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**DEPARTMENT OF
ENERGY**

**Contract and Project
Management Concerns at
the National Nuclear
Security Administration and
Office of Environmental
Management**

Statement of Gene Aloise, Director
Natural Resources and Environment



GAO

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Highlights of [GAO-09-406T](#), a testimony before the Subcommittee on Energy and Water Development, Committee on Appropriations, House of Representatives

Why GAO Did This Study

The Department of Energy (DOE) manages over 100 construction projects with estimated costs over \$90 billion and 97 nuclear waste cleanup projects with estimated costs over \$230 billion. DOE has about 14,000 employees to oversee the work of more than 93,000 contractor employees. Due to DOE's history of inadequate oversight and management of contractors, GAO continues to include DOE contract and project management on its list of government programs at high risk for fraud, waste, abuse, and mismanagement. This testimony discusses (1) recent GAO work on contract and project management within two of DOE's largest program offices—the National Nuclear Security Administration (NNSA) and the Office of Environmental Management (EM), (2) preliminary results of ongoing GAO work on project management at NNSA's Mixed Oxide Fuel Fabrication Facility (MFFF) project at the Savannah River Site in South Carolina, and (3) actions needed by NNSA and EM to improve contract and project management.

GAO's reports over the past 3 years have contained nearly 60 recommendations collectively calling for DOE to ensure that project management requirements are consistently followed, to improve oversight of contractors, and to strengthen accountability. While DOE has generally agreed with these recommendations and some actions have been taken, the majority are still open and awaiting action by DOE.

View [GAO-09-406T](#) or key components. For more information, contact Gene Aloise at (202) 512-3841 or aloise@gao.gov.

DEPARTMENT OF ENERGY

Contract and Project Management Concerns at the National Nuclear Security Administration and Office of Environmental Management

What GAO Found

Since 2006, GAO has issued 12 reports examining DOE's contract and project management. Two of these reports examined the performance of DOE's largest construction projects—nearly all of which are managed by NNSA or EM—and EM's largest nuclear waste cleanup projects. These reports documented that the cost increases and schedule delays that have occurred for most of these projects have been the result of inconsistent application of project management tools and techniques on the part of both DOE and its contractors. Specifically, GAO reported in March 2007 that 8 of the 10 major NNSA and EM construction projects that GAO reviewed had exceeded the initial cost estimates for completing these projects—in total, DOE added nearly \$14 billion to these initial estimates. GAO also reported that 9 of the 10 major construction projects were behind schedule—in total, DOE added more than 45 years to the initial schedule estimates. In particular, the Waste Treatment Plant project at the Hanford Site had exceeded its original cost estimate by almost \$8 billion and experienced schedule delays of over 8 years. GAO also reported in September 2008 that 9 of the 10 major EM cleanup projects GAO reviewed had experienced cost increases and schedule delays—in total, DOE estimated that it needed an additional \$25 billion to \$42 billion to complete these cleanup projects over the initial cost estimates and an additional 68 to 111 more years than initially estimated. In addition, GAO has issued a number of other reports over the past 3 years on specific projects which found similar management problems with NNSA and EM.

Preliminary results from GAO's ongoing review of NNSA's MFFF project indicate project management concerns continue. The facility, which is designed to convert 34 metric tons of surplus weapons-grade plutonium into fuel for use in commercial nuclear reactors, is estimated to cost about \$4.8 billion and begin operations in 2016. One of the key management systems NNSA uses to measure and report on the project's progress—the project's earned value management system—depends on a reliable schedule that specifies, for example, when the project's work activities will occur, how long they will take, and how they relate to one another. GAO has previously identified nine key practices necessary for developing a reliable schedule. However, the project's schedule, in addition to other problems, does not adhere to a key practice that is fundamental to having a sufficiently reliable schedule—specifically, MFFF project staff have not conducted a risk analysis on their current schedule using statistical techniques. DOE officials responded that they plan on conducting a risk analysis of the schedule for the MFFF project during the summer of 2009. Consequently, NNSA cannot adequately state its level of confidence in meeting the MFFF project's completion date, and NNSA's schedule for the project therefore may not be reliable. GAO's work on this project is continuing, and GAO intends to work with NNSA to resolve these issues.

Mr. Chairman and Members of the Subcommittee:

I am pleased to be here today to discuss GAO's work on contract and project management at the Department of Energy (DOE). As you are aware, we issue a high-risk status report at the start of each new Congress to help in setting congressional oversight agendas and to promote a more effective, credible, and results-oriented government. GAO designated DOE's contract management as a high-risk area in 1990—the first year the high-risk list was published. DOE, the largest civilian contracting agency in the federal government, relies primarily on contractors to carry out its diverse missions and operate its laboratories and other facilities—about 90 percent of its annual budget is spent on contracts. DOE has about 14,000 employees to oversee work performed under contract by more than 93,000 contractor employees. DOE's record of inadequate management and oversight of its contractors resulted in our initial high-risk designation for contract management and, as noted in our January 2009 high-risk report,¹ DOE's contract management, including both contract administration and project management, continues to be at high risk for fraud, waste, abuse, and mismanagement.

The two largest program offices within DOE—the National Nuclear Security Administration (NNSA) and the Office of Environmental Management (EM)—continue to experience significant problems completing projects on time and on budget. Together, these two offices account for about \$14 billion annually—roughly 60 percent of DOE's annual budget. Strong congressional oversight will continue to be important as NNSA embarks on a major initiative costing tens of billions of dollars to modernize the nation's aging nuclear weapons infrastructure and EM continues to spend billions of dollars to build facilities to treat and dispose of millions of gallons of radioactive waste. Further scrutiny is warranted because EM is the recipient of approximately \$6 billion in additional funding under the recently enacted American Recovery and Reinvestment Act.

In the nearly 3 years since we testified before this Subcommittee on the Hanford Site's waste treatment plant, one of DOE's most technically complex and largest construction projects, we have issued 12 reports—9 at the request of this Subcommittee—examining DOE's largest

¹GAO, *High Risk Series: An Update*, [GAO-09-271](#) (Washington, D.C.: Jan. 22, 2009).

construction and cleanup projects.² These projects are projected to cost, in total, roughly \$127 billion and take decades to complete. Nearly all of these projects are managed by NNSA or EM. These reports detail a litany of contract and management problems that have led to, in many cases, massive cost increases and significant schedule delays.

My testimony today discusses (1) our work over the past 3 years on NNSA and EM contract and project management of large projects, (2) the preliminary results of our ongoing review of the cost and schedule performance and the status of licensing on a major NNSA construction project—the nearly \$5 billion Mixed Oxide Fuel Fabrication Facility (MFFF) at the Savannah River Site in South Carolina, and (3) actions needed by NNSA and EM to improve contract and project management. Today’s statement is based on published GAO products and ongoing work for this Subcommittee. In conducting our work on the MFFF project, we met with NNSA and contractor officials, visited the MFFF construction site in South Carolina, reviewed relevant project documents such as project execution plans and performance reports, examined the reliability of the project’s earned value management data, and examined the reliability of the project’s schedule. We conducted the performance audit work that supports this statement in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to produce a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our statements today.

GAO’s Recent Work Shows That NNSA’s and EM’s Projects Continue to Be at High Risk for Fraud, Waste, Abuse, and Mismanagement

Over the past 3 years, we have reported on significant problems with NNSA’s and EM’s ability to manage major projects within cost and schedule targets. Two of these reports examined the performance of DOE’s largest construction projects—nearly all of these projects are managed by NNSA or EM—and EM’s largest nuclear waste cleanup projects. The estimated cost of completing these construction projects is about \$27 billion, and the estimated cost of completing these cleanup projects is about \$100 billion. In summary, these reports documented that the cost increases and schedule delays that have occurred for most of these projects have been the result of inconsistent application of project management tools and techniques on the part of both DOE and its

²A listing of related GAO products appears in appendix I.

contractors. These reports identified issues, including inadequate systems for measuring contractor performance, approval of construction activities before final designs were sufficiently complete, ineffective project reviews, and ineffective development and integration of the technologies used in these projects.

Regarding DOE's largest construction projects, we reported in March 2007 that 8 of the 10 major NNSA or EM construction projects we reviewed had exceeded the initial cost estimates for completing these projects—in total, DOE added nearly \$14 billion to these initial estimates.³ We also reported that 9 of the 10 projects were behind schedule—in total, DOE added more than 45 years to the initial schedule estimates. These projects included:

- the MFFF, the Pit Disassembly and Conversion Facility, the Tritium Extraction Facility, and the Salt Waste Processing Facility at the Savannah River Site;
- the Waste Treatment and Immobilization Plant at the Hanford Site;
- the Highly Enriched Uranium Materials Facility at the Y-12 National Security Complex in Tennessee;
- the National Ignition Facility at the Lawrence Livermore National Laboratory in California; and
- the Depleted Uranium Hexafluoride 6 Conversion Facilities at DOE sites in Kentucky and Ohio.

Cost increases ranged from \$122 million for the Tritium Extraction Facility to \$7.9 billion for the Waste Treatment and Immobilization Plant, and schedule delays ranged from almost 2 years for the Highly Enriched Uranium Materials Facility to over 11 years for the Pit Disassembly and Conversion Facility, with seven projects having schedule delays of 2 years or more. Although external factors, such as additional security and safety requirements, contributed to cost growth and delays, we found that cost growth and schedule slippage in many of the DOE projects we reviewed occurred principally because of ineffective project management oversight on the part of DOE and poor project management on the part of DOE's

³GAO, *Department of Energy: Major Construction Projects Need a Consistent Approach for Assessing Technology Readiness to Help Avoid Cost Increases and Delays*, [GAO-07-336](#) (Washington, D.C.: March 27, 2007).

contractors. We also found that, while DOE requires final project designs to be sufficiently complete before beginning construction, it has not systematically ensured that the critical technologies reflected in these designs have been demonstrated to work as intended prior to the start of construction.

For example, we found that NNSA's National Ignition Facility project had over \$1 billion in cost overruns and years of schedule delays, in large part because of poor management of the development and integration of the technologies used in the project's designs. The requirements for the National Ignition Facility—the use of 192 high-power laser beams focused on a single target in a “clean room” environment—had not been attempted before on such a large scale. According to the NNSA project director, early incorrect assumptions about the original facility design and the amount of work necessary to integrate the technologies and assemble the technical components contributed to about half of the project's cost increases and schedule delays.

In addition, we found that EM's Salt Waste Processing Facility project at the Savannah River Site had cost overruns and project delays, in part due to inadequate communication between officials on site and at DOE headquarters. This project, which is designed to treat radioactive waste from activities at the Savannah River Site, was originally scheduled to begin operating in 2009 but has been delayed twice and is not now projected to begin operations until as late as November 2013. We found that the Defense Nuclear Facilities Safety Board had expressed concerns in June 2004, 5 months after the preliminary design was started, that the facility design might not ensure nuclear wastes would be adequately contained in the event of earthquakes. However, project managers did not address these concerns for 17 months and continued to move forward with the existing project design. According to the DOE project director, better and more timely discussions between site officials and headquarters to decide on the actions needed to adequately address these safety and security requirements might have hastened resolution of the problem, and up to 1 year of design rework might have been avoided. Project delays added \$180 million to the total project cost. EM officials now require a more rigorous safety analysis earlier in the decision-making process.

In regard to EM's largest cleanup projects, in September 2008, we reported that 9 of the 10 major EM cleanup projects had experienced cost increases and schedule delays—in total DOE estimated that it needed an additional \$25 billion to \$42 billion to complete these cleanup projects over the initial

cost estimates and an additional 68 to 111 more years than initially estimated.⁴ These projects included:

- the solid waste stabilization and disposition project at the Idaho National Laboratory in Idaho;
- the nuclear facility decontamination and decommissioning project at the Oak Ridge Reservation in Tennessee;
- the nuclear material stabilization and disposition project and the radioactive liquid tank stabilization and disposition project at the Savannah River Site in South Carolina;
- the soil and water remediation project at the Los Alamos National Laboratory in New Mexico; and
- the nuclear material stabilization and disposition project, the solid waste stabilization and disposition project, the soil and water remediation project, and the radioactive liquid tank stabilization and disposition project at the Hanford Site in Washington.

Cost increases ranged from \$139 million for the Los Alamos soil and water remediation project to more than \$9 billion for the Hanford radioactive liquid tank stabilization and disposition project. Schedule delays ranged from 2 years for the Hanford nuclear material stabilization and disposition project to 15 years for two additional projects at the Hanford Site—the solid waste stabilization and disposition project and the soil and water remediation project. We found that these changes arose primarily because the initial baseline estimates for these projects made schedule assumptions that were not linked to technical or budget realities. Also, most of the 10 projects had cost increases and schedule delays because the previous baselines (1) had not fully foreseen the type and extent of cleanup needed, (2) assumed that construction projects needed to carry out the cleanup work would be completed on time, or (3) had not expected substantial additional work scope. We also found that DOE had not effectively used management tools—including independent project baseline reviews, performance information systems, guidance, and

⁴GAO, *Nuclear Waste: Action Needed to Improve Accountability and Management of DOE's Major Cleanup Projects*, [GAO-08-1081](#) (Washington, D.C.: Sept. 26, 2008).

performance goals—to help oversee major cleanup projects’ scope of work, costs, and schedules.

For example, the initial schedule estimate for a solid waste disposition project at DOE’s Idaho National Laboratory was influenced by an EM-wide effort to accelerate the office’s cleanup work by creating new, earlier completion dates for key cleanup projects and for closing entire sites to reduce the public health and environmental risks posed by the waste at these sites. To meet its 2012 accelerated completion date, the laboratory assumed its waste treatment plant could process waste at a rate that was more than 50 percent higher than the rate demonstrated at the time EM established the baseline. Because the plant had only recently begun operating, project staff lacked confidence that they could meet the processing rate. Moreover, the independent team reviewing the baseline reported that the rate was optimistically high. Nevertheless, EM proceeded with the initial baseline and attempted to meet the optimistic rate by providing the contractor with performance incentives, which proved ineffective. When the waste treatment plant did not meet that processing rate, EM revised its baseline, deferring 4 years of cleanup work, which added about \$450 million to the project.

In addition, we found that cost increases and schedule delays occurred because EM project officials did not accurately anticipate site or safety conditions. For example, an EM project at the Oak Ridge Reservation in Tennessee to decontaminate and decommission approximately 500 facilities and remediate 160 sites experienced cost increases of \$1.2 billion and a 9-year delay in its completion date from 2008 to 2017. These occurred because project officials did not accurately anticipate the site conditions or the types of work activities necessary to safely conduct the work, despite multiple estimates generated by the contractor, DOE, and the Army Corps of Engineers. In this case, a 1940s-era building was far more contaminated and deteriorated than first estimated. As a result, DOE changed its cleanup plan and implemented a more extensive—and therefore more expensive—approach to tearing down the building. In addition, after a worker fell through a weakened floor, the contractor had to reinforce the building’s structure so that contaminated equipment could be removed safely.

In addition to the findings in these two reports, we have issued other reports over the past 3 years that also found similar project management problems with NNSA and EM. We issued eight other reports that found poor scheduling practices, incomplete cost estimates, poor

communication between DOE headquarters and its field locations, and other issues related to ineffective project management.

- In January 2007, we reported that management problems within NNSA persisted, in part, because NNSA and DOE had not fully agreed on how NNSA should function within the department as a separately organized agency.⁵ This lack of agreement resulted in organizational conflicts that have inhibited effective operations. We also identified the following areas where additional management improvements were needed: (1) regarding project management, we found that NNSA had not developed a project management policy, implemented a plan for improving its project management efforts, or fully shared project management lessons learned between its sites; (2) regarding program management, we found that NNSA had not identified all of its program managers or trained them to a certified level of competency; and (3) regarding financial management, we found that NNSA had not established an independent analysis unit to review program budget proposals, confirm cost estimates, and analyze budget alternatives.
- In May 2007, we reported that despite a number of efforts by DOE to improve its approach to project management, the department's overall performance on projects had not substantially improved.⁶ DOE had set a performance goal of having 90 percent of its ongoing projects being managed within a 10 percent variance of cost and schedule baseline targets. However, we found that since October 2002, when DOE began reporting monthly project performance data, the department had achieved its performance goals for construction projects only about one-third of the time. Also, we found that since February 2004, EM's cleanup projects met cost and schedule performance goals only about one-fifth of the time.
- In June 2007, we reported that DOE's preliminary estimate of the cost to address the five waste sites where transuranic wastes are buried was about \$1.6 billion in 2006 dollars, but the estimate was likely to increase for several reasons.⁷ For example, DOE's estimate reflected the costs of

⁵GAO, *National Nuclear Security Administration: Additional Actions Needed to Improve Management of the Nation's Nuclear Programs*, [GAO-07-36](#) (Washington, D.C.: Jan. 19, 2007).

⁶GAO, *Department of Energy: Consistent Application of Requirements Needed to Improve Project Management*, [GAO-07-518](#) (Washington, D.C.: May 11, 2007).

⁷GAO, *Nuclear Waste: Plans for Addressing Most Buried Transuranic Wastes Are Not Final and Preliminary Cost Estimates Will Likely Increase*, [GAO-07-761](#) (Washington, D.C.: June 22, 2007).

leaving most waste under earthen barriers—typically the least expensive approach. If DOE was required to retrieve substantial portions of these wastes, costs would increase dramatically. In addition, DOE’s estimate excluded unknown costs, such as the cost of disposing of wastes off-site, if necessary. For example, DOE’s lifecycle cost estimate to remove transuranic wastes buried near the Columbia River at the Hanford Site could triple once options and costs for disposal are fully evaluated.

- Also, in June 2007, we reported that EM did not follow key departmental project management requirements for its Bulk Vitrification Demonstration Project, which aimed to demonstrate an alternative technology to treat low-activity radioactive waste at the Hanford Site.⁸ Specifically, early in the demonstration, EM did not conduct key internal and external reviews that would have evaluated the project’s design, procurement, and construction management approaches to identify potential problems and address them before starting construction. In addition, EM did not fully develop or update key project planning documents, such as a project execution plan, an acquisition plan, and a validated estimate of project costs. Without these management tools, EM initially overlooked a number of technical and safety problems facing the demonstration project, such as uncertainties about the quality of the glass formed using the bulk vitrification technology and inadequate systems to shield and confine radioactive material from workers and the environment. These problems contributed to an increase in estimated project costs from \$62 million to \$230 million, a 6-year delay, and an increase to the estimated life-cycle cost of a future full-scale bulk vitrification facility from about \$1.3 billion to \$3 billion. The project was subsequently suspended, after an investment of \$100 million and several years of effort.
- In July 2007, we reported that EM had performed little or no review of contractor invoices or supporting documents for millions of dollars in charges billed to DOE each month by the contractor for the construction of the Waste Treatment Plant at the Hanford Site.⁹ Given the multibillion-dollar cost and schedule overruns already experienced with the project, the need for close, ongoing review of invoiced transactions and support is particularly compelling. We found that the contractor’s invoices provided

⁸GAO, *Nuclear Waste: DOE Should Reassess Whether the Bulk Vitrification Demonstration Project at Its Hanford Site Is Still Needed to Treat Radioactive Waste*, [GAO-07-762](#) (Washington, D.C.: June 12, 2007).

⁹GAO, *Hanford Waste Treatment Plant: Department of Energy Needs to Strengthen Controls over Contractor Payments and Project Assets*, [GAO-07-888](#) (Washington, D.C.: July 20, 2007).

little detail as to the items purchased, contrary to federal acquisition regulations and contract requirements. EM officials chose to rely primarily on another agency (the Department of Defense's Defense Contract Audit Agency) to review and approve the contractor's corporate-wide financial systems, which EM officials believed allowed them to rely on the contractor's systems with little or no DOE oversight. In addition, EM relied primarily on its contractor to review and validate subcontractor charges without having a process in place to assess whether its contractor was properly carrying out its subcontractor oversight responsibility. EM's heavy reliance on others, with little oversight of its own, exposed the hundreds of millions of dollars it spent annually on the project to an unnecessarily high risk of improper payments. We also concluded that the property control weaknesses we identified, coupled with the lack of DOE oversight, created an environment in which property could be lost or stolen.

- In May 2008, we reported that NNSA's project to manufacture pits—the key component in a nuclear warhead that starts the nuclear chain reaction— at the Los Alamos National Laboratory in New Mexico did not include all associated costs in its estimates and did not establish a clear schedule for manufacturing pits.¹⁰ NNSA established a goal in 2002 to create the capability to manufacture 10 pits per year starting in 2007 and to deliver a single war reserve pit—a pit that can be used in the U.S. nuclear weapons stockpile—for the W88 nuclear warhead in 2007. NNSA estimated that this effort would cost about \$1.55 billion between fiscal years 2001 and 2007. NNSA subsequently reported that it was implementing the project under budget by spending \$1.29 billion on the pit manufacturing effort between fiscal years 2001 and 2007. However, NNSA's cost estimate did not include costs for a variety of activities that directly and indirectly supported the pit manufacturing project. These support activities, which included scientific experiments as well as facility operations and maintenance, totaled over \$1 billion. In addition, we found that NNSA did not establish a clear, consistent schedule of the number of war reserve pits it planned to produce. Specifically, although NNSA produced eight W88 war reserve pits in 2007—exceeding the goal established in 2002 of one W88 war reserve pit in 2007—other NNSA documents (including budget requests to the Congress) called for a goal of delivering 10 W88 war reserve pits per year starting in 2007.

¹⁰GAO, *Nuclear Weapons: NNSA Needs to Establish a Cost and Schedule Baseline for Manufacturing a Critical Nuclear Weapon Component*, [GAO-08-593](#) (Washington, D.C.: May 23, 2008).

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- In June 2008, we reported that EM had made limited progress in its cleanup efforts at the Hanford Site, specifically in transferring waste from its 149 single-shell tanks to its larger and more robust double-shell tanks.¹¹ We also reported that DOE's cost estimate for retrieving tank waste was significantly understated and that DOE's 2003 estimate of \$4.3 billion increased to \$7.6 billion. Under the current Tri-Party Agreement—an agreement between DOE, the state of Washington, and the Environmental Protection Agency laying out milestones for the cleanup efforts at Hanford—DOE agreed to empty all 149 single-shell tanks at the site by September 2018 and close them by 2024. To date, only seven tanks have been emptied, and at its present rate of progress—currently only one tank is emptied per year—DOE will not achieve the milestones it committed to in the Tri-Party Agreement. DOE has since acknowledged that (1) the start of waste treatment operations will be delayed by at least 8 years (from 2011 to 2019) and (2) the completion of waste treatment operations may be delayed by at least 29 years (from 2018 to 2047).
 - In July 2008, we reported that EM's cost estimate for processing 23 metric tons of highly enriched uranium and plutonium at a facility at the Savannah River Site known as H-Canyon did not include all associated costs.¹² Although EM estimated that it would cost approximately \$4.3 billion to \$4.6 billion to process these materials through 2019, this estimate did not include several costs EM expects will be associated with canyon operations. According to EM and NNSA officials, more highly enriched uranium and plutonium may be identified as suitable for processing using H-Canyon, which could delay its shutdown and increase its operational costs. In addition, the estimate did not include the cost of storing and treating the waste generated by H-Canyon operations through 2019—approximately \$253 million, according to EM. We also reported that completion of some safety and environmental analyses have been delayed by as much as 2 years, and any further delays could affect canyon operations.

¹¹GAO, *Nuclear Waste: DOE Lacks Critical Information Needed to Assess Its Tank Management Strategy at Hanford*, [GAO-08-793](#) (Washington, D.C.: June 30, 2008).

¹²GAO, *Nuclear Material: DOE Needs to Take Action to Reduce Risks Before Processing Additional Nuclear Material at the Savannah River Site's H-Canyon*, [GAO-08-840](#) (Washington, D.C.: July 25, 2008).

Preliminary Results From Ongoing GAO Work on NNSA's Mixed Oxide Fuel Fabrication Facility Indicate Continuing Project Management Concerns

We are currently reviewing the cost and schedule performance and the status of licensing the MFFF construction project at the Savannah River Site, a nearly \$5 billion facility that is designed to convert 34 metric tons of surplus weapons-grade plutonium into fuel for use in commercial nuclear reactors.¹³ In accordance with DOE's project management requirements, NNSA is using an earned value management system to measure and report the progress of the MFFF construction project. One critical component of an effective earned value management system is the development of a reliable schedule. For example, a schedule should specify when the project's set of work activities will occur, how long they will take, and how they relate to one another. The schedule not only provides a roadmap for the systematic execution of a program but also provides the means by which to gauge progress, identify and address potential problems, and promote accountability.

GAO has identified nine practices associated with effective schedule estimating: (1) capturing key activities, (2) sequencing key activities, (3) establishing the duration of key activities, (4) assigning resources to key activities, (5) integrating key activities horizontally and vertically, (6) establishing the critical path for key activities, (7) identifying "float time" between key activities, (8) performing a schedule risk analysis, and (9) distributing reserves to high-risk activities.¹⁴ Most of these practices are also identified by DOE in a recent guidance document on establishing performance baselines.¹⁵

Although the MFFF project's schedule was developed using many of these practices, the schedule, in addition to other problems, does not employ a key practice that is fundamental to having a sufficiently reliable schedule—specifically, MFFF project staff have not conducted a risk analysis on their current schedule using statistical techniques. Consequently, NNSA cannot adequately state its level of confidence in meeting the MFFF project's completion date of October 2016, and NNSA's schedule for the project therefore may not be reliable. In addition, we

¹³Our March 2007 review of DOE's major construction projects found that the MFFF had incurred more than a \$3.2 billion cost increase over the initial cost estimate and a schedule delay in excess of 11 years more than initially estimated.

¹⁴GAO, *Cost Assessment Guide: Best Practices for Estimating and Managing Program Costs – Exposure Draft*, GAO-07-1134 SP (Washington, D.C.: July 2, 2007).

¹⁵U.S. Department of Energy, *Performance Baseline Guide*, G 413.3-5 (Washington, D.C.: September 12, 2008).

found that the schedule does not fully employ other key practices that are also fundamental to having a sufficiently reliable schedule. For example, another key scheduling practice—the proper sequencing of key activities—requires that project officials logically schedule key activities in the order that they are to be carried out to establish a basis for guiding work and measuring progress. However, based on the preliminary results of our analysis, the MFFF project only partially satisfied this practice. Specifically, we found that almost 1,500 of the over 24,000 activities listed in the MFFF project’s schedule were not sequenced in a logical manner. As a result, we have reduced confidence in the ability of the MFFF project’s schedule to accurately reflect how the MFFF project will be executed (see app. II for the preliminary results of our analysis of the MFFF project’s schedule).

As recently as December 2008, the MFFF project’s earned value management system indicated that the project was meeting its cost and schedule goals. However, correcting weaknesses in the MFFF project’s schedule is important because the project is currently spending approximately \$25 million a month and plans to spend an additional \$3.6 billion before the project is completed in 2016. In our view, correction of these schedule reliability concerns now could avert potentially expensive schedule overruns in the future and will enable NNSA to more effectively measure the performance status of the MFFF project. NNSA and contractor officials told us that they recognize some of the problems we identified with the MFFF project’s schedule and are planning to make improvements. Specifically, project officials told us that they plan to conduct a schedule risk analysis during the summer of 2009. Our work on this project is continuing, and we intend to work with NNSA to resolve these issues to the extent possible. In the meantime, we would urge caution in using the results from the MFFF project’s earned value management reports until these issues have been addressed.

In addition to our work on the MFFF project, we are also currently conducting work on DOE cost estimating for this Subcommittee. Specifically, we are examining cost estimating practices within NNSA, EM, and DOE’s Office of Science by selecting a sample of large projects and comparing their cost estimates with DOE policy and GAO-identified best practices. We also plan to identify any impediments that DOE may face in developing reliable, credible, and comprehensive cost assessments. Finally, we are evaluating the cleanup strategy DOE is using to address the 56 million gallons of radioactive and hazardous waste at the Hanford Site in Washington State. Specifically, we will be evaluating the legal, technical,

and risk issues affecting this multi-billion, decades-long project. We plan to update the Subcommittee on the status of our work later this spring.

Action Underway and Needed to Reduce Project Vulnerability to Fraud, Waste, Abuse, and Mismanagement

In the nearly 3 years since we last testified before this Subcommittee, the reports we have issued on projects across NNSA and EM have contained nearly 60 recommendations. These recommendations collectively call for DOE to ensure that project management requirements are consistently followed, to improve oversight of contractors, and to strengthen accountability for performance. Although DOE's responses to these recommendations have been largely positive, and some corrective actions have been taken, most of the recommendations are still open, awaiting action by the department.

DOE has also taken steps to better understand weaknesses underlying its contract and project management.¹⁶ First, with input from headquarters and field officials with contract and project management expertise, it completed a root-cause analysis. In this analysis, DOE found a number of problems, including:

- Risks associated with projects are not objectively identified, assessed, communicated, or managed through all phases of planning and execution.
- Ineffective project oversight has resulted in failure to identify project performance issues in a timely manner.
- DOE is not effectively executing its ownership role on some large projects with respect to overseeing and managing contracts and contractors.

On the basis of its root-cause analysis, DOE also completed a comprehensive corrective action plan to address these weaknesses, with both near-term and long-term goals and objectives.

Because of these actions, and other improvements made over the past decade to establish a more structured and disciplined approach to contract and project management, we believe that DOE as a whole has substantially met three of the five criteria necessary for removal from our high-risk list. Specifically, DOE has (1) demonstrated strong commitment

¹⁶Department of Energy, *Root Cause Analysis: Contract and Project Management* (Washington, D.C., April 2008).

and leadership; (2) demonstrated progress in implementing corrective measures; and (3) developed a corrective action plan that identifies root causes, effective solutions, and a near-term plan for implementing the solutions.

Two criteria remain for removal from our high-risk list: having the capacity (people and resources) to resolve the problems and monitoring and independently validating the effectiveness and sustainability of corrective measures. Regarding capacity, DOE's April 2008 root-cause analysis report recognized as one of its top 10 issues a lack of an adequate number of federal contracting and project personnel with the appropriate skills (such as cost estimating, risk management, and technical expertise) to plan, direct, and oversee project execution.

Monitoring and validating the effectiveness and sustainability of corrective measures will take time to demonstrate. Our recent work has shown that the Office of Science—DOE's third-largest program office—has demonstrated strong performance in meeting cost and schedule targets.¹⁷ Specifically, we found that, of 42 Office of Science projects completed or under way from fiscal years 2003 through 2007, more than two-thirds were completed or being carried out within original cost and schedule targets. The office's ability to generally achieve projects' original cost and schedule targets is due in part to factors often considered fundamental to effective project management: leadership commitment to meeting cost and schedule targets; appropriate management and technical expertise; and disciplined, rigorous implementation of project management policies. The Office of Science's frequent independent reviews, in particular, were cited by DOE officials as a key reason for its project management performance. Until NNSA and EM can demonstrate these principles and consistently complete projects on time and within budget, it will be difficult to demonstrate that any of the corrective actions taken have achieved their desired effect—improved cost and schedule performance. Until that time, both NNSA and EM will remain vulnerable to fraud, waste, abuse, and mismanagement and therefore will remain on our high-risk list.

¹⁷GAO, *Department of Energy: Office of Science Has Kept Majority of Projects within Budget and on Schedule, but Funding and Other Challenges May Grow*, [GAO-08-641](#) (Washington, D.C.: May 30, 2008).

Agency Comments and Our Evaluation

We provided a draft of our preliminary findings with respect to the MFFF project's schedule to NNSA for its review and comment. Overall, NNSA and project officials agreed with many of our specific findings, including the fact that project officials have not conducted a risk analysis of the current project schedule using statistical techniques. However, NNSA officials did not agree with our conclusion that, as a result of some of the shortcomings we identified, the project's schedule may not be reliable. In addition, project officials told us that they planned to conduct a schedule risk analysis on the current schedule during the summer of 2009.

Mr. Chairman, this concludes my prepared statement. I would be happy to respond to any questions that you or Members of the Subcommittee may have at this time.

GAO Contacts and Staff Acknowledgments

For further information on this testimony, please contact me at (202) 512-3841 or aloisee@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. Ryan T. Coles, Daniel Feehan, and Janet Frisch, Assistant Directors; Alison Bawden; Carole Blackwell; James Espinoza; Stephanie Gaines; Eugene Gray; Jason Holliday; Chris Pacheco; Tom Perry; Leslie Pollock; Steve Rossman; Peter Ruedel; and Carol Herrnstadt Shulman made key contributions to this testimony.

Appendix I: Related GAO Products

High Risk Series: An Update. [GAO-09-271](#). Washington, D.C.: January 22, 2009.

Nuclear Waste: Action Needed to Improve Accountability and Management of DOE's Major Cleanup Projects. [GAO-08-1081](#). Washington, D.C.: September 26, 2008.

Nuclear Material: DOE Needs to Take Action to Reduce Risks Before Processing Additional Nuclear Material at the Savannah River Site's H-Canyon. [GAO-08-840](#). Washington, D.C.: July 25, 2008.

Nuclear Waste: DOE Lacks Critical Information Needed to Assess Its Tank Management Strategy at Hanford. [GAO-08-793](#). Washington, D.C.: June 30, 2008.

Department of Energy: Office of Science Has Kept Majority of Projects within Budget and on Schedule, but Funding and Other Challenges May Grow. [GAO-08-641](#). Washington, D.C.: May 30, 2008.

Nuclear Weapons: NNSA Needs to Establish a Cost and Schedule Baseline for Manufacturing a Critical Nuclear Weapons Component. [GAO-08-593](#). Washington, D.C.: May 23, 2008.

Hanford Waste Treatment Plant: Department of Energy Needs to Strengthen Controls over Contractor Payments and Project Assets. [GAO-07-888](#). Washington, D.C.: July 20, 2007.

Nuclear Waste: DOE Should Reassess Whether the Bulk Vitrification Demonstration Project at Its Hanford Site Is Still Needed to Treat Radioactive Waste. [GAO-07-762](#). Washington, D.C.: June 12, 2007.

Nuclear Waste: Plans for Addressing Most Buried Transuranic Wastes Are Not Final, and Preliminary Cost Estimates Will Likely Increase. [GAO-07-761](#). Washington, D.C.: June 22, 2007.

Department of Energy: Consistent Application of Requirements Needed to Improve Project Management. [GAO-07-518](#). Washington, D.C.: May 11, 2007.

Department of Energy: Major Construction Projects Need a Consistent Approach for Assessing Technology Readiness to Help Avoid Cost Increases and Delays. [GAO-07-336](#). Washington, D.C.: March 27, 2007.

National Nuclear Security Administration: Additional Actions Needed to Improve Management of the Nation's Nuclear Programs. [GAO-07-36](#). Washington, D.C.: January 19, 2007.

Appendix II: GAO’s Preliminary Analysis of the Mixed Oxide Fuel Fabrication Facility Project’s Schedule

Table 1: Extent to Which the MFFF Project’s Schedule Used Key Practices

Practice	Explanation	Satisfied?	GAO analysis
Capturing key activities	The schedule should reflect all key activities as defined in the program’s work breakdown structure, including activities to be performed by both the government and its contractors.	Yes	The project’s schedule reflects both government and contractor activities, such as the building and testing of software components, as well as key milestones for measuring progress.
Sequencing key activities	The schedule should be planned so that it can meet critical program dates. To meet this objective, key activities need to be logically sequenced in the order that they are to be carried out. In particular, activities that must finish prior to the start of other activities (predecessor activities), as well as activities that cannot begin until other activities are completed (successor activities), should be identified. This helps ensure that interdependencies among activities that collectively lead to the accomplishment of events or milestones can be established and used as a basis for guiding work and measuring progress.	Partially	Of 24,289 total activities, 1,474 are not logically sequenced—that is, the schedule does not identify interdependencies among work activities that form the basis for guiding work and measuring progress.
Establishing the duration of key activities	The schedule should realistically reflect how long each activity will take to execute. In determining the duration of each activity, the same rationale, historical data, and assumptions used for cost estimating should be used. Durations should be as short as possible and have specific start and end dates. The schedule should be continually monitored to determine when forecasted completion dates differ from the planned dates; this information can be used to determine whether schedule variances will affect downstream work.	Partially	1,064 of the 24,289 total activities have durations of over 200 days. Durations should be as short as possible and have specific start and end dates to ensure the objective measurement of progress.
Assigning resources to key activities	The schedule should reflect what resources (e.g., labor, material, and overhead) are needed to do the work, whether all required resources will be available when needed, and whether any funding or time constraints exist.	Yes	The schedule reflects \$3.2 billion in resource costs.
Integrating key activities horizontally and vertically	The schedule should be horizontally integrated, meaning that it should link the products and outcomes associated with other sequenced activities. These links are commonly referred to as “handoffs” and serve to verify that activities are arranged in the right order to achieve aggregated products or outcomes. The schedule should also be vertically integrated, meaning that traceability exists among varying levels of activities and supporting tasks and subtasks. Such mapping or alignment among levels enables different groups to work to the same master schedule.	Yes	The program has provided evidence that the schedule is sufficiently integrated.
Establishing the critical path for key activities	Using scheduling software, the critical path—the longest duration path through the sequenced list of key activities—should be identified. The establishment of a program’s critical path is necessary for examining the effects of any activity slipping along this path. Potential problems that might occur along or near the critical path should also be identified and reflected in the scheduling of the time for high-risk activities.	Partially	A critical path has been established but the program first needs to satisfy the other scheduling best practices listed above before the critical path can be considered reliable.

Practice	Explanation	Satisfied?	GAO analysis
Identifying the “float time” between key activities	The schedule should identify float time—the time that a predecessor activity can slip before the delay affects successor activities—so that schedule flexibility can be determined. As a general rule, activities along the critical path typically have the least amount of float time. Total float time is the amount of time flexibility an activity has that will not delay the project’s completion (if everything else goes according to plan).	Partially	The schedule contains 885 activities with extremely low float values (1 day or less).
Performing a schedule risk analysis	A schedule risk analysis should be performed using statistical techniques to predict the level of confidence in meeting a program’s completion date. This analysis focuses not only on critical path activities but also on activities near the critical path, since they can affect program status.	No	The MFFF project has not performed a schedule risk analysis using statistical techniques. Project officials told us that they plan to address this issue during the summer of 2009.
Distributing reserves to high-risk activities	The baseline schedule should include a buffer or a reserve of extra time. Schedule reserve for contingencies should be calculated using a schedule risk analysis. As a general rule, the reserve should be applied to high-risk activities, which are typically found along the critical path.	Partially	Although project officials have not identified appropriate schedule reserves based on a schedule risk analysis, they have identified contingency funding using a programmatic risk program to identify high-risk activities.

Source: GAO analysis of the MFFF project schedule, February 2009.

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