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DEPARTMENT OF ENERGY

Uncertainties and Management Problems Have Hindered Cleanup at Two Nuclear Waste Sites

Statement of Ms. Gary L. Jones, Associate Director,
Energy, Resources, and Science Issues,
Resources, Community, and Economic Development Division

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Mr. Chairman and Members of the Task Force:

We are pleased to be here today to discuss management, oversight, and other challenges that the Department of Energy (DOE) faces in its efforts to clean up radioactive and hazardous materials at the Paducah, Kentucky, uranium enrichment site and to remove high-level radioactive waste from more than 34 million gallons of liquid waste stored at its Savannah River, South Carolina, site. DOE faces a number of challenges and uncertainties at Paducah as it attempts to address about 10 billion gallons of groundwater contaminated with radioactive and hazardous materials, contaminated surface water that is in creeks and ditches and leaves the site, contamination in soils that may be spread by rain, tons of buried waste, and the equivalent of about 52,000 barrels of waste stored on the site. From 1988 though 1999, DOE spent about $388 million on the Paducah site's cleanup and plans to spend another $1.3 billion over the next 10 years. At Savannah River, we focused on identifying the factors that caused delays and cost growth of the in-tank precipitation (ITP) project. In 1983, DOE selected the ITP process to remove high-level waste from the 49 underground tanks. DOE estimated that the construction of the ITP facility would be completed in 1988 at a cost of $32 million. After years of delay and spending about a half billion dollars, in February 1998, DOE suspended the project because it would not work safely and efficiently as designed--large amounts of explosive, toxic benzene gas were produced by the process. Soon after the suspension, DOE began a process to find an alternative technology to replace the ITP project. The Department has narrowed the selection to four technologies.

Our testimony today is based on our April 28, 2000, report on the Paducah cleanup and our April 30, 1999, report on the ITP project at the Savannah River Site.[1] Our testimony describes the challenges and uncertainties facing DOE in cleaning up the Paducah site and the effectiveness of DOE's oversight and management of the ITP project. Our summary follows:

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[1]See *Nuclear Waste Cleanup: DOE's Paducah Plan Faces Uncertainties and Excludes Costly Cleanup Activities* (GAO/RCED-00-96, Apr. 28, 2000) and *Nuclear Waste: Process to Remove Radioactive Waste From Savannah River Tanks Fails to Work* (GAO/RCED-99-69, Apr. 30, 1999).

- DOE expects to complete the cleanup of the Paducah site by 2010 at a cost of about $1.3 billion. However, numerous technical, funding, and regulatory uncertainties present challenges to DOE's ability to complete the cleanup within this time frame and cost estimate. For example, technical uncertainties include the planned use of technologies that are unproven or perhaps not well suited to the site's conditions. If they do not work as planned, or at all, costs will increase. In addition, even when the planned cleanup has been carried out, billions of dollars and many years will be needed to address areas at the Paducah site that are not in the cleanup plan. For example, the plan does not include cleaning up nearly 1 million cubic feet of waste and scrap in areas known as DOE Material Storage Areas (DMSA) and 16 unused and inactive buildings and structures. Some of the waste and scrap material pose a risk of an uncontrolled nuclear reaction that could threaten worker safety.[2] By not including these areas in the plan, the Paducah cleanup managers cannot assess risk or plan cleanup on a comprehensive, sitewide basis. Therefore, the picture of the cleanup task at hand is distorted.

- A number of management and oversight problems caused DOE and Westinghouse Savannah River Corporation (Westinghouse), DOE's contractor, to spend almost a half billion dollars and to take about a decade before deciding that the ITP process would not work safely and efficiently as designed. For example, in 1993, a technical review team reported that the contractor tended to react to problems after they occurred, rather than working to prevent them in the first place. The team also found that DOE lacked the necessary personnel for adequate oversight. Moreover, DOE and the contractor encountered delays in starting up the ITP facility because they had begun construction before the design of the process was completed. DOE and the contractor also did not adequately understand the cause of the technical problems—such as a lack of understanding of the chemistry involved

[2]In this case, an uncontrolled nuclear reaction could produce a burst of radiation that generally lasts several hours; it is, however, a localized event that is not expected to result in an explosion or release of radioactivity into the atmosphere.

in the ITP process--that made the process unworkable. Some of the problems that led to the ITP failure may have continued in DOE's efforts to find an alternative. According to an October 1999 National Research Council report, a lack of understanding of the chemistry involved in the process continues, and the contractor appears to be focusing on an engineering solution on the basis of untested assumptions.[3]

Challenges and Uncertainties Face DOE in Paducah's Cleanup

In 1988, radioactive contamination was found in the drinking water wells of residences near the federal government's uranium enrichment plant in Paducah, Kentucky.[4] In response, DOE began a cleanup program to identify and remove contamination in the groundwater, surface water, and soils located within and outside the plant's boundaries. Sources of the hazardous chemical and radioactive contamination included spills, leaks from contaminated buildings, buried waste, scrap yards, and waste lagoons. From 1988 though 1999, DOE spent about $388 million on cleanup efforts.

DOE's plan for cleaning up the site includes activities, costs, and schedule that are estimated to cost about $1.3 billion from fiscal year 2000 through fiscal year 2010. We identified a number of challenges to accomplishing the current cleanup plan, including uncertainty about the nature and extent of contamination, technical risks, and optimistic assumptions about funding and regulatory approvals. In addition, even when the cleanup identified in the plan is complete, billions of dollars and many years will be required to address items not included in the cleanup plan—such as about 1 million cubic feet of waste and scrap material in DOE Material Storage Areas.

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[3]See *Interim Report – Committee on Cesium Processing Alternatives for High-Level Waste at the Savannah River Site*, Committee on Cesium Processing Alternatives for High-Level Waste at the Savannah River Site, National Research Council (Oct. 14, 1999). The National Research Council, as the principal operating agency of the National Academy of Sciences and the National Academy of Engineering, provides the government, public, and scientific and engineering communities with services and research.

[4]A private company, the United States Enrichment Corporation, operates the plant today under lease and produces enriched uranium for nuclear power plants.

DOE Plans to Clean Up Six Major Categories by 2010 at a Cost of About $1.3 Billion

DOE's January 26, 2000, Paducah cleanup plan focuses on six major categories of cleanup. The first category is groundwater contamination. About 10 billion gallons of groundwater contaminated with radioactive and hazardous materials are flowing toward the Ohio River. For example, trichloroethene (used as a degreaser and called TCE) has been found in the groundwater at levels of up to 700,000 parts per billion; far in excess of the Environmental Protection Agency's (EPA) drinking water standard of 5 parts per billion. As interim measures, DOE has connected nearby residences to municipal drinking water and constructed a system to pump some of the contaminated water out and treat it.

The second category is surface water contamination in surrounding creeks and ditches. One of the main sources of this contamination is the thousands of tons of contaminated scrap metal stored at the plant. During rainstorms, contamination washes from the scrap metal, and the runoff carries contaminated soils and sediments into the ditches and creeks. By the end of 2000, DOE plans to have removed that portion of the contaminated scrap metal called "Drum Mountain," which is made up of about 8,000 tons of crushed drums that contained depleted uranium. But, after the crushed drums are removed, 57,000 tons ,or 88 percent, of the total amount of scrap metal on site will still have to be removed. DOE also plans to dredge ditches and creeks and install basins to catch the contaminated water so it can be treated.

Under the third category, DOE has identified 72 areas with contaminated surface soils and has taken interim measures, such as installing erosion control fences, to prevent further migration of the contamination; the Department plans to excavate and dispose of about 35,000 cubic yards of soil. The fourth category includes 12 waste burial grounds containing a variety of radioactive and hazardous contaminants, including arsenic, beryllium, and polychlorinated biphenyls (PCBs). DOE is planning to excavate four or five of these areas and install a protective cover, or cap, over the remaining areas. The fifth category is the equivalent of

52,000 barrels of hazardous and low-level radioactive waste stored in various locations on-site--almost 25 percent of the barrels are stored outdoors and are deteriorating. Before it can ship this waste offsite, DOE must determine the nature and extent of the waste's contamination and repack most of the barrels to make them suitable for disposal. Under the sixth and last category, two buildings that were used in the uranium enrichment process until 1977, which are heavily contaminated, will be decontaminated and removed.

DOE Faces Challenges in Achieving Its Paducah Cleanup Plan

DOE faces many challenges to completing its cleanup within planned costs and schedules. Uncertainties about the extent, source, and nature of contamination yet to be cleaned up could increase cleanup costs. For example, the full extent of contamination in the surface water and soils within and outside the plant boundaries remains to be determined and could affect cleanup strategies and costs. While Kentucky prefers the installation of eight or nine sedimentation basins as part of the surface water cleanup, DOE has only budgeted for four.

Furthermore, uncertainties exist about the feasibility of available cleanup technologies. Some of the technologies are new, and others remain untested for the specific environment found at Paducah. For example, EPA officials told us that difficulties with steam injection--which DOE plans to use to treat the source of groundwater contamination--were encountered at another site, and there are questions about whether the technology will work at Paducah because of the site's complex geologic formation. DOE's ability to treat the contaminated groundwater is also uncertain. DOE plans to install about 4,000 feet of permeable treatment barriers across the paths of the highest concentrations of contamination. Installing the barriers involves injecting a gelatinous, gummy substance containing iron filings into the aquifer at depths of about 120 feet. The technology is quite new, and the potential for its success at Paducah is uncertain. For example, if groundwater flows too quickly through the barrier and thus spends too little time in the treatment zone, the barrier may not have enough time to fully treat the TCE. In that case, the actions of the barrier's treatment zone could change the TCE to vinyl chloride, which is even more toxic.

In addition to the technical uncertainties, the cleanup plan is built on some optimistic financial assumptions. The plan assumes that federal funding for cleanup at Paducah will increase to an average of $124 million annually over the next decade--ranging from $78 million in 2001 to a high of $307 million in 2008--compared with the annual average funding of $43 million over the last 7 years.

The plan also includes optimistic assumptions about quickly reaching agreement with the regulators on cleanup levels, strategies, and priorities. In the past, regulators have disagreed with some of DOE's proposed approaches. For example, Kentucky objected to DOE's cleanup of PCBs in soils to EPA's standard of 25 parts per million for unoccupied space, saying that it wanted the soil cleaned up to 1 part per million. The more stringent EPA standard would allow for industrial or residential use. The resolution of this issue has been deferred until DOE submits its plans for surface water cleanup. If DOE receives less funding than assumed and/or eventually adopts a more stringent cleanup level than currently planned, total costs to complete the overall cleanup will grow.

DOE's Cleanup Plan for Paducah Does Not Address All Areas that Require Cleanup

Even when DOE completes the cleanup that it has planned, billions of dollars and many years will be needed to address areas at the Paducah site that are not included in the cleanup plan because they fall under the purview of a different departmental program.[5] The plan excludes nearly a million cubic feet of waste and scrap contained in 148 DMSAs located across the site. Materials in these areas include thousands of barrels of low-level radioactive waste, PCB waste, and asbestos waste; contaminated equipment; various items and containers whose contents are unknown; and scrap metal. DOE has not yet determined the exact

[5]The cleanup program is the responsibility of DOE's Office of Environmental Management, while the Office of Nuclear Energy, Science, and Technology is responsible for maintaining the site's infrastructure.

nature and extent of contamination in these areas, but it has identified 73 of them as posing a risk of an uncontrolled nuclear reaction. In this case, such a reaction might produce a burst of radiation that generally lasts several hours but is nto expected to result in an explosion or release of radioactivity into the atmosphere. At the time of our report, DOE officials said they planned to pay nearly $5 million to conduct a nuclear criticality safety review on the 10 DMSAs posing the highest risk.

The cleanup plan also does not address 16 unused buildings and structures that were originally used as part of the enrichment process. These buildings and structures, as well as the DMSAs, are excluded from the plan not because they require no action but because they fall under a different departmental program—the Office of Nuclear Energy, Science, and Technology. DOE officials told us that they are hesitant to transfer any more areas to the Office of Environmental Management, the office responsible for cleanup, because this office already has a large workload and funding for cleanup is limited.

In addition, before the site can be considered clean, DOE will need to address almost 500,000 tons of depleted uranium stored on site as well as decontaminate and decommission the uranium enrichment plant, when it ceases operation. DOE estimates that it may cost between $1.8 billion and $2.4 billion to convert the depleted uranium to a more stable form and remove it from the site. In addition, according to DOE's January 1998 estimate, another $1 billion would be needed for final decontamination and decommissioning activities when the United States Enrichment Corporation ceases operations at Paducah and the plant is returned to DOE.

To ensure that cleanup risks and priorities are established on a comprehensive, sitewide basis and that a more comprehensive picture of the cleanup is presented to the Congress, our April report recommended that the Secretary of Energy transfer the responsibility for the DMSAs and the unused buildings and structures from the Office of Nuclear Energy to the Office of Environmental Management. We also recommended that DOE address in the cleanup plan, regardless of the current organizational responsibility, any and all materials at the site that are potential health hazards and reexamine the sitewide contamination risks and cleanup priorities, costs, and schedules. In response to our recommendations, DOE officials announced, in July 2000, that it will prepare an integrated sitewide plan that will address all aspects of the site requiring cleanup. However, it has not transferred the responsibility for these areas to the Office of Environmental Management. Without doing so, it will be more difficult to establish priorities and conduct the cleanup in a comprehensive manner.

ITP Fails to Work After 10 Years and a Half Billion Dollars

The ITP process was selected in 1983 as the preferred method for separating high-level waste from the 34 million gallons of liquid waste stored at the Savannah River site--a step considered necessary to effectively handle this large quantity of waste. In 1985, DOE estimated that it would take about 3 years and $32 million to construct the ITP facility. After a number of delays, the ITP facility was started up in 1995, but safety concerns about the amount of explosive, toxic benzene gas that the facility generated halted start-up operations. In February 1998, after about a decade of delays and spending almost a half billion dollars, DOE suspended the project because it did not work as safely and efficiently as designed. DOE then directed that its contractor begin a process to identify and select an alternative technology. Although originally expected to be completed in the fall of 1999, that selection process continues today with additional research and evaluations being made on four alternatives. DOE's plan calls for making a decision on the preferred alternative in June 2001.

A number of factors combined to cause DOE and Westinghouse to spend almost a half billion dollars and take about a decade to decide that the ITP process would not work as safely and efficiently as designed. First, because of ineffective DOE and contractor management and oversight during the 1980s and early 1990s, ITP problems were not being adequately dealt with. In addition, DOE and the contractor experienced difficulty managing the project's start-up operations.

Furthermore, there was limited oversight and visibility of the project because of the budgetary treatment it received. Lastly, the ITP process and the generation of toxic, explosive benzene were not fully understood.

Weaknesses Existed in Contractors' Management and DOE's Oversight

The principal factors contributing to the delays and increased costs of the project were ineffective management and oversight by DOE and its operating contractors. A number of these problems were noted in 1993 by a DOE technical review team (referred to as the Red Team) that examined the project[6] as well as in semiannual evaluations of contractor performance.

The Red Team reported that the contractor tended to use "reactive, discovery management" to react to problems after they occurred, rather than working to prevent problems in the first place. It found that this approach resulted in a high potential for inadequate process development, lengthening the project, and increasing its costs. The Red Team also reported that DOE oversight and support functions at the Savannah River site were not adequate because DOE lacked the necessary personnel. As a result, DOE's guidance and responsiveness to Westinghouse, the site contractor, were limited. Finally, the team found that DOE's organizational responsibilities appeared unclear and the DOE staff were forced to respond in a reactive manner to emerging issues.

Contractor management problems also surfaced repeatedly in the semiannual evaluations DOE performed to assess Westinghouse's eligibility for award fees. We found that in 14 of the 16 evaluations performed from April 1990 through March 1998, DOE identified weaknesses needing attention in contractor management or ITP planning activities. For example, a 1992 evaluation stated that performance against planned work was not adequately monitored and that

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[6]See *Independent Technical Review of In-Tank Precipitation (ITP) at the Savannah River Site,* DOE Office of Environmental Restoration and Waste Management (June 1993).

technical documents had deficiencies indicating a lack of management attention. A 1995 evaluation noted that insufficient resources had been assigned to meet the project schedule. In addition, a 1996 evaluation noted that while safety concerns about benzene gas from the ITP process was a key issue, the implementation of a program to resolve the benzene issue had been fragmented and no single manager had been given overall responsibility for resolving it.

Managing the Project's Start-Up Posed Difficulties

The ITP project was managed on a fast-track schedule--concurrent design and construction--with an emphasis on pushing ahead in the belief that the problems could be solved later. Rather than expediting the ITP project, this approach caused a series of delays that prolonged the project for 10 years while costs mounted. A number of studies in the early 1990s noted this problem, as the following examples show.

- A 1992 Westinghouse management assessment concluded that a number of start-up activities were begun prematurely--before the foundation for an efficient program was in place.[7] The key weaknesses observed included a lack of a technical baseline and a potential for inconsistencies among the project's various activities because they were not completely integrated.

- Our 1992 report on Savannah River's Defense Waste Processing Facility, which included the ITP project, cited the fast-track management method being used as contributing to the project's cost growth. We also stated that there was a risk associated with that method, especially when used with unique and complex facilities. We recommended that an assessment comparing ITP with an alternative technology be made.[8]

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[7]See *Management Assessment: In-Tank Precipitation Project*, Westinghouse Savannah River Company (Mar. 1992).

[8]See *Nuclear Waste: Defense Waste Processing Facility—Cost, Schedule, and Technical Issues* (GAO/RCED-92-183, June 17, 1992).

- The 1993 Red Team report noted that the project's start-up was not being managed as a first-of-a-kind chemical-processing system. It stated that Westinghouse was not following the accepted chemical engineering practice of completing process development, demonstrating the operability of the process on a pilot scale, and assessing all long-term impacts and requirements for sustaining the process before beginning plant operations. The Red Team recommended that alternatives to the ITP process be considered.

In response to our 1999 report, Westinghouse acknowledged that the risks associated with new applications of existing technologies were not managed well on the ITP project—that is, enough time was not built into the schedule to allow for the kinds of technical problems that arose. DOE Savannah River officials noted that ITP was a first-of-a-kind process and that because of funding constraints, they were scaling up the technology from lab tests to full-scale without the benefit of additional test facilities. Furthermore, DOE officials said they considered alternatives to ITP as the project progressed. DOE said it determined that risks were inherent in ITP and the alternative processes but that costs still favored the ITP process, so the project proceeded. The DOE Savannah River High-Level Waste Division Director said the Department is now attempting to manage the high-level waste program, of which ITP is a part, using a systems engineering approach that dictates that more testing be done up front.

Oversight and Visibility Were Limited by Budgetary Treatment

DOE paid for the ITP project with operating funds that are subject to less oversight and visibility than capital construction funds. Capital construction projects are subject to periodic reviews and reports, and those costing $5 million or more are shown as line items in the budget requests that DOE submits to the Congress.[9] Projects paid for with operating funds do not receive such scrutiny. DOE officials said they used operating funds for the ITP project because, throughout the life of the project, they had expected the technical issues to be solved shortly, thus not warranting its conversion to a capital construction project, which would be funded as a line item in DOE's budget request.

This is not a new issue. We raised concerns about this practice in our 1992 report, noting that because projects associated with Savannah River's Defense Waste Processing Facility were being funded from operating accounts, the Congress was not receiving enough information to fully understand the magnitude of the continuing cost increases and delays.[10]

Inadequate Understanding of the ITP Process Extended the Project

DOE and its contractors did not completely understand the ITP chemistry that caused excess benzene to be generated. Earlier in the project, the Westinghouse staff at the Savannah River Site identified the principal cause of benzene generation as the decomposition of the chemical (sodium tetraphenylborate) that was added to the tank waste during the ITP process to separate the high-level waste from the liquid waste solution. The benzene was thought to become trapped in the solution and be released with the addition of water and mixing. In 1997, after a recommendation by the Defense Nuclear Facilities Safety Board, additional research into the chemistry revealed that a catalyst or catalysts that produced large amounts of benzene were present in the waste solution.

The contractor based its initial belief on the results of the full-scale test conducted in 1983 and on subsequent smaller-scale tests. For the 1983 test, sodium tetraphenylborate was added to a tank with about 500,000 gallons of waste. During the test, a good separation of high-level waste occurred. However, a significant release of benzene was also observed--for 6 hours, the benzene levels were higher than the level that the instruments in the tank could register. As a result, additional studies were conducted.

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[9]Prior to fiscal year 1997, capital funded projects costing $2 million or more were to be shown as budget line items.

According to many DOE ITP project employees with whom we spoke, the test in 1983 was viewed as successful and provided credibility for the project's technology. However, an ITP engineer told us that the fact that the benzene level went over the instrumentation scale for 6 hours was not widely known. The test results seemed to have been forgotten over time. For example, two ITP project managers involved with the project since 1997 told us they were unaware of this aspect of the test.

During the development of the ITP process, we and the Red Team raised concerns about unresolved technical issues and the level of understanding the ITP process, as shown in the following:

- Our 1992 report raised concerns about the ITP process's unresolved technical issues and delays and recommended that the Secretary of Energy direct that an assessment of an alternative technology (ion-exchange process) be prepared to determine whether DOE should replace the ITP process.[11]

- In 1993, the Red Team noted that the chemistry of the ITP process was not adequately understood and that the ITP process appeared to cause more problems than it solved. These problems included a need to control benzene emissions; increased flammability risks; increased risk from aerosols, foams, and respirable particulates; increased chemical reactivity of high-level waste, leading to possible explosions; and the introduction of extremely complex organic chemistry.

- The Red Team also questioned whether the chemical used in the ITP process--sodium tetraphenylborate--was the best way to remove cesium from the liquid waste. It concluded that effective technologies were available and could be implemented. It noted that if the state environmental regulators adopted a more restrictive benzene emissions policy, the entire high-level waste complex, as well as the Savannah River Site itself, would be better served by a

[10]See GAO/RCED-92-183, June 17, 1992.

thorough reevaluation of alternative technologies.

In response to our 1999 report, DOE Savannah River officials told us that they considered the concerns raised but did not change their approach for a number of reasons. In their view, in 1992 and 1993, ITP was considered to be the best technology available for the type of high-level waste at the Savannah River Site. In addition, they believed that they understood the benzene generation problems and thought the problems had been identified, evaluated, and resolved. A number of modifications were made to the ITP facility, primarily to address the generation of benzene and to meet the more stringent safety standards that were adopted for all DOE facilities. Throughout this period, DOE Savannah River officials said that they considered the ITP process to have the lowest technical risk and the lowest cost of all the alternatives.

DOE Is Evaluating Four Alternatives to Replace ITP

Although pointed out by the Red Team, the Defense Nuclear Facilities Safety Board, and us, the lack of understanding of the chemistry of the ITP process may plague the selection of the replacement for ITP. In the fall of 1999, the National Research Council released an interim report on the alternative processes being considered for the high-level waste at the Savannah River site. Regarding one of the alternative technologies, called small-tank precipitation, which basically uses the same chemical to separate the high-level waste as the ITP process does, the report found that Westinghouse lacked an adequate understanding of the chemistry underlying the process responsible for benzene generation. The Council further reported that in place of such an understanding, Westinghouse appeared to be focusing on an engineering design solution that was based on untested assumptions about maximum likely benzene production. The Council believed it would be advantageous in terms of time and cost to undertake this research and development work before the process might be selected and deployed. The alternative--namely, to proceed with deployment immediately and

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[11]See GAO/RCED-92-183, (June 17, 1992).

engineer around the gaps in chemistry knowledge--carries a high technical risk and could result in a repeat of the ITP failure. As a result of the National Research Council report, DOE decided that further research and development on each alternative was required to reduce technical uncertainty prior to selecting a preferred alternative.

The National Research Council's report also suggests that Westinghouse may have a bias for its process, which is the small-tank precipitation alternative. The Council reported that the research and development resource allocations have been markedly inequitable for the four alternative processing options that DOE and the contractor are considering. It said that this funding disparity appears to be primarily responsible for the different levels of technical maturity of the four processing options, independent of their likelihood of success. The Council found in its discussions with the contractor and DOE staff that the contractor did not appear to be serious about pursuing research and development on any option but small-tank precipitation. These concerns were addressed when DOE removed research and development management responsibility from Westinghouse for the other options in October 1999 and limited its responsibility to the small-tank precipitation process. Although the Secretary of Energy had announced in April 1999 that a new contractor would be sought to continue work on separation processes at Savannah River, Westinghouse remained responsible for research and development on all the alternatives until October 1999.

In addition, DOE officials told us that (1) DOE has developed an action plan and project schedule that includes the steps necessary for choosing a preferred alternative by June 2001 and designing, constructing, and operating the facility by 2010; (2) DOE is developing selection criteria that will be used to pick the preferred alternative, which may include such factors as technical maturity, risk, life-cycle cost, and implementation confidence; and (3) DOE is using a technical working group to oversee the research and development being undertaken.

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In summary, Mr. Chairman, the issues we have raised today concerning these two projects illustrate the types of issues that we have raised in the past as part of the major performance and management challenges at DOE. For example, we reported to the Congress in January 1999 that DOE has difficulty completing large projects on time and within budget, that DOE contract management remains vulnerable to risk, and that DOE's staff lack technical and management skills.[12] These were touched on in the examples we provided today. While DOE has made improvements in all these areas, many of the issues are at the heart of DOE's culture as an organization and will take time and focused management attention to change. Continued oversight by this and other committees will continue to spotlight the progress made and challenges ahead to ensure that DOE continues to improve.

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

Contact and Acknowledgement

For future contacts regarding this testimony, please contact Ms. Gary L. Jones on (202) 512-3841. Individuals making key contributions to this testimony include Erin Barlow, Rachel Hesselink, and Glen Trochelman.

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[12]See *Major Management Challenges and Program Risks: Department of Energy* (GAO/OCG-99-6, Jan. 1999).

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