

**Independent Oversight Review of the
Department of Energy
Office of Environmental Management Assessment of the
Portsmouth/Paducah Project Office Oversight of the
Portsmouth Gaseous Diffusion Plant
Criticality Safety Program**



May 2012

**Office of Safety and Emergency Management Evaluations
Office of Enforcement and Oversight
Office of Health, Safety and Security
U.S. Department of Energy**

Table of Contents

1.0 Purpose.....	1
2.0 Background.....	1
3.0 Scope.....	2
4.0 Results	3
5.0 Conclusions and Opportunities for Improvement	5
6.0 Items for Independent Oversight Follow-up.....	6
Appendix A: Documents Reviewed	7
Appendix B: Supplemental Information	8

Acronyms

ANSI	American National Standards Institute
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
HSS	Office of Health, Safety and Security
NCS	Nuclear Criticality Safety
OFI	Opportunity for Improvement (Recommendation)
ORPS	Occurrence Reporting and Processing of Operations Information
PORTS	Portsmouth Gaseous Diffusion Plant
PPPO	Portsmouth/Paducah Project Office
RSI	Restoration Services, Inc.

**Independent Oversight Review of the
Department of Energy Office of Environmental Management
Assessment of the Portsmouth/Paducah Project Office Oversight of the
Portsmouth Gaseous Diffusion Plant Criticality Safety Program**

1.0 PURPOSE

The Office of Enforcement and Oversight (Independent Oversight), within the Office of Health, Safety and Security (HSS), conducted an independent review of the Department of Energy (DOE) Headquarters' Office of Environmental Management (EM) scheduled assessment of the Portsmouth/Paducah Project Office (PPPO).

The EM assessment focused on the PPPO Nuclear Criticality Safety (NCS) organization and its oversight of the NCS program at the Portsmouth Gaseous Diffusion Plant (PORTS). The EM assessment was conducted as part of the EM program for periodic monitoring of field office oversight of site NCS programs. The onsite portion of the EM assessment was conducted during January 31 – February 2, 2012.

Independent Oversight shadowed¹ the EM review to: (1) evaluate the effectiveness of the EM line oversight assessment and (2) to gain insights on the current status of PPPO NCS oversight and the PORTS NCS program. The shadowing review was conducted in accordance with the HSS *Office of Safety and Emergency Management Evaluations Protocol for Small Team Oversight Activities* dated May 2011, and with the HSS *Plan for the Independent Review of an Assessment of PPPO Oversight of the Portsmouth Gaseous Diffusion Plant Criticality Safety Program*, dated January 25, 2012.

2.0 BACKGROUND

PORTS is located in southern central Ohio and was one of nation's three large gaseous diffusion uranium enrichment plants. DOE owns the plant and leases portions of the site to the United States Enrichment Corporation (USEC) for its commercial enrichment programs. Gaseous diffusion uranium enrichment operations at PORTS were discontinued in 2001 and the facility has been transitioned to a shutdown mode pending Decontamination and Decommissioning (D&D). Fluor-B&W Portsmouth LLC manages and operates the non-USEC portions of PORTS under contract to DOE.

DOE's role at Portsmouth includes such functions as: owner/landlord, environmental cleanup, disposal of legacy waste, D&D of inactive facilities, storage and conversion of depleted uranium hexafluoride, interim storage/disposition of surplus uranium materials, and planning for D&D of the gaseous diffusion plant. Within EM, PPPO has line management responsibility for PORTS as well as the Paducah site, and maintains a site office at PORTS.

Two factors were important in the EM decision to conduct a review of the PPPO oversight of the contractor NCS program at PORTS:

- The ongoing D&D efforts at PORTS are progressing and additional facilities and equipment that are no longer needed for USEC activities are being turned over to DOE for D&D. Some facilities and

¹ Shadowing is a specific type of oversight activity where HSS personnel observe a site office and/or contractor assessment and document HSS's evaluation of that assessment.

equipment may contain significant quantities of special nuclear materials in forms that are difficult to extract (i.e., holdup). As a result, the PORTS NCS will be facing new challenges and will need to ensure that NCS controls are effective. Also, PPPO is taking on oversight responsibilities for additional facilities and may be overseeing various types of D&D activities that pose different types of challenges to criticality safety.

- PORTS recently (August 2011) experienced criticality safety-related anomalous conditions associated with non-compliant stacking of drums in the X-744G building. These conditions and associated deficiencies (e.g., inadequacies in documented Criticality Accident Alarm System coverage for the configuration) indicated weaknesses in NCS program implementation, contractor self-assessments, and DOE line oversight.

Collectively, these factors highlight the need for effective DOE (EM and PPPO) line management oversight and contributed to the HSS decision to perform an independent shadow review.

3.0 SCOPE

The EM assessment focused on the PPPO Nuclear Safety Oversight Lead organization and its oversight activities at PORTS in the area of NCS. The EM activities included:

- Reviewing the PPPO oversight at PORTS to ensure it meets the requirements in the DOE Oversight and Nuclear Safety Orders and that the PPPO Nuclear Safety Oversight organization is compliant with the PPPO procedural requirements related to NCS.
- Assessing the evaluation and incorporation of lessons learned from the Oak Ridge K-25 Plant and the PORTS response to the August 2011 NCS anomalous conditions in the X-744G Uranium Management Center.
- Reporting the results in accordance with an assessment plan that identifies Criteria and Lines of Inquiry derived from DOE Policy 226.1B, *Department of Energy Oversight Policy*, DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*, and PPPO program documents.

The HSS Independent Oversight review shadowed the EM assessment. The Independent Oversight assessor activities included reviewing documents, observing EM interviews with PPPO and PORTS personnel, and touring facilities. The Independent Oversight assessor:

- Evaluated the effectiveness of the EM line oversight assessment with a focus on evaluating the adequacy of EM's planning for and conduct of the assessment.
- Gathered information about the status of PPPO NCS oversight and the PORTS NCS program, with a focus on whether the PPPO program is adequately documented and whether PPPO is performing adequate oversight at PORTS.

Appendix A lists documents reviewed and Appendix B provides supplemental information about the HSS Independent Oversight assessment.

4.0 RESULTS

Effectiveness of the EM line oversight assessment

Most aspects of the planning for and conduct of the EM assessment of criticality safety oversight at PORTS were adequate. The Criteria and Lines of Inquiry used by EM are appropriate for an assessment of a field element NCS oversight program. Based on the low criticality risk, EM conducted this assessment in a graded approach through personnel interviews, document reviews, and field observations. The EM interviews with several personnel were sufficient to confirm that the PPPO personnel and other personnel that support the PPPO oversight efforts (i.e., NCS subject matter experts from a support contract to PPPO, which are locally referred to as “owner’s representatives”) were sufficiently knowledgeable of requirements and responsibilities. The EM assessor has extensive assessment experience and criticality safety management experience with DOE as well as previous experience with the Nuclear Regulatory Commission.

Although Independent Oversight determined that the EM assessment was generally planned and conducted appropriately, Independent Oversight initially identified a concern that the scope of the EM assessment was too broad, considering the resources available to perform the assessment (i.e., one NCS expert on site for less than three days). For example, the EM assessment report does not provide sufficient documented evidence that a comprehensive assessment was performed for some of the lines of inquiry. However, based on shadowing of the EM assessment and independent observations and document reviews, and subsequent discussions with the EM evaluator, Independent Oversight determined that PPPO is performing appropriate oversight of the current operations at PORTS (which pose a low risk of criticality). There are no major concerns with the current NCS program at PORTS.

The EM assessment concluded that PPPO oversight of the PORTS NCS programs was adequate. The EM assessment also determined that PPPO had effectively incorporated lessons learned from other DOE D&D projects into the M&O contract and had developed a useful assessment of the status and criticality safety risks for building that had recently transitioned back to DOE from USEC.

The EM assessment determined that there were no deficiencies that warranted a Finding. It identified four Opportunities for Improvement (OFIs), which are repeated verbatim below:

- The DOE standard for a Federal staff with NCS oversight responsibilities (DOE-STD-1173) should be folded into a document which provides specifics for NCS oversight. This document should describe the responsibilities and authority for the Federal staff and owner’s representatives with NCS assignments.
- PPPO should develop an oversight staffing plan for PORTS based on the oversight needed for the expanded mission. This should include the NCS subject matter expert and the Facility Representatives.
- The PPPO Nuclear Safety Oversight Lead with Criticality Safety oversight should review the contractor’s NCS budget requests.
- The PPPO should assure that the contractor’s NCS corrective actions will be monitored until the contractor’s corrective action process has demonstrated the ability to effectively correct deficiencies.

Independent Oversight generally agrees with the EM assessment conclusions and OFIs. However, as discussed below, Independent Oversight has some additional observations about the status of the NCS program at PORTS and PPPO oversight.

Status of PPPO NCS oversight and PORTS NCS program

Based on shadowing of the EM assessment and independent observations and document reviews, Independent Oversight determined that PPPO is performing appropriate oversight and no major concerns with the current NCS program at PORTS were identified. For the observed activities, PORTS has implemented programs that provide assurance that fissile material handling at PORTS operations have been subject to criticality safety process evaluations, and that procedures, postings, or engineered controls are implemented for fissionable material handling activities.

However, there are a few aspects of PPPO oversight that warrant increased EM and PPPO management attention relative to the current status of PORTS facilities and activities:

- While many PPPO NCS oversight expectations are defined in the documents that govern Facility Representative and Safety System Oversight programs, the EM assessment report appropriately identified an OFI calling for PPPO to specifically address DOE-STD-1173 in PPPO NCS oversight documents. However, the PPPO NCS oversight expectations for the owner's representatives (e.g., qualification requirements, reporting of activities) are also not well defined in the current documents. The EM OFI does not specifically address qualification equivalence of non-Federal personnel, since the DOE standard does not apply to them.
- The EM assessment report appropriately identified an OFI calling for PPPO to evaluate staffing needs in consideration of the expanded mission and expected increase in work load. PPPO has some plans to increase its NCS capabilities and activities (e.g., assigning an on-site DOE employee to devote approximately 50 percent time to criticality safety and related items at PORTS); however, PPPO does not have a specific plan or schedule for qualifying this person in accordance with the DOE-STD-1173. Also, the current PPPO program relies heavily on support contractors and this reliance is expected to continue or increase as the NCS oversight work load increases with the expanded mission and new D&D activities at PORTS. The qualification requirements of DOE-STD-1173 do not apply to support contractors and expectations for support contractor qualifications have not been sufficiently defined by PPPO. PPPO indicated that the owner's representatives met the employer's qualification requirement.
- PPPO maintains an Issues List (Nuclear Safety/NCS Issues Monitoring Report) that is adequate in some respects. However, most items do not adequately address the activities and schedules for resolution of the issue.

In addition, over the next few years PORTS will be performing D&D of types of equipment and materials that it has not handled in the past. Specifically, many former process components will be moved to the X-705 Facility on-site where as much recoverable fissile material will be removed as is practical to do so, and then these components will be staged for shipment to either an on-site or off-site burial ground, depending upon enrichment. As part of this effort, it will be necessary to process deposits of "ash" (which is primarily uranyl fluoride contaminated with other materials but typically not hydrocarbons) and "gunk" (which is uranyl fluoride contaminated grease, oil, or partially degraded hydrocarbons). These materials are unlike materials X-705 has processed in the past and present new and different challenges for the NCS program.

As these activities begin and expand, PPPO will experience challenges in performing its oversight activities. The EM report appropriately identifies an OFI addressing an evaluation of staffing needs. In addition, PPPO is likely to face challenges in a number of areas where its staff may have limited experience. For example, the non-destructive assay measurements and their relationship to NCS program controls can be important to the effectiveness of the NCS program. As another example, criticality safety aspects of calciner operations can be important (e.g., potential for upset scenarios to result in enriched uranium being moderated by condensed water or hydrocarbons, representing a situation where a criticality is feasible) and the controls need to be effective to ensure safe operations. It is important that PPPO be prepared to perform effective NCS oversight of the new and different activities and have staff that understands the operations and related issues and challenges to NCS.

5.0 CONCLUSIONS AND OPPORTUNITIES FOR IMPROVEMENT

The independent review concluded that the EM assessment of PPPO NCS oversight at PORTS was performed in accordance with DOE directive expectations and was generally adequate for the current operations and criticality hazards at PORTS. However, resources applied to the assessment were limited considering the broad scope, resulting in an assessment report that did not provide a detailed evaluation or definitive conclusion for some of the lines of inquiry.

While the EM assessment of NCS was adequate considering the current low risk of criticality accidents at PORTS, additional EM and PPPO resources and more detailed assessments will be needed in the future as PORTS performs D&D activities that involve different types of nuclear criticality hazards. Independent Oversight generally agrees with the EM assessment conclusion that the PPPO oversight program is acceptable for current operations and determined that the OFIs provided by EM are appropriate. Independent Oversight also identified a need for additional evaluation and attention in a few areas (i.e., oversight expectations for the owner's representatives, further definition of qualification expectations, and increased efforts to define activities and schedules for resolution of issues).

This Independent Oversight review identified the following opportunities for improvement (OFIs). These potential enhancements are not intended to be prescriptive or mandatory. Rather, they are offered to the site to be reviewed and evaluated by the responsible line management organizations and accepted, rejected, or modified as appropriate, in accordance with site-specific program objectives and priorities.

- OFI-1:** PPPO should either provide additional resources or increase the time on site for scheduled assessments to ensure that all lines of inquiry can be evaluated before PORTS begin D&D activities for operations that could pose different and higher nuclear criticality risks.
- OFI-2:** PPPO should consider oversight expectations for the support contractors (owner's representatives), and further definition of qualification expectations for PPPO and support contractor personnel as PPPO considers and addresses the OFIs provided by the EM assessment.
- OFI-3:** PPPO should perform an evaluation of anticipated new activities at PORTS and determine whether the new activities will result in a need to expand PPPO NCS expertise and oversight capabilities and, if so, determine the optimal means to ensure adequate oversight capabilities for anticipated needs (e.g., additional contractor support or additional training for PPPO personnel).

6.0 ITEMS FOR INDEPENDENT OVERSIGHT FOLLOW-UP

Independent Oversight will continue to monitor the status of the PORTS NCS program and PPPO and EM oversight of NCS at PORTS through the site lead program. Areas of emphasis for monitoring include the progression of new D&D activities that present challenges to NCS, the progress of PPPO's planned improvement efforts, the PPPO response to the EM OFIs, and the availability and qualifications of personnel that perform oversight activities at PORTS. Based on ongoing monitoring, Independent Oversight will determine whether additional onsite assessments are warranted.

Appendix A

Documents Reviewed

- DOE P 226.1B, *Department of Energy Oversight Policy*
- DOE O 226.1B, *Implementation of Department of Energy Oversight Policy*
- DOE O 420.1B, *Facility Safety*
- ANSI/ANS-8.19-2005, *Administrative Practices for Criticality Safety*
- EM Assessment Plan of PPPO Oversight of Contractor NCS Program, DOE/PPPO/03-0313, January 2012
- EM Assessment of PPPO Oversight of Contractor NCS Program, DOE/PPPO-03-0322, February 2012
- DOE-STD-1173, *Criticality Safety Functional Area Qualification Standard*
- PPPO-M-420.1-3, *Safety Systems Oversight Program Plan*, Portsmouth/Paducah Project Office, Lexington KY, November 2009.
- PPPO-1063, Rev. 1, *Facility Representative Program Plan*, Portsmouth/Paducah Project Office, Lexington KY, March 2010.
- Issues Listing for January 24, 2012
- Oversight Review Report for the Anomalous Condition in the X-744G Uranium Management Center
- NCS Anomalous Condition Reports for FY-2012
- ORPS Report, *Nuclear Criticality Safety Evaluation Not Followed During Fissile Material Move*, Final report 11/04/2011

Appendix B Supplemental Information

Dates of Review

Onsite Review: January 31 – February 2, 2012

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