last several years, the total estimated cost of the DOE's cleanup has gone from roughly \$100 billion in 1988 to a current figure ranging from \$230 billion to a high of \$350 billion.<sup>2</sup>

Mr. Chairman, over the past several years we have frequently reported on many issues that have affected and will affect the cost of the cleanup. One

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<sup>1</sup>Uranium Mill Tailings: Cleanup Continues, but Future Costs Are Uncertain (GAO/RCED-96-37, Dec. 15, 1995).

<sup>2</sup>These amounts are in 1995 dollars, but have not been discounted. All other amounts have been converted to discounted 1995 dollars.

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of these is the need for a national risk-based strategy under which DOE and its regulators can negotiate realistic agreements and milestones under increasingly restrictive budgets. We have also highlighted the need for DOE to more effectively address the complex technical problems it faces in cleaning up its most vexing problems, such as the high-level tank wastes at Hanford, as well as the need for more effective contractor management.<sup>3</sup>

Cleaning up these sites is an enormous task that is likely to span multiple generations. To date, only a small portion of DOE's environmental restoration projects have been completely cleaned up. By contrast, DOE's efforts to clean up at least surface contamination under its uranium mill tailings program is near completion; 16 of the 24 sites have already been cleaned up and work is under way or planned at the rest. While groundwater cleanup is still ahead, DOE hopes to adopt a strategy that will minimize its costs. Let me return to our findings on the uranium mill tailings program.

In summary, the cleanup of surface contamination has been completed at two-thirds of the sites and is underway at most of those remaining. However, since the surface cleanup began in 1979, it has grown in both size and cost. If it is completed in 1998, as DOE currently projects, it will have taken nearly 8 years longer than DOE originally expected. It will also have cost \$2.3 billion—\$621 million, or 37 percent, more than DOE anticipated. Moreover, total future cleanup costs are still uncertain. DOE estimates that the groundwater cleanup at contaminated properties, which is not subject to the same deadline as the surface cleanup, will be completed in 2014 at a cost of at least \$147 million, depending on which cleanup strategies DOE ultimately selects and whether the states pay their share of the costs. Other factors that could affect the federal government's costs include (1) the extent and cost of DOE's role in the future disposal of tailings in the Grand Junction, Colorado, area and (2) whether the charges for the long-term surveillance and maintenance of sites that are supposed to be assessed against owners/operators are sufficient to ensure that the U.S. taxpayer will not bear the burden of the long-term custody costs.

Before discussing these issues in detail, we would like to provide some background information on the program.

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<sup>3</sup>Nuclear Weapons Complex: Establishing a National Risk-Based Strategy for Cleanup (GAO/T-RCED-95-120, Mar. 6, 1995), Nuclear Waste: Hanford Tank Waste Program Needs Cost, Schedule, and Management Changes (GAO/RCED-93-99, Mar. 8, 1993), and Department of Energy: National Priorities Needed for Meeting Environmental Agreements (GAO/RCED-95-1, Mar. 3, 1995).

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## Background

During the three decades in which uranium was used in the government's nuclear weapons and energy programs, for every ounce of uranium that was extracted from ore, 99 ounces of waste were produced in the form of mill tailings—a finely ground, sand-like material. By the time the government's need for uranium peaked in the late 1960s, tons of mill tailings had been produced at the processing sites. After fulfilling their government contracts, many companies closed down their uranium mills and left large piles of tailings at the mill sites. Because the tailings were not disposed of properly, they were spread by wind, water, and human intervention, thus contaminating properties beyond the mill sites. In some communities, the tailings were used as building materials for homes, schools, office buildings, and roads because at the time the health risks were not commonly known. The tailings and waste liquids from processing uranium ore also contaminated the groundwater.

Tailings from the ore processing resulted in radioactive contamination at about 50 sites (located mostly in the southwestern United States) and at 5,276 nearby properties. The most hazardous constituent of uranium mill tailings is radium. Radium produces radon, a radioactive gas whose decay products can cause lung cancer. The amount of radon released from a pile of tailings remains constant for about 80,000 years. Tailings also emit gamma radiation, which can increase the incidence of cancer and genetic risks. Other potentially hazardous substances in the tailings include arsenic, molybdenum, and selenium.

DOE's cleanup authority was established by the Uranium Mill Tailings Radiation Control Act of 1978. Title I of the act governs the cleanup of uranium ore processing sites that were already inactive at the time the legislation was passed. These 24 sites are referred to as Title I sites. Under the act, DOE is to clean up the Title I sites, as well as the nearby properties that were contaminated. In doing so, DOE works closely with the affected states and Indian tribes. DOE pays for most of this cleanup, but the affected states contribute 10 percent of the costs for remedial actions.

Title II of the act covers the cleanup of sites that were still active when the act was passed. These 26 sites are referred to as Title II sites. Title II sites are cleaned up mostly at the expense of the private companies that own and operate them. They are then turned over to the federal government for long-term custody. Before a Title II site is turned over to the government, the Nuclear Regulatory Commission (NRC) works with the sites' owners/operators to make sure that sufficient funds will be available to cover the costs of long-term monitoring and maintenance.

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The cleanup of surface contamination consists of four key steps: (1) identifying the type and extent of the contamination; (2) obtaining a disposal site; (3) developing an action plan, which describes the cleanup method and specifies the design requirements; and (4) carrying out the cleanup using the selected method. Generally, the primary cleanup method consists of enclosing the tailings in a disposal cell—a containment area that is covered with compacted clay to prevent the release of radon and then topped with rocks or vegetation.

Similarly, the cleanup of groundwater contamination consists of identifying the type and extent of the contamination, developing an action plan, and carrying out the cleanup using the selected method. According to DOE, depending on the type and extent of the contamination, and the possible health risks, the appropriate method may be (1) leaving the groundwater as it is, (2) allowing it to cleanse itself over time (called natural flushing), or (3) using an active cleanup technique such as pumping the water out of the ground and treating it.

Mr. Chairman, we now return to the topics discussed in our report: the status and cost of DOE's surface and groundwater cleanup and the factors that could affect the federal government's costs in the future.

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## Status and Cost of DOE's Cleanup Project

Since our report was issued on December 15, 1995, DOE has made additional progress in cleaning up and licensing Title I sites. As of April 1996, DOE's surface cleanup was complete at 16 of the 24 Title I sites, under way at 6 additional sites, and on hold at the remaining 2 sites.<sup>4</sup> Of the 16 sites where DOE has completed the cleanup, 4 have been licensed by NRC as meeting the standards of the Environmental Protection Agency (EPA). At 10 of the other 12 sites, DOE is working on obtaining such a license, and the remaining 2 sites do not require licensing because the tailings were relocated to other sites. Additionally, DOE has completed the surface cleanup at about 97 percent of the 5,276 nearby properties that were also contaminated. Although DOE expects to complete the surface cleanup of the Title I sites by the beginning of 1997, it does not expect all of NRC activities to be completed until the end of 1998. As for the cleanup

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<sup>4</sup>The state of North Dakota, in which these two sites are located, has asked DOE to "delist" its sites, or drop them from the program, claiming that the sites present minimal risk to the public and environment and that the state legislature was not likely to appropriate funds for the state's share of the cleanup cost. According to DOE, if the state did not pay its 10-percent share, the Department would not have authority to complete the cleanup. Accordingly, DOE would notify the Congress that it could not complete the planned remedial actions. As of April 1996, DOE had not made a final decision on the North Dakota sites, but it did not include funds for cleaning up these sites in its fiscal year 1997 budget request.

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of groundwater at the Title I sites, DOE began this task in 1991 and currently expects to complete it in about 2014.

Since its inception in 1979, DOE's project for cleaning up the Title I sites has grown in size and in cost. In 1982, DOE estimated that the cleanups would be completed in 7 years and that only one pile of tailings would need to be relocated. By 1992, however, the Department was estimating that the surface cleanup would be completed in 1998 and that 13 piles of tailings would need to be relocated. The project's expansion was caused by several factors, including

- the development of EPA's new groundwater protection standards;
- the establishment or revision of other federal standards addressing such things as the transport of the tailings and the safety of workers; and
- the unexpected discovery of additional tailings, both at the processing sites and at newly identified, affected properties nearby.

In addition, DOE made changes in its cleanup strategies to respond to state and local concerns. For example, at the Grand Junction, Colorado, site, the county's concern about safety led to the construction of railroad transfer facilities and the use of both rail cars and trucks to transport contaminated materials. The cheaper method of simply trucking the materials would have routed extensive truck traffic through heavily populated areas.

Along with the project's expansion came cost increases. In the early 1980s, DOE estimated that the total cleanup cost—for both the surface and groundwater—would be about \$1.7 billion. By November 1995, this estimate had grown to \$2.4 billion. DOE spent \$2 billion on surface cleanup activities through fiscal year 1994 and expects to spend about \$300 million more through 1998.<sup>5</sup>

As for groundwater, DOE has not started any cleanup. By June 1995, the Department had spent about \$16.7 million on site characterization and various planning activities. To make the cleanup as cost-effective as it can, DOE is proposing to leave the groundwater as it is at 13 sites, allow the groundwater to cleanse itself over time at another 9 sites, and use an active cleanup method at 2 locations, in Monument Valley and Tuba City, Arizona. The final selection of cleanup strategies depends largely on DOE's reaching agreement with the affected states and tribes. At this point,

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<sup>5</sup>For the surface cleanup costs, fiscal year 1994 data were the most recent available, at the time of our review.

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however, DOE has yet to finalize agreements on any of the groundwater cleanup strategies it is proposing. At the time we issued our report, the cleanups were projected to cost at least another \$130 million using the proposed strategies, and perhaps as much as another \$202 million. More recently, DOE has indicated that the Department could reduce these costs by shifting some of the larger costs to earlier years; reducing the amounts built into the strategies for contingencies, and using newer, performance-based contracting methods.

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## Uncertain Future Costs

Once all of the sites have been cleaned up, the federal government's responsibilities, and the costs associated with them, will continue far into the future. What these future costs will amount to is currently unknown and will depend largely on how three issues are resolved. First, because the effort to clean up the groundwater is in its infancy, its final scope and cost will depend largely on the remediation methods chosen and the financial participation of the affected states. Since the time we issued our report, DOE has reported some progress in developing its groundwater cleanup plans. However, it is still too early to know whether the affected states or tribes will ultimately persuade DOE to implement more costly remedies than those the Department has proposed or whether any of the technical assumptions underlying DOE's proposed strategies will prove to be invalid. If either of these outcomes occurs, DOE may implement more costly cleanup strategies, and thereby increase the final cost of the groundwater cleanup. In its fiscal year 1997 congressional budget request, DOE identified five sites where it believes it may have to implement more expensive alternatives than the ones it initially proposed.

In addition, the final cost of the groundwater cleanup depends on the ability and willingness of the affected states to pay their share of the cleanup costs. According to DOE, several states may not have funding for the groundwater cleanup program. DOE believes that it is prohibited from cleaning up the contamination if the states do not pay their share. Accordingly, as we noted in our report, we believe that the Congress may want to consider whether and under what circumstances DOE can complete the cleanup of the sites if the states do not provide financial support.

Second, DOE may incur further costs to dispose of uranium mill tailings that are unearthed in the future in the Grand Junction, Colorado, area. DOE has already cleaned up the Grand Junction processing site and over 4,000 nearby properties, at a cost of about \$700 million. Nevertheless, in the



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past, about a million cubic yards of tailings were used in burying utility lines and constructing roads in the area and remain today under the utility corridors and road surfaces. In future years, utility and road repairs will likely unearth these tailings, resulting in a potential public health hazard if the tailings are mishandled. In response to this problem, DOE has worked with NRC and Colorado officials to develop a plan for temporarily storing the tailings as they are unearthed and periodically transporting them to a nearby disposal cell—referred to as the Cheney cell, located near the city of Grand Junction—for permanent disposal. Under this plan, the city or county would be responsible for hauling the tailings to the disposal cell, and DOE would be responsible for the cost of placing the tailings in the cell. The plan envisions that a portion of the Cheney disposal cell would remain open, at an annual cost of roughly \$200,000. When the cell is full, or after a period of 20 to 25 years, it would be closed. However, DOE does not currently have the authority to implement this plan because the law requires that all disposal cells be closed upon the completion of the surface cleanup. Accordingly, we suggested in our report that the Congress might want to consider whether DOE should be authorized to keep a portion of the Cheney disposal cell open to dispose of tailings that are unearthed in the future in this area.

Finally, DOE's costs for long-term care are still somewhat uncertain. DOE will ultimately be responsible for the long-term custody, that is, the surveillance and maintenance, of both Title I and Title II sites<sup>6</sup>, but the Department bears the financial responsibility for these activities only at Title I sites. For Title II sites, the owners/operators are responsible for funding the long-term surveillance and maintenance. Although NRC's minimum one-time charge to site owners/operators is supposed to be sufficient to cover the cost of the long-term custody so that they, not the federal government, bear these costs in full, at the time we issued our December 1995 report, NRC had not reviewed its estimate of basic surveillance costs since 1980, and DOE was estimating that basic monitoring would cost about three times more than NRC had estimated. Since then, NRC and DOE have worked together to determine what level of basic monitoring should occur and how comprehensive the inspection reports should be. However, DOE still maintains that ongoing routine maintenance will be needed at all sites, while NRC's charge does not provide any amount for ongoing maintenance. In light of the consequent potential shortfall in maintenance funds, our report recommended that NRC and DOE work together to update the charge for basic surveillance and

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<sup>6</sup>States have the option of assuming long-term custody of the cleaned-up Title II sites, but DOE does not expect that any states will choose to do so.

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determine whether routine maintenance will be required at each site. On the basis of our recommendations, NRC officials agreed to reexamine the charge and determine the need for routine maintenance at each site. They also said that they are working with DOE to clarify the Department's role in determining the funding requirements for long-term custody.

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Mr. Chairman, this concludes our prepared statement. We will be pleased to answer any questions that you or Members of the Subcommittee may have.

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