Independent Oversight Review of Preparedness for Severe Natural Phenomena Events at the Portsmouth Gaseous Diffusion Plant

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Office of Safety and Emergency Management Evaluations
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Acronyms

ACP	American Centrifuge Plant
AHJ	Authority Having Jurisdiction
BDBE	Beyond Design Basis Event
BNA	Baseline Needs Assessment
BWCS	Babcock &Wilcox Conversion Services, LLC
CAS	Central Alarm Station
CRAD	Criteria, Review, and Approach Document
CRD	Contractor Requirements Document
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
DUF6	Depleted Uranium Hexafluoride
EAL	Emergency Action Level
EAP	Emergency Action Plan
EMG	Emergency Management Guide
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EPA	U.S. Environmental Protection Agency
EPHA	Emergency Planning Hazards Assessment
EPIP	Emergency Plan Implementing Procedure
EPZ	Emergency Planning Zone
ERAP	Emergency Readiness Assurance Plan
ERO	Emergency Response Organization
FBI	Federal Bureau of Investigation
FBP	Fluor-B&W Portsmouth LLC
FUEF	Former Uranium Enrichment Facilities
FMT	Field Monitoring Team
FY	Fiscal Year
GETS	Government Emergency Telecommunications Service
HAZMAT	Hazardous Material
HF	Hydrogen Fluoride
HSS	Office of Health, Safety and Security
IC	Incident Commander
INZ	Immediate Notification Zone
LOU	Letter of Understanding
MCI	Mass Casualty Incident
NARAC	National Atmospheric Release Advisory Center
NFPA	National Fire Protection Association
NNSA	National Nuclear Security Administration
NPE	Natural Phenomena Event
NRC	Nuclear Regulatory Commission
OFI	Opportunity for Improvement
PA	Public Address
PAC	Protective Action Criteria
PAR	Protective Action Recommendation
PORTS	Portsmouth Gaseous Diffusion Plant
PPPO	DOE Portsmouth/Paducah Project Office
PSS	Plant Shift Superintendent
PWS	Public Warning System
RAP	Radiological Assistance Program

REAC/TS	Radiation Emergency Assistance Center/Training Site
SAE	Site Area Emergency
TEL	Threshold for Early Lethality
TSR	Technical Safety Requirements
UF_6	Uranium Hexafluoride
UPS	Uninterruptible Power Supply
USAR	Urban Search and Rescue
USEC	U.S. Enrichment Corporation
WEMS	Wastern-EnergX Mission Support, LLC
WPS	Wireless Priority Service

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1.0 PURPOSE

The U.S. Department of Energy (DOE) Office of Enforcement and Oversight (Independent Oversight), within the Office of Health, Safety and Security (HSS), conducted an independent review of the preparedness of the DOE Portsmouth/Paducah Project Office (PPPO), contractors at the DOE Portsmouth Gaseous Diffusion Plant (PORTS), and selected non-leased facilities to respond to a severe natural phenomena event (NPE). The HSS Office of Safety and Emergency Management Evaluations performed this review to evaluate the site's processes for identifying needed emergency response capabilities and maintaining these capabilities in a state of readiness. This report discusses the scope, background, methodology, results, and conclusions of the review.

2.0 SCOPE

This review was conducted in July and August 2013, and the scope included those aspects of the emergency management program related to emergency preparedness for a severe NPE. The primary areas of interest were the identification of needed facility response capabilities and their state of readiness.

United States Enrichment Corporation Inc. (USEC) has responsibility for the site emergency plan and compliance with Nuclear Regulatory Commission (NRC) regulations, while the lead DOE contractor, Fluor-B&W Portsmouth LLC (FBP), is responsible for the site-level response as defined by DOE requirements. FBP provides emergency management services and resources to DOE, DOE contractors, subcontractors, and USEC in accordance with work authorizations. Emergency planning, execution, and implementation of emergency planning activities for non-leased and de-leased facilities are the responsibilities of the respective facility managers/custodians, with assistance and planning coordination from the FBP emergency management staff. The principal contractors included in this review are FBP, Babcock &Wilcox Conversion Services, LLC (BWCS) and Wastern-EnergX Mission Support, LLC (WEMS). Additionally, USEC leases portions of the PORTS facilities, including the emergency operations center (EOC), from the DOE and conducts activities in support of uranium enrichment projects for the construction and deployment of the American Centrifuge Plant (ACP).

The facilities covered by this review include the:

- EOC
- Alternate EOC (located in the Plant Control Facility)
- Fire Station
- Uranium Hexafluoride (UF_6) Sampling Facility
- Depleted Uranium Hexafluoride (DUF6) Conversion Facility.

3.0 BACKGROUND

PORTS is located on a 3,711 acre DOE-owned reservation in sparsely populated, rural Pike County in south central Ohio, approximately 70 miles south of Columbus, Ohio. PORTS consists of approximately 190 buildings, including leased facilities that occupy approximately 500 acres on the site. DOE facilities include administrative offices; Former Uranium Enrichment Facilities (FUEF), which include the UF_6

Sampling Facility; DUF6 Conversion Facility; Resource Conservation and Recovery Act waste storage; mixed waste storage; radiological areas; chemical storage areas; and groundwater treatment facilities.

The emergency management program has undergone significant changes since fiscal year (FY) 2011. On October 1, 2011, DOE transferred the responsibility for the activities conducted by USEC Government Services to the FBP decontamination and decommissioning (D&D) contract. Among the activities transferred to FBP was the implementation of the site emergency management program and the responsibility for the site's emergency response activities; however, USEC retained responsibility for the site emergency plan. Responsibilities for DUF6 operations transitioned from Uranium Disposition Services, LLC, in March 2011, when BWCS was awarded the contract. WEMS continues in its role as the facility support services contractor.

Additionally, PORTS has received several exemptions from the categorization/classification requirements of DOE Order 151.1. The first, granted in 1997, was later updated in 2009 because of changes in the DOE order, the PPPO DOE field offices, and contractors. In August 2011, PPPO requested another exemption to allow PORTS to continue to use the NRC's classification requirements for "Alert" and "Site Area Emergency" (SAE) after USEC's anticipated termination of the certificate for performing gaseous diffusion plant operations at Portsmouth by September 30, 2011. This exemption was granted in a September 2011 memorandum. PPPO later requested clarification of whether this exemption included event categorization. The Office of Emergency Operations responded that PORTS and the DOE contractors are exempt from all the requirements in Section 11 of the DOE Order 151.1C Contractor Requirements Document (CRD). The Director, Office of Emergency Management, confirmed this interpretation in an e-mail dated September 6, 2013.

The last Independent Oversight review of the PORTS emergency management program was in 2006. The November 2006 Independent Oversight report identified six findings and stated that overall, the emergency management program was generally effective for responding to Operational Emergencies when the appropriate response tools were in place.

In addition, DOE Office of Environmental Management and PPPO conducted an assessment of PORTS January 28 through February 12, 2013. Issues identified during that assessment included incomplete hazards surveys for some facilities, use of non-radiological screening information from an outdated DOE order to complete hazards survey reviews, failure to include some assumptions in emergency planning hazards assessments (EPHAs), failure to develop protective action recommendations (PARs) and incorporate them into the emergency plan, and inadequate verification of availability, operability, and maintenance of facilities and equipment. Additionally, procedures needed to clarify roles, responsibilities, and required actions, and coordination and integration with local stakeholders needed improvement. Seven finding were identified.

4.0 METHODOLOGY

This review assessed both the comprehensiveness of the response capabilities identified by PORTS analyses, and their preparedness in terms of attaining and maintaining the necessary response and recovery capabilities. Of particular interest is PORTS preparedness for responding to, and recovering from, plausible severe natural phenomena events. This review was consistent with Objectives 1 through 7 of HSS Criteria, Review, and Approach Document 45-56, *Emergency Management Program Inspection Criteria, Approach, and Lines of Inquiry, Review of Preparedness for Severe Natural Phenomena Events*. These objectives are to determine whether:

1) The site/facility has an effective mechanism for quickly determining whether a natural phenomena event results in the loss of a significant quantity of hazardous material (HAZMAT) and is beyond the site's capability to respond.

2) The site has the means to perform required emergency response functions using designated facilities and reliable onsite equipment in case of severe natural phenomena events.

3) The site has prepared emergency response personnel for a severe natural phenomena event through a systematic and coordinated training and drills program.

4) The site's planning is adequate for obtaining and integrating offsite response assets for events beyond the site's response capability.

5) The site has planned for an approach for event termination and recovery operations through established plans and procedures.

6) The site has planned for sufficient medical support for contaminated or injured personnel that include documented arrangements with offsite medical facilities to transport, accept, and treat contaminated or injured personnel for mass casualty events.

7) The site/facility implements effective mechanisms for managing corrective actions from evaluations, assessments, and appraisals and lessons learned from external and internal reviews, facility training, drills, actual responses, and findings.

The DOE emergency management order is complemented by Order 420.1C, *Facility Safety*, which sets requirements for facilities to resist NPEs, perform baseline needs assessments for response capabilities and pre-incident planning for fire fighters, monitor seismic activity, and evaluate facilities following significant earthquakes. Additionally, Independent Oversight used the National Fire Protection Association (NFPA) codes and standards in its review of standby power sources at specified facilities. Independent Oversight evaluated the processes for identifying emergency response capabilities and maintaining them in a state of readiness in case of a severe NPE. DOE Order 151.1C identifies the functional emergency response requirements for a DOE site/facility, and the emergency management guides (EMGs) associated with DOE Order 151.1C provide guidance for implementing these requirements. Independent Oversight used the order and associated guides as the basis for determining whether DOE requirements and expectations are met. Independent Oversight also referenced applicable DOE, Federal, state, and local requirements when determining compliance with the DOE order.

Independent Oversight reviewed the documentation that establishes and governs PORTS emergency management program processes, including emergency plans, procedures, safety basis documents, program implementing checklists, records of program activities, and memoranda of agreement; interviewed key personnel; and performed walkdowns of facilities and equipment.

5.0 RESULTS

The following sections discuss the observations made by Independent Oversight during this review, keyed to the objectives in HSS CRAD 45-56.

5.1 Objective 1: HAZMAT Release Determination

The site/facility has an effective mechanism for quickly determining whether a natural phenomena event results in the loss of a significant quantity of HAZMAT and is beyond the site's capability to respond.

Independent Oversight reviewed the process guides that FBP and BWCS use to develop their hazards surveys and EPHAs, as well as the hazards surveys, EPHAs, and safety basis documents for the FUEF UF_6 Sampling Facility and DUF6 Conversion Facility. In addition, Independent Oversight reviewed the FUEF and DUF6 EPHAs (to determine the accuracy and adequacy of analyses conducted for severe NPEs) and the safety basis documents (to determine the consistency of the BDBEs identified in both the safety basis documents and the EPHAs). Further, Independent Oversight determined whether the facility-specific emergency action levels (EALs) were based on, and correlated with, the consequence analyses documented in the FUEF EPHA for the UF_6 Sampling Facility and the DUF6 EPHA. The EALs were also reviewed to determine their usability during plausible severe events (e.g., seismic event damaging multiple facilities on site) where the analysis concludes that such events would overwhelm or incapacitate the site's response capability.

Independent Oversight concluded that the FUEF EPHA is not based on a DOE compliant hazards survey and that the conclusions in the FUEF and DUF6 EPHAs were not appropriately used in developing the emergency planning zone (EPZ). Additionally, FBP and BWCS have not developed EALs for all of the classified events determined by EPHAs, and BWCS has not consistently analyzed plausible scenarios representing severe NPEs in the DUF6 EPHA.

DOE Order 151.1C requires development of a hazards survey to examine the features and characteristics of the facilities and activities and to identify generic emergency events and conditions, including NPEs such as earthquakes and tornadoes, and the potential impacts of such emergencies. The order also requires that if the hazards survey identifies specific HAZMAT in quantities that, if released, could result in an Operational Emergency by causing an airborne health hazard, the potential release of these materials requires further analysis in an EPHA. The order further requires that the Protective Action Guides promulgated by the U.S. Environmental Protection Agency (EPA) be used as protective action criteria (PAC) when planning for radioactive material releases. Additionally, the order requires that the EPHA must include a determination of the size of the facility/site EPZ. Although the order requires the development of EALs for the spectrum of potential Operational Emergencies identified in the EPHA, which must include protective actions corresponding to each EAL, PORTS contractors are exempted from the DOE Order 151.1C event categorization and classification requirements contained in Section 11 of the CRD. In accordance with the PORTS emergency plan, PORTS contractors are required to develop the EALs using examples from NRC Regulatory Guide 3.67, Appendix A.

DOE provides additional guidance on the expectations for EPHAs in DOE Guide 151.1-2, *Technical Planning Basis EMG*. Most importantly, the EPHA provides the technical planning basis for determining the necessary plans/procedures, personnel, resources, equipment, and analyses that comprise the Operational Emergency HAZMAT program. The EPHA also performs a key readiness assurance role by providing clear and convincing evidence that the responsible emergency management planners fully understand the facility-specific hazards and that, if used correctly, the EPHA represents a valid technical foundation for developing an emergency management program that is "commensurate with hazards." Additionally, the EMG recommends that analyses in the EPHA calculate the consequences at specific receptors of interest (i.e., facility boundary, onsite receptor locations, site boundary, and offsite locations of interest) and the maximum distances at which consequences exceed the PACs that were used to develop default initial protective actions. Further, the EMG directs EPHA developers to calculate the

maximum distance at which the threshold for early lethality (TEL) would be expected and to use the PAC and TEL distances in determining the facility-specific EPZ.

FBP and BWCS have prepared adequate procedures for developing and maintaining their respective hazards surveys, EPHAs, and EALs that meet the requirements of DOE Order 151.1C and follow the guidance of DOE Guide 151.1-2. The procedures appropriately establish the roles, responsibilities, and administrative and management requirements for preparing, reviewing, approving, and maintaining the hazards surveys, EPHAs, and associated EALs.

In accordance with the BWCS hazards survey development procedure, BWCS developed a hazards survey for the DUF6 Conversion Facility and associated support facilities that contains information on the area buildings and incorporates the provisions of DOE Order 151.1C and DOE Guide 151.1-2. The hazards survey identifies the generic types of emergency events and conditions (including natural phenomena such as earthquakes and tornadoes, wildland fires, and other serious events involving or affecting health and safety, the environment, and safeguards and security at the facility) and the potential impacts of such emergencies.

In accordance with the FBP hazards survey development procedure, FBP developed a DOE order-compliant hazards survey for the former DOE facilities. However, FBP has not ensured total compliance with their procedure and has not developed an order-compliant hazards survey for the recently de-leased FUEF buildings. (See **Finding F-1.**)

Finding F-1: FBP has not developed a hazards survey for all FUEF buildings to identify the conditions to be addressed by the comprehensive emergency management program, as required by DOE Order 151.1C.

In accordance with the EPHA development procedure, FBP developed an EPHA for the FUEF that generally meets the requirements of the order and includes the UF_6 Sampling Facility. The EPHA contains building descriptions, operations and processes, consequence assessments, and facility-level EPZ determinations. The NPEs analyzed in the FUEF EPHA are consistent with the NPEs analyzed in the basis for interim operation for the UF_6 Sampling Facility. FBP appropriately analyzed a severe NPE associated with a loss of confinement that results in the release of 100 percent of the inventory of liquid UF_6 cylinders allowed in the facility per the technical safety requirements (TSRs). The accident scenario initiator is a seismic event, malevolent act, or other applicable NPE (high winds, tornadoes, and windborne missiles). The consequence analysis for this event results in PAC (the projected dose value for initiating protective action) concentrations being exceeded at greater than five miles from the release point. The FUEF EPHA does not provide the TEL determination for use in establishing the EPZ. (See Section 8, **OFI 1**.)

In accordance with the BWCS EPHA development procedure, BWCS developed a DUF6 EPHA that generally meets the requirements of the order. The NPEs analyzed in the DUF6 EPHA are generally consistent with the events analyzed in the DSA for the DUF6 Conversion Facility. BWCS appropriately analyzed a severe NPE associated with the chemical hazards from a UF_6 and a U-238 equivalent release at the DUF6 Full Cylinder Staging Area. Further, BWCS appropriately analyzed a severe NPE associated with a uranium oxide release at the DUF6 Conversion Facility. The scenario appropriately assumed that a seismic event or other applicable NPE (high winds, tornadoes, and tornado missiles) would result in a large loss of building containment, resulting in the release of 100 percent of the uranium oxide contained in the hoppers.

Nevertheless, BWCS did not consistently follow the EPHA development procedure in that the EPHA does not consider BDBEs relative to severe NPEs. Although BWCS analyzed for an NPE associated with

the chemical hazards from a UF_6 and a U-238 equivalent release at the DUF6 Conversion Facility, BWCS did not analyze for a severe NPE that releases large quantities of HAZMAT and did not address all of the types of HAZMAT on site. The consequence analyses for a release of UF_6 and U-238 equivalent assumed that, due to the relatively low energy of the seismic event, only the inventory in the piping between the vaporization room and conversion unit would be involved. Additionally, BWCS did not analyze for a severe NPE associated with a hydrogen fluoride (HF) release at the HF Storage Tank Area. The NPE accident scenario initiator is a seismic event or other applicable NPE; however, the consequence analysis for this event calculated that the PAC and TEL for HF were not exceeded, so these events would not require classification. Although the EPHA contains an analyzed event for a loss of containment that results in PAC concentrations exceeded at greater than five miles beyond the release location with offsite consequences, this event is not associated with an NPE. These results have significantly greater planning distances than those currently used for an NPE accident scenario. (See Section 8.0, **OFI 21**.)

The facility-level EPZ determinations documented in the FUEF and DUF6 EPHAs are not based on the methodology required by the DOE order and do not accurately follow the guidance of the EMG. Per EMG instructions, a site EPZ is a composite EPZ derived from a compilation of all of the site's facility-level EPZs. The minimum size of an EPZ is the distance to TEL, and the maximum size should be the lesser of 10 miles or the distance to PAC. However, FBP and BWCS did not establish the facility-level EPZs using the TEL and PAC distances for the analyzed HAZMAT releases at the applicable facility. Rather than using the distance to TEL and PAC to establish a facility-level EPZ, each EPHA contains justifications for maintaining the two-mile immediate notification zone (INZ) that is not technically based on EPHA results. For example, the FUEF and DUF6 EPHAs result in a PAC distance greater than five miles (TEL is not calculated) from the breach of a large cylinder containing liquid UF_6. Per the EMG, the EPZ should extend closer to the PAC distance rather than the TEL distance for chemical releases. The FUEF EPHA inappropriately dismissed the consequences of the large cylinder release based on a low probability of occurrence. (See Section 8.0, **OFI 1**.) Further, the DUF6 EPHA uses an inappropriate rationale, stating that the area between the INZ and PAC is not heavily populated and thus does not require additional planning activities. Because each EPHA facility-level EPZ is inappropriately bounded by the two-mile INZ, a site composite EPZ was not determined, as required by DOE Order 151.1C. (See **Finding F-2** and Section 8.0, **OFI 21**.)

Finding F-2: FBP has not developed a site EPZ, as required by DOE Order 151.1C.

The emergency classification procedure contains EALs for HAZMAT releases from the FUEF and DUF6 Conversion Facility; however, the FUEF EALs are developed for HAZMAT-specific releases (fluorine, chlorine trifluoride, chlorine, UF_6, etc.), rather than facility-specific releases. The use of HAZMAT-specific release EALs caused performance weaknesses that resulted in a finding during the 2006 Independent Oversight emergency management review at PORTS. This finding has been closed.

The protective action distances indicated in the EALs are not based on the requirements of the DOE order. The FBP and BWCS EALs are developed per NRC Regulatory Guide 3.67, Appendix A, which allows the protective action distances to be based on the *Emergency Response Guidebook* used by the public for transportation events. DOE Order 151.1C requires sites to provide protective action distances that are linked to the analyzed distances established in the EPHA. The FBP and BWCS EALs do not provide a linkage to the maximum distance to PAC calculated in the EPHAs for formulating protective actions. During PPPO's review of the PORTS emergency management program earlier this year, PPPO identified that the PAC distances established in the EPHA should be included in the EALs, and FBP is implementing a corrective action plan to revise the procedure to include the analyzed EPHA PAC distances. Further, the BWCS NPE EAL in Attachment B and the FBP site-wide NPE EAL in Attachment C do not indicate that PACs could be exceeded offsite, whereas the EPHAs conclude that PACs are exceeded offsite and thus do not ensure timely implementation of required offsite PARs and

activation of the public warning system (PWS) within the INZ. (See **Finding F-3** and Section 8.0, **OFI 23**.)

Finding F-3: FBP and BWCS have not identified appropriate protective actions for the classified events analyzed in the EPHAs, and included in the EALs, to ensure the health and safety of onsite workers and the public, as required by DOE Order 151.1C.

Overall, PORTS contractors have not developed a means for quickly determining whether analyzed events result in the loss of a significant quantity of HAZMAT that are beyond the site's capability to respond. Additionally, FBP has not developed a hazards survey for the FUEF or a site EPZ. Further, PORTS contractors have not identified appropriate protective actions associated with the EALs because they use the *Emergency Response Guidebook* to formulate protective actions, rather than linking the EALs to the analyzed distances established in the EPHA, as required by the order.

5.2 Objective 2: Emergency Equipment and Facilities

The site has the means to perform required emergency response functions using designated facilities and reliable onsite equipment in case of severe NPEs.

Independent Oversight reviewed the site-level emergency management program facilities and equipment to determine their usability during a severe NPE and the facility-level response plans, facilities, and equipment used to allow safe evacuation and enable implementation of protective actions at the DUF6 Conversion Facility and the UF_6 Sampling Facility. Specifically, the review examined:

- Habitability and survivability of the EOC; the Plant Control Facility, which houses the alternate EOC, the alternate central alarm station (CAS), and the plant shift superintendent (PSS) office; the Fire Station; the DUF6 Conversion Facility; and the UF_6 Sampling Facility
- Capability and reliability of normal and backup power sources at the above facilities
- Readiness of emergency response equipment
- Capability and reliability of communication systems.

Independent Oversight selected the EOC, the Plant Control Facility, and the Fire Station for review because they are command centers occupied by emergency response personnel who manage a response during severe events. Independent Oversight selected the DUF6 Conversion Facility and the UF_6 Sampling Facility for this review because they have the potential for a hazardous chemical release that mandates protective actions at onsite and offsite locations. The UF_6 Sampling Facility also has the potential for accidental criticality events that could affect onsite workers.

Independent Oversight concluded that:

- The command centers are not habitable during severe events because of their proximity to HAZMAT release points and are not equipped with habitability systems.
- The facilities reviewed will survive all but the most severe events because they are built either to meet the Ohio building codes or to survive a bomb attack, or they were evaluated to ensure that they would survive current predictions of seismic motion based on periodic seismic studies.
- Adequate backup power capabilities exist and, except for the Fire Station uninterruptible power supply (UPS) system, all have an adequate test and maintenance program to ensure reliability.
- Emergency response equipment is available and in a state of readiness.

Independent Oversight also determined that PORTS has communication systems able to facilitate information flow during an emergency. FBP self-identified reliability concerns with the public address (PA) system and is in the early stages of designing a replacement system. Further, Independent Oversight identified specific areas for improvement in equipment testing and backup communication options.

5.2.1 Normal and Backup Power Systems

Independent Oversight reviewed normal power and backup power sources at the facilities under review. Additionally, Independent Oversight examined the PORTS protocols used by site contractors to ensure that sufficient and reliable fuel is available to replenish generator fuel tanks and concluded that PORTS is prepared to operate the emergency response facilities in case of a long-term loss of normal power. Independent Oversight reviewed design, maintenance, and test documents; interviewed personnel, and performed system walkdowns to reach its conclusions.

DOE Order 151.1C does not contain prescriptive requirements for normal and backup power systems supporting command centers and response equipment; rather, the order requires provisions for an alternate location if the primary command center is not available. In addition, the order requires the site to maintain facilities and equipment adequate for critical response functions and to ensure that the facilities and equipment are available and operable. DOE Guide 151.1-4, *Response Elements EMG*, further recommends that the EOC have alternate power supplies as one of the habitability systems.

Independent Oversight used the following National Fire Protection Association (NFPA) documents in its review of standby power sources at PORTS facilities because the NFPA documents are either in the PORTS contract or referred to in documents in the PORTS contract, and because they serve as the basis for DOE-STD-3003-2000, *Backup Power Sources for DOE Facilities*:

- NFPA-72, *National Fire Alarm and Signaling Code*
- NFPA 101, *Life Safety Code*
- NFPA-110, *Standard for Emergency and Standby Power Systems*
- NFPA-111, *Standard on Stored Electrical Energy Emergency and Standby Power Systems*.

The PORTS D&D contract includes NFPA-72 and NFPA-101, which incorporate by reference NFPA-110 and NFPA-111 for specific standby power uses. The contract does not include DOE-STD-3003-2000.

An important responsibility for the application of NFPA codes and standards is the assignment of an authority having jurisdiction (AHJ). AHJ responsibilities include the designation of standby power systems to establish testing and maintenance requirements and periodic verification of compliance with NFPA requirements. The PORTS fire chief serves as the AHJ for all site facilities except those operated by BWCS; the PPPO Fire Protection AHJ performs these duties for BWCS facilities.

Normal Power

PORTS has a reasonably reliable source of electrical power from offsite suppliers. Multiple public utilities provide electrical power through a single site switchyard, where it is distributed onsite through either an underground loop or an overhead loop. Either of these loops can provide normal power to facilities through a double-ended substation near the facilities.

Backup Power

PORTS contractors are required to implement NFPA codes and standards that link test and maintenance requirements to the functions of the facilities and the importance of the equipment installed therein. NFPA-72 addresses backup power systems for fire alarm panels and operator-staffed supervisory stations, and NFPA-101 addresses backup power systems for emergency egress illumination. Both of these codes are in the PORTS contract and incorporate by reference NFPA-110 and NFPA-111. NFPA-110 and NFPA-111 identify the required test and maintenance programs for engine-driven power systems and battery-backed power systems, respectively, based on the importance of the equipment powered from these sources. Additionally, these standards apply to backup power systems for equipment used to save lives or perform rescue operations. For equipment of this type, the standards require the AHJ to evaluate the loads served by backup power systems in order to establish the appropriate level of testing and maintenance. To aid with a load evaluation, DOE-STD-3003-2000 identifies important equipment unique to DOE facilities for the purposes of applying the NFPA standards.

The PORTS fire alarm panels are appropriately sized, tested, and maintained to comply with NFPA-72. Fire department personnel test and maintain the onsite fire alarm panels to ensure that sufficient capacity is available to power equipment for over 24 hours. Fire alarm panel batteries are replaced when they fail test acceptance criteria, but they are not replaced on a schedule based on their design life. (See Section 8.0, **OFI 24**.)

PORTS has diverse and partially redundant backup power sources at the EOC, Plant Control Facility, Fire Station, DUF6 Conversion Facility, and UF_6 Sampling Facility adequate to operate essential equipment and has additional equipment to complete response functions, if necessary. As detailed in Section 5.2.4, diesel fueled generators provide long-term backup power to essential equipment at all but the UF_6 Sampling Facility during a loss of normal power. UPS systems or batteries provide continuous power to important equipment, while generators start and power connected equipment. The battery capacities will operate equipment for a sufficient amount of time to allow implementation of protective actions. Facility-specific details on power systems are provided in Sections 5.2.3 and 5.2.4,

Generator Refueling Plans

PORTS has adequate diesel refueling plans for long-term generator operations. FBP, USEC, and BWCS contract separately with local diesel fuel suppliers to replenish their generator fuel tanks. FBP manages the PORTS diesel fuel bulk storage that consists of a 20,000-gallon underground storage tank. FBP measures the level in the bulk storage tank at least weekly and replenishes it when the fuel level drops to 4000 gallons. A local supplier with the lowest spot price replenishes the fuel every two to three months. After each delivery, FBP draws a sample from the tank and analyzes it for contaminants using an onsite laboratory. FBP distributes fuel from the storage tank to the generator tanks via a 1200-gallon diesel fuel truck. In case of a loss of normal power, FBP uses one of their portable generators to power the filling station fuel pump.

BWCS and USEC replenish their generator supply tanks directly from the supplier's tanker truck. For BWCS, refueling support is governed by the DUF6 Conversion Facility TSR, which specifies tanker routes and filling locations to minimize a vehicle crash and fire near DUF6 cylinders in the yard. USEC replenishes the fuel for the generator that provides backup power to the EOC. USEC periodically samples and analyzes the fuel in the EOC generator's supply tank to verify the absence of contaminants; however, BWCS does not periodically sample and analyze the fuel in the DUF6 Conversion Facility generator supply tank. (See Section 8.0, **OFI 22**.)

Overall, PORTS has an adequate normal power distribution system and has the capability to provide backup power from backup generators, UPS systems, or batteries to essential loads that support an emergency response. Except for the Fire Station UPS system, PORTS contractors adequately verify system capabilities and reliability through periodic tests and maintenance activities. PORTS contractors maintain adequate fuel supplies via contracted local suppliers and a large onsite diesel fuel storage tank. Except for the DUF6 Conversion Facility generator, diesel generator fuel supply tanks are periodically analyzed for contaminants to ensure that a reliable fuel supply is available for long-term generator operations.

5.2.2 Communication Systems

Independent Oversight reviewed the key communication systems that PORTS personnel – specifically, the EOC cadre, PSS, FBP Health Services, and FBP Fire Services – use to communicate with each other; site personnel; the surrounding public; and offsite local, state, and Federal agencies and organizations. The primary and backup systems were examined, along with the processes for maintaining and periodically testing the systems to ensure operability. Independent Oversight also reviewed the availability of alternate means to perform critical tasks when a primary system is out of service due to a severe NPE.

DOE Order 151.1C requires that equipment adequate for an emergency response be available, operable, and maintained and that the communication systems used to contact offsite agencies be tested at least annually. The order further requires that sites have the capability to notify employees of an emergency and to facilitate the safe evacuation or sheltering of employees. DOE Guide 151.1-4 provides additional guidance for communication systems and states that systems relied on to provide notifications and activate the emergency response organization (ERO) should be tested and maintained regularly. The guide also states that backup communications, such as cellular and/or satellite telephones and radios, should be available and periodically tested. In addition, the guide specifies that sites should integrate their communication systems with offsite responders and should periodically verify all emergency telephone and facsimile numbers with offsite agencies.

The PSS effectively uses the PORTS paging system to activate the EOC cadre and conducts periodic tests to confirm operability. A notable feature of the paging system is the ability to access the system from any telephone. If the paging system fails, the PSS can activate the EOC cadre using the One-Call-Now mass notification system, reachable from any telephone or computer with an Internet connection. The EOC cadre uses their pagers daily, and the PSS performs a test at the beginning of each shift to confirm that the paging system is operable. In addition, FBP Emergency Management conducts pager tests quarterly and One-Call-Now system tests semiannually with the EOC cadre.

The ERO is adequately equipped to provide emergency notifications to offsite organizations. The PSS uses a combination of telephone bridges (Pike County and State of Ohio) and ring-down telephones (DOE Oak Ridge Operations Center Duty Officer and DOE Headquarters Watch Office) to verbally provide offsite organizations with the information on the notification form and to answer any questions. The offsite notification responsibility transfers to the EOC once it is declared operational; the EOC Notification Advisor or designee contacts each offsite organization individually via telephone for subsequent notifications. If the telephone system fails, the PSS and EOC Notification Advisor can verbally provide the notification information to the offsite organizations using a radio (Pike County and the State of Ohio) or cellular telephone. Emergency Management validates the telephone and facsimile numbers for the offsite organizations quarterly. Additionally, Emergency Management invites the offsite organizations to practice receiving actual notifications by participating in site exercises; all of the offsite organizations participated in the notifications associated with the 2011 NRC biennial exercise, and the local organizations also participated in the 2012 DOE annual exercise.

The ERO can effectively warn the public near PORTS using the PWS, which consists of outdoor warning sirens and tone alert radio receivers. The PWS is the primary method for warning the public within a two-mile radius from the center of PORTS that they need to shelter-in-place and tune to their local Emergency Alert System radio station for additional instructions. The PSS provides a recommendation to the Pike County Sheriff's Office to activate the PWS, but the PSS or EOC Crisis Manager can activate the system from either the PSS office (located in the Plant Control Facility) or the EOC if the Pike County Sheriff's Office is unreachable or unable to activate the system. FBP performs periodic tests of the PWS, including a weekly silent test and a semiannual audible test of the sirens. FBP also performs preventive maintenance on the system quarterly to ensure its continued operability. PPPO identified an observation during their January-February 2013 independent assessment review regarding insufficient PWS coverage on the north side of the site. FBP developed corrective actions for this observation and plans to place tone alert radios in the affected area by October 31, 2013, while also preparing a design and cost estimate for adding a new siren. (See Section 8.0, **OFI 2**.)

The PORTS radio system provides a robust mobile communications link that allows interoperability with offsite responders, but the ERO does not test the ability to contact these responders and uses incomplete checklists to document EOC radio testing. Radios are the primary communication method in the field, and they are available at all ERO venues. The radio system covers the entire site and provides workers and emergency responders with four radio channels. Fire Services can also contact offsite mutual aid agencies using additional channels programmed on their radios or connecting through the Multi-Agency Radio Communications System. In addition, licensed amateur radio operators within Fire Services have additional radio frequencies programmed into their hand-held radios as an added radio resource during an emergency. Two independent electrical lines provide power to the radio repeaters; portable generators can power the system's repeaters if both sources of normal power are lost. The radio system can operate in simplex mode (limited to line-of-sight and reduced range) if the repeater for a particular radio channel fails. The radio system does not require periodic maintenance, and the PSS broadcasts a daily test message over all radio channels to verify operability. Further, the PSSs and Health Services use their hand-held radios daily, and the PSSs and Emergency Management perform quarterly tests of their vehicle-mounted radios. Fire Services also conducts twice-daily tests of their radios, but does not periodically test their ability to reach mutual aid organizations via radio. Emergency Management performs quarterly functional tests of the EOC hand-held radios; however, the form used to document the tests only requires verification that the radios were present. (See Section 8.0, **OFI 3**.)

The ERO venues are well equipped with telephones and facsimile machines; however, tests on infrequently-used equipment are either not performed or are stated incorrectly on a checklist. All ERO locations are equipped with an adequate number of telephones and facsimile machines, and the EOC and PSS office have telephone lines routed through a telephone switch external to the PORTS exchange. Furthermore, the PORTS contractors allow the use of cellular telephones (without cameras), which most ERO members possess, throughout most of the site. The PSS office is also equipped with satellite telephones; ring-down telephones are available to directly connect the PSS office with the EOC and the Fire Station. Telephones authorized for classified conversations are available in the EOC and PSS office. However, the ERO lacks access to Government Emergency Telecommunications Service (GETS) cards that provide priority telephone access and Wireless Priority Service (WPS) accounts that provide priority cellular telephone access during periods of severe network congestion or disruption. (See Section 8.0, **OFI 4**.) The PSSs and Health Services use their telephones and facsimile machines daily, and the PSSs test the telecommunications equipment in their vehicles quarterly. Additionally, Fire Services tests the ring-down telephone twice daily that connects the 911 operator with the PSS office and CAS. The PSSs also test their satellite telephones quarterly, but their checklist incorrectly states that a functional test of sending and receiving a call does not need to be performed. The PSSs do not periodically test the operability of their classified telephone or classified facsimile machine. Emergency Management performs quarterly functional tests of the EOC telephones and facsimile machines; however, the form

used to document the tests (FBP-EM-PRO-00028-F09, *EOC Inventory Inspection*) does not include the ring-down telephone between the EOC Crisis Manager and the PSS office. The telephones in the alternate EOC (located in the Plant Control Facility) are occasionally used but are not specifically tested by FBP. (See Section 8.0, **OFI 3**.)

Fire Services appropriately operates the emergency reporting telephone system but does not provide specialized training or tools to the cascade operators who could answer 911 calls. Fire Services has two incoming telephone lines for 911 calls from site personnel; these calls ring simultaneously at the cascade operator console in the Plant Control Facility. Site personnel can also report emergencies via the radio or by using "red" telephones that ring in the Plant Control Facility and are located in the PORTS process buildings. FBP tests the 911 telephone system and the red telephones daily. If the Fire Services alarm room operator has to evacuate the Fire Station, the operator can transfer 911 calls to the cascade operator in the Plant Control Facility; however, FBP does not provide the cascade operators with a procedure, specialized training, or tools, such as checklists, to use when answering 911 calls. (See Section 8.0, **OFI 5**.)

The PSS uses a variety of appropriate methods to notify employees of an emergency and facilitate the safe evacuation or sheltering of employees, although some hearing-impaired workers may not be notified and the site PA system can be accessed from only one location. The PA and radio systems are the primary methods the PSS uses to communicate emergency notifications and protective action instructions to workers. The PA system covers outside areas and most occupied buildings; field workers and buildings without operable PA system speakers use hand-held radios. Additionally, the PSS provides information on 911 calls to a select group of personnel via a group page that includes some hearing-impaired personnel; however, FBP lacks a process to ensure that all hearing-impaired employees are included in this pager group. If the PA and radio systems fail, the PSS can use the red telephones or call specific buildings directly. If buildings are evacuated, the PSS provides additional emergency instructions to workers via the PA system and radios. However, if workers are sheltered within buildings, the PSS may not be able to communicate with some workers because the FBP procedure FBP-EM-PRO-00036, *Development, Maintenance, and Inspection of Facility Emergency Packets and Emergency Actions Plans*, does not ensure that protective action instructions can be heard (via the PA system or radios) in the designated shelter locations. The cascade operator tests the PA and radio systems daily, but the PA system is experiencing a number of age-related failures; FBP is in the early design phase for a replacement system. Further limiting the usefulness of the PA system is that the PSS can only access the PA system from the Plant Control Facility. Based on EPHA results, exposures in excess of the TEL can occur at the Plant Control Facility based on several emergency scenarios, thereby causing building evacuation and rendering the PA system unusable. (See Section 8.0, **OFI 6**.)

Overall, communication systems are ready to facilitate information flow during severe NPEs. Redundant communication systems for most of the critical emergency response functions increase the likelihood that one or more systems can perform each function in case of a severe NPE. Nonetheless, limitations in the testing of some equipment, documentation of completed testing, and backup communication options somewhat diminish the robustness of the communication systems. More significantly, the PA system can be accessed only in the Plant Control Facility, rendering it unusable if the building is evacuated.

5.2.3 Emergency Response Facilities

Emergency response facilities are primary and alternate buildings where emergency responders remain, or assemble, to perform their emergency response functions in accordance with the PORTS emergency plan. Important functions that warrant personnel occupying these facilities during an event are:

- Overall management of an event from the EOC or Plant Control Facility

- Fire alarm monitoring
- Fire fighter dispatch.

Independent Oversight examined the EOC, Plant Control Facility, and Fire Station for habitability and survivability by reviewing documented evaluations provided by site personnel.

For survivability, an earthquake is the most significant NPE concern at PORTS. To address seismic survivability, the response facilities were built to meet or exceed the Ohio building codes, which are based on the International Building Code using the seismic maps at the time of their construction. These facilities undergo periodic seismic evaluations as seismic updates are published. Seismic studies published since construction, most recently in 2008, have reduced the predicted ground motion at PORTS from earthquakes and, so no seismic upgrades were warranted.

For habitability, onsite chemical HAZMAT releases caused by a severe NPE are of most concern. All of the PORTS command centers and designated alternate facilities are within the TEL, as expressed in the FUEF and DUF6 EPHAs, but are not equipped with habitability systems to alert and protect occupants.

Emergency Operations Center

Independent Oversight reviewed the EOC's documented capability to withstand analyzed severe NPEs and its ability to survive and allow the ERO to remain in a safe environment to perform emergency response functions. Items of interest include air monitoring and air filtration capabilities, backup power systems, and response procedures for use during emergencies.

DOE Order 151.1C does not contain prescriptive requirements for EOCs; rather, it requires a viable command center where required emergency response functions can be performed, along with provisions for an alternate location if the primary command center is not available. The order also requires the site to maintain facilities and equipment adequate for critical response functions and ensure that the facilities and equipment are available and operable. DOE Guide 151.1-4, *Response Elements EMG*, further recommends that the EOC have habitability systems and that an alternate EOC be located to minimize the risk of losing both facilities from the same event due to habitability or accessibility concerns. The guide defines a habitable EOC as one capable of remaining operable and life supporting for an extended period under accident conditions and maintaining its structural integrity under various design basis events, including a severe NPE. A habitable EOC must maintain a breathable atmosphere, provide sufficient shielding from radioactive material and other HAZMAT, and have a backup power supply.

The PORTS EOC is likely to survive all but the most severe earthquakes and is equipped with sufficient standby power sources. The PORTS EOC is located in building X-1020, which was built during the 1980s to meet the Ohio Building Code at the time of construction, and is equipped with a 150 kW stationary diesel generator and a 4-hour UPS system for backup power. The generator is capable of powering all the equipment in X-1020 and is equipped with a 550-gallon underground fuel supply tank. Test data indicates that the X-1020 generator will provide more than five days of electrical power with connected loads without refueling.

USEC leases the X-1020 building from DOE and performs adequate tests and maintenance on the EOC's backup power sources to ensure that reliable electrical power is available. The PORTS AHJ has determined the EOC diesel generator and the UPS system are "optional" standby power sources and are not subject to NFPA-110 or NFPA-111 requirements, although there is no record of this evaluation. **(**See Section 8.0, **OFI 25**.) The "optional" designation of these power sources has not diminished the amount or frequency of the testing and maintenance performed by USEC. The generator is started weekly using a start signal, and operating parameters are verified to be acceptable. USEC also starts the generator

monthly, using a low voltage signal that exercises the automatic transfer switch. USEC also performs annual maintenance on the generator based on the manufacturer's recommendations. USEC verifies that the generator fuel tank level is greater than 75% full monthly and draws a sample from the fuel supply tank semiannually for testing in an onsite laboratory to validate that no contaminants are present. USEC performs annual preventive maintenance on the UPS system and performs quarterly inspections and tests of the UPS batteries. Batteries are replaced if they fail to meet test acceptance criteria but are not on a schedule for replacement when they are near the end of their design life. (See Section 8.0, **OFI 24**.)

Nevertheless, the EOC is located within range of plausible hazardous atmospheres, based on the FUEF and DUF6 EPHA analyses, and is not equipped with the capability to monitor for airborne contaminants or to pressurize the EOC with filtered air to allow the EOC cadre to assemble there safely. Although the emergency plan identifies two alternate EOCs, their location, lack of habitability systems or poor reliability makes them vulnerable to the same HAZMAT releases that would cause an EOC evacuation.

Alternate EOCs

The PORTS alternate EOCs are likely to survive all but the most severe earthquakes but are not equipped, located, or maintained to ensure that a habitable facility is available. The PORTS emergency plan identifies the Plant Control Facility and a mobile command vehicle as alternate EOCs. The designated mobile command vehicle is referenced in the USEC-02 Portsmouth Emergency Plan, so FBP considers the vehicle to be an NRC license requirement. The Plant Control Facility, the most robust building onsite, was built to withstand bomb criteria, which are more stringent than NPE criteria, and is equipped with an adequately tested and maintained standby generator. However, the Plant Control Facility is closer to potential HAZMAT release points than the EOC, resulting in higher HAZMAT concentrations than at the EOC, and it cannot monitor for airborne contaminants or pressurize the alternate EOC location with filtered air to allow safe occupancy. (See **Finding F-4**.)

PPPO self-identified this concern during the 2013 emergency management review of PORTS, and a corrective action plan is in place to relocate the alternate EOC. FBP indicated that they are planning to use the current Joint Information Center facility because it is upwind of the prevailing wind direction. However, the Joint Information Center facility is also in range of plausible HAZMAT concentrations that the FUEF and DUF6 EPHAs determined to be above PAC and DOE policy encourages the implementation of protective actions that are not dependent on meteorological conditions. Instead, the EMG promotes protective actions to be implemented in a 360-degree manner. Therefore, the EOC and the alternate EOC could be within the protective action radius for the same HAZMAT release making it problematic for the EOC cadre to establish a safe command center.

Based on discussions with site personnel and the lack of an adequate test and maintenance program, Independent Oversight concluded that the mobile command vehicle is not a reliable alternate EOC. This vehicle is parked at the EOC, so it would likely be difficult to access the vehicle safely during a HAZMAT release that rendered the EOC uninhabitable. Furthermore, the mobile command vehicle is not in a test and maintenance program to ensure its reliability for driving to a habitable location; site personnel indicated that the vehicle is not reliable. Independent Oversight also noted that the recent draft revision of the FBP emergency plan does not identify the mobile command vehicle as an alternate EOC.

Finding F-4: FBP has not made appropriate provisions for use of an alternate location if the primary command center is not available, as required by DOE Order 151.1C.

Fire Station

The PORTS Fire Station is likely to survive all but the most severe earthquakes and is equipped with sufficient standby power sources. The Fire Station (building X-1007) was built during the 1980s to meet the Ohio Building Code. No seismic upgrades have been performed since construction because more recent seismic studies have decreased the expected ground motion from earthquakes. The Fire Station is equipped with a 150 kW stationary diesel generator and a 24-hour UPS system for backup power, sufficient to power all Fire Station essential loads. The generator is equipped with a 300-gallon fuel supply tank to provide more than 8 hours of electrical power without refueling. It is desirable for the Fire Station to be habitable because it houses the CAS for the fire alarms, which is an operator-staffed supervisory station under NFPA-72.

The FBP AHJ has determined that the UPS system complies with NFPA-72 and considers the generator to be an "optional" generator, although there is no record of these determinations. (See Section 8.0, **OFI 25**.) FBP adequately tests and maintains the generator to ensure that a reliable backup power source is available. FBP operations personnel perform weekly tests of the generator that includes an auto start from a low voltage condition and a 30-minute load test using connected loads. This test exercises the automatic transfer switch. FBP also performs an annual load test at 75% load for a minimum of 2 hours. The FBP preventive maintenance program for the generator includes a comprehensive list of inspections and maintenance items that are scheduled annually, semiannually, or monthly and are based on manufacturer recommendations.

FBP performs testing and maintenance of the Fire Station UPS system; however, no test and maintenance procedures were provided to determine the extent of testing to comply with NFPA-72 and NFPA-111, such as a 24-hour service test or UPS functional tests. (See **Finding F-5**.) This condition is partly mitigated by the UPS's capability to self-diagnose trouble conditions and annunciate trouble alarms remotely at the operator's location in the CAS. Additionally, FBP performs periodic inspections and maintenance on the UPS batteries (e.g., electrolyte level, specific gravity, cell voltages) and replaces the batteries when they fail acceptance criteria, but they are not on a schedule for replacement near the end of their design life. (See Section 8.0, **OFI 24**.)

The location of the CAS makes it vulnerable to some plausible chemical HAZMAT releases analyzed in the FUEF and DUF6 EPHAs. The Fire Station is located adjacent to the EOC and has no capability to monitor for airborne contaminants or to pressurize the CAS with filtered air to allow safe occupancy. The Plant Control Facility is a designated alternate location for the CAS and can provide CAS functions for many types of events that would render the Fire Station CAS inoperable. However, as noted, the Plant Control Facility is closer to HAZMAT release points than the Fire Station and lacks habitability systems. (See **Finding, F-5**.)

Finding F-5: FBP does not test and maintain the Fire Station UPS as a level-2 system, as required by NFPA-72, *National Fire Alarm and Signaling Code*, for a system that provides power to an operator-staffed supervisory station.

Overall, PORTS response facilities and their designated alternate locations are likely to survive all but the most severe earthquakes. The facilities have adequate backup power sources that provide long-term operating capabilities supported by fuel storage capacities and distribution mechanisms. Except for the Fire Station UPS system, backup power systems are adequately tested and maintained to ensure operability and reliability. The Fire Station UPS system is required to comply with NFPA-72 requirements; however, test procedures and records were not provided to verify compliance. Most significantly, the response facilities and their alternates are located where a high airborne concentration of

HAZMAT is possible and are not equipped with habitability systems, rendering all response facilities uninhabitable for some scenarios analyzed in the PORTS EPHAs.

5.2.4 HAZMAT Facilities

Independent Oversight reviewed the documented capability of the DUF6 Conversion Facility and the UF_6 Sampling Facility to withstand analyzed severe NPEs and the capabilities to receive protective action information, implement planned protective actions, and account for personnel after an evacuation. Key items of interest include facility structure; communication systems; power supplies; facilities and equipment used to perform protective actions, such as assembly stations, shelters, accountability mechanisms, and ventilation system controls; and abnormal operating procedures, emergency operating procedures, and safe shutdown procedures.

DUF6 Conversion Facility

The DUF6 Conversion Facility is operated by BWCS to convert depleted UF_6 to a more stable form of uranium oxide. Operations consist of removing depleted UF_6 from cylinders by vaporization, converting depleted UF_6 to uranium oxide and HF vapor, loading uranium oxide into modified cylinders, and transferring uranium oxide-filled cylinders to trucks or railcars for shipment to storage or waste disposal facilities. BWCS uses residual steam to condense the HF vapor from the conversion process into HF acid, which is temporarily stored in tanks. BWCS then loads HF acid into trucks or railcars for shipment to vendor facilities. The principal offsite hazard from this operation is the release of HF, though the chemical hazard associated with airborne uranium also represents a hazard to site workers. The facility is classified as a hazard category 3 nuclear facility.

The DUF6 Conversion Facility is likely to survive all but the most severe earthquakes. The facility was built to meet the 2002 Ohio State Building Code (based on the 2000 International Building Code), the Ohio State Fire Code, and NFPA-101. DUF6 Conversion Facility is provided with adequate power from normal and backup power sources. The site's normal power distribution system provides power to a double-ended DUF6 Conversion Facility substation via either of two underground feeders. An adequately sized standby generator, a central UPS system, and batteries provide sufficient backup power. A 350 kW generator with a 270-gallon fuel tank, providing at least 8 hours of operation before refueling, is available to power all DUF6 Conversion Facility equipment. The UPS system provides a minimum of 30 minutes of continuous power to essential equipment in case the generator does not start; and batteries, with the capacity to provide 24 hours of operating power to fire alarm panels, and dedicated batteries provide at least 90 minutes of power to emergency egress lights.

The PPPO AHJ has designated the generator and the UPS system as "optional" equipment because life safety code loads do not depend on their operation, although there is no record of this evaluation. (See Section 8.0, **OFI 25**.) These designations are consistent with the system design specification to perform an orderly plant shutdown and provide a continuous source of power to important equipment in case of a loss of normal power.

BWCS performs adequate tests and maintenance of standby power systems to verify capabilities, ensure reliability, and meet applicable NFPA codes and standards. BWCS tests the generator monthly using a test start switch and powers connected loads through the automatic transfer switch for a minimum of 15 minutes. BWCS tests the UPS system for 30 minutes at 100% load, and the system was factory-tested for 72 hours at 100% load. The most relevant load on the UPS system for an emergency response is the DUF6 Conversion Facility PA system. To comply with NFPA codes, the fire department tests the emergency egress light batteries and fire alarm panel batteries using BWCS procedures. BWCS procedures adequately require a 30-second monthly test and a 90-minute annual test on the emergency

egress light batteries, and a semi-annual 30-minute voltage test and an annual 24-hour load test of the fire alarm panel batteries.

BWCS does not ensure that the generator fuel tank level is adequately maintained and that the fuel is free of contaminants. BWCS indicated that operator daily rounds verify that the fuel tank is at least three-quarters full to ensure eight hours of standby power. However, the round sheets used by operators has fuel tank level acceptance criteria at only one-quarter full. Furthermore, BWCS does not periodically sample the generator fuel tank and analyze the fuel for contaminants. (See Section 8.0, **OFI 22**.)

BWCS plans, procedures, facilities, and equipment are adequate to implement protective actions and place DUF6 Conversion Facility in a safe shutdown mode. Each DUF6 Conversion Facility support building contains readily available emergency action plans (EAPs) that identify primary and alternate assembly points on opposite sides of the facility, two robust tornado shelter areas, and three take-cover areas in fixed permanent structures. DUF6 Conversion Facility has 100 percent PA system speaker coverage for area alerts and warnings, and normally-occupied buildings have portable HF detectors in place to alert personnel to the presence of HF, which is a hazardous byproduct of the depleted UF_6 conversion process. DUF6 Conversion Facility has three assembly areas for evacuations. Assembly point locations are identified in the EAPs and by signage at the physical locations. BWCS has adequate plans and procedures for building evacuations and personnel accountability protocols and relies on training to separate potentially contaminated personnel from non-contaminated personnel at assembly points while awaiting radiological surveys. For site evacuation, BWCS relies on the FBP site-level evacuation plan and the instructions from the incident commander (IC), which are provided over the PA system and radios.

BWCS is adequately prepared to implement shelter-in-place protective actions. All of BWCS's normally-occupied buildings in the DUF6 Conversion Facility complex have controls for shutting down the ventilation system from inside the buildings. Except for personnel at DUF6 Conversion Facility, all occupants are trained to perform shutdown of the ventilation system using simple thermostatic controls to increase the effectiveness of shelter-in-place protective actions. EAPs identify ventilation control locations in the facility. For DUF6 Conversion Facility, the facility manager determines the appropriate configuration of the ventilation system, and trained operators in the control room operate the system.

BWCS has established an adequate personnel accountability system via a network of accountability coordinators, resident rosters, and a visitor logbook. A BWCS site accountability coordinator, who is equipped with an area PA system microphone, telephone, radio, and an HF detector at his/her workstation, leads the team of accountability coordinators. One primary and at least one alternate accountability coordinator are assigned to designated areas to ensure full building coverage.

BWCS has adequate procedures to safely shut down DUF6 Conversion Facility operations and allow operators to evacuate the building, if necessary. BWCS operators perform safe shutdown via either normal shutdown procedures or an emergency shutdown switch at operator workstations. The emergency switch isolates all process flow, except nitrogen, and de-energizes process heat sources that allow cooling of material to a stable solid form, placing operations in a safe configuration before operators evacuate the building.

The BWCS pre-incident plan, intended to support fire fighters arriving at DUF6 Conversion Facility, provides minimal information. BWCS develops and maintains pre-fire plans through a work authorization with the FBP fire department. BWCS and fire department personnel jointly develop the pre-incident plan using a site-wide template; no development procedure describes the content of or the methodologies used to create a pre-incident plan. This process has produced a pre-incident plan that is minimally effective as a response tool because it relies on the expertise of fire fighting personnel instead

of specifying the location of response equipment, occupancy levels, exposures, hazards, and other relevant information prescribed by NFPA-1620, *Standard for Pre-Incident Planning*. (See Section 8.0, **OFI 26.**)

Overall, DUF6 Conversion Facility is adequately constructed to survive all but the most severe NPEs and is adequately equipped to implement protective actions. BWCS has adequate plans and procedures in place to implement protective actions and perform a safe shutdown of operations. However, improvements are warranted to increase the reliability of the generator diesel fuel via periodic sampling and analysis and to ensure that a sufficient fuel inventory is maintained. Improvements in pre-incident planning are also warranted to provide usable and meaningful information to fire fighters responding to a DUF6 Conversion Facility emergency.

UF_6 Sampling Facility

The UF_6 Sampling Facility (building X-344), operated by FBP, primarily performs sampling and transferring of UF_6 to other cylinders. The hazards include accidental criticality, UF_6 release, and release of UF_6 reaction products. The facility is classified as a hazard category 2 nuclear facility.

The UF_6 Sampling Facility is likely to survive all but the most severe earthquakes. Although this facility was built during the 1950s and has no code of record for its construction, a PORTS seismic assessment concluded that the building would survive the evaluation basis earthquake of 0.05g, but the fire suppression systems and electrical wiring and switchgear are not constructed to withstand seismic loading.

The UF_6 Sampling Facility is adequately equipped with alert and warning systems and the means to safely implement protective actions. The significant alert systems include fire alarms, evacuation alarms, and criticality accident alarms, in addition to process alarms. Fire alarm signals activated by pull boxes and the fire suppression system also generate alarms at the Fire Station and the Plant Control Facility. Evacuation alarms are generated using manual switches at key locations and exits. The criticality accident alarm system is activated by radiation detectors where criticality accidents are plausible and is governed by the facility TSR. Facility warning systems are comprised of the PA system, which the PSS in the Plant Control Facility uses to provide protective action instructions, and radios carried by key personnel in the facility. The facility is classified as a general occupancy facility; therefore, the fire department inspects this facility for compliance with NFPA-101 requirements, including emergency egress lighting and exit signs.

Important systems within this facility are adequately powered from normal and backup power sources, or appropriate provisions are in place to ensure that protective actions can be implemented. The site's normal power distribution system provides power to a double-ended substation via either an underground or an overhead feeder. Batteries are the sole source of backup power; the facility is not equipped with an engine-driven generator. The criticality accident alarm system, emergency egress lighting, and fire alarm panels are equipped with adequate battery backup power sources, and the facility PA speakers, which have no backup power source, are backed up by radios. Key FBP personnel have radios to receive protective action instructions from the PSS, and they in turn inform their workers. FBP does not rely on powered equipment, other than radios, to perform personnel accountability.

The batteries providing backup power to essential equipment are adequately tested and maintained. The X-344-battery room, used to power emergency egress lighting and the criticality accident alarm system, is maintained according to the TSR. The AHJ also accepts the TSR surveillances performed for the battery room batteries as compliance with NFPA-101. The battery room batteries are equipped with a battery charger that is inspected each shift by operators for proper operation. FBP also performs periodic

maintenance on the X-344-battery room using a 125 V direct current maintenance procedure that includes battery inspections, specific gravity and cell voltage measurements, electrolyte level maintenance, and performing an equalizing charge. Batteries are replaced if they fail acceptance criteria, but are not on a replacement schedule when they are near the end of their design life. (See Section 8.0, **OFI 24**.) FBP also performs a semiannual 30-minute load test of these batteries. During the Independent Oversight walkdown at the UF_6 Sampling Facility, the surveillance of the batteries was overdue and the facility was in a limiting condition for operation, requiring all personnel to have lighting with them.

FBP plans, procedures, facilities, and equipment are adequate to implement protective actions at the UF_6 Sampling Facility. FBP uses the site-level emergency plan implementing procedures (EPIPs) for protective actions. For facility evacuations, facility personnel assemble at one of three marked assembly point locations, depending on whether the event is a HAZMAT release or a criticality accident, or to an area designated by the IC. For severe weather events, FBP has designated two areas within the facility as severe weather shelters: an interior lunchroom and a conference room.

FBP has established site evacuation plans; however, further planning is warranted regarding contamination controls and access to public facilities. The site-level evacuation plans send site workers to one of four designated Pike County schools. Although these locations have sufficient capacity and are outside of a PORTS HAZMAT release protective action area, the plan specifies relocating there by any means possible. This aspect of the plan does not consider the possibility of contaminated personnel and vehicles arriving at the school, or whether school is in session. (See Section 8.0, **OFI 7**.)

FBP operations personnel are adequately prepared to implement shelter-in-place protective actions at the UF_6 Sampling Facility. Operators are prepared to shut down facility ventilation and close rollup doors to implement the protective action EPIP.

FBP has an adequate personnel accountability system for the small workforce at the facility. The facility manager performs accountability for operations personnel and a facility maintenance manager performs accountability for maintenance personnel in the building. Rosters of residents in the facility are maintained, and facility managers know who is present because they are typically responsible for less than ten people. Visitors are accounted for through a visitors log and through the visited organization's personnel. Although the FBP evacuation procedure defines and assigns roles and responsibilities for building and site evacuations for many different conditions, it does not address the collection of visitors logs. (See Section 8.0, **OFI 8**.)

FBP has adequate procedures to safely shut down UF_6 Sampling Facility operations and allow operators to evacuate the building, if necessary. FBP operators performs safe shutdown via either a normal shutdown procedure or an emergency shutdown procedure using an emergency shutdown switch. Emergency switches are available in multiple locations that operators can activate to isolate process fluids and secure heat sources, placing operations in a safe configuration before an immediate evacuation. Total loss of power also places operations in a safe shutdown condition by securing process flows and cylinder heating that will result in cooling of the material over several days, placing it in a stable solid form. Because no critical operator actions or monitoring activities are required at the UF_6 Sampling Facility before an evacuation, no habitability systems are necessary.

The UF_6 Sampling Facility pre-incident plan, intended to support fire fighters arriving there, provides minimal information. Facility and fire department personnel jointly develop the pre-incident plan using a site-wide template; no development procedure describes the content of or the methodologies used to create a pre-incident plan. Although the pre-incident plan does provide information in fighting fires involving enriched uranium, the overall process has produced a pre-incident plan that is minimally effective as a response tool because it relies on the expertise of fire fighting personnel instead of

specifying the location of response equipment, occupancy levels, exposures, hazards, and other relevant information prescribed by NFPA-1620. (See Section 8.0, **OFI 26**.)

Overall, the UF_6 Sampling Facility is adequately constructed to survive all but the most severe NPEs and is adequately equipped to implement protective actions. FBP has adequate plans, procedures, and equipment in place to implement protective actions and perform a safe shutdown of operations. However, improvements in pre-incident planning are warranted in order to provide usable and meaningful information to fire fighters responding to a facility event.

5.2.5 Protective Force

Independent Oversight reviewed the protective force capabilities that are essential for a response to an emergency caused by a severe NPE. This review also determined whether offsite law enforcement agencies use any specific protocols for PORTS events.

Protective force emergency planning adequately addresses nearly all Operational Emergency events. FBP provides the operational and manpower elements for the protective force, while WEMS provides the planning and oversight elements. FBP organizes the protective force in shifts. Each shift is under the supervision of a shift commander and contains all of the disciplines necessary for a full security response. The protective force works under company-specific protocol agreements for events requiring a response to the ACP and BWCS facilities. WEMS also has a memorandum of understanding with the Pike County Sheriff's Office to request and receive law enforcement assistance. Additional law enforcement assistance (manpower and equipment) is available from the Buckeye State Sheriff's Association via the Pike County Sheriff. Furthermore, Ohio State Highway Patrol assistance is obtainable through the Pike County Sheriff's Office. Although WEMS has a few pre-planned protocols with offsite agencies for supporting the protective force, those protocols contain minimal information on roles, responsibilities, logistical requirements, and procedures for use during an emergency event.

In addition to NPE preparedness, FBP and BWCS address malevolent act event initiators, including acts of terrorism, in their emergency planning. The Federal Bureau of Investigation (FBI) field office in Cincinnati, Ohio has jurisdictional responsibility for response to an act of terrorism at PORTS. However, PORTS has no formal agreement with the FBI or response planning to define the roles, responsibilities, and procedures for an event at PORTS that requires intervention by the FBI. (See Section 8.0, **OFI 9**.) Additionally, because FBP has no site/facility-specific catastrophic event response procedures, FBP would likely have to implement their draft security conditions plan to support security operations after a severe NPE or catastrophic event with severe consequences.

Overall, the protective force has adequately planned for a response to a severe NPE. FBP and WEMS have developed some protocols for the planned use of local law enforcement agencies to supplement onsite FBP protective force personnel during an emergency event. However, planning for events requiring FBI intervention warrants consideration. Additionally, WEMS protocols with offsite agencies supporting the protective force contain minimal response information, and the FBP security conditions plan is in draft form.

5.3 Objective 3: Training and Drill Program

The site has prepared emergency response personnel for a severe NPE through a systematic and coordinated training and drill program.

Independent Oversight reviewed the FBP emergency plan, training plan and implementing procedures, training schedules, status reports, and personnel training records to determine whether personnel

performing emergency response tasks are trained in their areas of responsibility. Independent Oversight also reviewed the drill implementing procedures, drill packages, and evaluation reports to determine whether ERO members have demonstrated their emergency response proficiency by participating in drills involving NPEs and multi-facility events.

Independent Oversight determined that FBP has established training programs consisting of formal training and hands-on drills to prepare ERO members for their assigned tasks, but does not provide training to ERO members to prepare a response to multi-facility events.

DOE Order 151.1C defines the ERO as a structured organization with overall responsibility for initial and ongoing emergency response and mitigation and specifies that an ERO must be established and maintained for each site. The ERO must establish effective control at the scene of an event/incident and integrate its activities with those of local agencies and organizations that provide onsite response services. The order further requires that ERO personnel be initially trained and attend annual refresher training, in addition to annually participating in a drill, exercise, or actual event to demonstrate proficiency, and that training be offered by the site to offsite responders annually. The PORTS emergency management training program is well defined in the FBP emergency plan and implementing procedures and establishes the appropriate curriculum to prepare ERO members for their assigned tasks. The training program comprehensively and systematically defines methods for accomplishing emergency management training goals. Design, development, and implementation of training are conducted in accordance with appropriately detailed institutional processes. Plans and procedures provide for both initial and recurring training, as well as annual participation in drills and/or exercises.

The training status of personnel assigned to the ERO duty roster is appropriately managed and effectively tracked. A detailed training matrix allows tracking of the status of all ERO positions' participation in required courses and drills. Independent Oversight determined that all ERO positions have an adequate number of qualified personnel and that all ERO members have completed the required training.

The ERO training program is effectively implemented through a variety of training settings, and trainees are appropriately evaluated to ensure that they are knowledgeable and proficient in their emergency response roles. The initial training program consists of a good mix of well-developed training that includes classroom, web-based, and practical training and drills. Training materials are thorough and include detailed course objectives, learning objectives, instructor guides, and student handouts. The EOC Concept of Operations annual refresher briefing appropriately includes details of program changes and lessons learned from actual events, drills, exercises, DOE and industry operating experience, and program evaluations. Demonstration of knowledge and proficiency is required through classroom and/or on-line testing with scores of ≥80 percent and during an evaluated drill or exercise. Trainees who do not satisfactorily complete training are provided an appropriate level of remedial training. However, the training program does not include responses to severe NPEs affecting multiple facilities. (See Section 8.0, **OFI 10**.)

The PORTS drill program is well structured and provides many opportunities to ensure that all ERO personnel receive hands-on training and demonstrate acceptable proficiency. The drill program also includes participation by medical, security, and fire department organizations. A dedicated emergency management drill coordinator implements the program by developing an annual drill program plan, preparing drill packages, conducting facility drills, and tracking ERO cadre drill participation. Drills are conducted frequently and formally, and they are appropriately based on scenarios analyzed within the EPHAs. The drill coordinator is currently developing sitewide drills representative of severe NPEs involving multiple facilities onsite.

Overall, the FBP emergency plan and implementing procedures generally establish an appropriate framework for the training and drill program. A systematic approach to training has established the appropriate curriculum for all ERO positions, and the status of training is appropriately tracked and monitored to ensure that only trained personnel are on the duty roster. The PORTS drill program provides sufficient opportunities for training and proficiency demonstration for ERO personnel. However, the training program does not address NPEs affecting multiple facilities.

5.4 Objective 4: Offsite Response Interfaces

The site's planning is adequate for obtaining and integrating offsite response assets for events beyond the site's response capability.

Independent Oversight reviewed the site's planning and interactions with offsite response authorities and organizations responsible for protecting the public and augmenting site response resources. This review also looked at the routine dialogue and interfaces with organizations needed to establish and maintain emergency response roles, responsibilities, capabilities, and information needs, consistent with the requirements of the National Incident Management System. Independent Oversight also examined written support agreements with offsite response agencies and organizations, evaluated related response plans, and assessed the adequacy of response procedures used after a severe NPE.

Independent Oversight determined that the site's planning is mostly adequate for obtaining and integrating offsite response assets for events beyond the site's response capability. However FBP has not adequately and consistently implemented offsite emergency planning, and the site exercise program has not validated some capabilities necessary for response to a significant PORTS HAZMAT event.

Offsite Interactions

DOE Order 151.1C requires that effective interfaces be established and maintained to ensure integration and coordination of emergency response activities with Federal, state, and local agencies and with organizations responsible for emergency response and protection of workers, the public, and the environment. Further, a formal exercise program must validate all elements of the emergency management program over a five-year period, including provisions to assess the potential or actual offsite consequences of an emergency. Consequence assessments must incorporate monitoring of specific indicators, and field measurements and must be coordinated with Federal, state, and local organizations.

The FBP and USEC emergency plans appropriately document a description of PORTS's required offsite relationships and includes detailed listings of Federal, state, and local organizations with emergency response or regulatory control responsibilities relevant to PORTS. Additionally, PPPO and PORTS contractors hold regular interface meetings with offsite response organizations to exchange information and address any response issues before an emergency occurs. FBP also invites offsite organizations to participate annually in site-level exercises designed to test offsite interfaces and capabilities and regularly incorporates offsite participation in USEC and DOE exercises.

The State of Ohio and county emergency planners/managers are familiar with NNSA asset capabilities in order to request asset support in the early phase of a severe event and implement a coordinated response. The most likely NNSA asset to support an emergency response to PORTS is the Region 5 radiological assistance program (RAP). The *DOE Region 5 RAP Regional Response Plan* covers basic response within the region and emphasizes that the primary responsibility for an emergency or incident involving radioactive material remains with the party having custody of the material. Upon request, Region 5 RAP teams (assembled from personnel located in Chicago, Illinois) can provide radiological monitoring and assessment services to help identify offsite areas contaminated by PORTS radiological material releases.

Importantly, the State of Ohio relies on PORTS personnel to perform offsite monitoring. Since the State of Ohio does not have readily available field monitoring teams (FMTs), the state expects DOE and FBP to provide the needed resources to perform offsite monitoring to verify dispersion modeling and to determine the necessary protective actions that offsite authorities may need to implement after a PORTS HAZMAT release. Thus, FBP maintains multi-disciplined FMTs for onsite and offsite deployment, accepting that the State of Ohio does not provide any additional personnel to augment the FBP FMTs.

Although the State of Ohio and FBP acknowledge that additional FMT resources may be required, minimal preparations have been made to obtain resources and practice field monitoring activities. No written plan or procedure defines how offsite monitoring of actual or perceived PORTS radiological hazards will occur, so FBP will likely need to include additional support from RAP assets in order to field a full response. PPPO, the State of Ohio, and local government agencies know they can request RAP assistance after an incident involving the offsite release of radiological materials from the site. Furthermore, no protocol or procedure integrates PORTS field monitoring concepts of operation with other potential offsite monitoring teams, which may include Ohio National Guard civil support teams, RAP, the DOE Federal Radiological Monitoring Assessment Center, the NRC, the EPA, or other Federal agencies. (See Section 8.0, **OFI 11**.) Additionally, FBP has not validated through exercises, an offsite radiological monitoring process that includes a request for participation with Region 5 RAP field teams, as self-identified by FBP in the FY-2012 emergency readiness assurance plan (ERAP). (See **Finding F-6** and Section 8.0, **OFI 12**.)

FBP has appropriately planned to coordinate consequence assessment from a radiological event with state and county emergency management agencies; however, the PORTS exercise program has not validated the required NNSA consequence assessment capabilities. The technical support room, located within the PORTS EOC, can analyze potential health effects of the emergency and provide protective actions to respective agency decision-makers. The technical support room also has several modeling and radiological monitoring capabilities, including required connectivity with the NNSA National Atmospheric Release Advisory Center (NARAC), to assist in identifying the plume footprint, relocation areas, and food control boundaries. However, FBP has not requested participation with NARAC assets, located in Livermore, California, as part of the site exercise program, as self-identified by FBP in the FY-2012 ERAP. (See **Finding F-6** and Section 8.0, **OFI 12**.) Similarly, FBP has not validated other site-level emergency management program elements through site exercises. For example, response to a nuclear criticality accident has not included a request for participation with the NNSA Radiological Emergency Assistance Coordination and Training Site (REAC/TS). Additionally, PORTS has not participated in an exercise with the DOE Headquarters Emergency Management Team to demonstrate an effective capability to provide DOE Headquarters with up-to-date significant event information, as prescribed in the DOE Headquarters Emergency Management Team Situation Report. (See **Finding F-6** and Section 8.0, **OFI 13**.)

Finding F-6: The FBP exercise program does not validate all elements of emergency response over a five-year period including provisions to request exercise participation from offsite organizations providing response capabilities, as required by DOE Order 151.1C.

Overall, FBP has appropriately documented a clear and comprehensive description of PORTS' relationships with local offsite authorities and frequently interacts with response agencies and organizations capable of augmenting FBP response resources. However, FBP has not demonstrated the appropriate planning and coordination to assist local governments in identifying the radiological plume, relocation area, and food control boundaries after a DOE radiological emergency. Additionally, the exercise program has not validated, through exercises, the RAP and NARAC capabilities needed to assess the potential or actual offsite consequences of a PORTS HAZMAT event and to coordinate with Federal,

state, and local organizations responsible for protecting public health and safety using these capabilities. Furthermore, the exercise program does not include participation with the DOE Headquarters Emergency Management Team and REAC/TS.

Support Agreements

DOE Order 151.1C requires that emergency plans and procedures document the arrangements agreed to by local police departments, fire departments, hospitals, contractors, and state and local emergency response teams that coordinate emergency services. State of Ohio law allows statewide mobilization of emergency resources under the State of Ohio's Emergency Management Agency, which enables local fire chiefs, sheriffs, and emergency managers to request resources from counterparts throughout the state. The site also recognizes that some governmental entities may elect to provide aid and assistance under a separate agreement. In such cases, an agreement between DOE and USEC authorizes FBP to manage and provide an ERO and adhere to any mutual aid agreements executed in accordance with the emergency plan.

FBP appropriately plans and prepares for the integration of offsite response assets as part of the ERO structure. The FBP emergency plan identifies the mechanisms for integrating local agencies and other external organizations into the PORTS response. These mechanisms include policy letters, agreements, and memoranda of understanding between USEC, DOE, and external agencies. Local agencies entering into agreements with FBP and WEMS include area hospitals, local fire services, and local law enforcement agencies.

Overall, appropriate written support agreements exist between PORTS and offsite emergency response agencies and organizations.

Offsite Response Planning

DOE Order 151.1C requires that contractors at all DOE/NNSA facilities coordinate with state and local agencies and organizations responsible for offsite emergency response and for protection of the health and safety of the public. The site emergency management program can incorporate or invoke by reference existing plans, such as catastrophic earthquake plans or mass-casualty plans detailing compliance with Federal or state standards. Additionally, contractors must develop a methodology for informing the public of planned protective actions before and during emergencies.

Several State of Ohio and Pike County emergency planning documents govern offsite emergency response for a major PORTS emergency:

- The *State of Ohio Emergency Operations Plan* describes the State's planned responses to all hazards using the Department of Homeland Security *National Response Framework.*
- The *State of Ohio Emergency Operations Plan Catastrophic Incident Response Annex* describes the State's approach for responding to a catastrophic disaster involving the New Madrid seismic zone.
- The *State of Ohio Emergency Operations Plan Annex for Events at DOE Facilities* describes the State's approach for responding to an emergency at PORTS.
- The *Pike County Emergency Operations Plan* establishes protocols for all local agencies involved in emergency operations.

PORTS uses a "lead" and "event" contractor concept of operations. FBP is the site lead contractor, and is responsible for site-wide emergency planning and response, including offsite interface planning. USEC

leases portions of PORTS and conducts uranium enrichment activities in the ACP facilities. Site event contractors are USEC, BWCS, and WEMS, who are responsible for the facility-specific emergency management program within their facilities. Nevertheless, the USEC-leased facilities present some unique complications for the PORTS emergency management program.
The FY-2012 PORTS ERAP documents that "the integration of DOE requirements into the FBP emergency management program is a process that is extended for expansive periods while the topic is studied by USEC Inc. and a determination can be made on the impacts of the issue to their NRC-based program. This causes delays and sometimes makes it difficult to meet the implementation schedule proposed or required by DOE." Some of the unique obstacles FBP faces in achieving a compliant emergency management program include:

- USEC is the lead organization responsible for managing the overall site emergency plan, in accordance with NRC rules and regulations.
- The USEC emergency plan was developed to comply with NRC rules and thus does not address all of the requirements of DOE Order 151.1C, as self-identified by FBP, BWCS, and WEMS.
- The FBP contract with PPPO states that the "emergency management program must meet 10 Code of Federal Regulations 76.91, as required by the NRC, and meets the intent of DOE Order 151.1B consistent with the DOE EMGs for the Portsmouth D&D Project."
- The work authorization between PPPO and USEC states that "DOE through its contractor performing the services shall coordinate and manage an emergency management program that implements the requirements of the PORTS Emergency Plan (USEC-02)."

Although FBP's contract states that FBP is required to meet the intent of DOE Order 151.1C, discussions with PPPO confirmed that the word "intent" does not imply any lessening of compliance and adherence to the order. Additionally, PPPO expects the FBP emergency plan, used in conjunction with the USEC plan, to address full compliance with DOE Order 151.1C for FBP and WEMS. Likewise, PPPO expects the BWCS emergency plan to flow down the requirements of the USEC emergency plan into implementing documents and describe the details of the BWCS emergency management program that satisfy compliance with DOE Order 151.1C. However, Independent Oversight found that these expectations are not widely accepted by the DOE contractors that must implement DOE Order 151.1C requirements. PPPO clarified their intent with FBP in a contract modification on September 16, 2013. The FBP contract now states that "an integrated and comprehensive Emergency Management Program must be implemented that meets DOE Order 151.1C, *Comprehensive Emergency Management System,* and the requirements of the site emergency plan (PORTS Emergency Plan, USEC-02)." Additionally, "in the event of a conflict between DOE Order 151.1C and the site emergency plan, the contractor will follow the more stringent requirement and provide written notification to DOE outlining the conflict within 5 days of discovering the conflict."

PORTS contractors' exemption from DOE Order 151.1C event categorization and classification requirements may add to the misperception regarding compliance with the order. The exemption for PORTS contractors, approved by the Office of Emergency Operations and the Environmental Management Office of Safety, Security and Quality Programs, allows continued implementation of the classification system described in the USEC emergency plan so as to minimize confusion among onsite personnel, the local community, and the State of Ohio Emergency Management Agency. Specifically, the exemption implements an event classification process that uses the PORTS technical bases (hazard surveys and EPHAs) to identify and differentiate the degree of emergency severity using only two classification categories (Alert and SAE) instead of the three categories required by DOE Order 151.1C (Alert, SAE, and General Emergency). Applying the two-category process, an Alert represents only onsite impacts and an SAE signifies further offsite impacts. The exemption also applies to Operational Emergency events that do not require further classification; however, the PORTS processes are imprecise

with respect to event categorization related to the requirements for Operational Emergencies not requiring further classification. For example:

- The USEC emergency plan refers to other emergency events (i.e., events not classified as an Alert or SAE); however, their plan does not provide specifics on categorization criteria or offsite notification requirements for FBP to implement.
- The BWCS emergency plan requires offsite notification within 30 minutes after event recognition for emergency events not classified as an Alert or SAE; however, their plan does not specify the categorization criteria that FBP uses to implement this requirement.
- The FBP emergency plan requires offsite notification within 15 minutes after event recognition for emergency events not classified as Alert or SAE; however, their plan also does not specify the categorization criteria to be used. Similarly, the FBP event classification procedure refers to "non-classified operational emergencies" and requires resultant activation of the EOC.
- PORTS contractors are exempt from all requirements stated in DOE Order 151.1C CRD Section 11 (Categorization and Classification); therefore, PORTS contractors are not required to report such events as accidental criticalities, mass casualty events, and building damage caused by NPEs or plane crashes, unless they are included as classified events.

Further complicating order compliance, the technical planning bases for USEC and other PORTS contractors have produced different offsite planning conclusions. State, county, and site emergency plans define a two-mile radius immediate notification area/zone, centered on the Plant Control Facility; however, no offsite EPZ has been developed from the site's technical bases and centered on release locations (refer to Section 5.1 for discussion of EPZ determination). Consequently, the State's DOE annex states that UF_6 release calculations "show that a radiological release would not go offsite because the radiological component involved is uranium. Uranium is heavier than lead and the models show that due to weight, uranium would drop out fairly quickly and not go beyond the boundaries of the site." However, the State's hazard analysis in their DOE annex shows a vulnerable zone, based on EPA criteria for non-radioactive hazards, to be greater than ten miles from the release point. This vulnerable zone is intended for use by state and county emergency planners in evaluating the risk of and planning for a response to HAZMAT releases. However, because of differences in both the impact (concentration) criteria and the methods used, the vulnerable zone does not directly correspond to the EPZ concepts developed for DOE facilities. Additionally, PORTS offsite planning does not reflect recent and ongoing revisions to the PORTS EPHAs and EALs, including the distance to PAC determinations discussed in Section 5.1. For example, the DUF6 and FUEF EPHAs document that the release of a single 14-ton cylinder of UF_6 has a distance to PAC of 5 miles, more than doubling the current 2-mile offsite PAR and offsite planning. (See **Finding F-7** and Section 8.0, **OFI 14**.) Furthermore, FBP has not reconciled with USEC the practice of truncating PAC distances at the maximum distance of 2 miles when the PAC can be exceeded at a much greater distance.

Finding F-7: FBP offsite response planning has not resulted in a clearly described understanding between state and county parties relative to response actions (e.g., EPZ, EALs, PARs, monitoring and consequence assessment plans, and actions anticipated by each interface agency), as required by DOE Order 151.1C.

Overall, FBP's emergency plan adequately documents provisions for interfacing and coordinating with Federal, state, and local agencies responsible for offsite emergency response. Additionally, the State of Ohio and Pike County have their own PORTS-specific emergency planning. However, PORTS emergency planning related to PAC distances is inconsistent with the DOE policy to protect public health and safety, and PARs do not reflect a bounding estimate of event consequences relative to PAC, as derived from the EPHA analysis. Additionally, the development of an approved PORTS EPZ (as

discussed in Section 5.1) will necessitate additional emergency planning with state and county agencies to reflect the PORTS EPHA consequence assessments and the worst-case scenarios that PORTS contractors use for emergency planning.

Response Operations

DOE Order 151.1C requires appropriate application of resources to mitigate an emergency event at a DOE site. Additionally, DOE Order 420.1B, *Facility Safety*, requires each DOE site with a staffed fire department to maintain a baseline needs assessment (BNA) to establish the site fire fighting and emergency response capabilities, consistent with the order and applicable NFPA standards. PORTS is located on a 3,711 acre DOE-owned reservation in lightly populated, rural Pike County in south central Ohio, approximately 70 miles south of Columbus, Ohio. During a severe NPE, PORTS would rely heavily on offsite support. Local fire departments that have entered into assistance agreements with PORTS are small all-volunteer groups with varying resources and capabilities.

The PORTS emergency plans appropriately describe the expected onsite incident command structure for an Operational Emergency response, in accordance with DOE Order 151.1C. For all events (fire, medical, HAZMAT, security, and technical rescue operations), the IC is the PSS. The protective force shift commander and the senior fire department officer manage sectors under the IC and control their respective response activities at the event scene. The IC coordinates the activities of multiple response elements at the scene (i.e., fire, rescue, medical, spill containment, and mutual aid) and makes on-the-spot decisions. The IC relies heavily on the local emergency director, assigned to each facility, to cope with facility emergencies.

FBP and BWCS performed BNAs in accordance with DOE Order 420.1B, *Facility Safety*, and appropriately determined the necessary onsite fire, emergency medical service, and HAZMAT resources based on the conclusions in the emergency plan. The BNAs identify that:

- The FBP is capable of responding to most fire emergencies at PORTS using only onsite FBP assets.
- Response capabilities account for multiple types of events, including a medical emergency in conjunction with a single event response, as well as contingencies for incident response through callback of off-duty personnel and reciprocal aid agreements.
- FBP maintains a formal agreement for fire fighting assistance with regional fire departments as identified in the emergency plan.

FBP has some provisions for technical rescue capabilities; however, FBP has not planned for technical rescue in accordance with NFPA-1670, *Standard on Operations and Training for Technical Search and Rescue Incidents*. PORTS BNAs do not identify important technical rescue capabilities, including structural collapse, rope rescue, confined space, and trench and excavation. A variety of hazards, including earthquakes, manmade accidents, and terrorist activities, may result in the need for urban search and rescue (USAR) and could involve the location, extraction, and initial medical stabilization of victims trapped in confined spaces due to a structural collapse. Assistance agreements with offsite organizations do not identify technical rescue capabilities or the intent for offsite organizations to provide these services at PORTS. The closest Federal Emergency Management Agency USAR team is the Ohio-Task Force One (approximately 125 miles away), a 62-person USAR task force based in Miami Valley, Ohio. (See Section 8.0, **OFI 15**.)

FBP does not plan for wildland fires based on the risk assessments documented in site fire hazards analyses. In the DUF6 Conversion Facility DSA and hazards survey, BWCS identifies that wildland fires are possible on the PORTS reservation but pose no significant risk to DUF6 Conversion Facility

operations as long as wildland fuels in the vicinity are controlled. Consequently, FBP has deemed the need for specific planning for wildland fires with Federal, state, and county agencies unnecessary and the FBP BNA does not document or establish response capabilities for conducting wildland fire operations. If needed, FBP would rely on the State of Ohio Department of Natural Resources Forestry Division to provide bulldozers to cut firebreaks. FBP is prepared to activate the Ohio Forestry capability through the Pike County Sheriff's Office. Additionally, FBP maintains qualified wildland fire fighters, personal protective equipment, equipment, and a brush truck for wildland fire fighting. (See Section 8.0, **OFI 16**.)

Overall, FBP has appropriately established the onsite response assets necessary to respond to most events at PORTS. However, Independent Oversight determined that FBP has incomplete planning for technical rescue, including structural collapse responses and trench rescue.

5.5 Objective 5: Termination and Recovery

The site has planned for an approach for event termination and recovery operations through established plans and procedures.

Independent Oversight reviewed the site's process for termination of emergencies and the planning for recovery from a terminated Operational Emergency. DOE Order 151.1C requires that recovery from a terminated Operational Emergency must include communication and coordination with state and local government and other Federal agencies; planning, management, and organization of the associated recovery activities; and ensuring the health and safety of workers and the public. Additionally, the contractor must have the means for estimating exposure to HAZMAT and for protecting workers and the public from exposure during reentry and recovery activities.

FBP adequately describes the basic framework for emergency event termination and recovery operations in relevant plans and procedures, but has not fully developed and practiced the planned concepts. Independent Oversight noted several limitations in termination and short-term recovery planning for severe NPEs. (See Section 8.0, **OFI 17**.) For example:

- The *Continuity of Operations Plan for FBP* identifies mission-essential functions. Although identifying these functions may help determine priorities for restoration and mitigation efforts during a severe NPE scenario, the plan documents only nominal reconstitution planning.
- Potential severe NPEs postulated for PORTS lack specific event response planning or procedures that include short-term recovery actions, such as considering infrastructure damage and outages that may impede the normal response of onsite or offsite responders, and procedures for inspecting structural damage following an NPE.
- Typically, FBP demonstrates only fundamental recovery plan preparation during functional exercises.
- FBP conducts some exercises that focus on severe NPEs, but none that postulate consequences resulting in significant structural damage or building collapse or that generates resource requirements that PORTS cannot meet.

Overall, FBP has appropriately established the framework for event termination and recovery operations. However, site exercises have focused minimally on important recovery planning and validation of termination and recovery elements.

5.6 Objective 6: Emergency Medical Support

The site has planned for sufficient medical support for contaminated or injured personnel, including documented arrangements with offsite medical facilities to transport, accept, and treat contaminated or injured personnel for mass casualty events.

Independent Oversight reviewed the plans, procedures, and policies that FBP Fire Services and Health Services use to provide medical treatment to onsite workers during an emergency. Independent Oversight also examined planning for a mass casualty incident (MCI), exercise after-action reports documenting the medical treatment received by contaminated injured workers, and the letters of understanding (LOUs) with offsite medical facilities that have agreed to treat contaminated injured workers from PORTS. Finally, the protocols for sharing patient information with onsite and offsite health care providers were examined.

Independent Oversight determined that FBP has planned for sufficient medical support for contaminated injured personnel, including documented arrangements with offsite medical facilities. A few instances were noted where exercise requirements and coordination with offsite hospitals could be improved.

DOE Order 151.1C requires that sites provide medical treatment, plan for MCIs, and coordinate sharing of patient information between onsite and offsite health care providers in advance of an emergency. In addition, the order requires that sites arrange and document agreements with onsite and offsite medical facilities to accept and treat contaminated injured personnel. DOE Guide 151.1-4 provides additional guidance for emergency medical support in the areas of HAZMAT event planning, resources, training, drills, and exercises.

FBP has appropriate arrangements in place for the medical treatment of injured contaminated workers. Fire Services provides the first responders for medical emergencies at PORTS. At least two paramedics are on duty each shift; the remaining fire fighters are trained as emergency medical technicians, and all are equipped with personal protective equipment. Fire Services has unhindered access to all parts of the site and has two advanced life-support ambulances available for use. The fire fighters evaluate and provide first aid and life support to the patients at the scene, decontaminate and/or wrap patients (if needed), and then transport the patients to Adena Pike Medical Center in Waverly, Ohio, unless otherwise directed by Adena Pike Medical Center or the PORTS Medical Director. Additionally, Health Services can provide first aid at their onsite facility and can assist Fire Services at the event scene, if requested. FBP has appropriate protocols in place to share patient information and notify receiving hospitals of the treatment administered to patients and their estimated time of arrival. Multiple decontamination areas are available throughout the site, in addition to the decontamination equipment carried in Fire Services vehicles. Fire Services and Health Services also maintain an adequate supply of calcium gluconate for hydrofluoric acid burns. FBP health physics personnel are available to assist Fire Services with patient surveys, contamination control, and decontamination. Furthermore, Health Services personnel receive radiation casualty management training from REAC/TS.

FBP has sufficient mechanisms in place to ensure that changes in hazards are incorporated into emergency medical response procedures and that medical staff members maintain proficiency in treating contaminated injured workers. Fire Services stays informed of changes in facility-specific hazards through the facility emergency package review process and physical inspections of site HAZMAT facilities. Health Services learns of changes in job hazards through regular meetings with FBP Occupational Safety and Health. In addition, the FBP drill and exercise program procedure requires that medical emergencies be included in drills and exercises periodically. Fire Services frequently participates in the FBP drills and exercises each year and many of these drills and exercises include injured workers,

some of whom are contaminated. Further, Fire Services paramedics and emergency medical technicians are required to maintain appropriate state certifications.

FBP has performed comprehensive planning for an MCI. Fire Services declares that an emergency is an MCI when three or more severely injured people are involved. Upon this declaration, Pike County Emergency Medical Services (EMS) and Adena Pike Medical Center coordinate with offsite hospitals to determine bed availability, while the fire fighters perform triage at the incident scene and transport patients as directed. If the MCI involves fatalities, Fire Services includes the coroner in the unified incident command and establishes a temporary morgue. Although FBP conducted an MCI exercise in 2011, the FBP drill and exercise program procedure does not include a requirement to periodically conduct an MCI exercise to ensure continued proficiency. (See Section 8.0, **OFI 18**.)

FBP has appropriate agreements in place with offsite medical hospitals to accept and treat contaminated injured personnel from PORTS; however, FBP does not provide training or invite all of these offsite medical hospitals to participate in exercises as required by the site's emergency plans. FBP maintains LOUs with Adena Pike Medical Center, Adena Regional Medical Center (located in Chillicothe, Ohio), and Southern Ohio Medical Center (located in Portsmouth, Ohio) to evaluate and treat injuries, radiation exposure, and effects of toxic agents. These hospitals are not rated for trauma services; the nearest hospitals that have Level I trauma centers are located in Columbus and Cincinnati, Ohio, and Huntington, West Virginia. Air ambulance support is available through Pike County EMS to transport trauma patients to one of these three Level I trauma centers, although FBP lacks a documented agreement that an air ambulance service will take a radiologically contaminated trauma patient. As a result, transport of a radiologically contaminated trauma patient may be unnecessarily delayed while the option of air ambulance transport is explored. (See Section 8.0, **OFI 19**.) The LOUs with the three local hospitals do not provide details on the essential equipment and services that FBP would provide them; however, the USEC and FBP emergency plans state that the following will be provided to offsite medical organizations:

- Personnel to help decontaminate patients, medical staff, equipment, and hospital facilities
- Medical treatment advisors (PORTS Medical Director and REAC/TS personnel)
- Biennial training on hazards, protective actions, and expectations for offsite emergency responders
- Invitations to participate or observe the site's biennial exercises.

FBP Occupational Safety and Health meets regularly with the Adena Pike Medical Center staff to keep them informed of facility-specific hazards. In addition, FBP Emergency Management provides an annual briefing on site hazards to offsite medical responders, but does not invite Adena Regional Medical Center to this training as required by the FBP and USEC emergency plans. Pike County EMS and Adena Pike Medical Center participate in site drills and exercises, but FBP does not invite Southern Ohio Medical Center and Adena Regional Medical Center to participate in or observe site biennial exercises as required by the FBP and USEC emergency plans. (See **Finding F-8** and Section 8.0, **OFI 20**.)

Finding F-8: FBP does not invite some offsite medical providers to the annual briefing on site hazards or invite them to participate or observe the biennial exercises, as required by the USEC and FBP emergency plans.

Overall, FBP has sufficient medical plans and procedures in place to treat injured or contaminated workers, as well as documented arrangements with offsite medical providers to accept and treat contaminated injured workers. Changes in the hazards at PORTS are suitably communicated to Fire Services and Health Services, and onsite medical responders are given ample opportunities to maintain

their proficiency in treating contaminated injured workers. Fire Services has developed appropriate plans for responding to an MCI. Suitable procedures have been established to share necessary patient information with offsite medical providers as needed. However, the documentation of exercise requirements, determination of air ambulance service availability, and coordination with offsite hospitals warrant improvement.

5.7 Objective 7: Corrective Action Implementation

The site/facility implements effective mechanisms for managing corrective actions from evaluations, assessments, and appraisals and lessons learned from external and internal reviews, facility training, drills, actual responses, and findings.

DOE Order 151.1C requires DOE/NNSA contractors to assess their emergency management programs based on specific standards and criteria issued by the DOE Office of Emergency Operations, which are published in DOE Guide 151.1-3, Appendix D. Additionally, the cognizant DOE/NNSA field element manager is required to review contractor assessment programs to ensure compliance with DOE/NNSA directives and policies. Emergency management programs must also effectively manage the issues and corrective actions identified through external and internal assessments. Independent Oversight did not perform a program review of the PORTS readiness assurance and exercise elements during this review, but instead based its conclusions on the effectiveness of corrective actions implemented to address weaknesses identified during the 2006 Independent Oversight review, the 2013 PPPO review, and the training and drill program elements.

Independent Oversight determined that PORTS contractors generally have mechanisms in place for identifying program weaknesses and managing corrective actions. However, corrective action implementation and closeout processes are not always effective and, in many cases, are inconclusive because closure files are not readily available.

Of the six findings identified during the 2006 Independent Oversight review, Independent Oversight concluded that one was effectively closed and one was not properly closed, but could draw no conclusions about the other four due to lack of evidence. Since 2006, FBP has added HotSpot and NARAC dispersion modeling programs for use in the EOC and provided appropriate training to users to address a finding regarding the lack of radiological dispersion modeling programs for use in performing ongoing assessments. A finding about user difficulties in applying EALs during performance tests was closed and EALs were developed per USEC requirements. However, in an attempt to simplify application, the FBP EALs are based on HAZMAT rather than on facilities and hazards. Independent Oversight could not draw a conclusion about the remaining four findings either because: (1) the findings were assigned to contractors that are no longer on site or that have different emergency management roles, or were related to performance weaknesses that could be corrected in a number of ways; or (2) Independent Oversight was not provided records of any actions taken or effectiveness reviews performed for these findings. Former PORTS contractors placed all closure records for these items in a long-term offsite storage facility, and the absence of these contactors prevented discussions about completed corrective actions.

Independent Oversight reviewed PPPO's report of their 2013 review of the PORTS emergency management program, which contained 33 concerns, and examined the progress on 9 concerns that were directly within the scope of this Independent Oversight review. Independent Oversight concluded that two concerns were properly closed, one is in progress with an appropriate corrective plan, three were closed inappropriately, and three have inadequate corrective action plans. PPPO defines concerns as findings or observations and requires FBP to develop a corrective action plan for both types of concerns.

For this set of corrective actions, PPPO has not completed an effectiveness review yet. Specifically, Independent Oversight concluded that:

- FBP appropriately changed the ERO refresher training from a biennial frequency to an annual frequency.
- FBP appropriately documented all assumptions in the EPHA for the FUEF EPZ but maintained the two-mile INZ rather than establishing a facility-specific, technically based EPZ (as discussed in Section 5.1).
- FBP is implementing an appropriate corrective action plan to link EALs with protective actions that reflect the results contained in the EPHAs.
- FBP inappropriately closed a finding regarding the lack of hazard surveys for all facilities without developing all of the required hazard surveys.
- FBP inappropriately closed a finding because they had developed a draft EAL procedure revision, but Independent Oversight noted numerous issues with existing and draft EALs (as discussed in Section 5.1).
- FBP inappropriately closed a finding based on the approval of a Mass Casualty Medical Response Policy without an associated response document to ensure that notifications are performed as required by Section 12 of the CRD.
- FBP is implementing an inadequate corrective action plan to move the alternate EOC to a building that is also located in range of PAC as determined in the EPHAs.
- FBP is implementing a narrowly focused corrective action plan to address technical rescue operations in the hazard surveys rather than fire department BNAs, as stipulated by NFPA-1670, to address both the capability and response personnel qualifications.
- FBP is implementing an inadequate corrective action plan to address the lack of an approved EPZ by expanding the immediate notification zone with the addition of a siren north of the plant, rather than establishing a technically based EPZ using DOE guidance methodologies.

Independent Oversight also determined that issues and corrective actions resulting from PORTS training and drill activities are tracked only informally. Anecdotal evidence indicates that ERO members are informed of issues discussed in "hot washes" via an annual briefing as stipulated in the EOC Concept of Operations EPIP; however, no records, databases, or other forms of evidence were available to determine the effectiveness of this process. (See **Finding F-9**.)

Finding F-9: PPPO has not ensured that PORTS contractors have effective mechanisms for managing corrective actions to achieve continuous improvement for weaknesses identified from internal and external evaluations, as required by DOE Order 151.1C.

Overall, Independent Oversight concludes that PORTS does not have effective mechanisms for managing corrective actions to improve weaknesses identified from external reviews and training and drill activities.

6.0 CONCLUSIONS

Independent Oversight noted several positive observations during its review of the PORTS emergency management program's preparedness for severe NPEs. FBP has planned for both onsite and offsite medical support of contaminated injured personnel and mass casualty events. The ERO training and PORTS drill programs are administered and structured to provide numerous opportunities for ERO members to maintain proficiency in their assigned duties. The PWS is a useful tool for alerting the public within a two-mile radius of PORTS, and the EOC and Fire Station have adequate backup power systems and refueling plans for long-term generator operations. Finally, the DUF6 Conversion Facility and the

UF_6 Sampling Facility have adequate protective action plans, personnel accountability protocols, and safe shutdown procedures.

Independent Oversight also identified a number of aspects of the emergency management program that warrant increased management attention to better prepare and respond to significant events, including severe NPEs. The EOC's proximity to HAZMAT facilities and the lack of a viable alternate EOC could endanger ERO personnel and jeopardize incident response. Further, the absence of a designated site EPZ inhibits coordinated offsite planning with state and local agencies. Additionally, because the program is defined by DOE-NRC agreements, Title 10 of the Code of Federal Regulations, numerous contracts, and historical precedents, it lacks the technical and quantitative basis that DOE requires for a comprehensive, all-hazards emergency management program. Finally, because PORTS contractors are exempt from the requirements of DOE Order 151.1C CRD Section 11:

- EALs have been developed per the NRC regulated USEC emergency plan, which directs that protective action distances be based on the *Emergency Response Guidebook*. The resulting offsite protective action distances differ significantly from those obtained from DOE-required EPHA consequence analyses.
- Contractors must correlate their NRC-based protective action distances with DOE-required protective action concepts and measures; this process has not been defined or consistently implemented.
- The PARs and PAC distances that PORTS provides to state and local agencies for events analyzed in the EPHAs do not correlate to the historically based INZ, further complicating offsite planning.
- Operational Emergencies not requiring further classification as an Alert or SAE might not be assessed as emergencies by PORTS contractors. These events include accidental criticalities, mass casualty events, or building damage caused by NPEs or plane crashes. The NRC has a similar category (Notification of Unusual Event), but contractors have either not clearly defined or not consistently implemented procedures for these events. As a result, offsite authorities (including DOE) may not be notified when such events occur.

The results of this Independent Oversight review raise questions as to whether the stated objective of the DOE Order 151.1C exemption – to minimize confusion among onsite personnel, the local community, and the State of Ohio Emergency Management Agency – has been achieved. In contrast, PORTS's use of a unique classification system, inconsistent with the NRC and Ohio nuclear power plant emergency classifications and the DOE HAZMAT emergency classifications, in conjunction with the lack of a site EPZ and the application of an INZ, has been detrimental to effective planning with offsite authorities. PPPO should reconsider the propriety of this exemption.

The significance of these issues, including inconsistencies in the administration and implementation of DOE and NRC requirements, leads Independent Oversight to conclude that the DOE-regulated PORTS emergency management program is not fully compliant with DOE Order 151.1C, diminishing its effectiveness in protecting the safety and health of workers and the public according to DOE requirements.

7.0 FINDINGS

Findings indicate significant deficiencies or safety issues 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. Findings may identify aspects of a program that do not meet the intent of DOE policy.

Finding F-1: FBP has not developed a hazards survey for all FUEF buildings to identify the conditions to be addressed by the comprehensive emergency management program, as required by DOE Order 151.1C.

Although the order requires development of a hazard survey to examine the features and characteristics of the facilities and activities and to identify generic emergency events and conditions to be addressed by the HAZMAT program, FBP has not developed a hazards survey for the FUEF.

Finding F-2: FBP has not developed a site EPZ, as required by DOE Order 151.1C.

The facility-level EPZ determinations documented in the FUEF and DUF6 EPHAs are not based on the methodology required by the order. The FUEF and DUF6 Conversion Facility EPZs are bounded by the two-mile INZ using an inappropriate methodology, so no site composite EPZ has been determined.

Finding F-3: FBP and BWCS have not identified appropriate protective actions for the classified events analyzed in the EPHAs, and included in the EALs, to ensure the health and safety of onsite workers and the public, as required by DOE Order 151.1C.

PORTS contractors have identified protective actions in the EALs that are based on the *Emergency Response Guidebook* used by the public for transportation events. DOE policy does not endorse this approach. Additionally, EALs developed for NPEs do not indicate that PAC could be exceeded offsite and do not ensure timely implementation of required offsite PARs and activation of the PWS within the INZ.

Finding F-4: FBP has not made appropriate provisions for use of an alternate location if the primary command center is not available, as required by DOE Order 151.1C.

DOE Order 151.1C requires that provisions be established for use of an alternate location if the primary command center is not available. The PORTS EOC and alternate EOC are not equipped with habitability systems and both facilities are within range of hazardous concentrations of airborne contaminants from the same HAZMAT release. The mobile communications vehicle is parked near the EOC, is known to be unreliable, and is not in a maintenance and test program to ensure it is operable.

Finding F-5: FBP does not test and maintain the Fire Station UPS as a level-2 system, as required by NFPA-72, *National Fire Alarm and Signaling Code*, for a system that provides power to an operator-staffed supervisory station.

The Fire Station UPS system provides backup power to an operator-staffed supervisory station where operators monitor site fire alarms and dispatch responders to emergency events. Supervisory stations of this type are required to have backup power capable of 24 hours of operation without recharging and to be in a test and maintenance program to comply with NFPA-111, per NFPA-72; however, no test procedure or test records were available to demonstrate compliance with these requirements.

Finding F-6: The FBP exercise program does not validate all elements of emergency response over a five-year period including provisions to request exercise participation from offsite organizations providing response capabilities, as required by DOE Order 151.1C.

The exercise program has not validated, through exercises, the RAP and NARAC capabilities needed to assess the potential or actual offsite consequences of an offsite HAZMAT event and to coordinate with

Federal, state, and local organizations responsible for protecting public health and safety using these capabilities. Furthermore, the exercise program lacks participation with the DOE Headquarters Emergency Management Team and REAC/TS.

Finding F-7: FBP offsite response planning has not resulted in a clearly described understanding between state and county parties relative to response actions (e.g., EPZ, EALs, PARs, monitoring and consequence assessment plans, and actions anticipated by each interface agency), as required by DOE Order 151.1 C.

DOE Order 151.1C requires contractors at all DOE/NNSA facilities to coordinate with state and local agencies and organizations responsible for offsite emergency response and for protection of the health and safety of the public. PORTS emergency planning related to PAC distances is inconsistent with the DOE policy to protect public health and safety, and PARs do not reflect a bounding estimate of event consequences relative to PAC, as derived from the EPHA analyses. Additionally, the development of an approved PORTS EPZ will necessitate additional emergency planning with state and county agencies to reflect the PORTS EPHA consequence assessments and the worst-case scenarios that PORTS contractors use for emergency planning.

Finding F-8: FBP does not invite some offsite medical providers to the annual briefing on site hazards or invite them to participate or observe the biennial exercises, as required by the USEC and FBP emergency plans.

FBP has LOUs in place with Adena Pike Medical Center, Adena Regional Medical Center, and Southern Ohio Medical Center that state these hospitals will evaluate and treat injuries, radiation exposure, and effects of toxic agents. In return, the FBP and USEC emergency plans state that these hospitals will be provided training through an annual briefing and offered the opportunity to participate in or observe the biennial exercises so that these hospitals maintain an understanding of the hazards present at PORTS. However, FBP does not provide these opportunities to Adena Regional Medical Center and Southern Ohio Medical Center.

Finding F-9: PPPO has not ensured that PORTS contractors have effective mechanisms for managing corrective actions to achieve continuous improvement for weaknesses identified from internal and external evaluations, as required by DOE Order 151.1C.

DOE Order 151.1C requires the implementation of corrective actions for findings from all types of evaluations, including both internal and external evaluations, to ensure continuous improvement in the emergency management program. Independent Oversight reviewed 11 corrective actions in various stages of implementation and concluded that seven had inadequate corrective action plans or were inappropriately closed. Closure evidence for corrective actions resolving program weaknesses identified before October 2011was not readily available for review.

8.0 OPPORTUNITIES FOR IMPROVEMENT

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

FBP

OFI 1: To ensure the accuracy of the EPHA consequence analyses and appropriate determination of facility-specific EPZs at the FUEF, consider:

- Calculating the distance to TEL for use in emergency planning and including it in the consequence analyses.
- Using the guidance provided in the EMG for facility-specific EPZ determinations.
- Developing a site EPZ from a compilation of all the site's facility-level EPZs.

OFI 2: To improve FBP's ability to provide the surrounding public with emergency warnings, consider expediting the placement of additional tone alert radios and installation of a new siren on the north side of PORTS.

OFI 3: To strengthen FBP's testing of communications equipment, consider:

- Adding a requirement to periodically test the following:
  - Fire Services' ability to communicate with offsite mutual aid organizations via radio
  - PSS office classified telephone and classified facsimile machine
  - Alternate EOC telephones in the Plant Control Facility.
- Including testing of the EOC hand-held radios and the EOC Crisis Manager ring-down telephone on the *EOC Inventory Inspection* form.
- Correcting the *PSS/Incident Command Equipment Inspection* form to state that functional testing of the satellite telephone is required.

OFI 4: To enhance the ERO's ability to use telephones and cellular telephones during periods of severe network congestion or disruption, consider developing a process to ensure that critical ERO members are issued a GETS card (landline telephone) and enrolled in the WPS (cellular telephone).

OFI 5: To strengthen the cascade operators' ability to provide backup support for the 911 system, consider developing a procedure and providing training and checklists to better prepare them for collecting the necessary information and giving needed assistance when answering 911 calls.

OFI 6: To improve FBP's ability to provide employees with emergency notifications, consider:

- Establishing a process to identify all hearing-impaired personnel and invite them to join the 911 pager group.
- Revising the FBP procedure for developing facility emergency packets and emergency actions plans to include a requirement to verify that protective action instructions can be heard in shelter locations (via PA system or hand-held radio).
- Expediting the replacement of the PA system and expanding the design to allow access to the PA system from more than one location.

OFI 7: To further prepare for a site evacuation, consider:

- Further planning with school authorities for various conditions, such as when school is in session or when the schools are locked during off hours.
- Further planning for potentially contaminated personnel and vehicles arriving at schools.
- Establishing controls or accountability procedures for personnel who decide not to relocate to a school.
- Updating agreements with school authorities to document the details of a PORTS site evacuation.
- Revising the evacuation EPIP to reflect details of a site evacuation.

OFI 8: To ensure that personnel are assigned to retrieve the visitors log and are familiar with this duty, consider revising the evacuation procedure to include this task to support personnel accountability.

OFI 9: To strengthen response and short-term recovery activities, consider planning with the FBI to define roles, responsibilities, logistical requirements, and procedures for an event at PORTS that requires FBI intervention.

OFI 10: To ensure effective emergency response capabilities during severe NPEs affecting multiple facilities, consider developing a training course and conducting drills and/or tabletop exercises for these types of scenarios.

OFI 11: To improve emergency planning for offsite radiological support for Pike County and the State of Ohio, consider:

- Developing a comprehensive plan for offsite field monitoring that defines an overall monitoring and sampling strategy, including minimum resources (personnel and equipment), command and control, data acquisition protocols, communications, and safety-related guidelines.
- Emphasizing that the primary objective for offsite monitoring is to verify the absence of an airborne plume and to identify the boundaries of the area contaminated with a HAZMAT deposition (i.e., bound the plume).
- Ensuring that monitoring capabilities include airborne sampling, direct measurement of the radiation dose rate or contamination levels, and sampling with appropriate radiological analysis of air, water, soil, and vegetation.
- Developing standard operating procedures for offsite monitoring that include staffing, assignment of responsibilities, control of field teams, and specific sampling and monitoring protocols.

OFI 12: To ensure validation of all emergency management program elements over a five-year period and to optimize the usefulness of annual exercises, consider:

- Using a scheduling matrix to assist with long-range planning for future exercises and short-range planning for the current year's exercises.
- Ensuring that all response program elements are tested and validated over a five-year period.
- Coordinating, via PPPO, the participation of DOE radiological emergency response assets (e.g., NARAC, REAC/TS, and RAP) in the exercise plan, as appropriate.

OFI 13: To demonstrate an effective capability to provide required event information, consider periodic exercise participation with the DOE Headquarters Emergency Management Team.

OFI 14: To improve offsite response planning specific to PORTS events, consider:

- Providing input to the *State of Ohio Emergency Operations Plan Annex for Events at DOE Facilities*, describing the actions by the parties for each type of classified PORTS emergency event.
- Developing the PORTS EPZ in cooperation with the State of Ohio and responsible county authorities, since each has statutory responsibility to protect its citizens.
- Coordinating offsite PARs, based on the analysis of scenario results documented in the EPHAs, with state and county agencies.
- Confirming that initial PARs provided to offsite authorities include the distance to PAC and reflect a bounding estimate of consequences relative to PAC, as derived from the EPHA analysis.
- Ensuring that the PAR provides the time available for carrying out the protective action before the onset of the impact.
- Planning with responsible offsite agencies for the expansion of protective actions outside the EPZ, if warranted by the actual conditions.

OFI 15: To improve site-specific planning for technical rescue operations, consider:

- Establishing and documenting, in the BNA, the levels of functional capability, in accordance with NFPA-1670, for technical rescue operations (structural collapse, rope rescue, vehicle and machinery rescue, confined space rescue, and trench excavation search and rescue).
- Establishing the minimum job performance requirements for personnel who provide a specific functional capability.
- Documenting, in the BNA, specific functional rescue capabilities relied on through mutual aid agreements.
- Providing a summary of technical rescue capabilities in the PORTS emergency plans.

OFI 16: To improve site-specific planning for wildland fire management, consider:

- Establishing and documenting the strategy for initial response to a wildland fire.
- Establishing the strategy for management of wildland fires beyond initial response capability.
- Documenting, in the BNA, wildland fire-fighting capabilities relied on through mutual aid agreements.
- Providing a summary of wildland fire response capabilities in the PORTS emergency plans.

OFI 17: To continue to improve site-specific planning for severe NPEs at PORTS, consider:

- Planning for response to NPEs that could have a significant and widespread impact on the site and surrounding community emergency response infrastructure.
- Integrating NPE response planning with applicable state and Federal catastrophic event plans.
- Referencing other appropriate site-specific emergency planning documents as annexes to the emergency plan (e.g., the security condition plan and continuity-of-operations plan).
- Developing functional (e.g., protective force operations, power and utilities, fire protection, telecommunications, shift operations, and critical facilities/operations) emergency response procedures, matrices, or checklists needed to respond to a severe NPE.
- Developing a generic incident action plan template for a multiagency response at PORTS; include in the template a statement of objectives, incident command system organization, tactics and assignments, and supporting materials (e.g., maps, communications plan, medical plan, traffic plan, and special precautions).
- Pre-determining the most likely types of additional resources needed by the site, the availability of those resources, and the logistical requirements once the resources arrive at the site.

- Continuing to include severe NPE scenarios in the PORTS drill and exercise program.
- Conducting tabletop exercises with appropriate Federal, state, and local response agencies and organizations that would respond to a PORTS event caused by a severe NPE, a manmade disaster, or terrorism.
- Updating response plans and procedures to reflect information extrapolated from severe NPE planning workshops, drills and exercises, and lessons learned from past disasters.

OFI 18: To ensure that an MCI drill or exercise is conducted periodically, consider adding a requirement for this type of drill or exercise to the FBP drill and exercise program procedure.

OFI 19: To clarify emergency transport options for contaminated trauma patients, consider confirming whether any of the air ambulance services will transport a contaminated trauma patient and establishing agreements as appropriate.

OFI 20: To ensure that offsite medical providers are kept apprised of the hazards at PORTS, consider determining whether LOUs are still necessary with Adena Regional Medical Center and Southern Ohio Medical Center and if so, inviting them to the annual briefings on site hazards and biennial exercises.

BWCS

OFI 21: To ensure accuracy and consistency in the EPHA consequence analyses, improve specific planning for implementing protective actions and PARs, and ensure accurate determination of facility-specific EPZs at the DUF6 Conversion Facility, consider:

- Conducting consequence analyses for severe NPEs at each of the DUF6 Conversion Facility support facilities with HAZMAT.
- Developing event-specific EALs for the severe NPE analyses in the DUF6 EPHA.
- Including the maximum distance to PAC and TEL associated with identified impacted inventories in the DUF6 Conversion Facility EALs.
- Revising situation-specific protective actions to indicate where sheltering or evacuation are implemented.
- Providing, where appropriate, PAR details in each EAL.
- Using the guidance provided in the EMG for facility-specific EPZ determinations.

OFI 22: To ensure that sufficient generator diesel fuel is available and reliable, consider:

- Revising the operator round sheet to ensure verification that the fuel tank is at least three-quarters full.
- Establishing a periodic sampling and analysis program for the fuel supply tank to ensure the absence of contaminants.

BWCS and FBP

OFI 23: To improve specific planning for implementing protective actions and PARs, consider revising the EAL sets by:

- Adding linkage to each EAL that provides the maximum distance to PAC and TEL calculated in the EPHAs for formulating protective actions.
- Ensuring that each EAL provides a linkage to appropriate protective actions and PARs for each analyzed scenario event.

- Revising situation-specific protective actions and PARs to indicate where sheltering or evacuation is implemented.

OFI 24: To improve the reliability of battery backup power sources, consider replacing batteries near the end of their design life rather than waiting for failure.

OFI 25: To ensure that backup power systems are properly tested commensurate with their importance, consider:

- Documenting AHJ decisions regarding applicability of NFPA standards.
- Developing a procedure that tasks the AHJ with responsibilities and record requirements.
- Tasking the AHJ or designated alternates to perform periodic reviews of backup power system test and maintenance activities to ensure compliance with required test and maintenance programs.

OFI 26: To improve the usefulness of pre-incident plans for arriving fire fighters, consider:

- Developing a procedure that reflects the content and format of site-wide pre-incident plans.
- Including information that is consistent with NFPA-1620.
- Eliminating the need for fire fighters to reference additional documents, such as material safety data sheets, when using pre-incident plans during an event.

9.0 ITEMS FOR FOLLOW-UP

PPPO should develop a corrective action plan for achieving full compliance with DOE Order 151.1C, and the DOE Office of Environmental Management should provide oversight of this plan and its progress. Once Environmental Management has validated that PORTS complies with DOE Order 151.1C, Independent Oversight will again review this emergency management program.

Appendix A
Supplemental Information

Dates of Review

Scoping Visit:	July 16-18, 2013
Onsite Data Collection Visit 1:	July 29 – August 1, 2013
Onsite Data Collection Visit 2:	August 12-14, 2013
Validation and Outbrief:	August 15, 2013

Office of Health, Safety and Security Management

Glenn S. Podonsky, Chief Health, Safety and Security Officer
William A. Eckroade, Principal Deputy Chief for Mission Support Operations
John S. Boulden III, Director, Office of Enforcement and Oversight
Thomas R. Staker, Deputy Director for Oversight
William E. Miller, Deputy Director, Office of Safety and Emergency Management Evaluations

Quality Review Board

William A. Eckroade
John S. Boulden III
Thomas R. Staker
William E. Miller
Michael A. Kilpatrick
Gary D. Wisdom

Independent Oversight Site Lead

James Coaxum

Independent Oversight Reviewers

Randy Griffin – Lead
John Bolling
Deborah Johnson
Teri Lachman
Tom Rogers

Appendix B
Referenced Documents and Interviews

Referenced Documents

- Department of Homeland Security, National Response Framework, January 2008
- DOE Guide 151.1-2, *Technical Planning Basis EMG*, 7/11/07
- DOE Guide 151.1-4, *Response Elements EMG*, 7/11/07
- DOE Guide 420.1-3, *Implementation Guide for DOE Fire Protection and Emergency Services Programs*, 9/27/07
- DOE Order 151.1C, *Comprehensive Emergency Management System*, 11/2/05
- DOE Order 420.1B, *Facility Safety*, 12/22/05
- DOE-STD-3003-2000, *Backup Power Sources for DOE Facilities*, January 2000
- Emergency Planning and Community Right-to-Know Act of 1986, Title III, Public Law 99-499, no date
- FBP-EM-PRO-00015, *Emergency Management Training*, Rev. 1, 3/14/13
- FBP-EM-PRO-00025, *Emergency Management Program*, Rev. 1, 6/20/13
- FBP-EM-PRO-00028, *Maintenance of Emergency Facilities*, Rev. 2, 12/26/12
- FBP-EM-PRO-00036, *Development, Maintenance, and Inspection of Facility Emergency Packets and Emergency Action Plans*, Rev. 1, 3/5/13
- FBP-EM-PRO-00028-F09, *EOC Inventory Inspection*
- HSS CRAD 45-56, Emergency Management Program Inspection Criteria, Approach, and Lines of Inquiry, Targeted Review of Site Preparedness for Severe Natural Phenomena Events, Rev. 0, 1/3/13
- PRC-PRO-IRM-309, *Controlled Software Management* , Rev. 2, 6/29/12
- NFPA-72, *National Fire Alarm and Signaling Code*, 2012
- NFPA 101, *Life Safety Code*, 2012
- NFPA-110, *Standard for Emergency and Standby Power Systems*, 2010
- NFPA-111, *Standard on Stored Electrical Energy Emergency and Standby Power Systems*, 2010
- NFPA-1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, 2002
- NFPA-1620, *Standard for Pre-Incident Planning*
- NFPA-1670, *Standard on Operations and Training for Technical Search and Rescue Incidents*, 2009
- PORT-13-IA-100474, *Independent Assessment Final Report of the FBP Emergency Management Program at PORTS, Piketon, Ohio*, April 2013
- *Pike County Emergency Operations Plan*, 2011
- *State of Ohio Emergency Operations Plan*, 2013
- *State of Ohio Emergency Operations Plan Catastrophic Incident Response Annex*, December 2010
- *State of Ohio Emergency Operations Plan Annex for Events at DOE Facilities*, 2006

Interviews

- Adena Pike Medical Center Medical Director
- Adena Pike Medical Center Registered Nurse
- DUF6 Accountability Reporter
- DUF6 Building Warden
- DUF6 Electrical Design Authority
- DUF6 Electrical Engineer
- DUF6 Electrical System Engineer
- DUF6 Emergency Preparedness Coordinator

- DUF6 Facility Manager
- DUF6 Operations Supervisor
- DUF6 Piketon Site Engineering Manager
- EMCBC Emergency Management Specialist
- FBP Crisis Manager
- FBP Electrical Distribution Manager
- FBP Electrical Maintenance Technicians
- FBP Emergency Management Manager
- FBP Emergency Management Specialist
- FBP Emergency Management Specialist
- FBP Emergency Management Specialist
- FBP Emergency Management Specialist
- FBP Environmental Engineer
- FBP Fire Services Manager/Fire Chief/AHJ
- FBP Nuclear Safety Manager
- FBP PSS
- FBP Radiological Protection Manager
- FBP Senior Staff Nurse
- FBP Site Shift Operations Manager
- FBP UF_6 Sampling Facility Manager
- FBP UF_6 Sampling Facility Operations Supervisor
- PPPO Facility Representative
- State of Ohio Emergency Management Agency
- USEC Fire Safety/Emergency Management Manager
- WEMS Telephone System Administrator