



U.S. Department of Energy  
Office of Inspector General  
Office of Audit Services

# Audit Report

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The Procurement of Safety  
Class/Safety-Significant Items at the  
Savannah River Site



**Department of Energy**  
Washington, DC 20585

April 23, 2009

MEMORANDUM FOR THE SECRETARY

FROM:   
Gregory H. Friedman  
Inspector General

SUBJECT: INFORMATION: Audit Report on "Procurement of Safety-Class/Safety-Significant Items at the Savannah River Site"

BACKGROUND

The Department of Energy operates several nuclear facilities at its Savannah River Site, and several additional facilities are under construction. This includes the National Nuclear Security Administration's Tritium Extraction Facility (TEF) which is designated to help maintain the reliability of the U.S. nuclear stockpile. The Mixed Oxide Fuel Fabrication Facility (MOX Facility) is being constructed to manufacture commercial nuclear reactor fuel assemblies from weapon-grade plutonium oxide and depleted uranium. The Interim Salt Processing (ISP) project, managed by the Office of Environmental Management, will treat radioactive waste.

The Department has committed to procuring products and services for nuclear-related activities that meet or exceed recognized quality assurance standards. Such standards help to ensure the safety and performance of these facilities. To that end, it issued Departmental Order 414.1C, *Quality Assurance* (QA Order). The QA Order requires the application of *Quality Assurance Requirements for Nuclear Facility Applications* (NQA-1) for nuclear-related activities. The NQA-1 standard provides requirements and guidelines for the establishment and execution of quality assurance programs during the siting, design, construction, operation, and decommissioning of nuclear facilities. These requirements, promulgated by the American Society of Mechanical Engineers, must be applied to "safety-class" and "safety-significant" structures, systems and components (SSCs). Safety-class SSCs are defined as those necessary to prevent exposure off site and to protect the public. Safety-significant SSCs are those whose failure could irreversibly impact worker safety such as a fatality, serious injury, or significant radiological or chemical exposure. Due to the importance of protecting the public, workers, and environment, we initiated an audit to determine whether the Department of Energy procured safety-class and safety-significant SSCs that met NQA-1 standards at the Savannah River Site.

RESULTS OF AUDIT

Our review disclosed that the Department had procured and installed safety-class and safety-significant SSCs that did not meet NQA-1 quality standards. Specifically, we identified multiple instances in which critical components did not meet required quality and safety standards. For example:



- Three structural components were procured and installed by the prime contractor at Savannah River during construction of the MOX Facility that did not meet the technical specifications for items relied on for safety. These substandard items necessitated costly and time consuming remedial action to, among other things, ensure that nonconforming materials and equipment would function within safety margins;
- In six instances, items used in the construction of TEF failed to satisfy quality standards. In one of these situations, operating procedures had to be modified to ensure that the problem item did not compromise safety; and,
- Finally, at the ISP, one component that did not meet quality standards was procured. The failure of the item could have resulted in a spill of up to 15,000 gallons of high-level radioactive waste.

Based on an extensive examination of relevant internal controls and procurement practices, we concluded that these failures were attributable to inadequate attention to quality assurance at Savannah River. Simply put, Departmental controls were not adequate to prevent and/or detect quality assurance problems. For example, Federal and prime contractor officials did not expressly require that subcontractors or lower-tiered vendors comply with quality assurance requirements. Additionally, management did not effectively communicate quality assurance concerns between the several Departmental program elements operating at Savannah River.

The procurement and installation of these nonconforming components resulted in cost increases. For example, as of October 2008, the MOX Facility had incurred costs of more than \$680,000 due to problems associated with the procurement of \$11 million of nonconforming safety-class reinforcing steel. In general, the internal control weaknesses we discovered could have permitted, without detection, the procurement and installation of safety critical components that did not meet quality assurance standards. In a worst case scenario, undetected, nonconforming components could fail and injure workers or the public.

In certain instances, the Department took steps to ensure that the prime contractors at Savannah River began action to remediate nonconforming components and to strengthen policies and procedures. Additionally, the Department took actions to ensure that critical components necessary for projects worked as designed by requiring that the prime contractor place personnel at manufacturers' locations. Further, the Department had suspended work with certain other manufacturers due to quality assurance problems. Although these are positive steps, weaknesses in oversight and communication remain; therefore, additional action is necessary. For that reason, we made several recommendations designed to strengthen quality assurance at Savannah River.

Finally, the matters discussed in this report provide valuable lessons learned as the Department implements the American Recovery and Reinvestment Act. Specifically, the Department will use massive amounts of Recovery Act stimulus funds to initiate new and to accelerate ongoing projects throughout its complex. All of this is to be done as expeditiously as possible to promote the stimulative impact of these expenditures. In such an environment, the Department must maintain a focus on quality assurance issues, such as those discussed in this report, to ensure the safety of its workforce and the public.

## MANAGEMENT REACTION

The Department's Office of Environmental Management (EM) supported the conclusions and the recommendations reached and told us that it had identified similar quality weaknesses at Savannah River. EM noted that it is taking steps to ameliorate the weaknesses identified in a manner consistent with the recommendations provided in our report. EM concluded that its efforts are expected to improve the procurement process for safety-class and safety-significant structures, systems, or components.

The National Nuclear Security Administration (NNSA) agreed with the recommendations presented in the report; however, it did not agree with stated conclusions concerning the safety of the facilities, related cost impacts, nor did it agree with the tone of the report. NNSA further asserted that our audit did not take into consideration the fact that when the U.S. Nuclear Regulatory Commission (NRC) reviewed the MOX Facility it opined that the quality assurance problems were of low significance.

We acknowledge that the Notice of Violation issued by the NRC for the MOX quality assurance problems was assigned NRC's lowest level of severity; however, we do not agree that the problems were of low significance. The NRC's findings were based on failures to meet regulatory and/or quality assurance criterion, and as such, are not inconsistent with our findings. Unless and until the Department resolves the internal control weaknesses that permitted the failures NRC identified at MOX, it is possible that non-conforming parts or components that do not meet safety standards could continue to be procured and installed in critical nuclear facilities.

Management's comments are generally responsive to our recommendations and are attached as Appendix 3. We summarized management comments and our responses and have included them in the body of the report.

### Attachment

cc: Office of the Deputy Secretary  
Office of the Under Secretary of Energy  
Acting Assistant Secretary, Office of Environmental Management  
Administrator, National Nuclear Security Administration  
Chief of Staff  
Manager, Savannah River Operations Office  
Manager, Savannah River Site Office

# **REPORT ON PROCUREMENT OF SAFETY-CLASS/SAFETY-SIGNIFICANT ITEMS AT THE SAVANNAH RIVER SITE**

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## PROCUREMENT OF SAFETY-CLASS/SAFETY-SIGNIFICANT ITEMS

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### Quality Requirements

The Department of Energy (Department) is required by 10 CFR Part 830 and 10 CFR Part 50 to implement quality assurance standards for building and operating its nuclear facilities. The Department implements the quality assurance standards through its prime contractors. Prime contractors are required to develop and implement a quality assurance plan necessary to provide assurance that all structures, systems and components (SSCs) will perform as designed. The Department's prime contractors at the Savannah River Site (Savannah River) are required to adhere to American Society of Mechanical Engineers *Quality Assurance Requirements for Nuclear Facility Applications* (NQA-1) standards for their quality assurance programs. NQA-1 sets forth requirements and guidance for the establishment and execution of quality assurance programs.

Relevant NQA-1 standards include requirements that prime contractors:

- Evaluate subcontractors' capabilities to provide a SSC in accordance with specified requirements prior to contract award;
- Perform periodic audits and inspections of subcontractors to ensure continued compliance with procurement requirements;
- Ensure that quality assurance requirements are "flowed down" in procurement documents. Additionally, contracts shall provide for access to subcontractor facilities for audits and inspections;
- Verify that the item procured conforms with procurement requirements prior to receiving and installing a SSC. This may be done through receiving inspections, source verifications, certificates of conformance, post installation tests or a combination of these methods;
- Employ special processes that control or verify quality, such as those used in welding, heat treating, and nondestructive examination. These processes must be performed by qualified personnel using qualified procedures in accordance with specified requirements; and,

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- Ensure that items that do not conform to specified requirements are not inadvertently installed and used.

As noted in the above requirements, it is important that NQA-1 requirements be followed to help ensure that SSCs meet safety and performance expectations. Therefore, when the prime contractor relies on subcontractors and lower-tiered vendors to supply safety-class or safety-significant SSCs, it is the prime contractor's responsibility to ensure that the appropriate NQA-1 requirements are clearly "flowed down" to all lower-tiered vendors.

### **Safety-Class/Safety-Significant Procurements**

Our audit disclosed that, in a number of instances, the Department's prime contractors at Savannah River procured and installed safety-class and safety-significant SSCs at major nuclear facilities that did not meet NQA-1 standards. We reviewed ten procurements for three nuclear facilities at Savannah River where NQA-1 standards were required. In each of the ten procurements, we noted that NQA-1 requirements were either not met or could not be substantiated.

#### Mixed Oxide Fuel Fabrication Facility

Of the three procurements of safety-class SSCs for the Mixed Oxide Fuel Fabrication Facility (MOX Facility) at Savannah River that we evaluated, none met NQA-1 standards. Construction of the MOX Facility, a \$4.8 billion project managed by the Department's National Nuclear Security Administration (NNSA), began in 2007. When complete, the MOX Facility will convert surplus weapon-grade plutonium into pellets for commercial reactor fuel assemblies. The project's prime contractor, Shaw/AREVA MOX Services, LLC (Shaw/AREVA) ordered more than \$11 million of rebar<sup>1</sup> as well as \$3.5 million in piping and embed plates<sup>2</sup>, from subcontractors. While these subcontractors were on Shaw/AREVA's Approved Suppliers List, the Nuclear Regulatory Commission (NRC), in an inspection report dated May 20, 2008, discovered that

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<sup>1</sup> Reinforcing steel bar (rebar) is used to reinforce concrete. Reinforced concrete is composite material. The concrete provides the material's compressive strength, while the steel - in the form of embedded reinforcing bars - provides tensile strength.

<sup>2</sup> Embed plates are steel plates set into the concrete during construction and are used to attach process equipment and structural components to concrete.

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the subcontractors had subsequently procured and delivered nonconforming SSCs from lower-tier vendors.

Specifically:

- Shaw/AREVA's subcontractor commercially procured 9,500 tons of rebar from a non-qualified NQA-1 vendor. The subcontractor in this case procured the rebar from a lower-tier vendor and had it shipped directly to the MOX Facility, failing to perform adequate inspections to verify conformance to specifications during fabrication. Although there had been previous reports of nonconformance with NQA-1 quality assurance requirements by the supplier for over one year, it was not until February 2008 that it was discovered that the rebar did not meet the code specification for nuclear structures. During installation, rebar was identified that did not conform to a nuclear specification for a bend in the material that was relied on for safety. The nonconforming rebar was identified after a piece broke when struck by a sledgehammer. Subsequently, Shaw/AREVA determined the design of the MOX facility was sufficiently robust to tolerate the 14 tons of nonconforming rebar already embedded in concrete. Approximately 135 tons were cut to remove the nonconforming nuclear bend and were used as straight rebar, or in areas without structural concerns; however, 935 tons of nonconforming rebar were returned to the manufacturer.
- The prime contractor for the MOX Facility, through a subcontractor, also procured commercial piping material used in applications relied on for safety from a non-qualified NQA-1 supplier. In this instance, Shaw/AREVA's subcontractor did not perform the necessary quality assurance reviews to provide reasonable assurance that the piping procured from a lower-tier vendor was suitable for use in nuclear applications.
- In yet another example, a Shaw/AREVA subcontractor commercially procured steel plate material that did not meet NQA-1 standards. As in the preceding example, the subcontractor did not



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perform an adequate review to provide reasonable assurance that the commercial plate material was suitable for use in a nuclear facility.

While Shaw/AREVA had conducted audits and surveillances of quality assurance at its subcontractors, it did not ensure that appropriate NQA-1 requirements were flowed down to lower-tier vendors. We noted that in each of the instances above, Shaw/AREVA had inadequate procurement and quality assurance procedures to ensure that NQA-1 requirements were passed down to all subcontractors and lower-tier vendors and that SSCs were suitable for use in nuclear facilities. It should be noted that on November 12, 2008, the NRC concluded that, overall, the construction of this facility was being performed safely and identified no specific areas needing improvement in the area of quality assurance.

#### Tritium Extraction Facility

None of the six procurements of safety-significant SSCs we reviewed for the Tritium Extraction Facility (TEF) met quality assurance standards. The TEF, located at Savannah River and managed by Washington Savannah River Company (WSRC) for NNSA, is a \$500 million one-of-a-kind facility operated to replenish the nation's stockpile of tritium. TEF handles highly radioactive substances, such as tritium, a radioactive form of hydrogen necessary for nuclear weapons. The TEF provides the capability to receive and extract gases containing tritium from irradiated rods. However, even though NQA-1 standards were clearly flowed down to its subcontractors, WSRC procured and installed safety-significant SSCs which did not meet NQA-1 requirements in the facility. For example:

- WSRC procured safety-significant gloveboxes from a subcontractor for more than \$12 million. The gloveboxes were designed to be airtight and contain inert argon gas and equipment for processing tritium. Even though the subcontractor was audited and qualified by WSRC as an NQA-1 supplier, it failed to flow down NQA-1 requirements to all of its lower-tier vendors. Specifically, some of these vendors maintained only commercial quality programs while others were merely retail catalog vendors and did not have a quality program at all. Thus, the glovebox components were not procured

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under an NQA-1 program, a practice that increased the risk that items may not function as intended and, therefore, may not adequately protect workers from exposure to radioactive gas. The Department reported that in spite of the quality assurance problems, the gloveboxes in question were ultimately certified for operations during pre-start-up using standard engineering procedures.

- The prime contractor ordered furnace module doors, valued at approximately \$690,000, from a subcontractor. These module doors were intended to provide a leak-tight seal for the Target Rod Preparation Furnace Modules and were part of the secondary confinement for the furnace modules used to extract tritium in a gaseous state. Even though the subcontractor was qualified by WSRC, certain SSCs supplied and used to manufacture the module doors did not meet NQA-1 standards. For example, NQA-1 requires that activities affecting quality must be prescribed by and performed in accordance with documented instructions, procedures, or drawings. However, the subcontractor failed to comply with documented instructions and, therefore, did not properly drill holes for the bolts that secured the module doors to the furnace modules. Management stated that subsequently, WSRC spent \$100,000 to perform retroactive quality assurance procedures that permitted it to certify this equipment under NQA-1.
- Additionally, WSRC procured approximately \$140,000 worth of studs and nuts to secure the module doors to the furnace modules. WSRC flowed down NQA-1 requirements to its subcontractor; however, the subcontractor did not flow down these requirements to its lower-tier vendors.
- WSRC also purchased a safety-significant robotic system for nearly \$1.5 million. The robotic system is to be used in remote operations to eliminate human contact with radiological and chemical hazards. Again, while WSRC required the subcontractor to comply with NQA-1 requirements,

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the subcontractor did not flow down these requirements to its lower-tier vendors. Consequently, the lower-tier vendor procured the components commercially.

We noted that in each of the instances above, WSRC procedures were inadequate in that they did not pass down appropriate quality assurance requirements to all subcontractors and lower-tier vendors to ensure that the SSCs were suitable for use in the facility. Additionally, WSRC had inadequate procedures to ensure that a subcontractor was qualified as a NQA-1 supplier prior to award. Specifically, WSRC procurement procedures do not require subcontractors to be audited and qualified to NQA-1 standards prior to contract award. WSRC procedures specify only that the supplier's quality assurance manual be reviewed during the bid evaluation for a particular component. In our review of safety-significant electronic SSCs for the gloveboxes in TEF, the subcontractor submitted its quality assurance manual; however, it was not reviewed by WSRC until four months after the contract award. Additionally, we found the subcontractor's quality assurance manual was inadequate because it did not incorporate the necessary methodology required by NQA-1 to meet safety and quality standards.

#### Interim Salt Processing Project

At the Interim Salt Processing (ISP) project our audit identified the procurement of one safety-class SSC that did not meet NQA-1 requirements. The ISP project was managed by the Office of Environmental Management (EM) and was designed to remove radionuclides and cesium from radioactive tank waste and facilitate its ultimate vitrification by the Defense Waste Processing Facility. WSRC procured stainless steel round bars that were machined into caps, designated as safety-class components, and used to support the transfer of radioactive salt waste. As with previous examples, the subcontractor had not "flowed down" NQA-1 requirements to lower-tier vendors and, therefore, the steel caps were not fabricated under a NQA-1 program. This subcontractor was the same one used by Shaw/AREVA to supply nonconforming SSCs to the MOX Facility.

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## Oversight of Quality Assurance Programs

The Department did not provide adequate oversight of the prime contractors' quality assurance programs at Savannah River. Particularly, the Department did not adequately establish and implement processes to detect and/or prevent quality problems. Additionally, the Department did not effectively communicate quality assurance issues between the programs operating or constructing major facilities at Savannah River.

### Detection/Prevention of Quality Problems

The Department did not establish adequate processes to detect and/or prevent quality problems from occurring at Savannah River. As previously noted, while the contractor had responsibility to implement quality assurance requirements, the Department must still provide the necessary oversight to ensure that the requirements are being followed. The Department, however, did not have a rigorous enough process in place to prevent and/or detect problems related to the flow down of NQA-1 requirements in purchase orders to subcontractors and lower-tier vendors. For example, the Department failed to detect quality assurance issues with the procurement of safety-class rebar at the MOX Facility until a piece of rebar broke during installation. Only then was oversight increased and management discovered that 9,500 tons of rebar was procured under a non-NQA-1 program. Even though the Department had procedures in place to detect and prevent quality problems, the Department and its contractors told us that they lacked adequate quality assurance resources to meet the required responsibilities.

In another example, the Department failed to detect and prevent quality problems at TEF where, as early as October 2003, the Department's Office of Enforcement noted quality assurance concerns and levied enforcement actions with the same subcontractor that provided the nonconforming furnace module doors at TEF. However, for both the TEF and ISP projects, which began hot operations in Fiscal Years 2007 and 2008 respectively, the Department continued to use the subcontractor for SSCs that were required to meet NQA-1 standards, but had not performed an adequate review of the subcontractor's quality assurance program. In fact, these quality problems were not identified at Savannah River until a whistleblower reported quality assurance concerns to the Department.

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### Communication Between Projects

The Department did not effectively communicate quality assurance issues between the various projects at Savannah River. Savannah River is considered a multi-programmatic site in that it includes EM and NNSA activities. Each of these programs maintains its own respective quality assurance oversight functions. However, quality assurance issues and concerns within these organizations were not communicated between the projects at the site. Specifically, the subcontractor that provided the nonconforming rebar for NNSA's MOX Facility also supplied nonconforming safety-class caps to EM's ISP project. When NNSA identified concerns with the rebar being provided to the MOX Facility, it failed to effectively communicate quality assurance problems with this subcontractor to EM officials at Savannah River Operations Office. In fact, the EM officials at Savannah River Operations Office were unaware of the quality issues with this subcontractor until we brought them to their attention. NNSA officials explained that they had included quality assurance problems with the rebar in the Department's Occurrence and Processing System and NNSA's Lessons Learned system. Our review, however, disclosed that the reports in these systems did not provide enough specificity, including the identification of the subcontractor, to be useful to other Departmental entities.

Likewise, EM officials at the Savannah River Operations Office did not communicate quality assurance problems discovered at TEF to NNSA officials at the MOX Facility. The MOX Facility was in the process of procuring SSCs when it became aware, as a result of a complaint made from outside the Department, that the subcontractor had quality assurance deficiencies. After learning of the quality assurance deficiencies, Shaw/AREVA awarded the work to another subcontractor.

According to officials, EM plans to develop a formal process to notify other Department offices about nuclear suppliers that do not meet quality assurance requirements. Effective implementation of such a process should significantly improve communication issues identified in this report, especially, if implemented on a Department-wide basis.

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### Recent Actions Encouraging

To the Department's credit, it has taken steps to ensure that the contractors at Savannah River remediate nonconforming SSCs and strengthen policies and procedures. Specifically, at the MOX Facility, action has been taken to remediate nonconforming rebar. Because rebar had already been embedded in the concrete, subsequent alternative procedures were used and approved by the NRC to determine whether the rebar could be acceptable as safety-class material. Additionally, the Department had taken steps to ensure that critical components function as designed by requiring the contractor to increase quality controls and place personnel at the manufacturer's locations. For example, one full-time contractor employee has been at a subcontractor's facility since July 2008 providing oversight activities such as ensuring that engineering and quality requirements are adhered to and that the subcontractor flowed down quality assurance requirements to lower-tier vendors. Further, the Department has suspended work with other manufacturers due to quality assurance problems. While these actions are encouraging, it is imperative that the Department take action to improve oversight and communication throughout the various projects and strengthen quality assurance procedures to help prevent or detect additional problems.

### **Cost and Programmatic Impacts**

Procurement of SSCs that do not meet NQA-1 standards can result in risk to the public, employees and the environment as well as increasing costs and causing operational delays and impacts to projects. In fact, the Department has experienced cost increases associated with recent quality assurance failures. For example, as of October 2008, the MOX Facility has experienced costs of more the \$680,000 due to the procurement of \$11 million of nonconforming safety-class rebar. Further, SSCs that do not meet NQA-1 quality requirements can result in programmatic delays and impacts. For example, failure of critical SSCs on the TEF project could result in an unwanted release of radioactive gases. Similarly, the failure of critical SSCs at the ISP could delay important tank waste remediation.

### **RECOMMENDATIONS**

We recommend that the Administrator, NNSA, and Acting Assistant Secretary for EM strengthen quality assurance at Savannah River by:

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1. Establishing more rigorous policies and procedures to detect and/or prevent quality problems;
  2. Evaluating safety-class/safety-significant procurements to determine whether the items will function as intended; and,
  3. Developing procedures to coordinate and communicate quality assurance issues between projects and among Departmental and contractor elements.

**MANAGEMENT REACTIONS**

EM supported the report's conclusions and the recommendations. EM stated that it had identified similar quality assurance weaknesses at the Savannah River and was taking steps to correct the weaknesses. EM committed to address future quality assurance problems in a manner consistent with the recommendations provided in our report. EM concluded that its efforts were expected to improve the procurement process for safety-class and safety-significant structures, systems or components.

NNSA agreed with the recommendations presented in the report; however, it did not agree with stated conclusions concerning the safety of the facilities, related cost impacts, or with the tone of the report. NNSA further asserted that we had not taken into consideration the opinion of the U.S. Nuclear Regulatory Commission (NRC) or key documents. NNSA asserted that the NRC reviewed the same quality assurance issues at the MOX Facility and concluded that these issues were of low significance.

**AUDITOR COMMENTS**

We consider both the EM and NNSA management responses to be generally responsive to our recommendations. As NNSA management noted in its response to our draft report, the NRC ultimately determined that the specific quality assurance problems identified in our report had been corrected. Regarding the significance of quality assurance problems discussed in our report, the NRC issued the MOX Facility contractor a Notice of Violation after it concluded that the failure to meet requirements for a nonconforming material used in the MOX Facility constituted a Severity Level IV violation, the lowest of severity levels, of NRC requirements. NRC defines Severity Level IV as violations involving the failure to meet regulatory requirements, including one or more quality assurance criterion. We, therefore, concluded that the quality assurance problems at the MOX Facility were

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significant in that such weaknesses could, if not corrected, permit the undetected procurement and installation of components in critical nuclear facilities that do not meet quality assurance standards.

Comments provided by NNSA tend to indicate that it approaches the quality assurance issues at Savannah River from a practical point of view, i.e., that through remedial procedures it was able to resolve these particular procurement and installation problems. The fact that the materials were ultimately useable, however, does not detract from the fact that the problems were unlikely to have occurred if all quality assurance requirements had been satisfied. Such weaknesses could, if not corrected, permit the undetected procurement and installation of components that do not meet quality assurance standards.

We revised the report as appropriate to respond to management's technical comments.

Management's verbatim comments are included in Appendix 3 of the report.



## Appendix 1

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### OBJECTIVE

The objective of this audit was to determine whether the Department of Energy (Department) procured safety-class and safety-significant structures, systems, and components that met NQA-1 standards at the Savannah River Site (Savannah River).

### SCOPE

We conducted the audit from September 30, 2008, to April 8, 2009, at Savannah River in South Carolina. The scope of the audit covered procurements of safety-class/safety-significant structures, systems and components at Savannah River. Our review focused on the circumstances surrounding previously discovered suspect procurements. We also indentified several problems of which management was not aware.

### METHODOLOGY

To accomplish the audit objective, we:

- Obtained and reviewed quality assurance plans for Washington Savannah River Company, the Tritium Extraction Facility, and the Mixed Oxide Fuel Fabrication Facility;
- Obtained and reviewed procurement documentation at Savannah River based on a judgmental sample of high dollar value or high-risk safety-class and safety-significant structures, systems, and components that were procured;
- Researched Federal, Departmental, and contractors regulations, policies and procedures; and,
- Interviewed key personnel in the Office of Environmental Management, National Nuclear Security Administration, Savannah River Site Office, Savannah River Operations Office, Washington Savannah River Company, and Shaw/AREVA MOX Services, LLC.

We conducted this performance audit in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective. The audit included tests of internal controls and compliance with laws and regulations to the extent necessary to satisfy the audit objective. Because our review was limited, it would not necessarily have disclosed all internal control

deficiencies that may have existed at the time of our audit. Also, we considered the establishment of performance measures in accordance with the Government Performance and Results Act of 1993 as they related to the audit objective. We determined that no performance measures directly related to quality assurance. Finally, we did not rely on computer-processed data to accomplish our audit objective.

An exit conference was held with EM and NNSA on April 8, 2009.

### PRIOR REPORTS

- *Audit Report on Quality Assurance Standards for the Integrated Control Network at the Hanford Site's Waste Treatment Plant* (DOE/IG-0764, May 2007). The audit found that the Waste Treatment Plant control system acquired by the Department of Energy (Department) did not meet applicable quality assurance standards – specifically, those required for "an activity affecting the immobilization of radioactive high-level waste." As a result, the system does not meet the stringent procedures, plans, specifications, or work practices associated with nuclear quality standards. Under the circumstances, we concluded that the Department cannot be sure that the Waste Treatment Plant's current system is suitable for processing nuclear waste.
- *Audit Report on the Department of Energy's Tritium Extraction Facility* (DOE/IG-0560, June 2002). The audit found that the Department was in jeopardy of not completing the Tritium Extraction Facility within its baseline cost, schedule, and scope. Some of the underlying reasons for this were that construction began before the design was complete, risk assessments and cost estimates were not adequately updated, insufficient documentation existed to allow management to review cost estimates and strategies, contingency funds were not adequate, and senior management direction focused on total project costs rather than project requirements. Given these circumstances, the Tritium Extraction Facility project would be completed well over cost and approximately a year later than scheduled.



**Department of Energy**

Washington, DC 20585

February 18, 2009

MEMORANDUM FOR RICKEY R. HASS  
DEPUTY INSPECTOR GENERAL  
FOR AUDIT SERVICES  
OFFICE OF INSPECTOR GENERAL

FROM:

INÉS R. TRIAY *Inés Triay*  
ACTING ASSISTANT SECRETARY FOR  
ENVIRONMENTAL MANAGEMENT

SUBJECT:

Inspector General Report (Pre-Decisional Draft) "Procurement of Safety Class/Safety Significant Items at the Savannah River Site"

The Office of Environmental Management (EM) acknowledges the Office of the Inspector General (OIG) for the opportunity to review and comment on the Pre-Decisional Draft Audit Report, "*Procurement of Safety Class/Safety Significant Items at the Savannah River Site.*" EM through its own audit process has identified similar quality weaknesses at the Savannah River Site (SR) and is taking steps to ameliorate the weaknesses. Therefore, EM supports the conclusions and recommendations reached by the OIG.

EM has been proactive in identifying similar issues through quality oversight of EM construction and operational projects that have or are currently procuring safety-class, safety-significant structures, systems or components (SSCs). Any additional issues identified during these audits are being addressed in a manner consistent with the recommendations provided in your report. These efforts are expected to improve the procurement process for safety-class and safety-significant SSCs in addition to improving the oversight of our contractors.

Three recommendations were offered within the Draft Audit Report.

The actions below summarize some of the initial progress that EM and SR have made with respect to these recommendations.

1. **Establishing more rigorous policies and procedures to detect and/or prevent quality problems:**

The issues identified in this report represent a failure of contractors and subcontractors to properly implement existing requirements and policies. EM agrees that current practices can and should be enhanced to provide greater Federal and contractor oversight and assurance that requirements are being properly implemented. Specifically, with respect to SR, the site will focus on ensuring that "flow-down" of American Society of Mechanical Engineers Nuclear



Quality Assurance-1 (NQA-1) requirements to vendors supplying safety related equipment and services is strictly enforced. The site Management and Operations (M&O) contractor has already completed an independent assessment of its Quality Assurance (QA) and Procurement process at SR and developed numerous actions to improve the process. As a result of EM Headquarters initiatives in early fiscal year (FY) 2008 to enhance QA performance, an EM/Energy Facility Contractor Group (EFCOG) QA Improvement Initiative Project Plan was established. Further, all DOE and site contractor quality assurance plans are currently being evaluated and updated or revised to meet the new EM Corporate QA Program requirements. This effort is currently scheduled to be completed by the end of FY 2009. The FY 2008 SR staffing plan was also approved to increase the number of DOE QA oversight personnel from one to five and the site is in the process of filling these positions. This will enable SR Federal oversight to better assess QA implementation within ongoing projects, including subcontractors.

2. **Evaluating safety-class/safety-significant procurements to determine whether the items will function as intended:**

EM has placed each of the components discussed in this report under a rigorous startup testing program to verify its ability to perform the intended safety function.

3. **Developing procedures to coordinate and communicate quality assurance issues between projects and among Departmental and contractor elements at the Savannah River Site:**

EM agrees that there should be better coordination among QA organizations within DOE and National Nuclear Security Administration (NNSA) and is currently assessing options for improving procedures and processes. The following initial improvements have been made:

- a. SR with NNSA are hosting the 2009 Regional Nuclear Suppliers Outreach Event on March 17-19, 2009, which is an opportunity for regional and international businesses to gain insights into the NNSA market for nuclear services and products as well as the QA requirements to enter this market. A four hour NQA-1 requirements training course for suppliers will be offered at the meeting. In July 2008 the first annual nuclear suppliers outreach event was successfully held in Denver, CO, to address the worldwide need for qualified nuclear vendors and suppliers.
- b. SR and NNSA has established and staffed a Lessons Learned Coordinator position to ensure the dissemination of lessons learned, including QA issues, between NNSA and EM organizations at the SR Site.
- c. SR and NNSA are coordinating to strengthen oversight of project quality and ensure that new projects review QA lessons learned

from past projects, including the operating experiences learned after startup, and incorporate them.

- d. SR's Office of Acquisition Management will establish additional procedures and processes to tighten controls over existing contractors beginning with requiring approved QA plans for each step on existing scope before allowing additional work to proceed.
- e. SR will host monthly interface meetings with NNSA and other tenants on-site. The focus of the meetings will be to discuss site programs and processes specific to work activities and the associated QA requirements.

The Department will apprise the IG of its progress in implementing the recommendations by using the process established in the DOE Audit Reporting and Tracking System.

Please be assured, our first commitment is to the health and safety of our workers and the public. If you have any questions, please call me at (202) 586-5216 or Mr. Dae Chung, Deputy Assistant Secretary for Safety Management and Operations, at (202) 586-5151.

cc:

J. Owendoff, EM-3

C. Anderson, EM-3

J. Fiore, EM-6

J. Boone, EM-6

J. Surash, EM-50

J. Allison, SR

C. Everatt, SR

R. Speidel, NA-66



**Department of Energy**  
**National Nuclear Security Administration**  
Washington DC 20585

February 25, 2009

OFFICE OF THE ADMINISTRATOR

MEMORANDUM FOR: Rickey R. Hass  
Deputy Inspector General  
for Audit Services

FROM: William C. Ostendorff *W. Ostendorff*  
Principal Deputy Administrator

SUBJECT: Comments to Draft Procurement of Safety-Class/  
Safety-Significant Items; Job Code A08RL067; IDRMS  
No. 2008-03181

The National Nuclear Security Administration (NNSA) appreciates the opportunity to review the Inspector General's (IG) draft report, "Procurement of Safety-Class/Safety-Significant Items at the Savannah River Site." We understand that the purpose of this audit was to determine if the Department of Energy (DOE) had procured safety-class and safety-significant items that met appropriate quality standards at Savannah River.

NNSA agrees with the recommendations presented in the report but does not agree with the stated conclusions concerning the safety of the facilities, related cost impacts or with the tone of the report. The actions that NNSA has taken or are being implemented will provide increased confidence to NNSA's program and project management in the continued improvement of procurement quality assurance (QA) systems.

NNSA does not agree with the IG report's estimated cost impacts. For example, the report implies the TEF furnace module doors, valued at \$690,000, were not useable due to the QA issues stated. In fact, these doors were fully certified using standard NQA-1 approved engineering procedures at a cost of less than \$100,000. Similarly, the \$12 million glovebox, implied to be a complete loss, was fully certified using standard engineering procedures during pre-startup testing at no additional cost to the government.

The report also fails to acknowledge that, while the auditors raised concerns about QA/Nuclear Quality Assurance (QA/NQA) at the MOX facility, they failed to acknowledge the opinion of the official federal regulatory authority over MOX as expressed in the Nuclear Regulatory Commission (NRC) letter that places the IG's concerns in perspective. It is important to reference that the NRC, by law, regulates the MOX facility, including quality. The IG report conclusions differ substantially from the official position of the NRC on precisely the same issues.



The report does not mention that the NRC issued the results of its assessment of the contractor's performance covering the time period of October 16, 2006 through September 30, 2008. The NRC had assessed the same issues that are included in this draft report and concluded that the same issues raised by the IG were "violations of low significance" and that the NRC's review did not identify any areas needing improvement in management measures, facility construction, or facility support. The review by NRC was significantly longer in duration and more in-depth than the audit that is being captured in this report.

There are no indications that parts or components have been installed in the MOX facility that are inadequate to protect the public, employees and the environment as the report implies. All nonconforming material at issue in the MOX facility has been evaluated and technically justified as acceptable using appropriate "NQA-1" processes as outlined in the NRC-approved MOX Quality Assurance Plan and Procedures.

Attached are the actions that we are taking in relation to the recommendations.

Should you have questions about this response, please contact the Director, Policy and Internal Controls Management. NNSA has additional technical comments for the IG's consideration should the IG be receptive to receiving them.

Attachment

cc: Deputy Administrator for Defense Nuclear Nonproliferation  
Deputy Administrator for Defense Programs  
Senior Advisor for Environment, Safety and Health  
Assistant Deputy Administrator for Nuclear Safety and Operations  
Director, Service Center  
Senior Procurement Executive



**Steps to be Taken as Related to the Recommendations in the IG's Draft Report on Procurement of Safety-Class/Safety-Significant Items (A08RL067)**

Regarding the recommendations, NNSA reiterates our agreement with the IG that quality assurance can always be strengthened. Therefore, the following actions related to the recommendations are in place.

- **Establishing more rigorous policies and procedures**
  - The DOE-SR issues identified in the IG report are primarily the failure of contractors and subcontractors to properly implement existing requirements and policies. DOE-SR and the NNSA SRSO agree that current practices can and should be enhanced to provide greater Federal and contractor oversight and assurance that requirements are being properly implemented – with specific focus to ensure that “flow-down” of NQA-1 requirements to vendors supplying safety related equipment and services is strictly enforced. The management and operating (M&O) contractor has already completed an independent assessment of its QA/procurement process at SRS and developed numerous actions to improve the process. As a result of DOE-EM Headquarters’ initiatives in early FY 2008 to enhance QA performance, an EM complex-wide QA plan was established and all DOE and site contractor QA plans are currently being evaluated and updated or revised to meet the new EM requirements. That effort is currently scheduled to be completed by the end of FY 2009. The FY 2008 DOE-SR staffing plan was also approved to increase the number of DOE QA oversight personnel from 1 to 5 and the site is in the process of filling these slots. This will enable DOE-SR to better assess QA implementation within ongoing projects, including subcontractors and procurements.
  - As stated above regarding the IG’s concerns with the MOX facility, NNSA does not believe that more rigorous policies and procedures need to be established. However, , NNSA does believe our oversight efforts needed to be improved and, accordingly, the MOX project has taken the following actions:
    - Increased oversight of the contractor by hiring a Senior QA Manager. This individual is conducting reviews and assessments of MOX project activities and reports independently of the NA-26 office directly managing the MOX project.
    - Implemented NNSA’s latest performance evaluation and assessment tool to better track and ensure resolution of issues.
    - Strengthened the MOX prime contractor’s award fee criteria to increase emphasis on the critical nature of NQA-1 compliance.
    - Upgraded the MOX project annual assessment plan to emphasize review of contractor and subcontractor QA procedures.

- Provided NQA-1 lead auditor training for NNSA personnel directly overseeing the construction and procurement of the MOX project.
- **Procurement of safety-related equipment**
  - NNSA's Office of Fissile Materials Disposition has taken significant action to improve assurance of quality in the MOX facility as indicated by the following:
    - Performed over 20 field assessments of suppliers (including those overseas) of MOX equipment with many more assessments being performed by MOX prime contractor personnel to ensure that NQA-1 requirements have been implemented. More assessments are being planned for the next 12 months.
    - Reduced the risk to project quality and functionality by approving a change in project strategy to assemble and test over 100 of the most complex safety-related process glove boxes at the site. Prime contractor personnel will perform the work according to the MOX QA procedure in lieu of subcontracting to outside suppliers.
    - Approved a greater than 100 percent increase in prime contractor QA staffing (from 35 to 75) to provide increased surveillance of supplier quality.
    - Developed a program in which the MOX prime contractor will locate QA personnel full-time at each key NQA-1 supplier location until it has demonstrated high quality work.
    - Obtained lists of qualified suppliers of NQA-1 equipment from several DOE sites for use by the MOX project.
  - DOE-SR and SRSO both agree with the recommendation regarding the specific quality issues discussed in the IG report. Each issue has been reviewed by the M&O contractor's engineering staff to ensure there are no adverse affects on safety. Additionally, each of the components discussed in this report underwent a rigorous startup testing program which verified their ability to perform the intended safety function.
  - NNSA SRSO has also taken strong actions to improve its oversight of QA of safety significant items as demonstrated by these examples:
    - At the time the procurements associated with the TEF construction was being made, the SRSO QA Program was focused primarily on weapons and operating facility quality assurance. Since that time, a second quality engineer position has been added.
    - SRSO has also greatly increased its focus on the quality of purchased components used in NNSA's tritium facilities. For example, a SRSO quality engineer recently spent several weeks at a subcontractor's shop overseeing the construction of magnesium beds used in the TEF stripper system to ensure they were manufactured to meet quality requirements.
    - Additionally, the SRSO QA Assessment Program has been revised to include assessments of work being performed by subcontractors within their facilities to ensure quality requirements have been

properly flowed down from our M&O contractor to the subcontractors.

- **Communication of QA issues with other projects**
  - NNSA's MOX program element is taking strong actions to improve communication of quality issues:
    - Conducted visits and lessons-learned exchanges between the MOX project team and other DOE nuclear projects including the Hanford Waste Treatment Plant, the Y-12 Highly Enriched Uranium Material Storage Facility, the Yucca Mountain project, and the Salt Waste Processing Facility project, to name a few. Additional visits and exchanges are being planned for the future.
    - Where appropriate, posted lessons-learned information in DOE's occurrence reporting system and on NNSA's project management website. In addition, the prime contractor has issued lessons-learned through the NRC process.
    - Met on a routine basis, usually weekly, with senior DOE managers at Savannah River to discuss the status of MOX project including QA issues and items.
    - Maintained an open communication with other DOE QA specialists at the Site to keep abreast of the latest information and issues.
  - Similarly, DOE-SR and SRSO agree there should be better coordination between the entities on quality assurance issues. DOE-SR and SRSO are currently assessing the options for improving procedures and communications in the quality assurance arena, and will implement improvements where necessary. For example:
    - DOE-SR and NNSA are hosting the 2009 Nuclear Outreach Conference on March 17-19, which includes regional, field-wide and international involvement for training businesses in the NQA-1 certification process. This program is sponsored by DOE EM-1 in partnership with NNSA and addresses international shortages in qualified NQA-1 contractors and suppliers.
    - SRSO has established and staffed a Lessons Learned Coordinator position which coordinates closely with DOE-SR personnel to ensure the dissemination of lessons-learned, including QA issues, between NNSA and EM organizations at the Savannah River Site.
    - SRSO is working with NNSA HQ to strengthen oversight of project quality and ensure that new projects review QA lessons-learned from past projects, including the operating experiences learned after startup, and incorporate them.
    - For the last year and a half, DOE-SR Office of Acquisition Management (OAM) has taken a more proactive role in oversight of safety related procurements, solicitations and awards. OAM intervened and prevented a subcontract award to a vendor currently under investigation by the OIG.

- DOE-SR OAM has also applied tight controls over an existing contractor by requiring approved QA plans for each step on existing scope before allowing additional work to proceed.

Finally, NNSA Headquarters has established a partnership with the Energy Federal Contractors Group (EFCOG) to improve QA throughout the Nuclear Weapons Complex. This project is initially focusing on improving QA in nuclear construction projects and will address issues such as those in the IG report on a risk-prioritized basis. This project is being led by the Defense Programs QA Manager with a co-Project Manager from the EFCOG Integrated Safety Management/QA community. The project goal is to institutionalize processes and methods to ensure that construction project QA programs and efforts preclude recurrence of events that negatively impact the assurance of quality in our construction projects and work, in general.

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