

**Office of Enterprise Assessments  
Assessment of Work Planning and Control at the  
Portsmouth Depleted Uranium Hexafluoride  
Conversion Facility**



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**Office of Worker Safety and Health Assessments  
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## ACRONYMS

AHA	Activity Hazard Analysis
AIHA	American Industrial Hygiene Association
BWCS	BWXT Conversion Services
CAS	Contractor Assurance System
CFR	Code of Federal Regulations
CRAD	Criteria and Review Approach Document
D&D	Deactivation and Decommissioning
DEAR	Department of Energy Acquisition Regulation
DUF6	Depleted Uranium Hexafluoride
DOE	U.S. Department of Energy
EA	Office of Enterprise Assessments
ECP	Employee Concerns Program
ES&H	Environment, Safety, and Health
FIR	Field Inspection Report
FPD	Federal Project Director
FR	Facility Representative
FTCP	Federal Technical Capability Program
FY	Fiscal Year
GDP	Gaseous Diffusion Plant
GHA	General Hazard Analysis
HCIC	Hazard Control Identification Checklist
HF	Hydrogen Fluoride
IH	Industrial Hygiene
ISM	Integrated Safety Management
ISMS	Integrated Safety Management System
KOH	Potassium Hydroxide
LOTO	Lockout/Tagout
MTS	Management Tracking System
NSOL	Nuclear Safety Oversight Lead
OFI	Opportunity for Improvement
OOG	Operations Oversight Group
OPP	Oversight Program Plan
PEMP	Performance Evaluation and Management Plan
PPPO	Portsmouth/Paducah Project Office
QA	Quality Assurance
QAPP	Quality Assurance Program Plan
SME	Subject Matter Expert
SSC	Support Services Contractor
SSO	Safety System Oversight
STARRT	Safety Task Analysis Risk Reduction Tool
STSM	Senior Technical Safety Manager
TQP	Technical Qualification Program
TQPP	Technical Qualification Program Plan
WP&C	Work Planning and Control

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**EXECUTIVE SUMMARY**

The U.S. Department of Energy (DOE) Office of Worker Safety and Health Assessments, within the independent Office of Enterprise Assessments (EA), conducted an independent assessment of selected elements of work planning and control, including some subcontracted work, at the Portsmouth Depleted Uranium Hexafluoride (DUF6) Conversion Facility. EA also examined the DOE Portsmouth/Paducah Project Office (PPPO) Federal oversight activities at the DUF6 Conversion Facility, which is operated by BWXT Conversion Services (BWCS).

The assessment included a scoping visit on September 19-22, 2016 and two onsite data collection visits on October 24-28 and November 14-18, 2016. During this period EA observed field operations and maintenance activities and work performed by subcontractors; attended pre-job briefings and daily status meetings; attended pre-job walkdowns conducted by the contractor and DOE; reviewed numerous work documents (e.g., work packages) as well as DUF6 project work procedures; and interviewed a wide variety of staff and workers.

During this assessment, the DUF6 Conversion Project was preparing for startup of Paducah, KY facility operations after a prolonged period in a non-operating status. BWCS voluntarily suspended operations in November 2015 at the Portsmouth facility and in December 2015 at the companion facility located in Paducah, following an accident that resulted in injuries to two employees due to exposure to potassium hydroxide (KOH). The Portsmouth facility operated for two days in fiscal year 2016. The PPPO Manager plans to authorize the contractor to bring the Portsmouth DUF6 conversion operations back on line in approximately April 2017.

**Work Planning and Control**

EA reviewed the suite of work control procedures for the performance of maintenance, operations and subcontracted work, and overall, these BWCS documents provide an adequate framework for the description of work processes and hazard analyses for the DUF6 project as observed at the Portsmouth site. The work that EA observed was generally performed within the established controls by trained and qualified workers. Work scopes, limitations, and precautions were well defined in most of the BWCS procedures and work packages reviewed by EA. BWCS training and qualification programs for Cylinder Yard technicians were robust, and worker training records were current. EA observed a number of work activities involving the application of the activity level hazard analysis processes, and in most cases activity level hazards have been identified and analyzed and are appropriately documented in work packages, operating procedures, hazard control identification checklists, and activity hazard analyses. EA observed a number of work activities in which the hazard controls were clear, adequately embedded in work documents, and consistent with the controls identified through the hazard analysis process.

Although for the most part, work planning and control processes and implementation are adequate, EA found two areas warranting increased management attention as follows:

- BWCS has not developed and implemented an effective low-hazard work control process (i.e., skill of the craft/worker program) that ensures that the core functions of integrated safety management are achieved, that hazards and controls are tailored to the work activity, and that the rigor of the work package, or lack of work package, is commensurate with the unmitigated risk and complexity of the work activity.

- Although BWCS Industrial Hygiene appears to have identified and quantified the most significant worker hazards through sampling and monitoring, BWCS has not developed and implemented an exposure assessment program for assessing worker risk (qualitative and quantitative) for all work areas or operations using recognized exposure assessment methodologies.

Additionally, EA found problems in several other areas:

- Some training (e.g., training for temperature extremes) has not been provided as required by BWCS Safety and Health procedures.
- The BWCS work control practice of integrating various risk levels into the same work package has led to confusion among workers and supervisors in identifying the appropriate work control requirements when performing some procedural steps.
- From a total of eight work observations, EA observed three cases where workers did not follow work package and/or procedure requirements.

### **Subcontractor Safety Programs and Requirements Flowdown**

EA reviewed the contractual and regulatory requirements that apply to the Portsmouth DUF6 Conversion Facility worker safety and health hazards through the DOE prime contract with BWCS. For this assessment, EA also evaluated two subcontractor company documents for contractual requirements and implementation processes. EA determined the process for ensuring that regulatory and contractual requirements flow down through BWCS programs and procedures into subcontracts is effective for the two contracts reviewed.

### **PPPO Oversight**

While PPPO has a relatively small oversight staff and its sites are geographically dispersed across three locations in two states, PPPO has conducted effective line oversight of DUF6 Conversion Facility programs and work activities and has identified substantive issues in WP&C through operational awareness oversight and formal assessments. PPPO is effective in evaluating the BWCS CAS, including a review of closed issues, contractor self-assessments and corrective action plans, and event response. PPPO has taken action to align oversight procedures and processes for the DUF6 activities in line with the PPPO-wide procedures and mechanisms.

EA noted several positive observations, including PPPO's recognition of its need to change the BWCS Performance Evaluation Management Plan to refocus attention on improving safety performance (e.g., successfully incentivized BWCS to improve its issue management system, which BWCS completed in October 2016); and its effective use of safety performance analyses to identify and address adverse trends.

EA identified eight deficiencies in PPPO oversight, primarily related to the need to improve oversight procedures, improve documentation of training and qualifications for personnel conducting oversight, and ensure that management self-assessments of the oversight processes are performed as required.

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**1.0 PURPOSE**

The U.S. Department of Energy (DOE) Office of Worker Safety and Health Assessments, within the independent Office of Enterprise Assessments (EA), conducted an independent assessment of selected elements of work planning and control (WP&C) and Portsmouth/Paducah Project Office (PPPO) oversight as it pertains to WP&C at the Portsmouth Depleted Uranium Hexafluoride (DUF6) Conversion Facility. EA elected to perform this independent assessment of the Portsmouth DUF6 Conversion Facility in consideration of the Deputy Secretary's response to the Defense Nuclear Facilities Safety Board letter and technical report (DNFSB/Tech-37) that included, in part, a commitment to enhance Federal oversight of activity-level WP&C. This assessment was conducted within the broader context of a series of targeted assessments of WP&C at DOE sites. The assessment included a scoping visit on September 19-22, 2016, and two onsite data collection visits on October 24-28 and November 14-18, 2016.

**2.0 SCOPE**

EA conducted this assessment in accordance with the *Plan for the Office of Enterprise Assessments Assessment of Work Planning and Control Programs at the Portsmouth Depleted Uranium Hexafluoride (DUF6) Conversion Facility, October-November, 2016*. This assessment evaluated selected areas of the BWXT Conversion Services (BWCS) WP&C program as well as the DOE Office of Environmental Management's (EM) PPPO processes for oversight of the contractor's WP&C activities. This assessment evaluated the effectiveness of both the contractor/subcontractor and field office programs in managing and maintaining WP&C at the Portsmouth DUF6 Conversion Facility.

**3.0 BACKGROUND**

PPPO was formed in October 2003 to oversee gaseous diffusion plants (GDPs) at Paducah, KY and Piketon, OH. At that time, much of the GDP space was leased to the United States Enrichment Corporation (now Centrus Energy Corporation), and construction had not started on the DUF6 project. Construction on the Portsmouth DUF6 Conversion Facility was completed in May 2008. Hot testing of the process at Portsmouth began in May 2011, and all three lines at Portsmouth were declared fully operational in September 2011.

PPPO responsibilities for oversight cover two site infrastructure contractors, two deactivation and decommissioning (D&D)/remediation contractors, and the DUF6 conversion facilities and operations at each GDP. The PPPO Federal staff is geographically dispersed throughout three locations in KY and OH. The Lexington, KY office provides management and technical support to the Operations Oversight Group (OOG) at each GDP. The Manager, Deputy Manager, Federal Project Director, and the Nuclear Safety Oversight and Quality Assurance (QA) Leads provide leadership and technical direction to Lexington environment, safety, and health (ES&H) and QA specialists, as well to the onsite safety oversight resources in each OOG. Safety oversight personnel within each OOG include three to five Facility Representatives (FRs), one safety system oversight (SSO) engineer, and three or four ES&H/QA specialists. The Site Lead at each OOG is the supervisor of record for the Federal safety oversight resources assigned to each site.

PPPO has a support services contractor (SSC) that, in part, provides subject matter experts (SMEs) to augment (with approximately seven full-time equivalents) the Federal oversight staff oversight of the DUF6 project. These SMEs provide safety oversight services, such as safety-related correspondence management, onsite daily operational awareness activities, and support to surveillances, field inspections, and assessments. In addition, the SSC SMEs provide support to document and track corrective actions made by DOE prime mission contractors for PPPO-identified safety oversight issues.

BWCS is the current prime contractor operating the DUF6 conversion facilities at Portsmouth and Paducah; the contract ends in January 2017. BWCS suspended DUF6 conversion operations at Portsmouth in November 2015 and at Paducah in December 2015 following an accident at Portsmouth in November 2015 that resulted in two employees exposed to potassium hydroxide (KOH). Paducah is expected to resume operations in December 2016. The Portsmouth DUF6 Conversion Facility operated just two days in fiscal year (FY) 2016, and PPPO currently plans to authorize the contractor to bring it back on line in approximately April 2017.

#### **4.0 METHODOLOGY**

The DOE independent oversight program is described in and governed by DOE Order 227.1A, *Independent Oversight Program*. EA implements the independent oversight program through a comprehensive set of internal protocols, operating practices, assessment guides, and process guides. Organizations and programs within DOE use varying terms to document specific assessment results. In this report, EA uses the terms “deficiencies, findings, and opportunities for improvement (OFIs)” as defined in DOE Order 227.1A. In accordance with DOE Order 227.1A, DOE line management and/or contractor organizations must develop and implement corrective action plans for the deficiencies identified as findings. Other important deficiencies not meeting the criteria for a finding are also highlighted in the report and summarized in Appendix C. These deficiencies should be addressed consistent with site-specific issues management procedures.

As identified in the assessment plan, this assessment considered requirements related to WP&C. The criteria guiding this assessment were based on selected objectives, criteria, and lines of inquiry associated with activity-level WP&C contained in DOE Guide 226.1-2A, *Federal Line Management Oversight of Department of Energy Nuclear Facilities, Appendix D, Activity-Level Work Planning and Control Criterion Review and Approach Documents with Lines of Inquiry, and Lines of Inquiry*, and EA Criteria and Review Approach Document (CRAD) EA-32-03, Rev. 0, *Industrial Hygiene Criteria Review and Approach Document*.

In addition, EA collected and analyzed data on the PPPO oversight activities related to WP&C at the Portsmouth DUF6 Conversion Facility, using elements of CRAD 45-21, Rev. 1, *Feedback and Continuous Improvement Assessment Criteria and Approach - DOE Field Element*. EA has not conducted a recent assessment of WP&C at the Portsmouth DUF6 Conversion Facility. Therefore, there were no items for follow-up during this assessment.

EA examined key documents, such as work packages, procedures, manuals, analyses, policies, and training and qualification records. EA also interviewed key personnel responsible for developing and executing the associated programs, observed field operations and maintenance activities and work performed by subcontractors, attended pre-job briefings and daily status meetings, and attended pre-job walkdowns conducted by the contractor and DOE. The members of the EA assessment team, the Quality Review Board, and EA management responsible for this assessment are listed in Appendix A, Supplemental Information. The documents reviewed, personnel interviewed, and observations made

during this assessment that are relevant to the findings and conclusions of this report are listed in Appendix B, Key Documents Reviewed, Interviews, and Observations.

## **5.0 WORK PLANNING AND CONTROL AND RELATED PROGRAMS**

### **5.1 Work Planning and Control Program**

*Objective:*

*The Organization has developed and approved WP&C processes to enable safe performance of work. (DOE Guide 226.1-2A, Appendix D, Objective WP&C1-1, Criteria #3 and 6)*

*The Organization has developed and approved WP&C processes that promote safe and efficient execution of work activities. (DOE Guide 226.1-2A, Appendix D, Objective WP&C1-3, Criterion #4)*

*The Organization has established a management and organizational framework for (1) initiating, analyzing, planning, and approving activity level work and (2) authorizing, releasing, and safely performing activity level work. (DOE Guide 226.1-2A, Appendix D, Objective WP&C1-4, Criterion #5)*

EA reviewed elements of the BWCS WP&C programs as they relate to maintenance activities, operations, and subcontractors. Work control programs with respect to maintenance and operations activities are addressed in this section, and subcontractor work control programs and communication of requirements to subcontractors are addressed in Section 5.2.

BWCS maintenance activities encompass work performed by maintenance technicians (e.g., mechanical, electrical, and instrument technicians). BWCS Procedure for BWCS-U-GFP-0108, *Control of Work*, defines the process for planning and executing work at DUF6 project facilities for most work activities, including the activities of BWCS maintenance technicians and BWCS subcontractors; office, technical and clerical work; operation of facilities, systems, and equipment performed in accordance with approved operating procedures (as described later in this section); and low-hazard activities, for which the hazards are typically few and the hazard mitigators are well understood, are exempt from following the *Control of Work* procedure.

The BWCS *Control of Work* procedure provides the work control framework, process, and description of the various types of preventive, predictive, corrective, minor, and general maintenance performed at the DUF6 project, as well as facility modifications and shop fabrication work. For these work activities, the *Control of Work* procedure is supplemented at the DUF6 conversion facilities by BWCS-U-WCG-0002, *Project Planning Guide*, and BWCS-U-SHP-0211, *Hazard Analysis*. Collectively these three BWCS documents provide an adequate framework for the description of work processes and hazard analyses at the DUF6 project, with a few exceptions as described in the following paragraphs.

Technical procedures are typically used for work activities that pertain to the operation of equipment and facilities at the DUF6 project. The process for the preparation, review, approval, issuance, revision, and cancelation of technical procedures is provided in BWCS-U-GFP-0015, *Technical Procedure Development*, which provides an adequate and clear description of the process for creating a new procedure and revising an existing procedure.

As previously mentioned, low-hazard activities are those work activities for which the number of identified hazards are typically few and the workers fully understand the hazard mitigators (often referred to as skill-of-the-craft or skill-of-the-worker at other DOE facilities). According to the BWCS *Control of*



Work procedure, these work activities are exempted from following the requirements of the aforementioned suite of procedures. For these low-hazard work activities, BWCS has not developed sufficient guidance to ensure that the scope, control, and limitations when performing such work are adequately understood and implemented. For the DUF6 project, the current requirements for low-hazard work are described in the *Control of Work* procedure. Missing from this description is a detailed discussion of how the BWCS low-hazard work process is defined, administered, and controlled such that the core functions of integrated safety management (ISM) are achieved. (See finding **F-BWCS-WP-01** and **OFI-BWCS-WP-01**.)

EA observed that trained and skilled workers perform many of the routine low-hazard work activities at the DUF6 project. Because they are routine and low-hazard, no work package or procedure encompassing the work activity is required. For example, EA observed routine work that BWCS considers low hazard in the BWCS Cylinder Yards, such as moving and restacking uranium hexafluoride cylinders; this work involves moving and stacking various-sized empty cylinders and concrete cradles using a fork truck and pry bars. For this type of work, the work supervisor provides a work briefing at the job site, and activity hazards are presumed to be embedded among other general work hazards in a 25-page general hazard analysis (GHA) for Cylinder Yard activities. No work request is prepared for the work activity, and the description of the work is communicated verbally but not documented. Although potential hazards are communicated during the pre-job briefing, there is typically no direct correlation or tailoring of the potential work hazards and controls in the GHA to a specific work activity. Since low-hazard activities are exempted from pertinent sections of the requirements of the *Control of Work* procedure (see Section 2 of BWCS-U-GFP-0108), the requirements for work descriptions, hazard analysis, pre- and post-job briefings, and other fundamental mechanisms to ensure that the core functions of ISM are implemented (as defined in DOE Policy 450.4A, *Integrated Safety Management Policy*, and the associated DOE Guide 450.4-1C) are not documented. Overall, BWCS has not developed and implemented an effective low-hazard work control process (i.e., skill of the craft/worker program) that ensures that the core functions of ISMS are achieved. (See finding **F-BWCS-WP-01** and **OFI-BWCS-WP-01**.)

Early in the work planning process, once the scope of work is defined, an initial risk level of the work/activity is determined by comparing the defined scope of work to the risk level criteria in Attachment A of the *Control of Work* procedure, *Guidelines for Determining Work Risk Levels*. Three levels of work risk are defined in Appendix A; namely low-risk, medium-risk, and high-risk. For a work activity to be low risk, the activity must meet three requirements: it must involve only low-hazard activities, as identified in the applicable Hazard Control Identification Checklist (HCIC); it is performed on general support or production support equipment; and it must be a simple activity that is within the training, knowledge, and experience of the craftsperson(s) involved. The work risk level, once determined, dictates such requirements as the rigor of the work package instruction level (i.e., requiring no instructions, or detailed instructions), whether work steps must be followed in sequence or not, and the use of hold points. A Level 3 work package is a low-risk work package for which no instructions or minimal instructions are required, while medium-risk (Level 2) and high-risk (Level 1) work packages require more detailed work instructions. However, in a number of HCIC forms accompanying work packages, EA found that some hazards identified as low risk include some of the highest-risk hazards at the DUF6 project; these hazards had been re-classified as low risk by assuming that they are appropriately mitigated through the application of a safety permit, training, or other hazard control. For example, typical high- or medium-risk work, such as confined space entries, working with or in radiological areas, excavation of rock and soil, and elevated work (including aerial lift work), are all classified on the HCIC as “low risk” hazards, on the assumption that the hazards have been effectively mitigated. Binning of hazards in the HCIC by “low, medium, and high risk” mischaracterizes the inherent risk of certain activities by assuming the presence and effectiveness of hazard controls, thereby limiting any further review of the potential risk and the rigor of work planning. Furthermore, since these activities are

classified as “low risk,” no (or minimal) work instructions are required, per Appendix A of the *Control of Work* procedure. While a number of these hazards require a safety permit that might identify the necessary hazard controls, the work package remains “low hazard.” In these cases, the overall rigor of the work package, work instructions, review, and approval are not commensurate with the unmitigated inherent risks when performing the activity. Additionally, the process for low-hazard work does not consider how the complexity of multiple controls affects the risk, as described in DOE Policy 450.4A and the associated DOE Guide 450.4-1C. (See finding **F-BWCS-WP-01** and **OFI-BWCS-WP-01**.)

For routine operations and low-hazard work, one of the challenges within the BWCS work control system is the identification and application of the most effective mechanisms for tailoring work scope, hazards, and controls to a specific work activity when there are few, if any, documentation requirements for work scope definition, and the only applicable hazard analysis is a very broad and general GHA. DOE Policy 450.4 and the associated DOE Guide 450.4-1C, Appendix 6 state that “tailoring is essentially a systems adaptation that operates at all levels and on all functions of work planning and performance. It encompasses the three core functions of work planning (define work, analyze hazards, establish controls) and the two core functions of work implementation (perform work, assess and provide feedback), and it occurs at all levels of work.” EA observed a number of pre-job briefings associated with routine operations and low-hazard work in which the mechanisms for tailoring the work scope, hazards, and controls for the day’s work activities were not clear. Examples included routine DUF6 project operations rounds and a Cylinder Yard pre-job briefing on daily inspection of a patch on a breached cylinder. In both cases, the work activity involved an operations activity with a rounds sheet or a low-hazard activity with a Standing Order, in which the hazard analysis mechanism – HCIC, activity hazard analysis (AHA), or GHA – was not evident, present at the pre-job briefing, or referenced in the work documents. Although hazards were discussed during the pre-job briefing, no applicable hazard analysis document was identified, and thus no tailoring to address job-specific hazards and hazard controls identified in the hazard analysis document. In addition to the pre-job briefing, most observed work was preceded by the work supervisor asking the workers at the job site a series of questions provided on a Safety Task Analysis Risk Reduction Tool (STARRT) card. Again, however, the process lacks a mechanism for tailoring the work scope, hazards, and controls and documenting the results on the STARRT card. (See finding **F-BWCS-WP-01** and **OFI-BWCS-WP-01**.)

Title 10 CFR 851 requires that contractors assess worker exposures to chemical, physical, biological, or safety hazards through appropriate workplace monitoring, and that they document assessments for these workplace hazards using recognized exposure assessment and testing methodologies. An exposure assessment methodology typically includes two elements to assess worker risk: a documented qualitative assessment of all work areas and operations, and a quantitative assessment (i.e., monitoring and sampling) of selected work areas and operations that pose a likely potential for workers to exceed a specified fraction of a known occupational exposure limit. Such an exposure assessment methodology is described in a recognized exposure assessment strategy, *A Strategy for Assessing and Managing Occupational Exposures*, published by the American Industrial Hygiene Association (AIHA). The BWCS strategy of conducting worker exposure assessments is documented in BWCS procedure BWCS-U-SHP-0505, *Exposure Assessments (Non-Radiological)*. The implementation of this procedure at the DUF6 project has resulted in the identification of a number of the most significant worker exposures, sampling and monitoring of these potential exposures, and a schedule for re-sampling these potential exposures on a risk-based frequency. This BWCS approach to worker exposures emphasizes the “quantitative assessment” of known risks, but with limited focus on documenting a “qualitative assessment” of worker exposures that are perceived as lower risk, but may not be low risk once evaluated. For example, during operations and maintenance of the DUF6 conversion facilities, two of the prominent, known chemical hazards that could pose an exposure risk to workers are hydrogen fluoride (HF) and potassium hydroxide (KOH). During the past few years, IH has performed considerable sampling for these two chemical hazards. However, BWCS also operates a small ES&H laboratory on site, where five hazardous

chemicals are routinely used during analytical chemical analyses. These analyses are performed on the benchtop, with only room ventilation for dispersing chemical vapors. The limited chemical quantities and short exposure times make exposure to these chemical unlikely to exceed occupational exposure limits, but no “qualitative” evaluation of the work activity has been performed or documented to determine the exposure potential or the need for “quantitative” sampling or monitoring. Similarly, the BWCS *Exposure Assessment* procedure provides guidance only for quantitative sampling. In summary, BWCS IH has identified and analyzed many significant potential worker exposures to airborne chemicals on the DUF6 project and has quantified these potential exposures through sampling. However, BWCS has not developed and implemented an exposure assessment program for assessing worker risk (qualitative and quantitative) for all work areas or operations using recognized exposure assessment methodologies (e.g., the AIHA exposure assessment strategy) or other recognized exposure assessment methodologies as indicated in 10 CFR 851.21 (a)(2) and 10 CFR 851 Appendix A.6. (See finding **F-BWCS-WP-02**.)

The training and qualification plans for Cylinder Yard technicians combine an evaluation of entry-level requirements with a robust classroom and computer-based ES&H compliance training and skills training program and required reading, providing a generally sound basis for the type of work activities observed in the Cylinder Yard. Also, the sampled training records for two Cylinder Yard technicians were complete and up to date. However, BWCS does not have a mechanism for BWCS ES&H SMEs to routinely review the adequacy of ES&H compliance training requirements. For example, the Cylinder Yard technician qualification card appropriately identifies the need for training on temperature extremes (heat and cold stresses), since many of their activities are performed outdoors. However, based on the requirements of BWCS-U-SHP-0514, *Temperature Extremes*, such training should be provided via computer-based training or classroom training and not solely through required reading of the DUF6 procedure on temperature extremes, as indicated in the qualification card. (**Deficiency**)

### **Work Planning and Control Program Evaluation Conclusion**

The BWCS *Control of Work* procedure provides a useful and easily understood work control process framework and a process and description for the various types of preventive, predictive, corrective, minor, and general maintenance performed at the DUF6 project. The *Control of Work* procedure is supplemented by the BWCS *Project Planning Guide* and the *Hazard Analysis Procedure*. Collectively, these three BWCS documents provide an adequate framework for the description of work processes and hazard analyses at the DUF6 project, with a few exceptions. However, BWCS has not developed and implemented an effective low-hazard work control process (i.e., skill of the craft/worker program) that ensures that the core functions of ISM are achieved, that hazards and controls are tailored to the work activity, and that the rigor of the work package (or the lack of work package) is commensurate with the unmitigated risk and complexity of the work activity. In addition, although BWCS IH appears to have identified and quantified the most significant worker hazards through sampling and monitoring, BWCS has not developed and implemented an exposure assessment program for assessing worker risk, both qualitatively and quantitatively, for all work areas or operations, using recognized exposure assessment methodologies.

Finally, BWCS training and qualification programs for Cylinder Yard technicians are robust, and the sampled worker training records were current. However, some training (e.g., for temperature extremes) has not been provided as required by BWCS Safety and Health procedures.

## 5.2 Subcontractor Safety Programs and Requirements Flowdown

*Criterion:*

*Processes are developed and effectively implemented to ensure that DOE integrated safety management (ISM), 10 C.F.R. 851, and DOE contract safety requirements are implemented and flowed down to all subcontractors at all tiers. (Department of Energy Acquisition Regulation [DEAR] Clause; 48 CFR 970.5223-1(i); 10 CFR 851; EA CRAD 30-01)*

EA reviewed the contractual and regulatory requirements that apply to the Portsmouth DUF6 Conversion Facility worker safety and health hazards through the DOE prime contract with BWCS (DE-AC30-11CC40015, 2 18 2016 Mod 103) and 10 CFR 851, *Worker Safety and Health*, which constitute the primary set of requirements to address worker safety and health hazards at the Portsmouth DUF6 Conversion Facility to ensure that they have been appropriately addressed and flowed down to subcontractors. For this assessment, EA also evaluated two subcontractor company documents for contractual requirements and implementation processes. Specifically, the prime contract incorporates the DEAR clause from 48 CFR 70970.5223-1, *Integration of Environment, Safety, and Health into Work Planning and Execution*, and requires the establishment and implementation of a formal ISM system (ISMS). The DOE-approved BWCS Worker Safety and Health Program Plan (DUF6-BWCS-PLN-074, Rev 5) has well-documented ISM requirements and states that an ISMS is mandatory for all work performed by BWCS or its subcontracted employees, unescorted vendors, and visitors and is documented through the DUF6-BWCS-PLN-040, *Integrated Safety Management System Plan for Operations*. In addition, the requirements for 10 CFR 851 establishment and implementation are well documented and include the roles and responsibilities of all levels of management.

EA evaluated a subcontract for scaffolding work (Subcontract Number/Amendment Number LEXS160176-02 with Geiger Brothers Mechanical Contractors, Inc.) and a supplier purchase order/work order for a liquid nitrogen delivery (Purchase Order/Work Order 1603329 with Air Liquide Industrial U.S. LP) to determine the extent to which the DOE safety requirements are flowed down to subcontractors and suppliers. The subcontract with Geiger Brothers includes requirements that all work must be performed in accordance with the DEAR Clause 48 CFR 970.5223-1, 10 CFR 851, and all applicable Federal regulations and site-specific requirements. The subcontract further states that Geiger shall adhere to BWCS's ISMS description and Worker Safety and Health Program Plan. The Air Liquide Industrial U.S. LP contract with BWCS (2120 001) requires that Air Liquide performs all work consistent with DOE Regulations and Directives. All Air Liquide work activity is performed under BWCS work orders, however, they use the Airgas Merchant Gases LLC's *Liquid Unloading Procedures* as activity-specific procedures to perform the liquid nitrogen unloading. This is the only work activity performed by Air Liquide at the DUF6 facility. EA observed one work activity performed by Air Liquide for liquid nitrogen delivery with Air Liquide Procedure Number 2B-INDDST-OPS-0007-P and BWCS Work Order 1603329. Details of this observation are described in Section 6.0.

### **Subcontractor Safety Programs and Requirements Flowdown Conclusion**

The process for ensuring that regulatory and contractual requirements flow down through BWCS programs and procedures into subcontracts is effective for the two contracts reviewed.

## 6.0 WORK PLANNING AND CONTROL IMPLEMENTATION

### *Objective:*

*The scope of work is described in sufficient detail to allow the work planning process to identify hazards associated with the work and to develop necessary schedules, priorities, and work instructions. (DOE Guide 226.1-2A, Appendix D, Objective WP&C2-1, Criteria #2 and 3)*

EA reviewed eight work activities involving maintenance, operations and subcontracted work activities. Overall, work scopes, limitations, and precautions were well defined in most of the BWCS procedures and work packages reviewed by EA. For the three BWCS preventative and corrective maintenance work packages reviewed, the work scopes were well defined within the work package task instructions. Work scope precautions and limitations are identified in work packages, and prerequisites are detailed and typically require a supervisor's initials before the work activity starts. Supporting documents, such as equipment or installation drawings and safety data sheets for hazardous chemicals, are also in the work package to provide work scope details and clarifications. An example is the preventative maintenance (PM) work package for the *Annual PM for the Internal/External Inspection of a Packaged Boiler* (WO 1603184) observed by EA, in which the work steps for electrical and mechanical maintenance, operations, and QA were well defined within the task instructions, and supplemental instructions, such as for installation of gaskets in the steam boiler, were provided as an attachment. Similar comprehensive work scopes were identified in the sample of corrective maintenance work packages reviewed. The Cylinder Yards procedure for *In-Storage Inspection of 30" and 48" DOE UF6 Cylinders* (Procedure BWCS-X-CYP-2502) is an example of a well-designed technical procedure with a descriptive work scope.

In general, for the work packages or procedures in use, the work scopes that EA reviewed were typically sufficiently defined so that the hazards could be identified and the appropriate controls implemented. However, for low-hazard work, the lack of clarity in the work planning process when defining low hazard work was evident. For example, no work request was generated for the routine Cylinder Yard movement work that EA observed; however, it does not appear to fall within one of the 11 defined low-hazard activities, such as "movement of materials within a facility, such as paper, water, furniture, material, and portable tools/equipment/materials," that are exempted from having a work request per Section 2 of the *Control of Work* procedure.

### *Objective:*

*All hazards that could potentially adversely impact workers, the public, the environment, the facility, and its equipment are documented and analyzed for severity/significance. (DOE Guide 226.1-2A, Appendix D, Objective WP&C2-2, Criteria # 2, 4, 5, 7 and 8)*

EA observed eight work activities involving the application of the activity level hazard analysis process, as described in procedure BWCS-U-SHP-0211, *Hazard Analysis*, and reviewed the associated hazard analysis documents. In all but one case, activity level hazards had been identified and analyzed and were appropriately documented in work packages, operating procedures, HCICs, and/or AHAs. In each work observation, the documented hazard analysis was consistent with the work activity and the documented work scope. For example, the corrective maintenance work package for replacement of a closed cooling water system pump included both an HCIC and an AHA, which identified all potential hazards. The hazard analysis documents were appropriately referenced within the body of the work package.

For operations work performed using technical procedures, the BWCS Technical Procedure Development process requires the integration of hazard controls into the technical procedure, but only requires the

HCIC/AHA to be attached for abnormal operation and alarm response procedures, which is consistent with the practices at other DOE sites. For technical procedures, the applicable hazard analysis is often referenced in the technical procedure, such as in Section 7.3 on the *In-Storage Inspection of 30" and 48" UF6 Cylinders*. However, in one case no hazard analysis (i.e., HCIC or AHA) supporting the PORTS BWCS Operator Rounds was referenced in the rounds sheets or accompanying instructions, and it was not clear whether a hazard analysis had been performed or was required, or whether the GHA may be sufficient.

*Objective:*

*Controls are identified and implemented that effectively protect against identified hazards and approved activity-level work control documents can be performed as written. (DOE Guide 226.1-2A, Appendix D, Objective WP&C2-3, Criteria #2, 3, 4, 5, 6, 7 and 8)*

At the work activity level, EA observed work activities in which the hazard controls were clear, adequately embedded in work documents, and consistent with the controls identified through the hazard analysis process. For example, the HCIC/AHA for the preventive maintenance work package for the internal and external inspection of the package boiler, the appropriate hazard controls were identified, addressed in the work package, and conveyed to workers during the pre-job briefing. In addition, the Cylinder Yard hazard analysis (AHA-X-13-0460) identified explicit and appropriate hazard controls for the hazards present in the Cylinder Yard.

EA identified one example in which the hazard control (an OSHA regulation) was not appropriately applied. In this example, the Portsmouth DUF6 Conversion Facility ES&H laboratory has been controlling hazardous chemical usage, storage and labeling under 29 CFR 1910.1450, *Occupational Exposure to Hazardous Chemicals in Laboratories*, which is designed more for research laboratories than production laboratories, such as the laboratory operations at the DUF6 project. The Occupational Safety and Health Administration laboratory standard requirements for hazardous chemicals defined in 29 CFR 1910.1200, *Hazard Communication*, are more appropriate for a production laboratory. As a result, labeling of chemical containers in the ES&H laboratory has not been updated to reflect newer Globally Harmonized System of Classification and Labeling of Chemicals labeling requirements as required by the hazard communications standard, although chemical labeling was consistent with the requirements of the laboratory standard. Furthermore, EA identified a one liter container of unknown liquid in the ES&H laboratory without any labeling to identify contents, hazard, or owner, contrary to the requirements of the BWCS procedure on *Hazard Communications* (BWCS-U-SHP-0601).

Through work observations, EA noted that a lack of routine facility maintenance has adversely impacted some equipment performance, sometimes resulting in unnecessary workarounds. For example, during the observation of operator rounds at the component cooling water system, EA noted that the cooling water screen had been punctured, resulting in an approximate one square foot hole in the screen, and that the poor condition of the cooling water recirculation pumps allowed a significant amount of cooling water to flow out of the base of the tower and onto the ground, rather than being recirculated as designed. As a result, a substantial volume of makeup water was continually required, with frequent chemical additions to minimize corrosion in system components; these conditions would not have occurred if the system had been appropriately maintained. In a second example, during the observation of routine preventive maintenance on a steam supply system boiler, the QA inspector identified a gasket on the hand hold plate as defective and requiring replacement, even though the gasket had been in service for less than two weeks. The QA inspector had previously identified this concern and had, during the past four years, informally offered a potential solution, but not through a recognized feedback mechanism such as a post-job briefing. In a third example, during the evening observation of the hydrogen fluoride storage tank inspection project, workers had to use portable lights so they could access office trailers, because of

longstanding maintenance issues with parking lot lighting. BWCS was repairing the component cooling water system during EA's second visit and had self-identified the overall concern about maintenance backlog for preventive and corrective maintenance in the recent issuance of the BWCS 2016 FY ISMS/QA review.

*Objective:*

*Work is conducted diligently in accordance with approved work instructions and within established controls. (DOE Guide 226.1-2A, Appendix D, Objective WP&C2-4, Criteria #2, 3 and 5)*

Work observed by EA was typically performed within the established controls and by trained and qualified workers, although in a limited number of cases workers did not follow some requirements in work packages and procedures, as described in the following paragraphs. Morning Daily Planning meeting (6:30 AM meeting) and Operations and Maintenance Plan of the Day meetings (7:00 AM meetings) were held by multiple operations and maintenance groups and were effective in communicating facility condition status, ongoing and current work activities, and other topics pertinent to the workers. The Cylinder Yard Plan of the Day meetings were comprehensive; addressed the day's planned work activities, hazards, and controls; engaged workers in discussions of work and safety topics through a variety of briefing techniques; and provided an overview of future work activities and management priorities.

Pre-job briefings observed by EA appropriately addressed the pertinent hazards and controls of the work packages, and the pre-job briefing typically involved workers through a variety of mechanisms. Examples of effective pre-job briefings included a facility manager pre-job briefing prior to performing a technical surveillance requirement surveillance on the vaporization system and a Cylinder Yard pre-job briefing on daily inspection of a patch on a breached cylinder. Attachment C, *Job Briefing Guidance*, from the *Control of Work* procedure provides detailed guidance on conducting pre-job briefings. One key attribute of an effective pre-job briefing, according to this attachment, is that all personnel included in the work activity should be present for the briefing. EA's observations indicated that this was not always the case. For example, during a pre-job briefing in preparation for performing preventive maintenance on a packaged boiler that day, a worker interrupted the work group supervisor to say that several of the craft workers responsible for performing the work were not present. The work supervisor appropriately paused the pre-job briefing until the missing craft workers joined the work group before resuming the briefing.

In one case, EA observed implementation problems with a work package that involved multiple risk levels (i.e., Levels 1, 2 and 3 as described in Section 5.1) in that some work steps are not labeled with risk levels, resulting in confusion to both supervision and workers as to the procedural requirements. For example, the BWCS work package to replace a cooling tower recirculation pump is both a Level 1 and a Level 3 work package. For this work package, the task instructions are provided in Section 7 of the work package. Step 7.1 involves the application of a lockout/tagout (LOTO) and zero energy check, and this step is appropriately marked as a Level 1 activity. The next step of the procedure (Step 7.2) addresses the disconnection and insulation of wire leads and is appropriately identified in the work package as a Level 3 activity. Steps 7.3 and 7.4 are also appropriately identified at Level 3 activities. However, the performance of post-maintenance testing, described in Section 7.5, is not identified as either a Level 1 or Level 3 activity, contrary to the BSCS *Control of Work* procedure. When interviewed by EA, neither the workers nor the work supervisor were certain of the risk level of the post-maintenance testing, or whether the work steps needed to be performed in sequence as required in a Level 1 activity or could be performed in random order as permitted in a Level 3 activity. **(Deficiency)**

In one example, EA observed that hazard controls were not adequately implemented as required by procedures or work packages. For example, during a nitrogen fill-tank evolution, when loading the liquid

nitrogen tank, the tank truck driver (a BWCS subcontractor) was not wearing all of the personal protective equipment prescribed in the nitrogen offloading procedure, and wore his face shield inappropriately (i.e., primarily in the open position, which provides no splash protection).

EA observed three work activities where procedures or work packages were not followed as written. In the first work activity, during corrective maintenance on a component cooling water pump and motor assembly replacement, workers exceeded the boundaries of the work package scope by disassembling the motor from the pump in order to change the orientation of the motor to facilitate making an electrical connection. Although workers are to be commended for their innovation in identifying a solution to a problem encountered when the wrong pump was delivered to the job site, the disassembly of the motor from the pump base was beyond the scope of work in the work package. Once the motor was removed from the pump, a replacement gasket to seal the pump to the motor could not be located, and the job was paused. However, the job was not paused for exceeding the boundaries of the work scope. Section 5.5 of the BWCS ISMS procedure states that “it is BWCS’s policy that any time work cannot be performed consistent with applicable procedures, that work shall be stopped or suspended, supervision notified, and the work remain stopped or suspended until the discrepancy is resolved.” In a second example, while BWCS subcontractors were filling a nitrogen tank using a BWCS operating procedure, EA observed that several work steps in the procedure requiring signatures had been signed prior to performing the work step, contrary to the requirements of BWCS-U-GFP-0022, *BWCS Procedure on Procedure Use and Adherence*. Section 5.1.2 of the procedure states that “the procedure user is to enter data where required and signoff/utilize provided place keeping method for each step or indicate completion of each step as it is completed prior to proceeding to the next step.” In a third example, during the verification of a LOTO in final preparation for the calibration of an autoclave temperature element, the work supervisor identified an apparent discrepancy between the lock number identified in the LOTO work permit (T11) and the lock number on the key in the lock box in the control room (T18). The facility manager confirmed the discrepancy and also verified that the locks placed on the equipment in the field were consistent with the key in the lock box (i.e., T18) and that the permit was incorrect although the permit had been prepared, independently verified, and approved. The discrepancy resulted in the issuance of a condition report by BWCS to further investigate the mishap. In each of the aforementioned examples, the work observed by EA was not performed in accordance within established controls. **(Deficiency)**

*Objective:*

*The WP&C processes are routinely evaluated by the organization’s contractor assurance system and feedback and improvement processes, and lessons learned are adequately captured and incorporated into the planning and performance of ongoing and future work activities. (DOE Guide 226.1-2A, Appendix D, Objective WP&C2-5, Criteria #3, 4, 5 and 6)*

BWCS utilizes a variety of feedback and improvement methods on an ongoing basis to evaluate the adequacy and effectiveness of the ISMS process and to encourage continuous improvement. Examples of BWCS management systems for feedback and improvement include self-assessments, independent assessments, and management presence in the workplace. At the work activity level, workers are encouraged to provide feedback and lessons learned through pre- and post-job reviews and through routine interactions with supervisors. Two examples of constructive worker feedback were observed during a boiler electrical maintenance pre-job review when workers identified that key work resources (QA and mechanical maintenance craft) were needed but not present; and during a condensate cooling water pump replacement when a worker identified an innovative process for mounting the pump motor that would expedite the work process and minimize work hazards (i.e., lifting heavy components).

Although EA observed a number of examples of constructive feedback and improvement, EA also identified areas for improvement in feedback processes such as during an observation of a work activity



where scaffolding was being installed by a BWCS subcontractor for use by BWCS maintenance workers performing activities in the KOH Building and X1300. Aluminum extension planks were being used as scaffolding working platforms and in place for over three years. Workers and a quality engineer noticed in September 2016 that the planks had a weight limit of 250 lbs. Inquiries by the quality engineer to the technical department of the manufacturer of the planks concluded that the planks are not intended for scaffolding use since they are only rated for 250 pounds, or one worker, to include the weight of any tools. According to the manufacturer, the use of the aluminum planks are intended for ladders with ladder jacks. In addition, the scaffolding was built with multiple components from various manufacturers and the scaffolding structure was not secured to the building per 29 CFR 1910 scaffolding requirements. BWCS was accepting a higher level of risk by allowing access to the scaffolding with the use of fall protection. Although BWCS has restricted use of the scaffolds in the interim, interviews indicated that prior use of these scaffolds by more than one worker at a time may have exceeded the 250 pound weight limitations. BWCS scaffolding competent persons, work planners and BWCS safety did not recognize the hazards of the scaffolding in this configuration during previous pre-job scaffolding inspections. Based on EA input, BWCS took prompt action and addressed the issue and plans to create a permanent scaffolding structure similar to the scaffolding at the Paducah Gaseous Diffusion Plant.

Guidance for performing post-job briefings is provided in Appendix C, *Job Briefing Guidance*, of the BWCS *Control of Work* procedure. For high-risk and medium-risk work that is complex or seldom performed, a post-job review is required immediately following work and at the job site. For low-risk or medium-risk activities, the post-job review can be performed throughout the day or at the end of the day with the entire crew for all work performed. EA observed a post-job briefing at the Cylinder Yard upon the completion of an inspection of a breached cylinder. The post-job briefing was effective in engaging the work crew in identifying any lessons learned and opportunities for improvement, such as identifying tripping hazards that had not been as noticeable when performing the same work previously.

BWCS has also been responsive to investigating, resolving, and implementing timely corrective actions identified by EA. Examples included the updating the hearing protection posting at the condensate cooling water pumps when questioned by EA, expediting performance of corrective maintenance on the same pumps, and revising the BWCS pre-job briefing checklist to address the importance of verifying the presence of work participants prior to conducting the pre-job briefing.

### **Work Planning and Control Implementation Conclusion**

Overall, the observed work was generally performed within the established controls by trained and qualified workers. Work scopes, limitations, and precautions were well defined in most of the BWCS procedures and work packages that EA reviewed. EA observed a number of work activities involving the application of the activity-level hazard analysis processes, and in most cases activity-level hazards were identified and analyzed and appropriately documented in work packages, operating procedures, HCICs, and AHAs. EA observed a number of work activities in which the hazard controls were clear, adequately embedded in work documents, and consistent with the controls identified through the hazard analysis process, but in three examples, EA observed that hazard controls were not adequately defined, appropriate, and/or implemented as required by procedures or work packages. Furthermore, in several cases EA observed work that was not performed within the established controls, and workers did not follow some requirements in work packages and procedures.

## **7.0 PORTSMOUTH/PADUCAH PROJECT OFFICE OVERSIGHT**

EA reviewed the PPO procedures and processes for conducting safety oversight, focusing primarily on implementation at the Portsmouth DUF6 Conversion Facility.

*Criterion:*

*DOE field element line management has established and implemented effective oversight processes that evaluate the adequacy and effectiveness of contractor assurance systems and DOE oversight processes. (DOE Order 226.1B)*

PPPO has established a number of procedures to establish the functions, responsibilities, authorities, and processes for conducting safety oversight that provide a good overall approach to oversight. EA found that some of these procedures were out of date, referred to procedures that no longer exist or are no longer consistent with current practice, or had not been reviewed and updated as required. **(Deficiency)**

- PPPO-2649582, *Management Plan*:
  - Has not been reviewed and updated as required by DOE Order 450.2, Section 4.g. and is not current with recent office management changes and safety authority delegations
  - Does not adequately describe how the PPPO, as a matrix organization, uses integrated project teams to perform safety oversight
  - Does not define the roles and responsibilities within and between functional groups, such as QA, ES&H, and FRs
  - Does not adequately describe delegations of safety authority to individuals in Appendix E, *PPPO Delegations of Authority*, which contains a list of delegation letters or other documents by title, with a number of the documents dated back through 2008 and delegation documents for individuals no longer assigned to PPPO.
- PPPO-M-226.1-2, *Oversight Program Plan (OPP)*, 2010:
  - Is not current as required by the PPPO-M-414.1-6F, *Quality Assurance Program Plan (QAPP)*, Section 4.4
  - Does not address the role of the Central Technical Authority and other requirements of the current version of DOE Order 226.1B, 2011
  - Does not address oversight of contractor assurance systems (CAS) and the data generated by the CAS.
- PPPO-M-414.1-1, *Corrective Action Program*, does not address implementing procedures and records necessary to document, track, and verify completion of contractor issues identified by PPPO.
- PPPO-2533131, *Assessment and Surveillance Processes*, does not establish procedures for scheduling and conducting management assessments of PPPO organizations and processes, but primarily addresses independent assessments of contractors.

The PPPO Federal Project Director (FPD) developed PMP-5-08, *Oversight Plan – Maintenance and Operation*, in 2007 to provide DUF6 Conversion Facility-specific safety oversight procedures when the DUF6 project was a capital asset construction project. PMP-5-08 was not fully aligned with the PPPO-wide oversight procedures, including utilizing forms and processes that are not identified in PPPO-wide oversight procedures. However, the intent for identifying, documenting, and tracking issues was met. Subsequent DUF6 Project FPDs continued to provide oversight using PMP-5-08 after they became operational in 2010 and continued its use through early FY 2016. The PMP-5-08 oversight procedure primarily addresses surveillances and use of field inspection reports to document and track surveillance results. PMP-5-08 does not address DOE Order 226.1B requirements for evaluation of the CAS, and it is inconsistent with the PPPO-wide oversight procedures. **(Deficiency)**

PPPO managers and technical leads stated that they recognize the need to revise the oversight procedures and have started drafting the revisions. The current DUF6 Project FPD has taken the lead on updating the OPP and plans to incorporate the DUF6 PMP-5-08 oversight processes where they would improve the PPPO-wide oversight processes. In February 2016, the DUF6 Project FPD directed by email development of changes to DUF6 Project oversight processes to adopt the use of PPPO-wide oversight procedures. Implementation of the revised practices awaits approval of the revised PPPO-wide oversight procedure. In March 2016, the DUF6 Project FPD directed by e-mail that some changes are required until PMP-5-08 is merged with the PPPO procedure on assessments and surveillances. Those changes included modifying the field inspection forms to include a DOE QA review as well as a DOE Deputy FPD review prior to sending to the contractor for information and action as necessary. EA observed evidence that some Portsmouth DUF6 Conversion Facility oversight activities were currently following the PPPO-wide process, such as the FY 2017 annual assessment and surveillance schedule, and recent assessment results and corrective actions documented in the Management Tracking System (MTS). However, there was evidence that SSC personnel supporting PPPO line oversight of the Portsmouth DUF6 Conversion Facility were continuing to document oversight issues they identified and associated contractor corrective actions by PMP-5-08 processes. (See **OFI-PPPO-01.**)

EA reviewed the annual assessment schedules for FYs 2014 through 2017. The schedules for FY 2014 through 2016 were developed before the FPD's direction to follow PPPO-wide oversight procedures; however, they were found to be adequate. The *FY 2017 DUF6 Assessment & Surveillance Plan* was in accordance with the PPPO oversight procedures and focused on the PPPO-required core assessment areas. In view of a new DUF6 contractor starting in February 2017, the FY 2017 assessment schedule targets appropriate areas, including ISM, operating experience, worker safety and health, maintenance, nuclear safety, radiation protection, CAS components, readiness assessment for re-starting DUF6 conversion operations, and other topics covering previous contractor WP&C-related performance issues. The formal FY 2017 schedule notes that the schedule may evolve due to contractor transition activities.

Before FY 2016, completion of DUF6 project assessment schedules was tracked primarily by SSC SMEs and shared with Federal managers periodically. To put emphasis on FY 2017 assessments and surveillances, the DUF6 Project FPD dedicates a portion of the DUF6 project integrated project team weekly calls to tracking assessment schedule progress and planning upcoming scheduled assessments and surveillances.

The PPPO Management Plan does not address responsibility for corrective action management systems and their use, and PPPO has not developed implementing procedures for corrective action processes as noted above. However, PPPO does use two processes for managing issues: the MTS for PPPO issues and PPPO-identified oversight issues related to remediation/D&D and infrastructure contracts; and the BWCS Condition Report database for PPPO-identified oversight issues related to the DUF6 project. This database ties issues found by PPPO to condition reports and requires access to the BWCS database to track corrective actions and completion. The Portsmouth DUF6 Conversion Facility SSC SMEs validate corrective actions by conducting a surveillance at the end of each year. The Federal and SSC SMEs use the MTS and a LiveLink module to capture oversight reports, individual issues, and associated corrective actions. The non-DUF6 project corrective actions are tracked and validated in MTS as contractors complete them. The MTS database provides appropriate analysis tools to identify emerging trends, but its use is not required of all personnel overseeing the DUF6 project. (See **OFI-PPPO-02.**)

*Criterion:*

*DOE Oversight processes must evaluate contractor and DOE programs and management systems, including site assurance systems, for effectiveness of performance (including compliance with requirements). Such evaluations must be based on the results of operational awareness activities; assessments of facilities, operations, and programs; and assessments of the contractor's assurance system. (DOE Order 226.1B)*

PPPO provides oversight of the Portsmouth DUF6 Conversion Facility through operational awareness activities conducted by FRs and oversight of safety systems by trained and knowledgeable engineers. These oversight personnel, along with various SMEs, have also conducted numerous surveillances of WP&C implementation as identified in their assessment and surveillance schedules (e.g., conduct of operations, hazard identification and control, LOTO, system health and maintenance activities, and work control).

While PPPO has reviewed WP&C implementation through surveillances, PPPO has not conducted formal assessments of the DUF6 conversion project contractor's overall WP&C program. (See **OFI-PPPO-03**.)

EA reviewed 17 field inspection reports (FIRs) from FY 2015 and 2016 that documented WP&C-related surveillances conducted by Portsmouth DUF6 Conversion Facility FRs and SSC SMEs. These FIRs covered elements of WP&C, including planning walkdowns, pre-job briefings, work activities, and post-job briefings. These FIRs effectively identified substantive issues and provided thorough documentation for BWCS to take corrective actions.

Evidence of oversight provided by the SSO engineer, augmented by SSC SMEs, included several system health surveillance reports for the Portsmouth DUF6 Conversion Facility safety significant systems in FY 2015 and 2016; an assessment (PPPO-14-IA-I00661, *Cognizant System Engineer Program & Configuration Management-Design Change Request-USQD Process*); and documentation of concerns about DUF6 deferred maintenance. The PPPO SSO at the Portsmouth DUF6 Conversion Facility provided a current qualification card.

PPPO provides oversight of startup activities, including a recent shadowing of the BWCS readiness assessment at Paducah and, according to the FY 2017 assessment and surveillance schedule, is scheduled to conduct a PPPO-led readiness assessment prior to the restart at the Portsmouth site. These methods for overseeing restart are appropriate, given the different safety performance history of the two facilities.

Oversight results are adequately communicated to the contractor through assessment reports, FIRs, and quarterly PPPO performance evaluation board feedback on safety performance and award fee, which includes evaluation of functional areas and CAS performance. PPPO established a performance evaluation board to monitor Performance Evaluation and Management Plan (PEMP) metrics and recommend award fee on a quarterly basis. As a positive observation, the new DUF6 Project FPD recognized the need to adjust the contract PEMP in early FY 2016 to drive better safety and operational performance and plans to continue these changes into the new DUF6 project contract PEMP. The changes included a reduced emphasis on award fee for production that was balanced with the requirement to make programmatic improvements, such as reducing the maintenance and condition report backlog. A performance-based incentive was included in the FY 2016 PEMP to enhance the CAS issue management system, resulting in a robust tool for managing and trending issues. In addition, the DUF6 Project FPD plans to address the appropriate PPPO-approved ISMS performance objectives, measures, and commitments in the PEMP.

PPPO also communicates oversight results and safety performance concerns to BWCS by letter from the PPPO Manager, contracting officer, or contracting officer's representative when concerns need to be addressed in a timely manner. For example, PPP0-02-3790853-16 letter, *Contract NO. DE-AC30-11CC40015, DUF6 Conversion Project: Safety Performance*, identified a series of events that pointed to serious deficiencies in ISMS implementation, including a statement that the "continued inability to comply with written procedures indicates a breakdown by BWCS to effectively implement ISMS in the field." In this letter, PPPO requested a corrective action plan to address these weaknesses.

The operation experience quarterly performance (recurring event) analysis process and implementation of the Office of Environmental Management ISMS annual review and declaration direction are well established and have provided important insights to the implementation posture of ISMS at the DUF6 project and other prime contractors.

*Objective:*

*The DOE field element has implemented an effective Facility Representative (FR) program. (DOE Order 422.1)*

PPPO-2691323, *Facility Representative Program Plan*, appropriately defines the FR program and FR duties and responsibilities, with the exception of requirements for ensuring appropriate coverage during night and weekend shifts (see OFI-PPPO-05 noted below). The FR plan indicates that FRs participate in assessments and surveillances, and their participation was evident on the annual assessment schedules for the Portsmouth DUF6 Conversion Facility and numerous completed field inspection and assessment reports. DOE-STD-1063-2011 requires field elements to conduct a triennial FR program self-assessment; however, there is no evidence that this self-assessment has been conducted since March 2010.

**(Deficiency)** The last annual staffing analysis, conducted in January 2016, indicates the need for seven FRs between the Paducah and Portsmouth sites; however, the Federal Technical Capability Program (FTCP) third quarter FY 2016 report on Federal technical capability indicates that eight FRs are needed. The October 10, 2016, version of the PPPO organizational chart indicates a total of eight FR positions. PPPO currently has three fully qualified FRs, two FRs nearing completion of their qualification requirements, and two FRs hired during this assessment period; one position remains vacant.

Currently, no full-time qualified FRs are assigned at either DUF6 conversion facility, due to the retirement of two highly experienced FRs in FY 2015. PPPO management reported that staffing level restrictions would not allow PPPO to hire new FRs before the retiring FRs left, so the replacement FRs had no experienced mentors. The currently assigned FRs and the backup FR for DUF6 conversion facilities are all located at the Portsmouth site. They had completed the general technical base and functional area qualifications at the time of the EA assessment. PPPO has several compensatory measures until the FRs become fully qualified, including providing opportunities to participate in re-start readiness assessment activities at the Paducah site, and plans to use former a former, experienced DUF6 project FR to provide one-on-one mentoring opportunities. EA found these compensatory measures adequate. The hiring of a professional industrial hygienist as the lead Portsmouth FR was a positive example of ensuring that PPPO has the skills to conduct oversight to address hazards found throughout PPPO contract work. To augment day-to-day operational awareness activities at the Portsmouth DUF6 Conversion Facility where needed, the DUF6 project FPD ensures that additional SSC SME resources support oversight with frequent walkthroughs of the facilities.

EA noted numerous FIRs in which the FRs and SSC SMEs identified serious safety issues for resolution by BWCS (e.g., fall protection issues during maintenance activities on the roof of the DUF6 Conversion Facility). EA observed an FR walkthrough of the DUF6 Conversion Facility and found the FR knowledgeable of the facilities, personnel, and current work activities. An up-to-date event reporting

procedure was displayed in FR offices, and, during interviews, PPPO managers said they receive reports from the FRs as needed. EA confirmed that FR quarterly performance indicators are being developed for the DOE FR program manager. The weekly meetings with PPPO management are an effective method of communication, and they give the FRs and other technical staff access to senior management. Overall, the FRs, with the supplemental support of SSC SMEs, are providing effective oversight. However, FRs do not currently schedule or perform oversight of work activities during the weekend and on the night shifts to provide the full coverage of work as required by DOE-STD-1063-2011, *Facility Representatives*. (See **OFI-PPPO-04**.)

As part of the assessment, EA requested to observe the delivery and transfer of liquid nitrogen to the Portsmouth DUF6 Conversion Facility nitrogen plant. EA was informed that the FR had recently asked to observe this nitrogen operation as well but had received “pushback” from BWCS. While this was the only such instance reported, EA believes it indicates potential impediments to unencumbered FR access to DUF6 activities. (See **OFI-PPPO-05**.)

*Objective:*

*Maintain sufficient technical capability and knowledge of site and contractor activities to make informed decisions about hazards, risks, and resource allocation; provide direction to contractors; and evaluate contractor performance. (DOE Order 226.1B)*

PPPO-M-426.1-0, *Technical Qualification Program Plan (TQPP)*, meets the requirements of DOE Order 426.1, *Federal Technical Capability*. The PPPO OPP supplements the PPPO TQPP with requirements and procedures for ensuring that SSC SMEs who support Federal safety oversight are technically qualified for their functions, responsibilities, and authorities.

The TQPP lists responsibilities for a FTCP Program Analyst that include maintaining training and qualification records for all technical qualification program (TQP) participants; however, this position has been vacant for two years. Current PPPO position descriptions indicate that 46% of 75 staff positions require the incumbent to be TQP qualified. Based on interviews with the human resources management analyst, the Nuclear Safety Oversight Lead (NSOL), the QA Lead, and the DUF6 Project FPD, and a review of available documentation, the PPPO TQP records are not current. PPPO has just recently started to reestablish and document TQP participant records. The TQP has not been effective in documenting the current qualifications of technical safety oversight personnel as required by PPPO-M-426.1-0, DOE Order 426.1, and the PPPO QAPP. **(Deficiency)**

Based on DOE Order 426.1 and the PPPO TQPP, EA noted six PPPO positions meeting the criteria for incumbents to be qualified as Senior Technical Safety Managers (STSMs) due to their supervision of or responsibility for FRs or TQP participants. The June 2016 FTCP third quarter report confirms six STSM positions at PPPO, but only the PPPO Manager is identified as STSM qualified. **(Deficiency)** Interviews with senior PPPO managers indicate that they either were previously qualified (but beyond the five-year requalification period) and/or have assembled STSM qualification documentation for processing. However, the processing, review, and approval of their qualification cards has languished for several years. For example, the STSM qualification card for the NSOL was completed in 2013 but was not effectively processed for review and approval per the TQPP.

PPPO has not conducted the required quadrennial self-assessment of TQP and FTCP implementation as required by DOE Order 426.1, Section 4.b.7. **(Deficiency)** This assessment was on the assessment and surveillance schedule in FY 2015 and FY 2016. However, the November 2016 status comments on the FY 2016 assessment schedule indicate that this self-assessment is now scheduled as part of the DUF6 restart readiness assessment. (See **OFI-PPPO-06**.)

EA found that the new, currently unqualified FRs are receiving frequent NSOL attention to assist them in the general technical basis, functional area, and site-specific training and experience needs.

EA noted some documentation (e.g., a current resume) of the technical qualifications of SSC SMEs supporting the Federal safety oversight functions. However, no technical training and qualification standards have been established for SME positions and no list of qualified SSC SMEs has been established, as required by the OPP, Section 5.4. **(Deficiency)**

*Criterion:*

*An effective employee concerns program has been established and implemented. (DOE Order 442.1A, CRAD 45-21)*

The functions, responsibilities, and authorities section of the PPPO Management Plan assigns responsibility for the PPPO employee concerns program (ECP) to site leads and the DUF6 Project FPD, and the ISMS section assigns this responsibility to the EM Consolidated Business Center. However the ECP is currently being managed by the human resources management analyst. EA's interview with the ECP Lead indicated that she has sufficient ability to manage employee concerns and identify appropriate oversight personnel (primarily FRs and SMEs) to conduct effective reviews of the concerns. PPPO records indicate 27 employee concerns in FY 2016, 7 of them from DUF6 project contractor employees. Four of the seven concerns were submitted anonymously. The ECP Lead informs the PPPO manager as concerns are received.

The PPPO ECP Lead does not have a designated trained backup assigned in the event of absences to respond to new employee concerns in a timely manner, keep ongoing concern investigations on track, and communicate the status/results to concerned individuals in a timely manner. (See **OFI-PPPO-07**.) PPPO has not conducted an annual required self-assessment of ECP effectiveness in accordance with DOE Order 442.1A, Section 4.f. for at least the last two years. **(Deficiency)** The ECP Lead conducted an independent assessment of the BWCS DUF6 ECP in FY 2016, but it did not meet all the requirements of PPPO-2533131; it was not conducted or led by a Nuclear Quality Assurance-1 qualified auditor and did not follow the format for an assessment. **(Deficiency)**

EA's review of PPPO-M-442.1-1, *Processing of Employee Concerns*, noted several areas that are ambiguous or not adequately specific. (See **OFI-PPPO-08**.) These include:

- PPPO-M-442.1-1 does not have a requirement to provide responses or status reports to concerned individuals in a specific timeframe. Many DOE sites require feedback or status reports to a concerned individual within 10 days (final response or plan for responding). Prompt engagement with the concerned individual is important to building confidence in the ECP process. The ECP Lead indicated that she has an informal goal of two days to respond to concerned individuals.
- PPPO-M-442.1-1 has no requirement for the ECP Lead to notify concerned individuals that their concern will be referred back to their contractor management for investigation and proposed resolution if the concern is substantiated. Such a requirement would assist the ECP Lead in identifying any vulnerabilities in referring the concern back to the concerned individual's contractor management for action.
- While the ECP Lead maintains an informal employee concern tracking table, PPPO-M-442.1-1 does not include a formal requirement to track employee concerns data for trending purposes, as well as for assurance that concerns and substantiated concern corrective actions are address in a timely manner. The informal tracking table kept by PPPO ECP Lead does not cover many of the

data elements described in DOE Guide 442.1-1, Section 6.4, *Employee Concerns Tracking System*. At the request of the PPPO ECP Lead, EA performed a gap analysis between the current informal concerns tracking table data elements and those described in DOE Guide 442.1-1 1. The gap analysis identified 12 data elements not included in the current PPPO employee concerns tracking table.

*Criterion:*

*An effective differing professional opinion process or program has been established and implemented. (DOE Order 442.2)*

PPPO uses DOECAST emails and contractor advertisements and posters to adequately inform employees regarding the availability of the differing professional opinion process outlined in DOE Order 442.2. A public address announcement informing employees about this process was made throughout the DUF6 facilities while EA was on site for this assessment. The PPPO human resources management analyst was not aware of any differing professional opinions submitted from PPPO.

### **Portsmouth/Paducah Project Office Oversight Conclusion**

Although PPPO has limited Federal oversight staff and oversight procedures that have not been updated as needed, PPPO has ensured effective oversight of the DUF6 project. PPPO has identified substantive issues in WP&C through operational awareness oversight and formal assessments, as documented in FIRs and assessment reports. Positive observations include PPPO's effective use of safety performance analysis (recurring event/trending) and recognition of the need to change the contract PEMP approach to address safety and work performance issues.

PPPO is reestablishing its FR resources at both the Paducah and Portsmouth sites with eight FR positions: three fully qualified, two in the process of qualifying early FY 2017, two new hires in October 2016, and one remaining vacancy.

PPPO's evaluation of the BWCS CAS includes reviews of closed condition reports and corrective actions, contractor self-assessments, and event response, and PPPO provides adequate evaluation of the contractor's WP&C performance. PPPO's oversight of DUF6 project activities has been different than required by the PPPO-wide oversight procedures, but PPPO is now integrating the oversight process to provide one consistent oversight approach for all PPPO projects.

PPPO has inadequate records and management support for ensuring an effective TQP and providing training and qualification assurance for SSC SMEs performing oversight. Other concerns include needed improvements in the ECP.

## **8.0 FINDINGS**

Findings are deficiencies that warrant a high level of attention from management. If left uncorrected, findings could adversely affect the DOE mission, the environment, the safety or health of workers and the public, or national security. DOE line management and/or contractor organizations must develop and implement corrective action plans for EA appraisal findings. Cognizant DOE managers must use site- and program-specific issues management processes and systems developed in accordance with DOE Order 227.1A to manage these corrective action plans and track them to completion. In addition to the findings, deficiencies that did not meet the criteria for a finding are listed in Appendix C, with the



expectation from DOE Order 227.1A for site managers to apply their local issues management processes for resolution.

**F-BWCS-WP-01: BWCS has not developed or implemented an effective low-hazard work control process (i.e., skill of the craft/worker program) that ensures that the core functions of ISMS are achieved as required by DOE Policy 450.4A, *Integrated Safety Management Policy*, and the associated DOE Guide 450.4-1C. Specifically:**

- The BWCS *Control of Work* procedure lacks requirements and guidance for low-hazard work with respect to the core functions of ISM, particularly work scope definition, hazard identification and analysis, development and implementation of controls, and work authorization.
- Low-hazard work is also exempted from all of the requirements of the *Control of Work* procedure, resulting in a lack of guidance and requirements for some low-hazard work control elements, such as pre-job briefings.
- The BWCS *Control Work* procedure lacks guidance on the limitations of work that can be performed as low hazard.
- The BWCS *Control of Work* procedure does not consider how the rigor of work planning for low-hazard work is impacted by work complexity or the use of multiple safety permits resulting in “low-hazard” activities.
- The mechanisms for tailoring the work scope, hazards and controls for the day’s work activities were not clear in a number of routine operations and low-hazard work, as required by DOE Policy 450.4 and the associated DOE Guide 450.4-1C, Appendix 6.

**F-BWCS-WP-02: BWCS has not developed and implemented an exposure assessment program for assessing worker risk (qualitative and quantitative) for all work areas or operations using recognized exposure assessment methodologies (e.g., the AIHA Exposure Assessment Strategy Manual) or other recognized exposure assessment methodologies as required by 10 CFR 851.21 (a)(2) and 10 CFR 851 Appendix A.6.**

## 9.0 OPPORTUNITIES FOR IMPROVEMENT

EA identified some OFIs to assist cognizant managers in improving programs and operations. While OFIs may identify potential solutions to findings and deficiencies identified in appraisal reports, they may also address other conditions observed during the appraisal process. EA offers these OFIs only as recommendations for line management consideration; they do not require formal resolution by management through a corrective action process and are not intended to be prescriptive or mandatory. Rather, they are suggestions that may assist site management in implementing best practices or provide potential solutions to issues identified during the assessment.

**OFI-BWCS-WP-01:** BWCS should consider benchmarking other DOE site programs developed for low-hazard or skill-of-the-craft/workers. An example of a mature low-hazard work control program is the DOE Y-12 National Security Complex maintenance skill-of-the-craft program.

**OFI-PPPO-01:** PPPO should consider establishing specific expectations and plans for oversight for DUF6 project work to be conducted in accordance PPPO-wide oversight procedures.

**OFI-PPPO-02:** PPPO should consider requiring all organizations and personnel overseeing the DUF6 project to use the MTS database and corrective action validation method to provide improved tracking of issues and real-time validation of corrective action completion, as well consistency in oversight over all

PPPO projects.

**OFI-PPPO-03:** PPPO should consider conducting formal assessments of the Portsmouth DUF6 Conversion Facility WP&C program.

**OFI-PPPO-04:** PPP4 should consider revising the FR procedure to address coverage of all shift work and the Portsmouth DUF6 Conversion Facility night and weekend shift work activities.

**OFI-PPPO-05:** PPPO should consider ensuring that contractor management understands that DOE FRs and other oversight personnel have unencumbered access to DUF6 project activities. This should also be considered for the new contractor that will be managing the DUF6 project starting in January 2017.

**OFI-PPPO-06:** PPPO should ensure the conduct of the required quadrennial self-assessments of TQP and FTCP implementation as required by DOE Order 426.1, Section 4.b.7.

**OFI-PPPO-07:** PPPO should consider designating a trained ECP Lead backup in the event of absences in order to ensure that new employee concerns are investigated in a timely manner, ongoing concern investigations are on track, and the status/results are communicated to concerned individuals in a timely manner. In addition, consider ensuring that ECP files and tracking documentation are immediately accessible to the backup ECP Lead to ensure proper continuity when the ECP Lead is not available.

**OFI-PPPO-08:** PPPO should consider the following additions to PPPO-M-442.1-1, *Processing of Employee Concerns*, to added needed clarification and specificity, including requirements for:

- Providing responses or status reports to concerned individuals in a specific timeframe
- The ECP Lead to notify concerned individuals that their concern will be referred back to their contractor management for investigation and proposed resolution if the concern is substantiated
- Maintaining a formal tracking system in accordance with DOE Guide 442.1, Section 6.4, *Employee Concerns Tracking System*.

## **Appendix A Supplemental Information**

### **Dates of Assessment**

Scoping Visit: September 16-23, 2016  
Onsite Assessment: October 24-28 and November 14-17, 2016

### **Office of Enterprise Assessments (EA) Management**

Glenn S. Podonsky, Director, Office of Enterprise Assessments  
William A. Eckroade, Deputy Director, Office of Enterprise Assessments  
Thomas R. Staker, Director, Office of Environment, Safety and Health Assessments  
William E. Miller, Deputy Director, Office of Environment, Safety and Health Assessments  
C.E. (Gene) Carpenter, Jr., Director, Office of Nuclear Safety and Environmental Assessments  
Patricia Williams, Director, Office of Worker Safety and Health Assessments  
Gerald M. McAteer, Director, Office of Emergency Management Assessments

### **Quality Review Board**

William A. Eckroade  
John S. Boulden III  
Kevin L. Dressman  
Thomas R. Staker  
William E. Miller  
C.E. (Gene) Carpenter, Jr.  
Patricia Williams  
Gerald M. McAteer  
Michael A. Kilpatrick

### **EA Site Lead for PPPO**

Rosemary B. Reeves

### **EA Assessors**

Kevin G. Kilp, Team Leader  
Patricia Williams  
Terry E. Krietz  
James R. Lockridge  
Valerie M. Steele

## **Appendix B**

### **Key Documents Reviewed, Interviews, and Observations**

#### **Documents Reviewed**

- Daily Plan of the Day Packages
- 10 CFR 851 Worker Safety and Health Program, DUF6-BWCS-PLN-074, 7/24/2016
- DUF6 Project Planning Guide, BWCS-U-WCG-002, 7/29/2015
- Integrated Safety Management System Plan, DUF6-BWCS-PLN-040, 12/18/2016
- Control of Work, BWCS-U-GFP-0108, 5/24/2016
- Hazard Analysis, BWCS-U-SHP-0211, 8/31/2016
- Access Control for the Paducah and Portsmouth DOE UF6 Cylinder Storage Yards, BWCS-u-CYP-0001, 8/22/2016
- Procedure Use and Adherence, BWCS-U-GFP-0022, 2/16/2016
- Technical Procedure Development, BWCS-U-GFP-0015, 8/3/2016
- Temperature Extremes, BWCS-U-SHP-0514, 8/24/2015
- Exposure Assessments (Non-Radiological), BWCS-U-SHP-0505, 8/24/2015
- Hearing Conservation Program, BWCS-U-SHP-0502, 8/24/2015
- Cylinder Yard Technician Qualification Card, BWCS-X-TPD-CYO-001-F01, Rev. 1, 9/26/2016

#### ***Subcontractor Files***

- BWCS Work Order, Liquid Nitrogen Delivery, WO 1603329 LN2 Delivery 11-15-16
- Airgas Merchant Gases Liquid Unloading procedure
- Vendor (Air Liquide) Delivery of Liquid Nitrogen, Att. A – NIT-TOD-03, Rev. 1
- Air Liquide Procedure Number 2B-INDDST-OPS-0007-P
- Geiger Brothers Scaffolding Services Agreement, LEXS160176-00-SUB-Pennington, SOW-14-X-ENG-0004, REV. 0, 2/01/2016

#### ***PPPO Files***

- PPPO Organizational Chart, 10/20/16
- DOE Contract No. DE-AC30-11CC40015 with BWCS, *Operation of DUF6*, December 2010
- PPPO-M-226.1-2, *Oversight Program Plan*, Rev 1, March 2010
- PPPO-M-414.1-6F, *Quality Assurance Program Plan*, Rev 6, October 2013
- PPPO-M-414.1-1, *Corrective Action Program*, February 2010
- PPPO-M-426.1-0, *Technical Qualification Program Plan*, Rev 0, April 2013
- PPPO-M-442.1-1, *Processing of Employee Concerns*, Rev 0, July 2010
- PPPO-2533131, *Assessment and Surveillance Process*, Rev 2, October 2014
- PPPO-2691323, *Facility Representative Program Plan*, Rev 3, March 2015
- PPPO-2649582, *Management Plan*, Rev 3, February 2015 (includes Appendix C, *Integrated Safety Management System Description* )
- PMP-5-08, [PPPO DUF6 Project] *Oversight Plan - Operations and Maintenance*, Rev 3, March 2012
- *DUF6 Conversion Project Assessment Schedule – FY15 Planned*, Rev 0, 9/29/14
- *DUF6 Conversion Project Assessment Schedule – FY16 Planned*, Rev 0, 10/7/15
- *DUF6 Conversion Project Assessment Schedule – FY16 Planned*, Rev 0, with comments, November 2016
- *FY 2017 DUF6 Assessment & Surveillance Plan*, 10/8/16
- PPPO-OI-I056-11 Letter from PPPO Thompson to Project Manager, BWCS, subj: *Contract NO. DE-AC30-11CC40015, DUF6 Conversion Project: Request for Action on Deliverable D-7, Site Contractor Assurance System Description*, dated 3/21/11

- PPP0-01-2982953-15 Letter from PPPO Murphie to Project Manager, BWCS, subj: *Contract No. DE-AC30-11CC40015, DUF6 Conversion Project: Approval of Worker Safety and Health Program Annual Update*, dated 7/17/15
- PPPO-01-1056-11 Letter from PPPO Thompson to Project Manager, BWCS, subj: *Contract No. DE-AC30-11CC40015, DUF6 Conversion Project: Request for Action on Deliverable D-7, Site Contractor Assurance System Description*, date 3/21/11
- PPP0-01-3216141-16 Letter from PPPO Edwards to Chair, FTC P, subj: *Portsmouth/Paducah Project Office Annual Workforce Analysis and Staffing Plan Report for Calendar Year 2015*, dated 1/15/16
- Memorandum from FTCP Boardman for Distribution, subj: *Annual Workforce Analysis and Staffing Plan Report for Calendar Year 2015*, dated 10/14/15
- Memorandum from Boardman, FTCP, to Distribution, subj: *Quarterly Report on Federal Technical Capability*, dated 7/29/16
- PPP0-01-3216141-16 Letter from PPPO Edwards to Chair, Federal Technical Capabilities Panel (FTCP), *Portsmouth/Paducah Project Office Annual Workforce Analysis and Staffing Plan Report for Calendar Year 2015*, dated 1/15/16
- TQP Qualification Card for T. Hines, NSOL, STSM functional area qualification, unsigned by first-line supervisor and FTCP agent, issued 8/8/12
- TQP Qualification Card for R. Mayer, Engineer Functional Area, dated 2/23/10
- TQP Qualification Card for J. Morgan, General Technical Base, dated 8/8/16
- PPPO-O 1-405-10 Letter from PPPO McCallister to PPPO Nuclear Safety Basis Lead, subj: *Management Assessment of the Portsmouth/Paducah Project Office Facility Representative Program (PADU-10-1A-056)*, 3/22/10
- *FISCAL YEAR 2016 A WARD FEE PLAN For BWXT Conversion Services, LLC*, Rev 1, December 2015
- Award Fee Evaluation Period 5 [FY16] Determination Scorecard *FY15 Award Fee Determination Scorecard* for BWCS
- *Award Fee Evaluation Period 5 Determination Scorecard* For BWCS FY16 Performance
- PPP0-01-3261831-16B Letter from PPPO Edwards to President, BWCS, subj: *Contract No. DE-AC30-11CC40015, DUF6 Conversion Project: Award Fee Determination for Fourth Period Ending in Fiscal Year 2015*, dated 2/8/16
- PPPOO 1-2667849-15 Memorandum from PPPO Burbank to PPPO Murphie, subj: *Performance Evaluation Board Award Fee Recommendation for Third Period, Babcock & Wilcox Conversion Services, LLC Depleted Uranium Hexafluoride Project Contract DE-AC-30-11CC40015*, 12/4/14
- PPP0-02-3790853-16 Letter from PPPO Knerr to President, BWCS, subj: *Contract NO. DE-AC30-11CC40015, DUF6 Conversion Project: Safety Performance*, dated 9/23/16
- PPP0-01-3263698-16 Letter from PPPO Swett to President, BWCS, subj: *Contract NO. DE-AC30-11CC40015, DUF6 Conversion Project: Request for Corrective Action Plan from BWXT Conversion Services, LLC*, dated 11/27/15
- PPPO-01-2111927-14 Letter from PPPO Zimmerman to Project Manager, BWCS, subj: *Contract No. DE-AC30-11CC40015, DUF6 Conversion Project: Babcock & Wilcox Conversion Services, LLC Reporting and Learning Culture Issue Letter Response Fails to Capture Department of Energy-Integrated Project Team Previously Identified Minimum Response Requirements*, dated 10/8/13
- PPPO-01-2308633-14 Letter from PPPO Burbank to Acting Project Manager, BWCS, subj: *Contract No. DE-AC30-11CC40015, DUF6 Conversion Project: Request for Action for Prompt Short Term Corrective Actions for Hazards Analysis Weakness*, dated 4/24/14
- PPPO-01-2357188-14 Memorandum from PPPO Burbank to PPPO Murphie, subj: *Extent of Condition Review on Deferred Maintenance of Safety Related Systems*, dated 6/3/14

- PPP0-01-3313555-16 Letter from PPPO Edwards to Project Manager, BWCS, subj: *Contract No. DE-AC30-11CC40015, DUF6 Conversion Project: Department of Energy Concerns with the Condition Report Process*, dated 12/18/15
- Letter from BWCS Woolery to PPPO Edwards, subj: *Contract No. DE-AC30-11 CC40015, DUF6 Conversion Project: Response to Department of Energy Concerns with the Condition Report Process*, dated 1/20/16
- PPP0-02-3299326-16C Letter from PPPO Edwards to Project Manager, BWCS, subj: *Contract No. DE-AC30-11 CC40015, DUF6 Conversion Project: Safety Focus Areas for Fiscal Year 2016 Performance Review Period*, dated 1/14/16
- PPP0-01-3342887-16 Letter from PPPO Edwards to Project Manager, BWCS, subj: *Contract No. DE-AC30-11CC40015, DUF6 Conversion Project: Forwarding of Field Inspection Reports for First Quarter Fiscal Year 2016*, dated 1/14/16
- PPP0-01-3712841-16 Letter from PPPO Edwards to Project Manager, BWCS, subj: *Contract No. DE-AC30-11CC40015, DUF6 Conversion Project: Approval of BWXT Conversion Services, LLC Start-up Notification Report for the Paducah Depleted Uranium Hexafluoride Facility*, dated 8/18/16
- PPP0-02-3 790853-16 Letter from PPPO Knerr to Project Manager, BWCS, subj: *Contract No. DE-AC30-11CC40015, DUF6 Conversion Project: Safety Performance*, dated 9/23/16
- PPP0-01-3421312-16 Letter from PPPO Knerr to Project Manager, BWCS, subj: *Contract No. DE-AC30-11CC40015, DUF6 Conversion Project: Department of Energy Response to the BWXT Conversion Services, LLC Corrective Action Plan for Portsmouth Depleted Uranium Hexafluoride Facility Chemical Exposure Event*, dated 2/24/16
- PPP0-01-3743730-16 Letter from PPPO Knerr to Project Manager, BWCS, subj: *Contract No. DE-AC30-11CC40015, DUF6 Conversion Project: Forwarding Independent Assessment Report For Fire Protection Program at the Portsmouth Depleted Uranium Hexafluoride Conversion Facility*, dated 9/9/16
- Report, *FY 2015 PPPO Contractor Employee Concerns Program (ECP) Assessment*, 9/22/15
- PPPO-1-2230605-14 Letter from PPPO Johnson to Project Manager, BWCS, subj: *Contract No. DE-AC30-11CC40015, DUF6 Conversion Project: Independent Assessment Report for the Babcock & Wilcox Conversion Services, LLC Cognizant System Engineer Program to Include – Configuration Management – Design Change Request and Unreviewed Safety Question Determination (PPPO-IQ-100661)*, dated 2/21/14
- PPP0-02-3790853-16 Letter from PPPO Knerr to BWCS Project Manager, subj: *Contract No. DE-AC30-11CC40015, FIR DUF6 Conversion Project: Safety Performance*, dated 9/23/16.
- PPP0-01-3637803-16 Letter from PPPO Swett to Distribution [Project Manager, BWCS], subj: *Fiscal Year 2016 Integrated Safety Management System and Quality Assurance Effectiveness Review Declaration*, dated 8/3/16
- Letter from BWCS Woolery to PPPO Swett, subj: *Contract No. DE-AC30-11 CC40015, DU Fe Conversion Project Fiscal Year 2016 Annual Integrated Safety Management System and Quality Assurance Effectiveness Review Declaration*, 10/18/16
- PPPO-01-2830193-15 Memorandum from PPPO Murphie to Office of Environmental Management Hutton, subj: *Fiscal Year 2014 Annual Integrated Safety Management System and Quality Assurance Effectiveness Review and Annual Declaration*, dated 4/1/15
- PPP0-01-3342887-16 Letter from PPPO to BWCS Project Manager, subj: *Contract No. DE-AC30-11CC40015, DUF6 Conversion Project: Forwarding of Field Inspection Reports for First Quarter Fiscal Year*, dated 1/14/16
- PPP0-02-3417919-16 Letter from PPPO Edwards to Project Manager, BWCS, subj: *Contract No. DE-AC30-11CC40015, DUF6 Conversion Project: Forwarding Personnel Selection Training and Qualification Assessment Report # PPPO-16-IA-1001001*
- *PPPO QA Monthly Report*, June and August 2016

- FIRs Related to WP&C (17); including FIR X/C-201511-027, subj: *Conduct of Operation*, dated 11/27/15
- FIR C-201601-001, subj: *Assessing System Health*, 3/3/16
- FIR C/X-201512-032, subj: *Operating Experience Program (Lessons Learned)*, 1/8/16
- FIR C/X-201603-006, subj: *Test Rig Corrective Action Plan Review*, 9/1/16
- Condition Reports Nos: 16-413; 16-444; 16-465; 16-477; 16-508
- DUF6 Quarterly Safety Analysis Reports for 1Q-4Q FY15 and 1Q-2Q FY16
- Email from PPPO Knerr to Mowbray, subj: *Integrating oversight/assessment of DUF6 into existing PPPO procedures/processes*, dated 2/17/16
- PPPO-M-420.1-3, *Safety Systems Oversight Program Plan*, Rev 1, September 2012
- Independent Assessment Report PPPO-14-IA-I00661, *Cognizant System Engineer Program & Configuration Management-Design Change Request-USQD Process*, 2/11/14
- Email from PPPO Knerr to Jim Kenney, subj: *Your questions on FIRs*, dated 03/04/2016

## **Interviews**

### ***PPPO***

PPPO Manager, Lexington Office  
 PPPO Deputy Manager, Lexington Office  
 PPPO Site Lead, Portsmouth Site  
 PPPO DUF6 Program Manager / Federal Project Director, Paducah Site  
 PPPO DUF6 Deputy Federal Project Director/General Engineer, Portsmouth Site  
 PPPO Nuclear Safety Oversight Lead, Lexington Office  
 PPPO Quality Assurance Lead, Lexington Office  
 PPPO Quality Assurance Specialist for DUF6, Paducah Site  
 PPPO Safety System Oversight Engineer, Portsmouth Site  
 PPPO Facility Representatives for DUF6 Project, Portsmouth Site  
 PPPO Human Resources Management Analyst, Lexington Office  
 PPPO Support Service Contractor Personnel (RSI/SMSi) Supporting Federal Oversight Activities

### ***BWCS***

Site Technical Representative, Engineer for Nitrogen Plant  
 Operations Manager  
 Facility Managers  
 Operating Technicians  
 Maintenance Manager  
 Maintenance Supervisors  
 Maintenance Technicians  
 ES&H Technicians  
 Industrial Hygiene Manager  
 Work Control Manager  
 System engineers  
 Training Development Manager  
 Training Development Coordinator

### **Observations**

PPPO Facility Representative Oversight of BWCS Plan of the Day Meeting, Pre-job Briefing and DUF6 Facilities  
 Daily Planning Meetings (6:30 AM)  
 Various Plan of the Day Meetings (7:00 AM)

Multiple Pre-job Briefings

Post-Job Briefings:

WO 1603184, Preventative Maintenance, Internal & External Inspection of Packaged Boiler

WO 1501569, Corrective Maintenance, Replace Pump CCW-Cell2 Recirculating Pump

Inspection of Breached Cylinder in X-745-G1 Cylinder Storage Yard

Movement and Placement of Empty UF<sub>6</sub> Cylinders in the Section 8 Cylinder Yard

Walk down for Replacement of UF<sub>6</sub> Cylinders and Conex Boxes in the Cylinder Yards

Verification of LOTO Permit Prior to Calibration of Autoclave Temperature Elements

BWCS Operator Rounds

WO 1603329 Liquid Nitrogen Delivery

WO 1501362, Testing of Autoclave High Temperature Shut Off



## **Appendix C Deficiencies**

Deficiencies that do not meet the criteria for a finding are listed below, with the expectation from DOE Order 227.1A that site managers will apply their local issues management processes for resolution.

### **BWCS - Work Planning and Control Deficiencies**

- Some ES&H training for Cylinder Yard technicians is not provided as required by BWCS procedures. For example, based on the requirements of BWCS-U-SHP-0514, *Temperature Extremes*, such training should be provided via computer-based training or classroom training and not solely through required reading of the DUF6 procedure on temperature extremes, as indicated in the qualification card.
- Contrary to the BWCS *Control of Work* procedure requirements, in some work packages that involve multiple risk levels (i.e., Levels 1, 2, and 3), some work steps are not labeled with risk levels, resulting in confusion among supervision and workers as to the procedural requirements.
- During field observations, workers performed three work activities in which procedures or work packages were not followed as written as required by DOE O 450.1 and BWCS-approved procedures.
  - During corrective maintenance on a component cooling water pump and motor assembly, the work scope boundaries in an approved work package were exceeded and work was not stopped.
  - While filling a nitrogen tank, a subcontractor worker signed work steps in a BWCS procedure signifying work step completion before performing the work step.
  - During the final review of an autoclave temperature element LOTO, and before performing work, the work supervisor identified a discrepancy in the lock tag numbers between the LOTO permit and the locks placed in the field, even though the lock and tag configuration and LOTO had been reviewed and verified as correct.

### **PPPO - Oversight Deficiencies**

- PMP-5-08 oversight procedure does not address DOE Order 226.1B requirements for evaluation of the CAS, and it is inconsistent with the PPPO-wide oversight procedures.
- PPPO is not conducting triennial FR program self-assessment as required by DOE-STD-1063-2011. The last triennial FR program self-assessment was conducted in March 2010.
- The TQP has not been effective in documenting the current qualifications of technical safety oversight personnel as required by PPPO-M-426.1-0, DOE Order 426.1, and the PPPO QAPP.
- Six STSM positions are needed at PPPO based on DOE Order 426.1, but only the PPPO Manager is identified as STSM qualified.
- PPPO has not conducted the required quadrennial self-assessment of TQP and FTCP implementation as required by DOE Order 426.1, Section 4.b.7.
- PPPO did not establish technical training and qualification standards for SSC SME positions or a list of qualified SSC SMEs as required by the OPP, Section 5.4.
- PPPO has not conducted an annual required self-assessment of the ECP effectiveness in accordance

with DOE Order 442.1A, Section 4.f. for at least the last two years.

- An independent assessment of the BWCS DUF6 ECP was not in accordance with PPPO-2533131; it was not conducted or led by a Nuclear Quality Assurance-1 qualified auditor, did not follow the format for assessment reports, and did not review program implementation in a thorough manner.