Independent Oversight Review of Preparedness for Severe Natural Phenomena Events at the Hanford Site

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Office of Safety and Emergency Management Evaluations
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Acronyms

AHJ	Authority Having Jurisdiction
BDBE	Beyond Design Basis Event
BNA	Baseline Needs Assessment
CHPRC	CH2M Hill Plateau Remediation Company
CRAD	Criteria, Review, and Approach Document
D&D	Deactivation and Decommissioning
DOE	U.S. Department of Energy
DOE/RL	DOE/Richland Operations Office
DSA	Documented Safety Analysis
EAL	Emergency Action Level
EMG	Emergency Management Guide
EOC	Emergency Operations Center
EP	Emergency Preparedness
EPA	U.S. Environmental Protection Agency
EPHA	Emergency Planning Hazards Assessment
EPIP	Emergency Plan Implementing Procedure
EPZ	Emergency Planning Zone
ERO	Emergency Response Organization
FBI	Federal Bureau of Investigation
FERO	Facility Emergency Response Organization
FOB	Federal Office Building
GETS	Government Emergency Telecommunications Service
GSA	General Services Administration
HAZMAT	Hazardous Materials
HFD	Hanford Fire Department
HPMC	HPM Corporation Occupational Medical Services
HSEAS	Hanford Site Emergency Alerting System
HSS	Office of Health, Safety and Security
IC	Incident Commander
LLEA	Local Law Enforcement Agency
MCI	Mass Casualty Incident
MOU	Memorandum of Understanding
MSA	Mission Support Alliance, LLC
NARAC	National Atmospheric Release Advisory Center
NFPA	National Fire Protection Association
NNSA	National Nuclear Security Administration
NPE	Natural Phenomena Event
OFI	Opportunity for Improvement
PAC	Protective Action Criteria
PAG	Protective Action Guideline (1 Rem)
PAR	Protective Action Recommendation
PFP	Plutonium Finishing Plant
POC	Patrol Operations Center
RAP	Radiological Assistance Program
SWOC	Solid Waste Operations Complex
TRU	Transuranic
UDAC	Unified Dose Assessment Center
UPS	Uninterruptible Power Supply
USAR	Urban Search and Rescue

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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 Richland Operations Office (DOE/RL) and the various Hanford Site contractors to deal with severe natural phenomena events (NPEs). The HSS Office of Safety and Emergency Management Evaluations performed this review to evaluate the processes for identifying emergency response capabilities and maintaining them in a state of readiness in case of a severe NPE. This report discusses the scope, background, methodology, results, and conclusions of the review.

2.0 SCOPE

This review was conducted April – May 2013, and the scope included those aspects of the emergency management program that relate 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.

Hanford Site emergency operations are operated and managed by Mission Support Alliance, LLC (MSA), which is composed of Lockheed Martin, Jacobs Engineering, and G4S Government Solutions, Inc. Other contractors at the site also have responsibilities in the event of an emergency. MSA's emergency responsibilities include:

- Providing for fire suppression, emergency rescue, emergency medical, hazardous materials (HAZMAT) response, fire protection services, and incident response through the Hanford Fire Department (HFD)
- Providing for site security, access control, emergency (911) telephone system call answering and dispatching, and transportation emergency response through the Hanford Patrol
- Providing for emergency communications, including onsite and offsite notifications, through the Hanford emergency operations center (EOC) Shift Office
- Staffing a 24-hour Emergency Duty Officer position
- Managing and ensuring that the Hanford EOC is staffed with qualified personnel
- Providing personnel to staff the Hanford EOC (both management and technical staff)
- Providing onsite and offsite radiation monitoring and sampling
- Obtaining weather information from the Hanford Site meteorology station
- Providing for transportation and heavy equipment operations (e.g., motor carrier services, crane and rigging)
- Providing for services in support of reentry and recovery operations, such as decontamination, engineering, equipment maintenance, utilities, procurement, and waste disposal
- Maintaining radio, telecommunications, computer, and audiovisual services
- Evaluating radiological doses to personnel in the event of a criticality emergency
- Managing sitewide radiological tasks, including plume assessment and tracking; surveying, sorting, and decontamination of large groups of personnel; survey of individuals evacuated from the Columbia River (if requested); and radiological control support during medical care of radiation accident patients at the local hospitals.

Other contractors on the Hanford Site with significant emergency management responsibilities include:

- CH2M HILL Plateau Remediation Company (CHPRC)
- Washington Closure Hanford, Inc.
- HPM Corporation Occupational Medical Services (HPMC).

The facilities covered by this review include:

- EOC, located in the City of Richland
- Alternate EOC, located in the City of Richland
- Other response command centers
  - Hanford main fire station, Fire Station 92, located in the 200 West Area
  - Patrol Operations Center (POC), located in the 200 East Area
- Solid Waste Operations Complex (SWOC), located in the 200 West Area
- Plutonium Finishing Plant (PFP), located in the 200 West Area.

3.0 BACKGROUND

The Hanford Site occupies 586 square miles in Benton County, Washington. The Columbia River flows along the site for approximately 50 miles, forming its northern and eastern boundary. The site is divided by function into three main areas. The nine former plutonium production reactors are located along the river in an area designated as the 100 Area; the chemical separations complexes are located inland in the Central Plateau, designated as the 200 Area; and various support facilities are located in the southeast corner of the site, designated as the 300 Area. The site is bordered on the southeast by the Tri-Cities, a metropolitan area composed of Richland, Kennewick, Pasco, and smaller communities, and home to over 270,000 residents.

The PFP is located in the central part of the 200 West Area, with the nearest Hanford Site boundary about 7.5 miles to the west. The building emergency plan and the documented safety analysis (DSA) list over 60 buildings and facilities that are part of the PFP Complex. In early 2004, the PFP Complex completed stabilizing its large, aged, and degraded collection of plutonium-bearing scraps, residues, powders, solutions, polycubes, and other leftovers from decades of weapon production. The remaining plutonium is legacy inventory in various forms, consisting of process material holdup in gloveboxes, contaminated components, and contaminated waste. Plutonium contamination is also present in equipment, ventilation systems, cribs, and trenches. The current mission of the PFP is deactivation and decommissioning (D&D) to place the facility in a safe and stable condition, including the removal of hazardous and radioactive materials, and then to decontaminate and dismantle the equipment and structures. D&D activities are expected to continue for the next few years.

The SWOC is also located in the 200 West Area, with the nearest Hanford Site boundary and nearest residents approximately 6.9 miles west of the facilities. The nearest shore of the Columbia River is approximately 5.5 miles north. The primary mission of the SWOC is to receive, retrieve, treat, process, store, and dispose of low-level waste, low-level mixed waste, transuranic (TRU) waste, and TRU-mixed waste. The SWOC consists of the Hanford Site Low-Level Burial Grounds, the Central Waste Complex, the T Plant Complex, and the Waste Receiving and Processing facility. These facilities are functionally interrelated, and their combined functions are integrated into a solid waste management function that is the responsibility of the CHPRC Waste and Fuels Management Program organization.

The last comprehensive inspection of Hanford, in 2001, identified weaknesses in the technical basis and emergency response organization (ERO) performance. Since 2001, Independent Oversight has conducted the following emergency management activities at Hanford:

- The 2006 Independent Oversight inspection of the Hanford emergency management program focused narrowly on the implementation of key aspects of emergency management at T-Plant. Emergency planning, emergency preparedness, and readiness assurance were rated as "effective performance," with one finding concerning the SWOC emergency planning hazards assessment (EPHA). Independent Oversight determined that CHPRC had conducted adequate corrective actions to address and close the finding.

- In 2010, at the request of the Hanford emergency management organization, Independent Oversight reviewed specific areas of the program, including:

  - Processes for developing hazards surveys, EPHAs, and emergency action levels (EALs)
  - Plans and procedures associated with emergency categorization, classification, and protective actions
  - Training and drill program elements associated with building emergency director, incident commander (IC), and role player performance
  - Drill and exercise planning and execution, and emergency management readiness assurance.

  There were no findings, based on the type of review that was requested; however, the report offered several recommendations for DOE/RL and contractor line management to accept, reject, or modify as appropriate.

- In 2011, Independent Oversight observed the Hanford Site Emergency Preparedness fiscal year 2011 Annual Field Exercise conducted at the PFP. In addition, Independent Oversight informally provided comments on the PFP EPHA, focusing on the accuracy of the consequence analyses and resultant protective actions, protective action recommendations (PARs), and facility-specific emergency planning zone (EPZ). The greatest concern identified in the EPHA involved the development of the consequence analyses that provide data for EAL development and protective action and PAR distances.

  There were no findings, based on the informal review that was requested; however, an informal report provided to the site offered recommendations for contractor line management's consideration.

4.0 METHODOLOGY

Severe NPEs and other catastrophic events, such as earthquakes, tornados, floods, wildland fires, and manmade disasters, have emphasized the need to adequately plan and prepare for a large-scale event that could degrade or overwhelm a site's emergency response capability. The facility-specific DSA report contains scenarios that personnel use to reduce risk from operations to acceptable levels; these scenarios are referred to as design basis events. When establishing a facility design, DSAs do not analyze events that are more severe than (i.e., that go beyond) the parameters defined for the design basis event. "Beyond design basis events" (BDBEs) include severe NPEs that represent the upper end of the consequence spectrum that DOE/National Nuclear Security Administration (NNSA) facilities are required to address in their EPHAs and prepare for in their emergency response programs.

The facility EPHA is the basis for establishing a graded approach that will meet the program requirements outlined in DOE Order 151.1C. Its vital role in a DOE emergency management program is to provide the technical planning basis for determining the necessary plans/procedures, personnel, resources, equipment, and analyses that comprise the facility's Operational Emergency HAZMAT program. Importantly, it also performs a key role in readiness assurance by providing clear and convincing evidence that the responsible emergency management planners clearly understand the facility-specific hazards, and it represents a valid technical foundation for developing an emergency management program that is "commensurate with hazards."

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. The order and associated guides were used to determine whether DOE requirements and expectations were met. Independent Oversight also referenced applicable DOE, Federal, state, and local requirements when determining compliance with the DOE order. The scope of this review is consistent with Objectives 1 through 7 of HSS Criteria, Review, and Approach Document (CRAD) 45-56, *Emergency Management Program Inspection Criteria, Approach, and Lines of Inquiry, Review of Preparedness for Severe Natural Phenomena Events*.

Independent Oversight reviewed the documentation that establishes and governs the Hanford Site 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. Additionally, Independent Oversight reviewed previous exercise after-action reports, independent assessments, and accident investigations to determine the site's effectiveness in managing corrective actions. The purpose and scope of the Independent Oversight activities listed in Section 3 of this report did not document formal program weaknesses and did not evaluate the readiness assurance program element for an in-depth evaluation of the site's corrective action program (Section 5.7 of this report).

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 has an effective mechanism for quickly determining whether an NPE 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 Hanford uses to develop its EPHAs, as well as the EPHAs and DSAs for the PFP and the SWOC; even though PFP is undergoing D&D, the facility EPHA signifies the worst-case consequence from a HAZMAT release at Hanford and represents the bounding events used in emergency planning. In addition, Independent Oversight reviewed the current PFP and SWOC EPHAs (to determine the accuracy and adequacy of analyses conducted for severe NPEs) and the DSAs (to determine the consistency of the BDBEs identified in both the DSAs and the EPHAs). Further, Independent Oversight determined whether the facility-specific EALs were based on, and correlated with, the consequence analyses documented in the PFP and SWOC EPHAs. 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.

DOE Order 151.1C requires that EPHAs must be used to define the provisions of the Operational Emergency HAZMAT program so that the program is commensurate with the identified hazards. The order also requires that the Protective Action Guides (PAGs) promulgated by the U.S. Environmental Protection Agency (EPA) be used as protective action criteria (PAC) when planning for radioactive material releases.

MSA has developed an adequate sitewide procedure for developing, maintaining, and ensuring the consistency of EPHAs that meets the requirements of DOE Order 151.1C. CHPRC is the Hanford contractor responsible for revising and maintaining the PFP and SWOC EPHAs in accordance with the MSA procedure. CHPRC has adequately defined each facility and its operations, and has identified and characterized the HAZMAT of concern in the EPHAs. The EPHAs establish seismic events as having the worst-case consequences and analyze them as BDBEs. The consequence analyses documented in the EPHAs provide the maximum distances at which the EPA PAG of 1 rem is exceeded.

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 hazardous material program. Additionally, the documented EPHA provides an archival record of the data, assumptions, and methods used in developing the technical planning basis for the program and documents the reasoning used to modify the program in response to changes in operations and hazards in order to avoid the loss of continuity that can result from uncertainty about past hazard analyses and emergency planning decisions. Further, the EPHA 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 the EPHA, if used correctly, represents a valid technical foundation for developing an emergency management program that is "commensurate with hazards." Furthermore, emergency planning and emergency response personnel should use the same consequence assessment models, and the selection of models should be justified in the EPHA for each facility. Lastly, 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 calculate the maximum distances at which consequences exceed the applicable PAC used to develop default initial protective actions.

Independent Oversight identified significant issues related to development of the consequence analyses in the EPHAs. CHPRC EALs are not always linked to the appropriate protective action distances established by the EPHAs, and some EALs are inappropriately classified. Significantly, CHPRC has not documented a valid technical foundation in the PFP EPHA that includes the rationale for the use of an in-house developed modeling spreadsheet called RADIDOSE for conducting consequence assessments, and has not conducted timely revisions of the PFP EPHA once significant changes were identified. Additionally, the PFP and SWOC EPHAs do not identify critical onsite facilities (e.g., POC, fire stations, health clinic, and nearby facilities) and offsite receptors of interest (e.g., EOC, alternate EOC, schools, daycare facilities, nursing homes, and hospitals) and correlate them with projected exposures to establish planning and preparedness activities commensurate with site hazards.

Furthermore, contrary to DOE guidance, which recommends that EPHA developers and EOC consequence assessment teams use the same consequence models, Hanford procedures call for the Unified Dose Assessment Center (UDAC) personnel (who provide consequence assessment results to the emergency management team in the EOC) to use models other than RADIDOSE (HotSpot for radiological releases and EPIcode for chemical releases). The use of different models has resulted in

significant differences between the initial protective actions, PAC distances, PARs in the EALs, and ongoing assessment analyses calculated by UDAC personnel during an emergency event. (See Section 8.0, **OFI 1**.)

Independent Oversight could not obtain a rationale for the significant difference between outputs from RADIDOSE and Hotspot. However, the dose projections from the PFP worst-case seismic event scenario using RADIDOSE indicates that PAC is exceeded 36 miles from the release point, whereas the results using Hotspot indicate that PAC is exceeded at approximately 8 miles. Importantly, this consequence assessment establishes the initial protective action decisions used by the Hanford ERO. The consequence assessment results in the PFP EPHA are supposed to be used within the first few minutes into the event, and serve as the technical basis for the EAL and conservative initial protective actions. As UDAC personnel receive information during an emergency event, consequence assessment personnel analyze and provide refined dose plume projections. However, the initial PAC distance provided in the PFP EPHA indicates that protective actions must be implemented within a radius of 36 miles around PFP for the seismic event until UDAC results are available. The implications of planning and implementing the 36-mile PAC distance documented in the PFP EPHA, which results from RADIDOSE analyses, are considerable and significantly impact current plans and preparedness activities. Some of the potential impacts of carrying the 36-mile PAC distance forward in emergency planning include:

- Causing the evacuation of emergency response command centers, including the DOE/RL EOC, alternate EOC, joint information center, and Benton County and Franklin County EOCs
- Rendering planned evacuation routes, public assistance shelters, and emergency monitoring/ decontamination centers unusable
- Causing the evacuation of people over a large geographical area, including the cities of Richland, Kennewick, and Pasco and portions of the State of Oregon.

Additionally, the CHPRC EALs are not always linked to the appropriate protective action distances established by the EPHAs, and some PFP EALs are inappropriately classified. The order requires the development of EALs for the potential Operational Emergencies identified in the EPHA, and the protective actions must be linked to the corresponding EALs. The Hanford EALs contain protective action information to establish this link. However, the PFP EALs for events classified as General Emergencies do not reflect the results of the EPHA analysis whenever a PAC distance is exceeded beyond 10 miles. The PAC distances in these EALs are truncated at a maximum EPZ distance of 10 miles even though the EPHA analyses indicate that the PAC can be exceeded at a much greater distance. Further, some PFP EALs listed as Site Area Emergencies should be classified as General Emergencies because the PAC is exceeded beyond the site boundary. (See **Finding F-1** and Section 8.0, **OFI 2**.)

Independent Oversight requested an official interpretation from the DOE Office of Emergency Management on the frequently asked question *Protective Action Recommendations (PARs) Outside the EPZ,* dated June 9, 2006. The Office of Emergency Management stated that the answer to this frequently asked question is:

> "…while all scenarios must be identified in the EPHA, not all scenarios must serve as the basis for special planning and be taken into consideration in determining the size of the EPZ. However, this does not mean that there should be no planning for those scenarios that are not the basis of the EPZ determination. An analyzed event with onsite and offsite impact should have a corresponding EAL with a predetermined Protective Action (PA)/Protective Action Recommendation (PAR) included in the facility EAL set. The key to response for scenarios whose consequences extend beyond the EPZ is that planning efforts within the EPZ provide a substantial basis for expansion of response efforts beyond the EPZ, if necessary."

Finding F-1: CHPRC has not documented the technical basis or accurately applied the PFP EPHA results when establishing event classifications and areas to implement protective actions, as required by DOE Order 151.1C.

Independent Oversight, at the request of DOE/RL, conducted a review of the PFP EPHA in June 2011 and identified concerns with the use of RADIDOSE. MSA revised the EPHA development procedure in a timely manner to require the use of HotSpot and EPIcode for consequence analysis determinations. However, CHPRC did not revise the PFP EPHA, despite the known adverse effects (discussed above) of using RADIDOSE for emergency preparedness and response. (See **Finding F-2** and Section 8.0, **OFI 1**.) CHPRC has expressed its commitment to revise the PFP EPHA by August 2013, along with relevant EALs, protective actions, and PARs. However, contrary to DOE Guide 151.1-2, *Technical Planning Basis EMG*, regarding the role of the EPHA in the emergency management program, the PFP EPHA does not:

- Provide an adequate technical planning basis for determining the necessary plans/procedures and analyses (greater than 10-mile distances to PAC documented in the EPHA vs. the 10-mile PAC distances documented in the EAL, and the rationale for the use of HotSpot by UDAC for consequence assessment).
- Provide an archival record of the data, assumptions, and methods used in developing the technical planning basis for the program (an explanation of the significant differences in the products of the two models, or the rationale and justification for the continued use of RADIDOSE) and provide the reasoning used to modify the program in response to changes in operations and hazards (the rationale for why recent and future EPHAs will use HotSpot and EPIcode for consequence analysis determinations and not RADIDOSE).
- Represent a valid technical foundation for developing an emergency management program that is "commensurate with hazards."

Finding F-2: CHPRC has not documented a valid technical foundation in the PFP EPHA or ensured timely revision of the EPHA when significant changes resulting in adverse effects to the health and safety of the workers and the public are identified, as required by DOE Order 151.1C.

An additional issue concerns the absence of projected exposures at critical onsite and offsite receptors of interest in the EPHAs recommend in DOE guidance documents. Calculation of consequences at key receptors provides emergency planners with essential parameters that impact classification decisions, protective action determinations, and habitability requirements for command centers. CHPRC departed from the DOE guidance for determining potential exposures to personnel at receptors of interest in the EPHA consequence analyses. The POC, EOC, and Hanford main fire station are important receptors of interest because it is desirable to keep these facilities staffed during an event in order to effectively implement a response, as described in Section 5.2.3. However, during EPHA development, CHPRC did not provide the projected exposures to personnel at these locations to aid in planning and preparing for plausible Hanford events (including ensuring that personnel do not receive potentially lethal doses or suffer permanent ill health effects). Independent Oversight extrapolated approximate dose consequence data from the spreadsheet calculations provided in Appendix A of the PFP EPHA for the severe seismic event to determine a projected dose at receptors of interest. The data indicates that a release from a single facility could expose SWOC (a co-located facility) personnel to approximately 1500 rem, medical personnel to approximately 120 rem, fire department personnel to approximately 30 rem, and POC personnel to approximately 20 rem if they remain at their locations for only one hour. (See **Finding F-3** and Section 8.0, **OFI 1**.) Further, these exposure rates could be higher because the EPHAs do not consider plausible severe events, such as a seismic event destroying multiple facilities on site, that (based on analysis) could overwhelm or incapacitate the site's response capability. (See Section 8.0, **OFI 1**.)

Finding F-3: CHPRC has not established the technical basis for the emergency management program commensurate with the hazards present at their facilities, as required by DOE Order 151.1C.

Overall, Hanford contractors have 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. However, the consequence analyses in the PFP EPHA do not provide an adequate technical basis for identifying where to implement protective actions, and PARs and do not always yield correct event classifications. CHPRC has not determined and resolved the significant differences in results between RADIDOSE and HotSpot, even after concerns were identified by Independent Oversight in 2011. Further, Hanford contractors have also not determined the projected exposure at nearby facilities and at critical onsite and offsite response facilities to plan and prepare an effective response.

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 PFP. Specifically, the review examined:

- Habitability and survivability of the EOC, the POC, Hanford's main fire station (Fire Station 92), the PFP, and their designated alternate facilities
- Normal and backup power sources at the above facilities
- Emergency response equipment
- Communication systems.

Independent Oversight selected the EOC, the POC, and the main fire station for review because they represent facilities that support important emergency response functions during severe NPEs that may result in a HAZMAT release. Independent Oversight selected the PFP for this review because it represents the Hanford Site's worst-case consequences from a HAZMAT release and thus is the basis for offsite emergency planning. The PFP has the potential for dispersion of plutonium beyond the site boundary, as well as accidental criticality events that could affect onsite workers.

Independent Oversight determined that the Hanford Site emergency management program could be more effective by establishing a program that is commensurate with the hazards being managed, as described in Section 5.1, and improving the reliability of backup power sources by adhering to industry test and maintenance standards. Hanford contractors did not use the PFP EPHA results to help identify potential locations and habitability requirements for both primary and alternate emergency facilities to ensure that one of these facilities is always habitable for the emergency management team's use during a design basis earthquake. The alternate EOC is closer to the Hanford Site than the EOC, both facilities are in range of dangerous concentrations of airborne plutonium per the EPHA, and neither facility is equipped with habitability systems. This condition, however, could be largely remedied through a more appropriate quantitative analysis, as described in Section 5.1, rather than by modification of facilities and equipment. Finally, Hanford contractors can improve the reliability of backup power sources by adhering to the test and maintenance programs for stationary diesel generators and emergency egress lighting described in National Fire Protection Association (NFPA) standards.

Independent Oversight also determined that, with one significant exception, MSA has communication systems able to facilitate information flow during an emergency. MSA cannot provide continuous 911-system service if an emergency causes an evacuation of the POC. Further, Independent Oversight identified specific areas for improvement in emergency communication processes and equipment testing. These OFIs are discussed below and identified in Section 8.0.

5.2.1 Normal and Backup Power Systems

Independent Oversight reviewed normal power and backup power sources for the facilities within the scope of this review and concluded that appropriate and sufficient normal and backup power capabilities exist through diverse sources, although testing and maintenance of backup power systems could be improved. Additionally, Independent Oversight examined the protocols that site contractors use to ensure that sufficient and reliable fuel is available to replenish generator fuel tanks and concluded that the Hanford Site 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 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 NFPA documents in its review of Hanford facilities. Hanford is committed to adhering to these in authorization basis or design criteria documents for Hanford Site facilities and through the General Services Administration (GSA) – owner of the Federal Office Building (FOB) – contract with a provider of standby power testing and maintenance services. In addition, these documents are 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*.

An important responsibility for the application of NFPA codes and standards is the assignment of an authority having jurisdiction (AHJ). The AHJ's responsibilities, as defined in NFPA documents, include designating standby power systems with NFPA protocols to establish testing and maintenance requirements and periodically verifying compliance with NFPA programs. Hanford has identified the Hanford Site Fire Marshal as the AHJ for Hanford Site facilities; however, no AHJ was identified for GSA's FOB. (See Section 8.0, **OFI 3**.)

Overall, Hanford has adequate normal and backup generator capacity and sufficient uninterruptible power supply (UPS) systems or battery sources to provide continuous power during generator start and loading operations and to implement protective actions. Hanford generators are in a state of readiness via their auto-start capabilities, minimum fuel supply tank levels, and maintenance programs. Hanford has prepared for long-term generator operations via contracted suppliers with multiple fuel sources, large bulk diesel fuel storage tanks on site, and two Hanford-operated fuel distribution trucks. Except for the FOB emergency egress light batteries, battery-based backup power systems are appropriately tested, inspected, and replaced to provide assurance of their capability and reliability. However, Hanford has not properly

evaluated and assigned all of the stationary generators to the appropriate NFPA-110 test program to ensure that a reliable backup power system is available and based on required industry standards. (See **Findings F-4, F-5, and F-6**.)

Normal Power

Hanford has a reasonably reliable source of power from offsite sources. Energy Northwest, a public utility, provides normal power to the Hanford Site electrical distribution system from either a north or a south transmission loop through a switchyard.

Backup Power

Hanford is appropriately committed to NFPA codes and standards that link the functions of the facilities and the importance of the equipment installed therein to test and maintenance requirements. NFPA-72 is the code that addresses backup power systems for fire alarm panels and operator-staffed supervising stations, and NFPA-101 is the code that addresses backup power systems for emergency egress illumination. Both of these codes incorporate by reference NFPA-110 and NFPA-111 to identify the required test and maintenance programs for engine-driven power systems and battery-backed power systems, respectively. Additionally, the standards apply to backup power systems that power other equipment used to save lives or perform rescue operations. For equipment of this type, the standards require the individual designated as 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, *Backup Power Sources for DOE Facilities*, is also available to identify important equipment unique to DOE facilities for the purposes of applying the NFPA standards.

The Hanford Site fire alarm panels are appropriately sized, tested, and maintained to comply with NFPA-72. HFD personnel test the onsite fire alarm panels to ensure that sufficient capacity is available to power equipment for more than 24 hours. The HFD also performs annual preventive maintenance on the fire alarm panels and replaces their five-year batteries every four years.

Hanford has adequate backup power capability at the EOC, POC, the main fire station, and PFP to operate essential equipment through diverse and sometimes redundant backup power sources. Propane or diesel fueled generators provide long-term backup power to essential equipment at these facilities during a loss of normal power, as detailed later in this report. UPS systems or batteries provide continuous power to important equipment, while generators start and power loaded equipment. The battery capacities can operate equipment for a sufficient time to allow implementation of protective actions.

Nevertheless, backup power systems are not comprehensively tested, or are tested less frequently than required for compliance with the NFPA standards. Although site contracts establish compliance with NFPA-72, NFPA-101, and NFPA-110 for ensuring reliability of backup power systems, the level of compliance varies among the facilities, as described later in the report. Contributing to this condition is the absence of initial reviews by an AHJ for establishing the necessary level of testing and maintenance and performing ongoing reviews of test and maintenance programs to ensure that compliance is maintained. (See Section 8.0, **OFI 3**.)

In the absence of an AHJ evaluation, Independent Oversight concluded that because the EOC backup generator system, which is located in the FOB in Richland, provides backup power to emergency egress illumination for nearly all of the FOB, it should be tested and maintained as an NFPA-110 level-1 system, as required by NFPA-101 and NFPA-110. Additionally, Independent Oversight concluded (in the absence of an AHJ evaluation of the POC generator) that the POC and (in agreement with an AHJ evaluation of the fire station generator) the main fire station backup generator systems should be tested

and maintained as NFPA-110 level-2 systems because they provide backup power to operator-staffed supervising stations for fire panel monitoring or emergency call/dispatch as described in NFPA-72. However, the generators at the FOB and POC do not comply with the most critical tests specified by NFPA-110, and the main fire station generator test program could be improved as well. (See **Findings F-4** and **F-5**.) NFPA-110 does not apply to the PFP generator because it is an optional generator, in the form of a mobile generator; the PFP stationary generators have been removed, and the PFP technical safety requirements were revised to reflect their removal. Finally, the few battery-backed emergency egress lights that do exist in the FOB are not tested in compliance with NFPA-101. (See **Finding F-6**.) Additional details on these conditions are provided in Section 5.2.3 of this report.

Finding F-4: The diesel generator system at the FOB is not tested and maintained as a level-1 system as required by NFPA-101, *Life Safety Code*, and NFPA-110, *Standard for Emergency and Standby Power Systems*, for a system that provides backup power to emergency egress lighting.

Finding F-5: The propane generator system at the POC is not tested and maintained 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 supervising station.

Finding F-6: The batteries for emergency egress lighting at the FOB are not tested as required by NFPA-101, *Life Safety Code*.

Generator Refueling Plans

The Hanford Site has established adequate propane refueling plans for long-term generator operations. The generator owner organizations manage refueling operations by establishing contracts with area fuel suppliers. The POC contracts with a local propane supplier that refills the POC propane fuel tank on request, and POC personnel check the fuel tank level monthly. The local supplier has significant fuel available: 320,000 gallons of propane, soon to be increased by an additional 300,000 gallons. Similarly, the HFD has a contract with a local supplier, and HFD personnel check the main fire station propane fuel tank level monthly.

The Hanford Site has established adequate diesel refueling plans for long-term generator operations. The Hanford Site has a 20,000-gallon underground bulk storage facility on site. The local diesel fuel supplier monitors Hanford's bulk storage tank levels remotely via wireless technology and replenishes them at a pre-determined level. The Hanford Site has four diesel fuel distribution trucks and two drivers who are on site or can be recalled at any time. Each truck can transport 1500 gallons of diesel fuel. A separate supplier provides diesel fuel to the FOB generator fuel tank, which is replenished directly from the supplier's truck.

The Hanford Site could improve diesel fuel reliability by establishing a diesel fuel tanks sampling and analysis program. Although the FOB generator fuel tank is sampled and analyzed annually, the Hanford Site does not routinely sample and analyze fuel upon receipt or at the bulk storage tanks, primarily because the supplier's fuel analysis is accepted as accurate and fuel turnover occurs every two to three months. Furthermore, analysis of diesel fuel in generator supply tanks is at the discretion of the facility; there is no site-level program. (See Section 8.0, **OFI 5**.)

Overall, Hanford 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. Hanford maintains adequate fuel supplies via contracted suppliers and a large onsite diesel fuel storage tank. In addition, the diesel fuel supply tank at the FOB is analyzed annually to ensure that a reliable fuel supply is available for long-term generator operations.

Nevertheless, Hanford's generator test and maintenance program warrants improvements to ensure the reliability of backup power systems. The POC and the main fire station generators provide backup power to an operator's supervising station, as described by NFPA-72, indicating the need for an NFPA-110 level-2 test and maintenance program. Further, the FOB generator provides backup power to emergency egress lighting for most of the building, indicating the need for a NFPA-110 level-1 test and maintenance program to comply with NFPA-101 and NFPA-110. However, the generator test and maintenance programs do not fully comply with these NFPA codes and standards. (See **Findings F-4** and **F-5**.) Furthermore, the batteries for the emergency egress lights in the FOB are not tested to comply with NFPA-101. (See **Finding F-6**.) Finally, the Hanford Site does not periodically sample and analyze onsite diesel fuel tanks to ensure that the fuel is reliable. (See Section 8.0, **OFI 5**.)

5.2.2 Communication Systems

Independent Oversight reviewed the key communication systems that the Hanford Site personnel – specifically, the EOC, EOC Shift Office, POC, and HFD – use to communicate with each other and with 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 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.

MSA has ensured that the EOC is adequately equipped to provide appropriate emergency notifications to offsite organizations. The EOC Shift Office duty officer faxes a form to the offsite organizations to provide the initial notification information and then uses one of the two available telephone bridges or "crash telephones" to conduct a conference call with these organizations and the other ERO venues to ensure receipt of the form and to answer any questions. If both crash telephones fail, the duty officers can contact the offsite organizations individually via radio or cellular telephone. The duty officers validate the telephone and facsimile numbers for the offsite organizations quarterly, test the primary crash telephone weekly (along with a facsimile test message), and test the backup crash telephone monthly.

MSA can effectively warn the public to take protective actions by means of a series of outdoor warning sirens located along the Columbia River. The responsibility for activating the sirens normally resides with Benton and Franklin counties, although for a pre-defined set of emergencies that could occur near the Columbia River, the counties allow the EOC Shift Office duty officer to activate the sirens directly. Lockheed Martin performs preventive maintenance on the sirens annually to ensure their continued operability. In addition, the duty officers perform periodic tests of the sirens, including frequent silent tests and a semiannual audible test conducted jointly with Benton and Franklin counties.

MSA uses a notable variety of appropriate methods for notifying employees of an emergency. The Hanford Site Emergency Alerting System (HSEAS) consists of six methods that MSA uses to communicate information and protective action instructions to workers (located at the site and in town):

- Outdoor warning sirens, which cover personnel working outdoors in the more densely populated areas of the site
- AM radio station, which covers all major site roadways
- Message boards, which instruct commuters at the site entrances to tune to the AM radio station
- Pop-up computer messages, which display on all computers connected to the Hanford local area network
- Telephone notifications, which include all office telephones
- Tone alert radios, which cover remote work locations.

MSA can activate all HSEAS functions from either the EOC Shift Office or the POC except for the message boards and the AM radio station, which can be accessed only from the EOC Shift Office. Additionally, the POC duty officers can broadcast emergency information over the two-way commercial radio system used by operations personnel, and building emergency directors can activate facility sirens at their locations, if so equipped. Lockheed Martin performs preventive maintenance on the outdoor warning sirens annually to ensure their continued operability. The AM radio station broadcasts continuously, and the EOC Shift Office and POC duty officers perform monthly tests of the sirens, pop-up computer messages, telephone notifications, and tone alert radios. MSA recently installed the message boards but has not yet determined their testing frequency. (See Section 8.0, **OFI 4**.)

The Hanford emergency radio system provides a robust mobile communications link that allows interoperability with offsite responders. Emergency responders use radios as the primary method for communication in the field; personnel in the EOC, EOC Shift Office, and POC monitor the radio traffic during an emergency. The emergency radio system covers the entire Hanford Site and includes amplifiers in some buildings to boost signal strength. HFD radios have pre-programmed channels corresponding to the radios used by the various mutual aid responders, resolving an issue identified in the Type B accident investigation report regarding a wildland fire in 2000. UPS units and backup generators power the system's repeaters if normal power is lost. The radio system can also operate in simplex mode (limited to line-of-sight and reduced range) if all of the repeaters fail. Lockheed Martin recently initiated annual preventive maintenance checks on the repeaters and frequently-used radio base stations; the remaining components of the radio system do not require periodic maintenance. MSA tests the radio equipment in the EOC, alternate EOC, and POC periodically and includes radio checks with mutual aid organizations. Further, HFD tests the radios in their vehicles, but does not test the ability of their hand-held and vehicle radios to reach mutual aid organizations. (See Section 8.0, **OFI 4**.)

MSA uses a variety of suitable methods to activate the EOC and conducts periodic tests to confirm operability. The EOC Shift Office duty officer activates the EOC using an automated notification system and the site paging system to transmit voice and text messages to the various devices registered in the systems for each EOC member (i.e., pagers, work telephones, home telephones, and cellular telephones). If both systems fail, the duty officers can use a calling tree to contact the EOC members individually. Testing consists of announced tests of the automated notification system monthly and the paging system quarterly; however, the duty officers do not perform unannounced tests or conduct tests outside of normal working hours to confirm that EOC members can be consistently contacted. (See Section 8.0, **OFI 6**.)

The ERO venues are well equipped with telephones and facsimile machines that are adequately tested (with a few exceptions) to ensure that the equipment is functional when needed. All ERO locations (including the HFD Mobile Incident Command Vehicle) are equipped with an adequate number of

telephones, satellite telephones, and facsimile machines, and the EOC, EOC Shift Office, and POC have telephone lines routed through a telephone switch external to the Hanford Site exchange. DOE/RL allows cellular telephones, which all ERO members possess, to be used throughout most of the Hanford Site. Further, the EOC, EOC Shift Office, and POC have Government Emergency Telecommunications Service (GETS) cards that provide priority telephone access during periods of severe network congestion or disruption. Some ERO members use government-issued cellular telephones as a backup communications system, but the phones belonging to the EOC, EOC Shift Office, and HFD lack access to the Wireless Priority Service that provides priority cellular telephone access. (See Section 8.0, **OFI 7**.) MSA tests most of the communication systems periodically to ensure operability but does not test some systems periodically or does not document the completed tests. For example, HFD does not document the weekly tests of the satellite telephone and does not test the operability of the cellular telephones and facsimile machines in the Mobile Incident Command Vehicle. In addition, the EOC Shift Office duty officers do not test their GETS card, and MSA does not test its ability to connect to the external telephone lines in the EOC, EOC Shift Office, and POC. (See Section 8.0, **OFI 4**.)

The POC duty officers appropriately operate the emergency (911) telephone system but cannot ensure continuous operation of the 911 system if personnel must immediately evacuate the POC due to an emergency. The POC has multiple incoming lines for 911 calls from site personnel, and the duty officer adds an HFD dispatcher to the call when a response requires HFD assets. Network Operation Center personnel test the 911 system daily, but they do not test the system's ability to roll over additional incoming calls to the other 911 lines. (See Section 8.0, **OFI 8**.) If the duty officers have to evacuate the POC, they can transfer 911 calls to the alternate POC located in the EOC Shift Office; however, the ability to transfer calls was tested only during the backup system's installation, and periodic tests to confirm the continued ability to transfer 911 calls are not performed. (See Section 8.0, **OFI 4**.) More significantly, during an emergency that causes the immediate evacuation of the POC, the 911 system would remain out of service until a duty officer can report to the alternate POC (nominally 30 minutes), complete the transfer of the 911 calls, and resume answering 911 calls. This arrangement does not meet the MSA contract requirement to provide continuous 911 system services. (See **Finding F-7** and Section 8.0, **OFI 9**.)

Finding F-7: MSA cannot provide continuous 911 system services during an evacuation of the POC, as required by the MSA contract.

Overall, with one notable exception, the communication systems are sufficient 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 and processes somewhat diminish the robustness of the communication systems. More significantly, the 911 system would be out of service for at least 30 minutes during an evacuation of the POC.

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 Hanford Emergency Plan. Independent Oversight examined the EOC, the POC, the main fire station, and their designated alternate locations for habitability, survivability, and accessibility using documented evaluations provided by the site. Important functions that warrant personnel occupying these facilities during an event are:

- Overall management of an event from the EOC
- 911 call and dispatch center from the POC
- Fire alarm monitoring and fire fighter dispatch and housing at the main fire station.

For survivability concerns, an earthquake is the most significant NPE in the Hanford Site area. To address seismic survivability, these response facilities were built to meet the Uniform/International Building Code using the seismic maps current at the time of their construction. Additionally, these facilities have undergone periodic seismic evaluations as seismic updates were published. The most recent seismic evaluations, performed in 2002, concluded that these emergency response buildings do not need any seismic upgrades to meet the 2002 criteria.

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 its emergency response functions. Items of interest include alert and warning systems, communication systems, habitability systems, backup power systems, and response procedures to support an emergency.

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 Hanford EOC, located in the Richland FOB, is likely to survive all but the most severe earthquakes, but its habitability is vulnerable to the worst-case Hanford HAZMAT release, per the current EPHA analysis, and blackout conditions. The FOB was built to the Uniform Building Code of 1961 and is equipped with a 350 kilowatt stationary diesel generator for backup power, but it lacks the capability to monitor for airborne contaminants or to pressurize the EOC with filtered air. The EOC is subject to blackout conditions because the FOB is not fully equipped with battery-powered emergency egress lights, relying instead on the diesel generator for powering illumination during a loss of normal power. Hanford has compensated for the potential loss of the primary EOC by designating an alternate EOC as allowed by DOE Order 151.1C, although the alternate EOC's location is more at risk from Hanford Site HAZMAT releases than the EOC, as discussed later.

Hanford personnel could not identify an AHJ responsible for the FOB backup power systems. Nevertheless, in the absence of an AHJ evaluation, Independent Oversight determined that the diesel generator and associated equipment that provide backup power for most of the FOB emergency egress lighting do not meet the applicable NFPA requirements. Both NFPA-110 and -101 require power systems that are used as the backup power source for emergency egress lighting to comply with an NFPA-110 level-1 testing and maintenance program to ensure a reliable power supply. However, the descriptions of these programs provided by test personnel, and the available test records, indicate that these programs do not comply with NFPA-110. Furthermore, no test procedure was available to indicate the extent of testing. (See **Finding F-4**.) Of most significance, the FOB generator's critical features of auto-starting and automatic transfer switching are not tested. Furthermore, the EOC is not equipped with a UPS system and has no emergency lights, so if the generator does not start or the automatic transfer switch does not close, the EOC and other parts of the FOB would be in a blackout condition. Loss of power to the FOB is significant not only to the Hanford Site, but also to the states of Washington and

Oregon, because the FOB also houses the joint information center, the Hanford Site alternate call and dispatch center, and the UDAC used by the Hanford Site as well as the states of Washington and Oregon. Although there are a few emergency egress lights backed up by battery power in remote parts of the building, such as mechanical equipment rooms, these lights are also not tested to comply with NFPA-101. The test performed on emergency egress light batteries, as described by FOB test personnel, does not subject the batteries to a 90-minute annual test, and there are no test procedures, test records, or test schedules indicating the extent or frequency of testing for determining compliance with NFPA-101. (See **Finding F-6**.)

Alternate EOC

Because of its location, the alternate EOC is more at risk from a Hanford HAZMAT release, or a loss of power, than the primary EOC. The facility was built to the Uniform Building Code so that it will survive the most probable earthquakes, but it is not equipped with backup power or habitability systems and, although located in the City of Richland, is closer to Hanford HAZMAT releases than the EOC. Furthermore, the alternate EOC is located in the same plume path as the EOC. This vulnerability in siting was identified during the summer of 2000 during a wildland fire on the Hanford Site, when smoke infiltrated the EOC and a decision was made not to relocate to the alternate EOC because the conditions there were likely to be worse. A subsequent Type B accident investigation highlighted this vulnerability; however, the review board concluded that this condition did not represent a substantial gap in management systems or infrastructure, so the judgment of need was categorized as an area for improvement and lessons learned. Consequently, no actions were taken to remedy this condition, even though DOE emergency management guidance promotes the siting of an alternate EOC at a location that minimizes the possibility of losing both the EOC and the alternate EOC in the same event. (See Section 8.0, **OFI 22**.) Although the PFP EPHA determined that the EOC and the alternate EOC would be uninhabitable for the seismic BDBE, this condition is likely to be remedied by a more appropriate consequence assessment, as described in Section 5.1.

Patrol Operations Center (Call/Dispatch Center)

The POC is adequately built and equipped to survive the most probable NPEs and allow the POC staff to perform their emergency response functions. The POC was built to comply with the Uniform Building Code using seismic maps current at the time of construction, and it is equipped with adequate backup power supplies in the form of a propane generator and redundant four-hour UPS systems. It is important for this facility to remain staffed during Operational Emergencies because it serves as the Hanford Site emergency call and dispatch center.

Nevertheless, the POC is located in the 200 West Area within range of some potential HAZMAT releases that EPHAs indicate are above PAC, and the POC is not equipped with habitability systems. In case of an evacuation, the POC staff can relocate to an alternate facility in the FOB that is equipped to perform POC emergency response functions. However, as already discussed, the FOB also warrants an evacuation for a PFP seismic BDBE. (See Section 5.1, **Finding F-3** and Section 8.0, **OFI 1**.)

The Hanford AHJ has not evaluated the POC backup power system to determine its appropriate test and maintenance program for compliance with NFPA-110 because the generator owner has not requested the evaluation. NFPA-72 allows backup power systems to be either a UPS system or a generator that has the capacity to operate for 24 hours without a recharge/refueling. The POC four-hour UPS system does not meet the NFPA-72 capacity requirements, but the generator does. NFPA-72 requires that a generator system providing backup power to an operator-staffed supervising station be an automatic-starting engine generator that is compliant with an NFPA-110 level-2 program; however, the POC generator test and maintenance program was not developed to meet the NFPA-110 level-2 requirements. In lieu of NFPA-

110 standards, the POC backup power system is tested and maintained based on the expertise of the POC electrical engineer and manufacturer recommendations. Test procedures were not available to allow a determination of the full extent of testing, and the test records that were provided do not include the critical tests of automatic start testing of the generator from a loss-of-power condition or automatic transfer switching. (See Finding **F-5**.)

Hanford's Main Fire Station (Fire Station 92)

Hanford's main fire station was adequately built and equipped to survive the most probable NPEs so that HFD personnel could remain there and perform their emergency response functions. The main fire station was built to comply with the Uniform Building Code using seismic maps current at the time of construction, and it is equipped with adequate backup power supplies in the form of a propane generator and redundant four-hour UPS systems. It is important for this facility to remain staffed during Operational Emergencies because is serves as a fire alarm monitoring supervising station and houses the site's main complement of fire fighters and apparatus.

Nevertheless, the main fire station is located in the 200 West Area within range of some potential HAZMAT releases that EPHA analyses indicate could be above PAC, and the building is not equipped with habitability systems. HFD has planned for this situation by establishing an alternate facility in the site's 300 Area. However, current PFP EPHA analyses, using the very conservative mechanisms described in Section 5.1, indicate that the alternate facility also warrants evacuation for the PFP seismic BDBE. (See Section 5.1, **Finding F-3** and Section 8.0, **OFI 1**.)

The main fire station backup power systems comply with the applicable NFPA requirements for the most critical features. NFPA-72 requires that a generator system used as backup power for an operator supervising station be an automatic-starting engine generator that is compliant with an NFPA-110 level-2 program. As the designated AHJ, the Hanford Fire Marshal has determined that the main fire station backup generator system is a level-2 system. HFD test and inspection procedures include the critical checks for a level-2 system of monthly auto-starting the generator from a loss of power condition, exercising the automatic transfer switches, and performing fuel level checks; however, test procedures could be improved by more comprehensively describing system testing by (for example) including test acceptance criteria and establishing generator runtimes. (See Section 8.0, **OFI 10**.)

5.2.4 HAZMAT Facilities

Independent Oversight reviewed the documented capability of the PFP 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.

Plutonium Finishing Plant

Even while undergoing D&D, the PFP continues to represent the site's most significant HAZMAT release and is the primary source that drives the need for offsite emergency planning. The PFP is likely to survive the most probable NPEs; however, it is not designed to withstand the Hanford Site's design basis earthquake or tornados. The PFP is a performance category-2 equivalent structure (parts having a 0.13 g or 0.2 g design basis earthquake motion) that does not meet the latest site seismic design criteria (0.25 g) because seismic upgrade costs were too high for a building undergoing D&D. Additionally, the PFP was

designed for high winds rather than tornados due to the low probability of tornado activity at the PFP location.

The PFP requires no significant operator actions to place the facility in a safe shutdown condition and does not require operators to remain at the facility for long durations after an Operational Emergency. Only some events, such as an earthquake, require an operator action to achieve safe shutdown conditions: depressing a safe shutdown switch that turns off normal ventilation fans and turns on auxiliary exhaust fans so the building's interior is not pressurized above atmospheric pressure in order to prevent or minimize an unfiltered release. Because no critical operator actions are required at PFP before an evacuation, no habitability systems are necessary.

The PFP has adequate backup power sources to alert and warn personnel of hazardous conditions and implement protective actions. PFP powered safety systems consist of the confinement system, criticality alarm system, continuous air monitors, fire protection systems, voice announcements, sirens, and emergency egress lighting. The confinement system also has auxiliary exhaust fans to maintain negative pressure and filtered exhaust in case of a loss of normal power. The auxiliary exhaust fans are powered from steam-driven turbines that require the availability of steam and the PFP diesel generator to remove steam condensate. The remaining systems are equipped with batteries that have sufficient capacity for a safe PFP evacuation.

NFPA-110 does not apply to the PFP generator, and it is in an adequate test and maintenance program for an "optional" generator. The test and maintenance program provides periodic inspections, tests, and maintenance and includes a monthly start test of the generator. Operators perform daily fuel level checks, and the PFP is established as a high priority facility for diesel fuel replenishment although no periodic sampling and analysis is performed on the generator's fuel supply tank. (See Section 8.0, **OFI 4**.)

PFP has adequate battery inspection, test, and replacement programs in place to ensure that battery-backed power is available. PFP procedures implement mechanisms to ensure that adequate power is available for the criticality alarm system and emergency egress lighting as required by the PFP technical safety requirements and NFPA-101, respectively. Tests of alert and communication systems were determined to be satisfactory, as described in Section 5.2.2.

Sitewide protective action protocols are in place at PFP to provide adequate means for implementing protective actions and aiding the fire department in its response. These protocols include:

- A PFP emergency plan
- Designated assembly points for evacuation
- Assigned assembly point leader and building emergency coordinator for personnel accountability determinations
- Sirens, tone alert, and public address communication systems
- Emergency egress lighting
- Building run sheet for fire fighters to use when responding to the facility.

PFP has adequately prepared for performing and reporting personnel accountability after an evacuation. At the nuclear facility, PFP employs a positive accountability system using an accountability board and badges. For the remainder of the PFP area, composed of mobile offices, PFP protocols implement a negative accountability system using a network of building wardens and accountability leaders. None of the PFP accountability protocols relies on any power except for battery-operated radios or cell phones for communicating results, which runners can also perform.

PFP emergency plans for shelter-in-place protective actions are adequate for most events, with the exception of tornados. Adequate PFP procedures are in place to improve the effectiveness of sheltering from a HAZMAT release by directing the shutdown of ventilation systems and the closure of doors and windows. The procedure for the nuclear facility appropriately requires judgment by the facility manager in determining the appropriateness of reconfiguring the confinement system. At mobile offices, procedures direct building occupants to turn off ventilation via simple thermostatic controls, although these actions are minimally effective because mobile offices have high air infiltration rates. More significantly, the PFP procedure for tornados instructs employees to shelter in the nearest building, which would likely be a mobile office that does not provide adequate protection against tornados. (See Section 8.0, **OFI 11**.)

5.2.5 Protective Force

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

Protective force emergency planning adequately addresses nearly all Operational Emergency events. MSA provides the operational and workforce elements for the protective force, in addition to the planning and oversight elements. Each MSA protective force shift contains all of the disciplines necessary for a full security response. The protective force has various agreements with local law enforcement agencies (LLEAs) to ensure effective integration of supplemental personnel, equipment, and capabilities. In accordance with the *Memorandum of Understanding (MOU) for Mutual Law Enforcement Assistance*, DOE/RL has an agreement with the Adams County, Benton County, Franklin County, Grant County, and Yakima County Sheriff's Offices; Kennewick, Pasco, Richland, and West Richland Police Departments; and the Tri-City Detachment of the Washington State Patrol. The Benton County Sheriff's Office has primary responsibility for providing law enforcement on the Hanford Site, via a contractual agreement with DOE/RL. MSA plans for LLEAs to provide supplementary personnel to the protective force during an emergency event inside the Hanford Site and thus has some pre-planned protocols with offsite agencies for support to the protective force, including operating under a joint incident command system. Additionally, DOE/RL has MOUs for law enforcement assistance with the Washington Department of Fish and Wildlife and the U.S. Fish and Wildlife Service.

MSA also includes malevolent act event initiators, including acts of terrorism, in its emergency planning and EALs. The Federal Bureau of Investigation (FBI) field office in Seattle, Washington has jurisdictional responsibility for response to an act of terrorism at the Hanford Site. However, DOE/RL has no formal agreement with the FBI or response planning to define the roles, responsibilities, and procedures for an event at the Hanford Site that requires intervention by the FBI. (See Section 8.0, **OFI 12**.) Additionally, MSA does not have site/facility-specific catastrophic event response procedures and would implement the existing security incident response plans to support security operations after a severe NPE or catastrophic event with severe consequences.

Overall, the protective force is prepared to provide full security services and interact appropriately with offsite local law enforcement personnel in case of a severe NPE. MSA has developed some protocols for the planned use of LLEAs to supplement onsite MSA protective force personnel during an emergency event. However, response to events requiring FBI intervention warrants consideration of planning needed with the FBI.

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 Hanford 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 MSA and CHPRC have established coordinated training programs consisting of formal training and hands-on drills to prepare ERO members for their assigned tasks.

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.

The ERO training program is well defined in the Hanford Emergency Management Plan and emergency plan implementing procedures (EPIPs) 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. A process is in place to ensure that any EPIP changes result in the required changes to training lesson plans. Additionally, CHPRC emergency preparedness (EP) coordinators conduct EP training reviews to ensure that the training requirements in the Emergency Management Plan are implemented effectively.

The training status of personnel on the ERO duty roster is appropriately managed and effectively tracked. A detailed training matrix allows tracking of the completion status of required courses and drill participation for all ERO positions. Independent Oversight determined that all ERO members on the duty roster 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 annual refresher training 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 13**.)

The Hanford drill program is well structured and provides ample opportunities to ensure that all Facility Emergency Response Organization (FERO) and Hanford EOC personnel are appropriately trained to receive hands-on training and demonstrate acceptable proficiency. The drill program also includes participation by medical, security, and fire department agencies. A facility EP coordinator implements the facility-level drill program through an annual drill program plan and administers drills using drill packages that reflect appropriate scenarios. The EP coordinators also ensure that all FERO members participate in at least one drill annually to remain on the duty roster. Similarly, MSA implements site-level ERO functional drills. The facility-level and site-level drill programs are required to conduct at least two functional NPE drills each year, one for seismic and one for tornado/high winds.

Overall, with one exception, the Hanford Emergency Management Plan and EPIPs establish an appropriate framework for the training and drill program. A systematic approach to training has established the appropriate curriculum for all FERO and ERO positions, and the status of training is appropriately tracked and monitored to ensure that only trained personnel are on the duty roster. The Hanford 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, as discussed later, DOE/RL has not consistently implemented emergency planning related to offsite PARs, and the site exercise program has not validated some capabilities necessary for response to a significant Hanford radiological 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 must be coordinated with Federal, state, and local organizations.

The DOE/RL emergency plan appropriately documents an adequate description of Hanford's required offsite relationships and includes detailed listings of Federal, state, and local organizations with emergency response or regulatory control responsibilities relevant to the Hanford Site. Additionally, DOE/RL and MSA hold regular interface meetings with offsite response organizations to discuss response issues to prepare for emergencies. DOE/RL also invites offsite organizations to participate in

site-level exercises designed to test offsite interfaces and capabilities and regularly incorporates organizations that provide field level assistance in site exercises.

The States of Washington and Oregon and county emergency planners/managers are familiar with NNSA asset capabilities so they can readily 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 Hanford is the Region 8 radiological assistance program (RAP), which includes the States of Alaska, Oregon, and Washington. The *DOE Region 8 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 8 RAP teams (assembled from personnel located at Hanford) can provide radiological monitoring and assessment services to help identify contaminated offsite areas resulting from Hanford radiological material releases.

The Hanford Site has adequately planned radiological field monitoring activities with state emergency organizations. The DOE/RL emergency plan and MOUs between DOE/RL, the State of Washington, and the State of Oregon also discuss the offsite radiological field monitoring capability needed to assist state and local governments in identifying the radiological plume, relocation area, and food control boundaries after a Hanford Site radiological emergency. MSA provides an initial field monitoring team capability with six teams to perform onsite and offsite monitoring when deployed by the EOC emergency director. These MSA teams may require integration with other potential offsite monitoring capabilities, including RAP, the Washington National Guard civil support teams, the DOE Federal Radiological Monitoring Assessment Center, the EPA, or other Federal agencies. Nevertheless, DOE/RL has not validated, through exercises, an offsite radiological monitoring process that includes participation with Region 8 RAP field teams. (See Section 8.0, **OFI 14**.)

The Hanford Site has adequately planned to coordinate dose estimates from a Hanford radiological event with state emergency organizations. DOE/RL has agreed to provide a UDAC, located within the EOC, from which DOE, the State of Washington, and the State of Oregon responders can jointly analyze potential health effects of the emergency and provide protective actions to the respective agency decision-makers. UDAC has several modeling and radiological monitoring capabilities, including a required connectivity with the NNSA National Atmospheric Release Advisory Center (NARAC), to assist in the identification of the plume footprint, relocation areas, and food control boundaries. However, the site has not participated with NARAC assets, located in Livermore, California, as part of the site exercise program. (See Section 8.0, **OFI 15**.)

Overall, DOE/RL has appropriately documented a clear and comprehensive description of the Hanford Site's relationships with local offsite authorities and frequently interacts with response agencies and organizations capable of augmenting MSA response resources. However, the exercise program has not validated, through exercises, the RAP and NARAC capabilities needed to assess the potential or actual offsite consequences of a significant radiological event and to coordinate with Federal, state, and local organizations responsible for protecting public health and safety using these capabilities.

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. Washington State law also allows statewide mobilization of emergency resources under the Washington Military Department's Emergency Management Division, which enables local fire chiefs, sheriffs, and emergency managers to request resources from counterparts throughout the state. However, the Hanford Site is Federal property and may not be eligible for state mobilization unless the event threatens private lands or structures. DOE/RL

recognizes that some governmental entities may elect to provide aid and assistance under a separate agreement.

DOE/RL appropriately plans and prepares for the integration of offsite response assets as part of the ERO structure. The DOE/RL emergency plan describes and identifies the mechanisms for integrating local agencies and other external organizations into the Hanford Site response. These mechanisms include policy letters, agreements, and MOUs between DOE and external agencies. Local agencies entering into agreements with DOE include area hospitals, local fire services, and LLEAs. Additionally, DOE/RL has executed agreements with the State of Washington, the State of Oregon, and the U.S. Fish and Wildlife Service.

Overall, appropriate written support agreements exist between Hanford 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.

DOE/RL adequately documents existing provisions for interfacing and coordinating with Federal, state, and local agencies responsible for offsite emergency response in the emergency plan. An overarching factor in response planning is the location of Hanford, which is in southeastern Washington where land use is mostly farming, state- and Federal-controlled lands, and the associated residential communities and commercial areas. The permanent population within the 10-mile 200 West Area EPZ is approximately 100 residents; the ingestion exposure EPZ has approximately 270,000 residents, centered on Energy Northwest's Columbia Generating Station and stretching into the State of Oregon. A severe regional event is likely to affect both the site and the surrounding communities, making immediate local offsite assistance unlikely.

Several State of Washington, State of Oregon, and county emergency planning documents govern offsite emergency response for a major Hanford emergency. The State of Washington, the State of Oregon, and the respective EPZ county emergency plans address Hanford facilities as fixed nuclear facilities, and the applicable states and counties have Hanford-specific response planning.

DOE/RL supports the practice of issuing evacuation PARs to offsite authorities for a Site Area Emergency classification as a precautionary measure for events that could escalate, even without a technical basis, due to the length of time that boaters may need to evacuate from the Columbia River. Nevertheless, this is another example of overly conservative consequence assessment assumptions exceeding the requirements of DOE Order 151.1C, and there is an opportunity to reduce the potential for confusion during an emergency by working with the offsite organizations to align PARs with the hazards documented in the EPHA. (See Section 8.0, **OFI 16.**)

DOE/RL has allowed truncating PAC distances at a maximum EPZ distance of 10 miles when the PAC can be exceeded at a much further distance. For example, the PFP EPHA analysis of a seismic event concludes that this event represents the Hanford Site's worst-case offsite consequences, calculating a 1-rem exposure at a distance of 36 miles from PFP. However, PFP EALs identify the event as a General Emergency with an isolation zone of a 1-mile radius around PFP and a protective action distance of only

10 miles. DOE/RL truncated the protective action area within the 10-mile distance rather than the 36 miles reflected in the EPHA so that emergency planning remains within the 10-mile EPZ. (See **Finding F-1** and Section 8.0, **OFI 17**.)

Overall, DOE/RL has adequately documented provisions for interfacing and coordinating with Federal, state, and local agencies responsible for offsite emergency response in the emergency plan. Additionally, the State of Washington, State of Oregon, and appropriate counties have their own Hanford-specific emergency planning and response agreements with the Hanford Site. However, emergency planning related to PAC distances is inconsistent with the DOE policy to protect public health and safety, and PARs should reflect a bounding estimate of event consequences relative to the PAC, as derived from the EPHA analysis.

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.

The DOE/RL emergency plan appropriately describes the expected onsite incident command structure for an operational emergency response, in accordance with the order. For most events, such as fire, medical, HAZMAT, and special rescue operations, the IC is the senior responding HFD officer. For a security event, such as an event that may involve weapons firing, security alarm response, hostage negotiations, or similar situations, the IC is the senior protective force officer. Additionally, during a security event the protective force officer and the senior fire department officer form a unified command to manage and control all response activities at the event scene. The unified command 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.

MSA performed a BNA in accordance with DOE Order 420.1B and appropriately determined the necessary onsite fire, emergency medical service, and HAZMAT resources based on the conclusions in the emergency plan. The BNA identifies that:

- The HFD is capable of responding to most fire emergencies at the Hanford Site using only onsite HFD assets.
- The fire department can meet the minimum response criteria identified in the BNA with on-duty staffing.
- Response capabilities account for multiple types of events, including an emergency medical service incident in conjunction with a single event response, as well as contingencies for incident response through callback of off-duty personnel and reciprocal aid agreements.
- DOE/RL maintains several formal agreements for fire fighting assistance with regional fire departments as identified in the emergency plan.
- Mutual aid fire fighters do not respond to onsite areas containing radiological material, emphasizing the importance of callback of Hanford off-duty fire fighters.

MSA has appropriate provisions for most technical rescue capabilities in accordance with NFPA-1670, *Standard on Operations and Training for Technical Search and Rescue Incidents*; however, MSA has not adequately planned for collapsed structure rescue and water rescue. The HFD is at the “awareness” level for structural collapse and water search and rescue, which represents the minimum capabilities of organizations that provide response for technical search and rescue incidents. 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. MSA has identified the need for structural collapse response in the HFD standard operating guideline, *Technical Rescue Operations*; however, the BNA and emergency plan do not address an event at the Hanford Site that necessitates structural collapse response requiring activation of USAR task forces. The closest Federal Emergency Management Agency USAR team is Washington-Task Force One, a 70-person USAR task force based in Puget Sound, Washington. During a regional severe earthquake, USAR response to the Hanford Site will likely take more than eight hours. Likewise, neither the BNA nor the emergency plan identifies that water rescue is provided by the Columbia Basin Dive Rescue. The HFD has established technician-level capability for rope rescue, confined space rescue, vehicle and machinery extrication, and trench rescue; however, the BNA does not establish the required operational levels for all technical rescue capabilities. (See Section 8.0, **OFI 18**.)

Hanford has adequately planned for wildland fires in accordance with DOE Guide 420.1-3, *Implementation Guide for DOE Fire Protection and Emergency Services Programs*. DSAs and the hazards surveys identify the potential for wildland fires on the Hanford Site. Accordingly, MSA has a response plan for wildland fires with Federal, state, and county agencies that identifies and establishes the response capabilities needed for conducting wildland fire operations. A large wildland fire fighting capability appropriately exists within the HFD.

Overall, MSA has appropriately established the onsite response assets necessary to respond to most events at the Hanford Site. However, Independent Oversight determined that MSA has incomplete planning for structural collapse responses and water 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.

DOE/RL 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 19**.) For example:

- Most exercises requiring the demonstration of termination and recovery objectives focus only on the implementation of the termination checklist and the identification of an initial recovery organization.
- MSA has not prepared a continuity of operations program plan to strategize and document reconstitution planning for essential support activities, an important emergency planning activity for determining the priorities for restoration and mitigation efforts during a severe NPE scenario.

- DOE/RL does not have specific event response planning or procedures for postulated severe NPEs that include short-term recovery actions, such as considering infrastructure damage and outages that may impede the normal response of onsite or offsite responders.
- DOE/RL last conducted an ingestion pathway exercise (a recovery phase activity) with state and county EOCs in 2005.
- There is minimal planning for ingestion phase assessment, the calculation of site-specific derived response levels, and the coordination of recovery with affected offsite agencies before emergency termination (which may not be necessary once DOE/RL contractors recalculate the EPHA consequence determinations).
- MSA conducts some exercises that focus on severe NPEs, but few of these exercises postulate consequences that result in significant structural damage or building collapse that would generate requests for external resources.

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

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 HFD and HPMC 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 that document the medical treatment received by contaminated injured workers, and the MOUs with offsite medical facilities that have agreed to treat contaminated injured workers from the Hanford Site. Finally, the protocols for sharing patient information with onsite and offsite health care providers were examined.

Independent Oversight determined that the Hanford organizations have planned for sufficient medical support for contaminated injured personnel, including documented arrangements with offsite medical facilities. Only minor instances were noted where exercise requirements and coordination with offsite agencies could be improved.

DOE Order 151.1C requires that sites provide medical treatment, plan for MCIs, and coordinate the 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.

HFD and HPMC have appropriate arrangements in place for the medical treatment of injured contaminated workers. The HFD fire fighters provide the first responders for medical emergencies at the Hanford Site. At least three paramedics are on duty each shift, and most of the remaining fire fighters are trained as emergency medical technicians. The fire fighters possess DOE security clearances, use appropriate personal protective equipment, and have access to six advanced life-support ambulances. The fire fighters evaluate and provide first aid and basic life-support to the patients at the scene, decontaminate and/or wrap patients (if needed), and then transport the patients to one of the following receiving facilities as directed by Kadlec Medical Center:

- Kadlec Medical Center (Level III trauma center) in Richland
- Kennewick General Hospital (Level III trauma center) in Kennewick
- Lourdes Medical Center (Level IV trauma center) in Pasco.

HPMC can provide first aid and stabilization for any emergency patients at their two occupational medical clinics (located on the site and in Richland). HPMC also provides chelation therapy for internal radionuclide uptake at their two clinics and maintains Kadlec Medical Center's inventory of the chelating agent. Radiological control technicians and industrial hygienists are available to assist HFD with patient surveys, contamination control, and decontamination. HFD and HPMC maintain an adequate supply of specialized medicines needed to treat certain hazards, such as calcium gluconate for hydrofluoric acid burns.

HFD and HPMC have 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. HFD stays informed of changes in facility-specific hazards through the permitting process required by the Fire Marshal for any changes to facility hazards, quarterly updates of the site chemical inventory, and meetings with Pacific Northwest National Laboratory staff when new hazards are introduced into their facilities. HPMC learns of changes in job hazards through the contractor employee job task analysis processes. Additionally, the MSA six-year exercise plan requires that the transportation and treatment of contaminated individuals be included in an exercise every two years. In practice, MSA includes contaminated patients in most exercises, and HFD and HPMC participate in all site exercises. Furthermore, HPMC is accredited for ambulatory health care, and HFD paramedics are required to maintain appropriate certifications.

HFD has performed comprehensive planning for an MCI. The IC (fire or security), in consultation with Kadlec Medical Center, declares that an emergency is an MCI when a situation may exist that could overwhelm existing onsite resources or require additional offsite resources. Upon this declaration, Kadlec Medical Center coordinates with other offsite hospitals to determine bed availability, while the HFD fire fighters perform triage at the incident scene and transport patients as directed by Kadlec Medical Center. If the MCI involves fatalities, HFD includes the coroner in the unified incident command, establishes a temporary morgue, and invokes MSA's detailed procedure for handling the remains of a radiologically contaminated deceased worker. Although MSA conducted an MCI exercise in fiscal year 2010, the MSA six-year exercise plan does not include a requirement to periodically conduct an MCI exercise to ensure continued proficiency. (See Section 8.0, **OFI 20**.)

DOE/RL has appropriate agreements in place with offsite medical facilities to accept and treat contaminated injured personnel from the Hanford Site and to share patient information. DOE/RL maintains MOUs with Kadlec Medical Center, Lourdes Medical Center, and Kennewick General Hospital for services in the event of a chemical, biological, or radiological incident and agrees to provide each hospital with essential equipment and services, including:

- Health physics support and medical treatment advisors (HPMC physicians and physician assistants)
- Replacement of materials used from pre-stored radiation emergency kits (supplied by the nearby Columbia Generating Station)
- Access to training on radiological safety and chelation therapy (including training by the Radiation Emergency Assistance Center/Training Site)
- Participation in joint exercises (held every two years and rotated over a six-year basis between the three local hospitals).

HPMC provides the three local hospitals with exposure quick-reference guides to aid in the initial treatment of radiologically and/or chemically contaminated injured employees. HFD and HPMC have appropriate protocols in place to provide advance notifications to receiving hospitals; notifications include the treatment administered to patients and their estimated time of arrival. Air ambulance support is available to transport trauma patients to Kadlec Medical Center, Kennewick General Hospital, the Level II trauma center in Spokane, or the Level I trauma center in Seattle (using pre-established helicopter landing pads), although MSA lacks a documented agreement that the air ambulance service will take a contaminated trauma patient. As a result, transport of a contaminated trauma patient may be unnecessarily delayed while the option of air ambulance transport is explored. (See Section 8.0, **OFI 21**.)

Overall, the Hanford organizations have sufficient medical plans and procedures in place to treat injured or contaminated workers, as well as documented arrangements with offsite medical provides to accept and treat contaminated injured workers. Changes in the hazards at the Hanford Site are suitably communicated to HFD and HPMC, and medical responders are given ample opportunities to maintain their proficiency in treating contaminated injured workers. HFD 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 and provision for air ambulance services availability 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 determined that Hanford generally has the mechanisms in place for identifying and managing corrective actions, but incompletely-resolved issues raised during previous external assessments and exercise after-action reports would still impact the site's response today. Specifically, issues with the PFP EPHA were identified as early as 2010 and 2011. The planning associated with the primary and alternate EOC, as well as offsite PARs, is not consistent with the EPHA analysis. These continuing inconsistencies may account for the issues documented in recent exercise after-action reports concerning consequence assessments and PARs. (See Section 8.0, **OFI 22**.)

6.0 CONCLUSIONS

Independent Oversight noted several positive observations during its review of the Hanford emergency management program's preparedness for severe NPEs. Significantly, Hanford uses a variety of methods to communicate information and protective action instructions to workers located at the site and in town. The Hanford Site also has sufficient medical plans and procedures in place to treat injured or contaminated workers, as well as documented arrangements with offsite medical provides to accept and treat contaminated injured workers. Changes in the hazards at the Hanford Site are suitably communicated to HFD and HPMC, and medical responders are given ample opportunities to maintain their proficiency in treating contaminated injured workers. HFD 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. Additionally, the Hanford training program is well defined in the Hanford Emergency Management Plan and implementing procedures and establishes the framework for an effective program; the Emergency Management Plan also includes sitewide training standards. The Emergency Plan is supported by a training program plan and implementing procedure that provide additional and implementing actions for the program.

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. Longstanding weaknesses and inconsistencies identified in two facility EPHAs, incorrect distances to PAC in the EALs, and lack of documentation of the rationale and justification for key technical decisions result in the emergency management program, and potentially the emergency response, being degraded. Correctly designating and testing backup generators and batteries, as well as addressing habitability and siting issues with the EOC and alternate EOC, will better ensure the ERO's ability to respond to incidents safely. Further, the lack of continuous 911 system service, when relocating to the alternate POC becomes necessary, should also be addressed.

The situation at the Hanford Site continues to evolve as cleanup efforts mitigate certain risks and new processes bring new risks to be addressed. The emergency management program needs to ensure that hazards are properly documented and analyzed and that the results are applied consistently across all elements of the program. Key Hanford decision makers should ensure that the Hanford Site emergency management program is truly commensurate with the hazards and consequences associated with facilities and activities on the site (i.e., developed consistent with a graded approach) as stated in the Hanford Emergency Management Plan and required by DOE Order 151.1C.

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: CHPRC has not documented the technical basis or accurately applied the PFP EPHA results when establishing event classifications and areas to implement protective actions, as required by DOE Order 151.1C.

The PFP EALs for General Emergency events do not reflect the results of the EPHA analysis whenever PAC is exceeded beyond 10 miles. For example, the PFP seismic event EAL protective action distance has been truncated to 10 miles instead of using the 36 miles indicated in the EPHA consequence analyses. Some PFP EALs are listed as Site Area Emergencies, but should be General Emergencies.

Finding F-2: CHPRC has not documented a valid technical foundation in the PFP EPHA, or ensured timely revision of the EPHA, when significant changes resulting in adverse effects to the health and safety of the workers and the public are identified, as required by DOE Order 151.1C.

Independent Oversight identified concerns about CHPRC's use of RADIDOSE for EPHA analyses in 2011. MSA quickly revised the EPHA development procedure to ensure the use of HotSpot and EPIcode to provide consistency between the EPHA consequence analysis determinations and consequence analyses conducted in the UDAC during an emergency event. Nonetheless, CHPRC has not revised the PFP EPHA.

Finding F-3: CHPRC has not established the technical basis for the emergency management program commensurate with the hazards present at their facilities, as required by DOE Order 151.1C.

The consequence analyses in the EPHAs are conducted using RADIDOSE, a spreadsheet modeling program, which departs from DOE guidance and is overly conservative. Additionally, consequence analyses do not identify potential exposures to personnel at critical receptors of interest. Finally, the assumptions used for developing seismic event analyses in the EPHAs are inappropriate, resulting in overly conservative protective action distances.

Finding F-4: The diesel generator system at the FOB is not tested and maintained as a level-1 system as required by NFPA-101, *Life Safety Code*, and NFPA-110, *Standard for Emergency and Standby Power Systems*, for a system that provides backup power for emergency egress lighting.

The FOB generator is the backup power source for most of the FOB emergency egress lights. NFPA-101 requires backup power sources to be tested and maintained as NFPA-110 level-1 systems. FOB generator system test procedures are not available to ascertain the extent of testing, and test records do not indicate that the critical features of a generator starting from a loss-of-power condition or load transfers via the automatic transfer switch are tested as required for NFPA-110 level-l systems.

Finding F-5: The propane generator system at the POC is not tested and maintained 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 supervising station.

The POC propane generator system provides backup power to a supervising station that remains manned during emergencies to perform call and dispatch tasks. NFPA-72 requires backup power systems for such operator-staffed supervising stations to be tested and maintained as NFPA level-2 systems. In addition, the POC generator system has not been evaluated by an AHJ to establish its testing and maintenance program requirements, and no test procedures are available to ascertain the extent of testing. The POC generator is tested and maintained per vendor recommendations.

Finding F-6: The batteries for emergency egress lighting at the FOB are not tested as required by NFPA-101, *Life Safety Code*.

NFPA-101 requires batteries for emergency egress lighting to be tested monthly and annually. Anecdotal evidence determined that the FOB emergency egress light batteries are periodically tested to meet the monthly test but not the annual test. No test procedures, test records, or test schedules are available to support any testing.

Finding F-7: MSA cannot provide continuous 911 system services during an evacuation of the POC, as required by the MSA contract.

The POC duty officers can transfer 911 calls to the alternate POC, which is located in the EOC Shift Office; however, a duty officer must relocate to the EOC Shift Office to complete the transfer. The 911 system would be out of service during the time it takes for a duty officer to respond to the EOC Shift Office.

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.

DOE/Richland Operations Office

OFI 3: To ensure that reliable backup power systems are available sitewide, consider performing an AHJ review of all backup power systems relied upon by Hanford in order to establish the appropriate NFPA-110 test and maintenance program. Once established, consider performing periodic assessments of test and maintenance programs to ensure compliance with the applicable test and maintenance program level.

OFI 5: To improve the reliability of diesel fuel, consider establishing a sitewide periodic sampling and analysis program to ensure the absence of contaminants. In doing so, consider fuel checks of:

- Fuel upon receipt from supplier
- Underground bulk storage tanks
- Fuel distribution trucks, particularly following maintenance on tanks and piping
- Generator supply tanks.

OFI 12: 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 the Hanford Site that requires FBI intervention.

OFI 14: To improve offsite radiological assessment, monitoring, and decontamination support for the State of Washington, State of Oregon, and ingestion EPZ counties, consider:

- Developing protocols for establishing unified command among the organizations capable of providing offsite monitoring (MSA, RAP, State of Washington, State of Oregon, Washington National Guard, EPA, and DOE Federal Radiological Monitoring Assessment Center), depending on each team's capabilities.
- Coordinating field monitoring methods to ensure that data is collected in a uniform manner consistent with Federal Radiological Monitoring and Assessment Center methods.
- Planning for a significant offsite monitoring effort that includes a phased response by the Federal Radiological Monitoring and Assessment Center that initially provides a Consequence Management Response Team to augment RAP.
- Reconciling multiple dispersion models so there is an appropriate transition to the Federal Radiological Monitoring and Assessment Center and the Interagency Modeling and Atmospheric Assessment Center.

OFI 15: To ensure validation of all emergency management program elements over a five-year period and to optimize the usefulness of annual exercises, consider coordinating the participation of DOE radiological emergency response assets (e.g., NARAC, Radiation Emergency Assistance Center/Training Site, and RAP) in the exercise plan, as appropriate.

OFI 16: Consider improving offsite response planning specific to PAR decision making for Hanford events:

- Provide offsite PARs based on the analysis of scenario results documented in the EPHA.
- Ensure that protective actions and PARs are implicit in event classifications and reflect conservatively calculated distances at which a PAC can be exceeded for each analyzed scenario.
- Formally document any agreements with offsite jurisdictions to provide PARs, as a precautionary measure, for events that do not have the potential to exceed PAC at the site boundary.

OFI 17: To improve implementation of offsite PARs, consider:

- 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 for the expansion of protective actions beyond the EPZ for scenarios whose consequences exceed the EPZ.

CH2M Hill Plateau Remediation Company

OFI 1: To ensure the accuracy of the EPHA consequence analyses and to address the weaknesses identified in Findings F-1 and F-2, consider:

- Conducting consequence analyses using DOE-approved models.
- Ensuring that the same modeling programs are used for EPHA development and EOC consequence assessment.
- Ensuring that EPHAs identify key receptors of interest and include consequence analyses for these distances.
- Ensuring that mechanisms are in place to encourage timely revision of EPHAs when issues are identified that impact emergency planning.

OFI 2: To improve specific planning for implementing protective actions and PARs and to address the weaknesses identified in Finding F-3, consider revising the EAL sets by:

- Ensuring that each EAL accurately indicates the maximum distance to PAC associated with EPHA consequence analysis protective action distances.
- Ensuring that each EAL developed and included in the EPHAs is reflected in the facility-specific EAL set.
- Ensuring that each EAL indicates appropriate protective actions and PARs for each analyzed scenario event.
- Ensuring that each EAL, where appropriate, contains PAR details to provide to offsite authorities.

OFI 11: To improve the effectiveness of protective actions at the PFP, consider:

- Using the most robust and below-grade portions of the nuclear facility as a shelter for tornados, rather than using mobile offices for that purpose.
- Determining whether any of the mobile offices are suitable for HAZMAT shelters, and if not, developing plans for an immediate evacuation to a safe location.

Mission Support Alliance, LLC

OFI 4: To strengthen MSA's testing of communications equipment, consider:

- Adding a requirement to periodically test the following:
  - HSEAS message boards
  - HFD's ability to communicate with offsite mutual aid organizations via radio
  - HFD Mobile Incident Command Vehicle cellular telephones and facsimile machines
  - EOC Shift Office GETS card
  - EOC's, EOC Shift Office's, and POC's ability to use the external telephone lines
  - POC's ability to transfer 911 calls to the alternate POC.
- Documenting the completion of satellite telephone testing in the HFD Mobile Incident Command Vehicle inspection checklist.

OFI 6: To further improve the usefulness of the EOC activation tests, consider:

- Adding unannounced tests and tests outside of normal working hours to the suite of tests performed.
- Developing a performance metric that measures EOC availability.
- Establishing a goal for the percentage of the EOC personnel who provide affirmative responses.

OFI 7: To enhance the ability of the EOC, EOC Shift Office, and HFD to use cellular telephones during periods of severe network congestion or disruption, consider enrolling the government-issued cellular telephones for these organizations in Wireless Priority Service.

OFI 8: To increase the effectiveness of the daily tests of the 911 system, consider making multiple simultaneous calls to ensure that the calls roll over to the other incoming 911 lines.

OFI 9: To strengthen the POC's ability to provide continuous 911 system services, consider:

- Establishing an arrangement to temporarily transfer the Hanford 911 system to an alternate 911 communications center associated with a local mutual aid organization, while a POC duty officer relocates to the alternate POC.
- Temporarily transferring the Hanford 911 calls to another POC duty officer (located in an area unaffected by the emergency) until the on-duty duty officer arrives at the alternate POC.
- Training the EOC Shift Office duty officers to operate the 911 system until a POC duty officer arrives at the alternate POC.

OFI 10: To improve the testing of the main fire station backup generator system, consider:

- Performing a complete evaluation of the 609A generator test and maintenance procedure for compliance with NFPA-110 level-2 program requirements, and updating the procedure accordingly.
- Revising the 609A generator test to procedure to include test acceptance criteria, such as automatic starts within 10 seconds, successful transfer of loads by the automatic transfer switches, and other important operating parameters established by the manufacturer.

OFI 13: 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 18: To improve site-specific planning for technical rescue (structural collapse and water-rescue) operations, consider:

- Establishing and documenting, in the BNA, job performance requirements for technical rescue capabilities.
- Documenting, in the BNA, any specific functional rescue capabilities provided by offsite assistance, along with reference to applicable mutual aid agreements.
- Including in the emergency plan all technical rescue capabilities, how they are provided, and applicable agreements.

OFI 19: To continue to improve site-specific planning for severe NPEs at the Hanford Site, 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 Hanford; 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 logistical requirements once the resources arrive at the site.
- Continuing to include severe NPE scenarios in the Hanford drill and exercise program.
- Conducting tabletop exercises with appropriate Federal, state, and local response agencies and organizations that would respond to a Hanford 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 20: To ensure that an MCI drill or exercise is conducted periodically, consider adding a requirement for this type of drill or exercise to the MSA six-year exercise plan.

OFI 21: To clarify emergency transport options for contaminated trauma patients, consider determining whether any of the air ambulance services will transport a contaminated trauma patient and establishing MOUs as appropriate.

OFI 22: For corrective actions to be more effective, consider improving the management of the readiness assurance process by:

- Ensuring that the effectiveness review confirms assurance of prevention of recurrence.
- Expanding the focus of the review to determine whether the evidence indicates continuing problems in the issue topical area.
- Increasing the use of performance-related criteria that require a clear demonstration of adequate performance.
- Reviewing the need to re-open the issue and generate additional corrective actions when effectiveness reviews identify continuing weaknesses.

9.0 ITEMS FOR FOLLOW-UP

As part of its oversight activities, Independent Oversight will follow the closure of the findings identified in Section 7.0 and monitor the disposition of the OFIs identified in Section 8.0. Because this review encompassed only selected emergency management elements from DOE Order 151.1C, future assessments should consider focusing, in part, on additional elements of the emergency management program and should apply limited-scope performance tests, drills, and exercises to validate plans and ERO performance in coordinating and integrating response activities. Based on inconsistencies and errors identified in the two facility EPHAs that were reviewed, the adequacy of the EPHA review and approval process should be further assessed, and a systematic review of all facility EPHAs should be conducted.

Once the Hanford Site has addressed these findings and OFIs, Independent Oversight (or other external organization) will assess the EPHA development, exercise, and readiness assurance programs, and the RL oversight program.

Appendix A
Supplemental Information

Dates of Review

Scoping Visit:	April 16-18, 2013
Onsite Data Collection Visit 1:	April 29 – May 2, 2013
Onsite Data Collection Visit 2:	May 20-23, 2013
Validation and Outbrief:	May 24, 2013

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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
- 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-1670, *Standard on Operations and Training for Technical Search and Rescue Incidents*, 2009

Interviews

- DOE/RL Emergency Preparedness Program Manager
- DOE/RL Physical Security Lead
- CHPRC Emergency Preparedness Program Manager
- CHPRC Emergency Preparedness Technical Specialist
- Fire Station NFPA-72 Compliance Manager
- Fleet Services Manager
- FOB Operations and Maintenance Supervisor Project Lead
- Franklin County Office of Emergency Management
- Hanford Structural Engineer
- HPMC Emergency Preparedness Specialist
- HPMC Hanford Site Occupational Medical Director
- Lockheed Martin Project Engineer
- MSA Activity Manager
- MSA Duty Officer
- MSA Emergency Management EPHA Technical Specialist
- MSA Emergency Management Operations Manager
- MSA Emergency Management Program Director
- MSA Emergency Management Readiness Assurance Manager
- MSA Emergency Preparedness Specialists
- MSA HFD Assistant Chief for Operations

- MSA HFD Chief
- MSA POC Administrator
- MSA POC Manager
- MSA Protective Force Deputy Chief for Operations
- MSA Radiological Control Manager
- MSA RAP Region 8 Contractor Response Coordinator
- MSA Reserve Duty Officer
- PFP Building Warden
- PFP Criticality Alarm System Design Authority
- PFP Electrical Design Authority
- PFP Emergency Preparedness Coordinator
- PFP Facility Manager
- PFP Nuclear Safety Operations Specialist
- Project Planner for Land and Facility Management
- State of Washington Office of Emergency Management, Tri-Cities Director
- SWOC Emergency Preparedness Coordinator
- SWOC Facility Manager