Office of Enterprise Assessments
Emergency Management Assessment
of the Waste Isolation Pilot Plant

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Acronyms

CAT	Consequence Assessment Team
CBFO	Carlsbad Field Office
CM	Crisis Manager
CMR	Central Monitoring Room
CMRO	Central Monitoring Room Operator
DCM	Deputy Crisis Manager
DOE	U.S. Department of Energy
EA	Office of Enterprise Assessments
EAL	Emergency Action Level
ED	Emergency Director
ENF	Emergency Notification Form
EOC	Emergency Operations Center
EPHA	Emergency Planning Hazards Assessment
EPHS	Emergency Planning Hazards Survey
EPIP	Emergency Plan Implementing Procedure
ERO	Emergency Response Organization
FSM	Facility Shift Manager
HAZMAT	Hazardous Material
IC	Incident Commander
ICP	Incident Command Post
LSPT	Limited-Scope Performance Test
MOU	Memorandum of Understanding
NARAC	National Atmospheric Release Advisory Center
NWP	Nuclear Waste Partnership, LLC
OAT	Operational Assistance Team
OE	Operational Emergency
OFI	Opportunity for Improvement
PA	Protective Action
PAC	Protective Action Criteria
PAO	Public Affairs Officer
PAR	Protective Action Recommendation
SFO	Senior Federal Official
SIP	Shelter-in-Place
SWB	Skeen-Whitlock Building
WIPP	Waste Isolation Pilot Plant

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EXECUTIVE SUMMARY

The Office of Emergency Management Assessments, within the U.S. Department of Energy (DOE) independent Office of Enterprise Assessments (EA), conducted an assessment of the Waste Isolation Pilot Plant (WIPP) emergency management program. Nuclear Waste Partnership, LLC (NWP) operates WIPP, and the DOE Carlsbad Field Office provides Federal oversight. EA performed this assessment from October 20 to December 10, 2015.

EA conducted this assessment using limited-scope performance tests (LSPTs) to evaluate emergency response organization personnel's performance, followed by a programmatic assessment of four emergency management program elements. The LSPTs consisted of two scenarios: a radiological release initiated by an earthquake, and a radiological release from a waste assembly dropped down the mine shaft. The emergency response organization personnel on two shifts conducted these scenarios. EA evaluated the organization's ability to respond to a simulated Operational Emergency and its capability to make decisions, formulate protective actions, and demonstrate mitigating strategies. EA also assessed the conduct of the LSPTs to validate the effectiveness of NWP's exercise program. Based on the results of the LSPTs, EA then assessed WIPP's emergency management program technical basis, plans and procedures, training and drills, and exercise program elements.

NWP conducted the LSPTs effectively and in a manner that allowed the demonstration of an integrated emergency response. LSPT planning and preparation appropriately used an effective, structured approach that included specific objectives, scope, time lines, injects, and controller instructions for realistic scenarios.

During the LSPTs, NWP demonstrated good recognition of Operational Emergencies; accurately categorized and classified event scenarios; appropriately activated the emergency response organization; utilized procedures, checklists, and equipment; and informed the site and offsite authorities of event conditions and protective actions. All emergency response organization teams correctly recognized the need to evacuate the site population early in the event scenarios. However, EA noted that other onsite protective actions were not sufficient to protect workers and responders from the potential high radiological doses resulting from these scenarios. The scenarios postulated significant exposures to workers who sheltered in place and to emergency responders. Members of the emergency response organization overlooked the significance of these exposures; did not correlate the consequences when declaring a General Emergency; did not recognize the need to change protective actions based on the dose rates and their potential severity and impact; and did not inform incident commanders of the potential radiological doses predicted on site so they could adequately protect responders and establish appropriate locations for the incident command posts and staging areas. Additionally, consequence assessment personnel did not provide safe route information, timely and accurate initial plume projections, or timely estimates of exposure at locations of interest.

The EA programmatic assessment determined that NWP's emergency planning hazards survey incorporates the relevant order requirements and procedures for developing and maintaining the emergency planning hazards survey and emergency action levels. NWP has also made significant improvements in its emergency management program through significant upgrades to the WIPP emergency plan and implementing procedures. For most operational concepts described in the emergency plan, NWP has developed response procedures that are readily available, up-to-date, and user friendly.

NWP provides training to all workers, holds periodic drills for workers to practice taking the relevant protective actions, and provides briefings to offsite responders and invites them to attend the site's emergency management training. Further, NWP has improved the emergency response organization training program and implemented an active drill program.

However, EA noted that the emergency planning hazards assessment contains inappropriate meteorological parameters and material source terms that skew the model outputs by overestimating offsite and underestimating onsite exposures. Additionally, emergency action levels do not provide the specific actions or clear guidance needed by emergency response organization personnel to adequately protect onsite personnel. EA also identified several inconsistencies between the *WIPP Emergency Management Plan*, the consequence assessment procedure, the consequence assessment checklist, and the emergency planning hazards assessment. Significantly, site evacuation planning does not adequately address routing, transportation, accountability, monitoring for contamination, and decontamination. NWP does not conduct joint drills with the onsite fire department and protective force for emergencies involving a hazardous material and security concerns. EA also noted weakness in consequence assessment and refresher training, proficiency demonstrations, and tracking of training completion. Further, EA identified a number of significant issues noted by NWP during drills but not entered into the site issues management system.

EA has identified emergency planning deficiencies in the areas of consequence assessment, protective actions, and evacuation planning. Once corrected, the NWP training, drill, and exercise programs are for the most part sufficiently supported and managed to prepare the emergency response organization personnel to respond to emergencies associated with WIPP facilities and activities.

Office of Enterprise Assessments
Emergency Management Assessment of the
Waste Isolation Pilot Plant

1.0 PURPOSE

The U.S. Department of Energy (DOE) independent Office of Enterprise Assessments (EA) assessed emergency management at the Waste Isolation Pilot Plant (WIPP) to evaluate the effectiveness of WIPP's preparedness for responding to classifiable Operational Emergencies (OEs) as established by DOE Order 151.1C, *Comprehensive Emergency Management System*. During this assessment, EA evaluated the ability of various site response organizations to recognize specific hazardous situations, notify appropriate onsite and offsite organizations and agencies, implement appropriate protective actions, establish command and control, and mitigate consequences from the postulated events. In addition, EA assessed WIPP's emergency management program plans and procedures, technical basis, and its training, drill, and exercise programs. Nuclear Waste Partnership, LLC (NWP) is the contractor at WIPP, and the DOE Carlsbad Field Office (CBFO) provides line oversight of WIPP operations on behalf of the Office of Environmental Management.

EA performed this assessment of the WIPP site from October 20 through December 10, 2015. This report discusses the scope, background, methodology, results, and conclusions of the assessment, as well as the deficiencies, findings and opportunities for improvement (OFIs), as those terms are defined in DOE O 227.1A, *Independent Oversight Program*, identified by the assessment team.

2.0 SCOPE

For this assessment, EA assessed selected elements of the WIPP emergency management program and NWP's effectiveness in implementing them, with specific attention to execution of emergency response elements during a classifiable OE. This assessment applied limited-scope performance tests (LSPTs) to evaluate selected capabilities of the emergency response organization (ERO), emergency facilities and equipment, event categorization and classification, notifications and communications, consequence assessment, protective actions, and emergency public information elements that support response functions at the site. In addition, EA assessed the emergency management program elements of the response-related aspects of the technical basis, plans and procedures, and training, drills, and exercises. The assessment was consistent with the scope defined in the *Plan for the Office of Enterprise Assessments Evaluation of the Emergency Management Limited-Scope Performance Test (LSPTs) at the Waste Isolation Pilot Plant*, dated November 2015. Each set of LSPTs involved a combined assessment of response activities at the Central Monitoring Room (CMR), the incident command post (ICP), and the emergency operations center (EOC) in the Skeen-Whitlock Building (SWB), where CBFO is located, approximately 30 miles northwest of WIPP in Carlsbad, New Mexico.

3.0 BACKGROUND

EA's oversight program is designed to enhance DOE safety and security programs by providing the Secretary and Deputy Secretary of Energy, the Under Secretaries of Energy, other DOE managers, senior contractor managers, Congress, and other stakeholders with an independent evaluation of the adequacy of DOE policy and requirements and the effectiveness of DOE and contractor line management performance in safety and security and other critical functions as directed by the Secretary. The DOE independent oversight program is described in and governed by DOE Order 227.1A, *Independent Oversight Program*,

and EA implements this program through a comprehensive set of internal protocols, operating practices, assessment guides, and process guides.

During February 2014, WIPP had two OEs that led to a shutdown of site operations and a significant upgrade of the WIPP emergency management program, which is still in progress. On February 5, 2014, an underground mine fire involving a salt haul truck occurred at WIPP, and on February 14, 2014, a radiological release occurred in the underground repository. As a result, NWP is currently performing work in a recovery mode that includes a goal to establish and maintain a healthy emergency management program, as part of a more general effort of strengthening safety programs, regulatory compliance, decontamination of the underground, increasing ventilation, mine stability and underground habitability, and additional workforce retraining. WIPP will undergo an operational readiness review prior to resuming waste emplacement, currently scheduled for late 2016. This is an evolving program undergoing major improvement in all aspects to address issues identified by the accident investigation board reviews, previous emergency management assessments conducted by EA's predecessor organization, and a post-incident safety management program assessment.

Since the accidents, CBFO and NWP have made several significant changes in the emergency management program. For example:

- NWP added a fire department staffed with full-time emergency responders that replaced the fire brigade, the first line initial response team, and the emergency services technician/fire protection technician used in the past.
- NWP implemented a new incident command system structure that uses a fire department officer in the role of incident commander (IC) for structure fires, wildland fires, emergency medical response (mass casualty), mine rescue, and hazardous material (HAZMAT) incidents, and a protective force officer as IC for security-related incidents; the IC role is no longer assigned to a facility shift manager (FSM).
- NWP instituted a new, tiered ERO structure for responding to OEs using the National Incident Management System approach, with each tier having defined management, direction, and support roles and responsibilities for emergency response activities.
- NWP built a new offsite emergency operations center (EOC) in the SWB in Carlsbad, providing dual capability with the existing onsite facility.
- NWP issued a new WP 12-9, *WIPP Emergency Management Plan*, which is consistent with DOE Order 151.1C.

Given the magnitude of the recent changes to the WIPP emergency management program, EA elected to focus on assessing the effectiveness of the current emergency management program and did not specifically follow up on the findings from the 2012 emergency management review by EA's predecessor. EA concentrated on providing a value-added assessment to improve the health of the emergency management program and preparing NWP and CBFO for the upcoming operational readiness review.

4.0 METHODOLOGY

This assessment considered requirements related to emergency management listed in DOE Order 151.1C and recommendations provided in the associated emergency management guides. Key aspects of DOE Order 151.1C requirements are included in the performance test objectives and lines of inquiry used by the assessment team.

The EA team examined key documents, such as plans, procedures, manuals, analyses, policies, training and qualification records, and numerous other supporting documents. The team interviewed key personnel responsible for developing and executing the associated programs; observed the LSPTs; and walked down emergency response facilities, focusing on systems and capabilities. Two LSPTs were conducted to examine and validate elements of the WIPP emergency management program by simulating plausible emergency events/conditions in a manner that, as nearly as possible, enabled CBFO and NWP to initiate and implement an integrated emergency response. One LSPT scenario was a radiological release initiated by an earthquake, and the second scenario was a radiological release from a waste assembly dropped down the waste hoist shaft.

EA selected these two scenarios from the approved emergency planning hazards assessment (EPHA) as the technical basis for the LSPTs. Both scenarios reflected the current facility/site-specific hazards, correlated technically with the EPHA, and reflected technically accurate conditions in terms of operations and radiological, chemical, and meteorological data. One set of NWP and CBFO personnel participated in both LSPTs on day one, and NWP repeated the LSPTs on a second day with another set of NWP and CBFO personnel. EA evaluated the ERO's ability to respond to the two simulated OEs, assessed the capabilities of site personnel responsible for initial decision-making to accurately categorize and classify the OEs, make required notifications, implement protective actions (PAs) and protective action recommendations (PARs), perform consequence assessments, release event information to the public, and mitigate the events. EA also assessed the conduct of the LSPTs to determine whether NWP can plan and conduct emergency management drills and exercises by initiating a response to simulated, realistic emergency events in a manner that, as nearly as possible, replicates an integrated response to OEs.

During this assessment, EA discussed all identified deficiencies and other observations with CBFO and NWP on a real time basis. The Results Section (Section 5.0) identifies Deficiencies and Findings, which are summarized in Section 6.0. Section 7.0 lists OFIs for suggested program or process improvements for management consideration. Appendix A lists the members of the EA assessment team, the Quality Review Board, and EA management responsible for this assessment, and Appendix B lists the documents reviewed, personnel interviewed, and observations made during this assessment, relevant to the findings and conclusions of this report.

5.0 RESULTS

5.1 Limited-Scope Performance Tests

Objectives:
LSPTs examine and validate elements of an emergency management program by initiating a response to simulated, realistic emergency events/conditions in a manner that, as nearly as possible, replicates an integrated emergency response to an actual event. Planning and preparation use an effective, structured approach that includes documentation of specific objectives, scope, time lines, injects, and controller instructions for realistic scenarios. (Paraphrased from the *Plan for the Office of Enterprise Assessments Evaluation of the Emergency Management Limited Scope Performance Test at the Waste Isolation Pilot Plant)*

The information provided in this section is based on EA observations of two sets of emergency management LSPTs. Each set of LSPTs involved a combined assessment of response activities at the CMR, the incident command post (ICP), and the SWB EOC. The CMR is staffed with an FSM serving as the emergency director (ED) in this 24/7 facility. For any declared OE or as directed by the FSM, procedure WP 12-ER4925, *CMR Incident Recognition and Initial Response*, requires the following. The CMR operator (CMRO) activates the EOC. The CMRO/FSM provides first-responders with appropriate

information, such as hazards, location of incident, safe route, wind direction, and other incident details as they become available. When the EOC achieves a minimum staffing level, the FSM briefs the EOC crisis manager (CM) or deputy crisis manager (DCM), who is required to declare the EOC operational and formally assume the roles and responsibilities as the ED for emergency management functions in support of the IC and FSM.

EA has organized the results of these performance tests according to observations at the evaluated venues (CMR, ICP, EOC and consequence assessment), and a cross-cutting topical area (i.e., the overall conduct of the LSPTs. Sections 5.2 through 5.4 provides EA's assessment of the emergency management program elements of technical planning basis, plans and procedures, training and drills, and exercises.

5.1.1 Central Monitoring Room

The CMR, located on site in the Support Building, serves as the WIPP coordination point for site activities and communications between the surface and underground facilities, in addition to monitoring site fire and radiation alarms and transportation activities. A CMRO also controls ventilation systems from the CMR. During an emergency, the CMR serves as the communications hub for the IC, EOC, site workers, and offsite authorities. NWP normally staffs the CMR with a CMRO and an assistant CMRO. Upon recognition of an event, WP 12-ER4926, *CMR Expanded Staffing Operations* requires the CMRO to recall the FSM and the Operational Assistance Team (OAT) to the CMR. The FSM is the senior shift representative responsible for maintaining the facility in a safe configuration during normal and abnormal situations and serves as the ED until the ED functions are transferred to the EOC CM or DCM. The OAT consists of three additional personnel having technical expertise to support an emergency response.

At the start of the LSPTs, NWP staffed the CMR with a CMRO, an assistant CMRO, and an FSM. Once the CMR staff recognized that an event had occurred, the CMRO effectively told the underground workers to go to their egress assembly stations, recalled the OAT to the CMR, dispatched the site fire department and radiological control personnel to the scene, and instructed the remaining site population to suspend all activities and remain indoors. The CMROs appropriately simulated placing the CMR ventilation system into filtration mode to maintain habitability when they recognized the potential for a radioactive material release on the surface. The FSM then directed activation of the EOC (the new SWB EOC in Carlsbad instead of the site EOC by exercise design) and subsequently reviewed emergency action levels (EALs) to determine event categorization and classification and predetermined PAs appropriately. Initial PAs included underground and surface evacuations for the earthquake scenario and underground evacuation and shelter-in-place PAs on the surface for the dropped waste assembly scenario. The CMR staff then recalled the mine rescue team, requested personnel accountability reports, made offsite assistance requests, and supported the IC. All of these initial actions were performed in accordance with response procedures and checklists.

Although the CMR staff performed their response in accordance with procedures, the sequence of activities did not provide complete protection for personnel under some circumstances. Specifically, during all LSPTs, the FSM activated the EOC before reviewing the EALs for determining the OE, and, therefore, did not consider the predetermined PAs for use in determining safe routing instructions for the EOC cadre. The CMRO also mobilized the OAT, fire department, and radiological control personnel during the initial part of the emergency before the status of the radiological release was known; potentially exposing them to the release unnecessarily (see **OFI-NWP-1**).

EA observed several good practices associated with conduct of operations in the CMR. These good practices include establishing management expectations through a nearly complete set of procedures and checklists that govern activities performed in the CMR as well as CMR staff implementation of access

controls, log and record keeping, formal turnovers, and periodic briefings by the FSM with the CMR staff and on the command telephone bridge line.

Nevertheless, some operations, procedures, and communications were not complete or effective: FSM periodic briefings did not always contain all known information nor performed at an established frequency; records did not always reflect actual times of occurrence (using logged times instead). Additionally, the CMR teams entered information into WebEOC (a computer-based system for sharing information among command centers) differently; one team used a scribe and whiteboard equipped with copying capability and provided records to a WebEOC operator for making event entries of activities, while the other team's WebEOC operator entered activities as reported. During the player critique (hotwash), a site participant stated that the scribe method provided more information for WebEOC entries and was easier for the CMR staff to use. EA also observed that because the CMR staff did not implement mechanisms to maintain awareness of timed actions, such as event classifications, notifications, and briefing updates, some actions were late, as outlined below. Finally, in one scenario, the FSM and the IC disagreed on whether to evacuate the site, delaying actions until the EOC provided a plume projection and an evacuation plan, leaving some personnel in an atmosphere above PAC for an unnecessarily prolonged period. Once plume projections were available, the FSM recognized that the ICP was in the plume path and notified the IC of the need to relocate, but the ICP had already relocated without notification to the FSM (see **OFI-NWP-1**, **OFI-NWP-3**, and **OFI-NWP-17**).

While serving as the ED, the FSMs accurately classified the emergencies, implemented predetermined PAs, and made the required notifications, including follow-up phone calls. However, event information was not always timely and accurate, and in one case was incomplete (see **OFI-NWP-1**):

- The FSMs completed three (of four) of the event categorizations and classifications a few minutes after the 15-minute time requirement from event discovery.
- NWP faxed event notification forms for the classified events to offsite authorities a few minutes after the 15-minute time requirement following event classification.
- NWP completed three of the notifications to the Mine Safety and Health Administration a few minutes after the 15-minute time requirement following discovery.
- The times of the event provided in the notification forms were a few minutes later than the actual times of the controller's injects.
- The facsimile machine time stamped the notification forms to offsite authorities with incorrect times (Daylight Savings Time had changed to Standard Time the weekend before).
- The SWB EOC did not receive one of the notification forms.

During implementation of personnel accountability protocols, the CMR staff was not well informed of the identification or location of missing or injured personnel. Although the LSPTs simulated many of the personnel accountability tasks, the CMR staff did not immediately pursue the identification of injured or missing people once they received accountability reports. In one case, the CMRO did not have the identity of a transported victim so he called a hospital, located in Carlsbad, to try to determine who was sent there, and in another case, there was an unnecessary delay in making a site public address announcement to ask missing people to call the CMR, once their names became known. Further, the CMR staff did not demonstrate any sense of urgency in completing personnel accountability as established in DOE emergency management guidelines to avoid unnecessary searches (see **OFI-NWP-1**).

The CMR staff did not recognize indicators that emergency exposure dose limits were exceeded or the potential for site workers to receive a high radiological dose based on data that was available in the CMR. The staff in the CMR, EOC, and ICP did not correlate exposure consequences after the EOC declared a General Emergency or recognize the need to change PAs based on the elevated dose rates and their

potential severity and impact. This recognition was important at the time because personnel from the underground and on the surface had evacuated to outside surface site assembly areas while emergency responders were outside to support the response. In addition, although the CMRO had placed the CMR ventilation system in filtration mode, the CMR lacks fixed air monitoring capabilities and the CMR staff did not request that portable air samplers be brought to the CMR to verify continuous habitability (see **Finding F-NWP-1** and **OFI-NWP-1**).

DOE Order 151.1C states that PAs must be predetermined for onsite personnel and must include methods for controlling access to contaminated areas. The PAs specified in the EPHA and EAL for an unfiltered plutonium-equivalent release require only the personnel in the immediate area to evacuate, while all nonessential WIPP personnel shelter in place. By extrapolation from the EPHA for an unfiltered release from a waste assembly dropped down the waste shaft, personnel within 300 meters (distance to the site boundary) could receive greater than a 270 rem total effective dose equivalent exposure within an hour, while the DOE PAC is one rem for an hour exposure. Because the predetermined PAs consider only the immediate area, which site personnel interpret to mean the facility where the release occurred, significant exposures are possible for workers who shelter in place at nearby facilities and for emergency responders.

Overall, the CMR staff demonstrated good recognition of OEs; used their procedures, checklists, and equipment; accurately categorized and classified event scenarios; activated the EOC and first responders; informed the site and offsite authorities of event conditions and PAs; and placed the CMR ventilation system in filtration mode. However, the CMR response did not always provide adequate predetermined PAs, ensure safe routing instructions for responders, or confirm CMR habitability. The CMR staff lacked proficiency in performing timely and complete notifications, in completing personnel accountability protocols, and most significantly, in recognizing conditions that require the implementation of emergency exposure limit guidelines. Lastly, EA observed additional issues in FSM communications with the IC and briefings with the CMR staff.

5.1.2 Incident Command

At the start of the LSPTs, NWP quickly established a unified incident command with a single IC from the fire department and support personnel from radiological control, protective force, and the mine rescue team. The ICs effectively used their command vehicle and made full use of communication equipment and the resource materials (e.g., maps, whiteboards, checklists) contained in the vehicle. Further, the ICs clearly established command and control of the on scene emergency response. The ICs worked collaboratively with the ICP staff to evaluate the situation and develop an overall incident action plan for responding to the simulated emergencies. No facility shift engineer reported to the ICP when requested by the IC, so the IC had limited situational awareness of the facility status. In two of the LSPTs, the protective force representatives incorrectly wore an IC identification vest, which could cause confusion at the ICP (see **OFI-NWP-2**).

The ICs quickly requested numerous offsite resources to augment the response to escalating emergency conditions. Immediately after learning of the incidents, the ICs requested that regional resources be placed on standby to assist at the site. The protective force representatives also requested offsite law enforcement resources to assist with road closures. In addition, the ICs established a staging area for offsite resources and requested dispatch of specific resources from the staging areas to the site as the extent of injuries on site became known.

The ICs initiated an appropriate initial response to the emergency. The ICs quickly sized up the scene, and for the seismic event, they directed the movement of all fire department equipment out of the fire station in case of aftershocks that could damage or trap the equipment. For the underground release event, when the injured contaminated worker was evacuated from underground, the ICs had an ambulance

ready to immediately transport the worker to the Carlsbad Medical Center. For the seismic event, the ICs quickly set up a triage area and dispatched fire fighters to begin rescue and treatment of injured workers. In all cases, the ICs discussed the need for a site evacuation with the ICP staff, but the authority to direct a site evacuation is not defined and there was no predetermined plan for a site evacuation (discussed further in Section 5.3). For the underground release event, the ICs tried to appropriately initiate a site evacuation shortly before the radiological release reached the surface but could not, because either the FSM disagreed and did not make the public address announcement to start the evacuation, or the EOC decided to hold a conference call with the FSM and IC to discuss the decision (see **Finding F-NWP-1** and **OFI-NWP-1**).

ERO personnel did not alert the ICs to the potential radiological doses that could occur during the events, so the ICs did not establish safe operating locations for most of the ICPs and staging areas. For both events, the ICs and radiological control representatives were concerned about a surface radiological release and closely monitored conditions that would indicate an imminent or occurring release, such as reports from the FSM on the status of the high efficiency particulate air filters, which filter underground exhaust air, and the surface continuous air monitoring alarms. However, the ICs and radiological control representatives did not discuss the need for 360 degree PAs as required for initial PAs by WP 12-9, and the ERO did not tell them about the potentially high doses predicted by the EPHA. Once the radiological release started during the seismic scenario, the ICs immediately simulated the movement of the ICPs (one further upwind and the other slightly downwind) and remained in these locations until the termination of the LSPTs. Nonetheless, one of the ICPs was still within 400 meters of the building, where, by extrapolation from the EPHA, a potential dose of 25 rem within an hour of exposure is predicted. Similarly, for the underground dropped assembly release scenario, the ICs established one ICP upwind and the other slightly downwind. Once the release reached the surface, the ICs did not relocate the ICPs farther from the release point but remained in the same location until the termination of the LSPTs. Both ICPs were closer than 300 meters from the release point, where the EPHA predicted a potential dose of 270 rem within an hour of exposure. Further, for the two ICPs located slightly downwind, the ICs did not consider that if the wind direction changed to the predominant wind direction at WIPP, the plume would be directly over the ICPs. The ICs also established staging areas for offsite emergency response assets, with the two staging areas for the underground release event within the 1 rem PA distance, as predicted by the EPHA. In no case did the ICs conduct habitability checks of the ICPs or the staging areas after the surface radiological releases occurred as required by WP 12-9 (see **OFI-NWP-3**).

As the postulated radiological releases continued on site, the ERO did not take all actions necessary to protect emergency responders. The ICs and radiological control representatives reviewed the plume model maps that they received on their cell phones, but focused on the 1 rem downwind plume projection line and, as previously mentioned, did not discuss the need for 360 degree PAs. The ERO also did not tell the ICs about the potential doses for unprotected personnel at the ICPs and staging areas, and there was no discussion about getting the CM's concurrence for dose limits greater than 25 rem as required by WP 12-ER3903, *Termination, Reentry, and Recovery*. For example, during one of the underground release scenarios, the IC sent fire fighters to check on the welfare of workers who had been sheltered in place for an hour after the surface release, including buildings within 300 meters of the ongoing release, where the EPHA predicted a potential dose of 270 rem within an hour (see **Finding F-NWP-2** and **OFI-NWP-3**).

The ICs demonstrated good communications protocols, but system limitations and noisy conditions caused challenges in communicating timely and effective event information among the emergency response command centers. The ICP staff exhibited excellent use of "repeat-backs" on the radio to ensure correct transmission of information between the various responders. In addition, the ICs and FSMs shared information frequently on the radio to ensure that they were aware of each other's actions; however, the limited radio system on site meant that radio traffic for the IC, FSM, fire department tactical operations, and real-world activities was all on the same channel (discussed further in Section 5.1.3). The

ICs also participated in conference calls with the EOC and FSM over a cell phone, but the ambient background noise made it difficult to hear, and the rest of the ICP staff could not participate (see **OFI-NWP-4**). During two of the LSPTs, the names of injured workers were broadcast over the radio instead of by more secure means to protect their privacy as stated in EA12ER4925-3-0, *CMR Initial Response Actions* (see **OFI-NWP-5**).

Overall, NWP formed a unified incident command, and the ICs initiated an appropriate initial emergency response. The ICs also requested assistance from numerous offsite resources and integrated those resources into the onsite response. However, the ICs could not evacuate the site before the underground release dispersed on the surface in two of the LSPTs, mostly because of confusion over authorities for ordering an evacuation and the lack of a site evacuation plan. Further, ERO personnel did not tell the ICs about the potential radiological doses predicted on site, so the ICs could not adequately protect responders and establish appropriate locations for the ICPs and staging areas, and the ICs did not conduct habitability checks at the ICPs once the radiological releases started. The ICs also faced communication challenges with the limited radio system, and they participated in briefings with the EOC and FSM using a cell phone, which was difficult to hear and precluded participation by the rest of the ICP staff. Finally, the names of some injured workers were not protected to ensure their privacy.

5.1.3 Emergency Operations Center

NWP recently completed construction of a new 4,000 square foot, EOC in the SWB in Carlsbad, which also houses CBFO. The EOC includes a primary EOC area, an EOC support area, and several contingency rooms. The EOC is equipped with wall-mounted monitors, interactive message boards, computer workstations, and telephones at the response positions. NWP has also implemented a number of software enhancements to improve incident response capabilities.

At the start of each LSPT, NWP and CBFO personnel pre-staged in the EOC and were allowed to commence play through a controller inject, timed to reflect when staffing of the EOC would occur. In all cases, the FSM provided an adequate initial briefing to the EOC CM and DCM, who then declared the EOC operational and formally assumed the roles and responsibilities for emergency management functions in support of the IC and FSM.

DOE Order 151.1C states that the cognizant field element official is responsible for approving the initial news releases; ensuring that effective communications are coordinated and maintained with the Headquarters Operations Center; monitor the facility response; have a senior official who serves as an emergency manager with decision-making authority and responsibilities; and conduct appropriate and necessary emergency actions. Generally, the CBFO Senior Federal Official (SFO) and the CBFO representative conducted their duties as specified in their respective checklists, and one or both participated in and contributed to leadership and EOC briefings. However, neither the SFO nor the CBFO representative checklists included event categorization/classification, onsite PAs, offsite PARs, or other emergency manager decision-making authorities or responsibilities (see **OFI-CBFO-1**).

Likewise, the CM and DCM conducted their duties as assigned and followed the actions specified in their respective checklists, with a few exceptions discussed later in this section. When emergency conditions worsened, CMs responded appropriately by selecting the correct EALs and implementing the corresponding event classification upgrades. However, as stated in Sections 5.1.1 and 5.1.2 of this report, EOC personnel did not alert the ICs or FSMs to the potential radiological doses above emergency exposure limits that could occur during the upgraded events, as extrapolated from the distances to protective action criteria (PAC) for each associated EAL. As a result, the ICs did not establish safe locations for most of the ICPs and staging areas. Additionally, the EOC did not tell the ICs about the potential doses for unprotected personnel at the ICPs and staging areas, and there was no discussion about

getting the CM's concurrence for entering areas, as established in the emergency plan, where doses could exceed the 25 rem limit. Furthermore, because the predetermined PAs consider only the immediate area, which site personnel interpret to mean the facility where the release occurred, workers who shelter in place could experience significant exposures. Thus, the initial PAs for the declared General Emergencies were inadequate when information was sparse or confusing, especially when the known information indicated potentially high radiological doses (see **Finding F-NWP-1** and **OFI-NWP-1**).

All EOC teams quickly recognized the need to evacuate the site population early in the events, but no team completed an evacuation in a timely manner. Importantly, there is no preplanned procedure for implementing a site evacuation under severe scenario conditions. The lack of a site evacuation procedure resulted in:

- Confusion over the authority (IC, FSM, or EOC CM) to approve and implement a site evacuation
- Confusion over the terms and locations of site "assembly areas" and "evacuation staging areas," to the extent that workers might move from protected areas and could become contaminated or inhale radioactive material by going to the wrong location
- Evacuation directions from the CMR stating that "non-essential" personnel should evacuate and "essential personnel" should remain on site; NWP did not demonstrate how personnel accountability is implemented for either group of personnel during the LSPTs
- Considerable time needed to develop evacuation plans, once the EOC decided to implement a site evacuation to protect worker safety (see **Finding F-NWP-1** and **OFI-NWP-1**).

The duties of the offsite liaison are specified in the checklist and include confirming receipt of offsite notifications and providing an explanation, if needed; maintaining an offsite interface; and evaluating and passing on incoming requests. During the LSPTs, the offsite liaisons used their checklists and supplemental documents (Local Rancher and Oilfield Contact Information and Offsite Contact Information) to adequately establish and maintain offsite contacts. However, the public affairs officer (PAO) checklists do not require recording the times the contacts were made; this omission is significant, because multiple contacts may become necessary. The Emergency Notification Form (ENF) facsimile cover sheet (Immediate Action Required form), which accompanies the ENF, does contain columns for Time Verified and Person Contacted, but was not consistently filled out. This deficiency in the checklist quickly became obvious when multiple ENFs were transmitted due to the upgrade of the event classification.

The EOC did not complete all actions required by WP 12-ER3907, *Offsite Emergency Notifications*, for emergency notifications. During one LSPT, the EOC staff did not follow up with DOE Headquarters to ensure receipt of one of the ENFs, and during another LSPT, there was no follow-up with the state and county EOCs following an upgrade in the event classification. In addition, some ENFs contained contradictory or erroneous information (see **OFI-NWP-17**). For example:

- An ENF that contained an upgrade of the event classification was not correctly marked as a "significant change."
- Another ENF contained contradictory PARs, indicating both "remain indoors" and "evacuate."
- A different ENF incorrectly listed the EAL number.
- An ENF stated to evacuate out to 5.3 miles from the site and close the barriers on the Whitlock and South Access roads; however, based on the NWP emergency management plan, closing the barriers would require local law enforcement personnel to be within 5.3 miles of the site.

PAO responsibilities specified in DOE Order 151.1C include obtaining approval of the designated Federal official for initial news releases or public statements; coordinating updates with DOE/National

Nuclear Security Administration Headquarters; releasing information within one hour of the declaration of the event; and providing accurate, candid, and timely information to workers and the public so as to establish facts and avoid speculation. Both PAOs used the PAO checklist, but they marked the items differently (one PAO correctly marked nine items as N/A, while the other PAO checked these same items as completed). Both PAOs obtained approval of the news releases from the CM and SFO as required. Although the checklist does not mention releasing information within one hour of the emergency declaration, both PAOs met this requirement (see **OFI-NWP-6)**. However, NWP does not define a specific format for the initial news release and uses several formats (WIPP Emergency Communications tweets, Event Release, and DOENews) to make announcements to the public. None of these releases contained the appropriate event classification (Site Area Emergency or General Emergency), and some contained incorrect PARs. Additionally, some of the information disseminated to the public could be misinterpreted or confusing ("surface continuous air monitors are alarming, indicating possible external radiological release") when not accompanied by additional information (see **OFI-NWP-7)**. DOE Guide 151.1-4 states that chronological files with news releases, pending releases, media inquiries, and rumor control should be maintained for reference. However, some identical DOENews releases had different time stamps, and some WIPP Emergency Communications had times and dates that were after the exercises terminated.

Effective command, control, and communication are critical functions in maintaining situational awareness and a common operating picture at all command centers. However, the ICP, CMR, and EOC did not always share a near real-time common operating picture of the event, resulting in fundamentally different understandings of the event at the command centers (i.e., potential consequences, response actions, and PAs). A significant weakness in the new EOC is the lack of effective radio communications with the WIPP site. EA observed numerous instances of inadequate communications capabilities during the LSPTs (see **OFI-NWP-8**). Specifically:

- Limited radio channels required exercise radio traffic and real-world activities to use the same channel.
- A poor quality repeater system created unpredictable "dead zones" for radio communications, a primary communication method according to WP 12-9.
- The IC conducted conference calls with the EOC and FSM over a cell phone that was difficult to hear.
- EOC personnel used photos of computer screen shots of the plume model and transmitted the photos via cell phone to IC due to a lack of adequate data communications in the field.
- Cellular communications from the onsite EOC, where the simulation cell was located, were nonexistent due to poor cellular coverage.

Overall, NWP and CBFO have created a new, modern, and functional EOC in the SWB that is well equipped with information management capabilities, computer workstations, and telephones. NWP and CBFO personnel stationed in the EOC performed their duties as assigned and followed the actions specified in their respective checklists, with a few exceptions. However, a major missing link in the new EOC is effective radio communications with the site, so NWP could not maintain adequate near real-time situational awareness among the EOC, the CMR, and the ICP. This condition also contributed to inadequate communication of initial PAs for the declared General Emergencies when information was sparse or confusing, especially information concerning the severity of the incident. Most importantly, EOC personnel did not alert the ICs or FSMs to the potential radiological doses above emergency exposure limits that could occur during the upgraded events, as extrapolated from the distances to PAC for each associated EAL. However, neither the SFO nor the CBFO representative checklists included event categorization/classification, onsite PAs, offsite PARs, or other emergency manager decision-making authorities or responsibilities. Furthermore, all EOC teams quickly recognized the need to

evacuate the site population early in the events, but no team successfully completed an evacuation in a timely manner. Importantly, there is no preplanned procedure for implementing a site evacuation. Lastly, the EOC sent some emergency notifications that contained contradictory or erroneous information and did not record when offsite notifications were verified.

5.1.4 Consequence Assessment

At the start of the LSPTs, the consequence assessment team (CAT) representative was pre-staged in the EOC and was allowed to commence play through a controller inject, timed to reflect when staffing of the EOC would occur. Important tasks that the CAT representative is required to perform per WP 12-ER4916, *Consequence Assessment*, include verifying event classification and PAs issued, modeling HAZMAT releases, providing safe route instructions to mobilized personnel, providing dose projections at key receptors of interest, and keeping key EOC personnel informed of dispersion modeling results through discussions and briefings.

EA observed each CAT representative making use of real-time meteorological data and using the appropriate event release times for modeling the initial plume projections. Each CAT representative performed initial analyses for plutonium-239 using the HotSpot health physics dispersion modeling software, and one representative contacted the National Atmospheric Release Advisory Center (NARAC) personnel for assistance in developing a refined plume projection.

However, EA noted the following issues in the timeliness and accuracy of the initial analyses (see **Finding F-NWP-2 and OFI-NWP-9**):

- Neither CAT representative performed the initial consequence assessment activities of providing safe route information and timely estimates of exposure at receptors of interest, as described in the WIPP protocols.
- The CAT representatives did not provide initial analyses until approximately one and a half hours after each of the releases occurred; it is important to have initial consequence assessment information quickly because DOE PACs are based on one-hour exposures that should be sufficient to avoid irreversible health effects.
- The CAT representatives used inaccurate source terms for the underground radiological releases, resulting in much lower dose consequences than projected in the EPHA.
- The CAT representatives did not review or use the EPHA to ensure the development of accurate plume projections or provide all of the consequence assessment data.
- The CAT representatives did not perform quality control checks of consequence assessment input data and output products before the results were distributed.

Additionally, CAT representatives did not perform several tasks required by the WIPP protocols, including (see **OFI-NWP-17)**:

- Reviewing the PAs/PARs and making changes based on the consequence assessment process and modeled plume projections
- Briefing key ERO personnel on the modeled plume projections, such as:
  - Dose consequences at receptors of interest (i.e., ICP, CMR, locations housing evacuated personnel, site boundary, and offsite receptors of interest)
  - Plume arrival times at receptors of interest.

The CAT representatives also did not provide NARAC plume projections to the ERO. Although one CAT representative contacted NARAC personnel to request that they develop plume projection modeling

and initiated a NARAC run during another LSPT, final NARAC plume projections were not completed. The other CAT representative did not call NARAC personnel or initiate the development of plume projections using the NARAC software (see **OFI-NWP-9**).

Overall, the CAT representatives generally demonstrated familiarity with their assigned tasks, including such key activities as event classification verifications and producing HAZMAT dispersion modeling projections. However, CAT representatives did not provide safe route information, timely and accurate initial plume projections, or timely estimates of exposure at receptors of interest. Most significantly, if the ERO had received, and acted upon, the initial consequence assessment that projected inappropriately low dose consequences, site personnel could have been unnecessarily or excessively contaminated.

5.1.5 Conduct of LSPTs

NWP effectively conducted the LSPTs in a manner that enabled NWP and CBFO to validate elements of the WIPP emergency management program by initiating a response to simulated, realistic emergency events/conditions in a manner that, as nearly as possible, replicated an integrated emergency response to an actual event. LSPT planning and preparation appropriately used an effective, structured approach that included specific objectives, scope, time lines, injects, and controller instructions for realistic scenarios. In addition, NWP effectively used a comprehensive simulation center staffed with experienced and knowledgeable participants to portray the agencies and individuals who would likely participate during a real event. The simulation center generated injects, received player responses, and delivered scenario injects using telephone calls, radio messages, and facsimiles to represent actions, activities, and conversations with individuals who were not participating. As a result, the simulation center was able to maintain exercise realism and allowed the participants to simulate the necessary coordination expected during a real event. NWP controllers also appropriately provided players with earned information when player actions would have provided them.

NWP also provided venue controllers and simulation center personnel with adequate exercise-specific training, rules of conduct, and appropriate guidelines on interactions with players. Venue controllers executed the exercise package as designed, and NWP, using good after action tools, executed a hotwash at each venue immediately after the LSPTs to gather and document the participants' observations. NWP also conducted daily evaluator and controller debriefs to determine whether the assessed responders accomplished the individual exercise objectives, based on a synthesis of the observations and information gathered during the conduct of the LSPTs. NWP controllers also participated in the controller/evaluator critique at the conclusion of all LSPTs.

Although NWP conducted the LSPTs in accordance with DOE requirements, EA identified the following weaknesses in LSPT planning and control (see **OFI-NWP-10**):

- The controllers' radios did not work at the first ICP location on site, making it necessary to simulate the remaining ICP locations during the LSPTs so the controllers could stay in contact with the simulation cell, instead of allowing the ICs to move the ICPs to the desired location.
- Although NWP designated an exercise radio channel for player use, inadequate repeater coverage prevented the identified channel from providing the necessary connectivity to coordinate exercise safety, logistics, and player actions between the exercise director, controllers, and simulation center. The lack of reliable communications required a radio channel normally reserved for daily operational activities and real emergencies to be shared with LSPT play.
- The IC radiological control controller did not use headphones with her radio, so players could hear controller radio traffic during one day of LSPTs.

- The lack of preplanned radiological data injects caused confusion and led to delays in providing information to players that would normally be available.
- The NWP simulations cell provided an unrealistic perception regarding the timeliness of offsite resource response times to command staff and decision makers by quickly approving support requests for assets that, in actual practice, would require in-depth coordination and approval to activate and deploy (e.g., State Civil Support team deployment, and regional and national assets).

Overall, NWP effectively conducted the LSPTs in accordance with DOE requirements. EA identified a few areas related to exercise planning and control where NWP could further improve the WIPP exercise program.

5.2 Technical Basis

Objectives:
The NWP site emergency planning hazards survey (EPHS) identifies the conditions to be addressed by the comprehensive emergency management program. The EPHS contains a HAZMAT screening process that identifies specific HAZMAT that, if released, could produce impacts consistent with an OE. NWP provides quantitative analyses of the release of, or loss of control of, the HAZMATs in the site EPHA. NWP has developed facility-specific EALs for the spectrum of potential OEs identified in the EPHA, including corresponding protective actions. (Paraphrased from DOE Order 151.1C.)

The EPHS and EPHA serve as the foundation of the emergency management program; consequently, the accuracy of these documents is key in developing effective emergency response procedures and other elements of the program. The degree to which the EPHA effectively serves this function depends primarily on the effectiveness of the initial screening process for HAZMAT; the completeness and accuracy of the processes for developing the EPHS and EPHA; and the accuracy of the analyses in the EPHA.

NWP has maintained effective methods for tracking the types and quantities of HAZMAT present on site, which is limited to transuranic waste and beryllium. NWP effectively identifies, controls, and tracks HAZMAT, and notifies emergency planners of significant changes in HAZMAT inventories. Waste generators perform waste characterization of transuranic waste shipments and enter this data into the WIPP Waste Information System electronic database, which is widely accessible at WIPP. This database will not accept entries for containers whose contents are above allowable radioactivity and beryllium limits, so containers exceeding these limits cannot be shipped to the site.

NWP has appropriately developed an EPHS that incorporates the requirements of DOE Order 151.1C; the provisions of DOE Guide 151.1-2, *Technical Planning Basis*; and the provisions of the EPHS development and maintenance procedure. For example, the EPHS provides good technical descriptions of the WIPP facilities and areas; describes emergency events and conditions; screens HAZMAT as directed by DOE Order 151.1C and DOE Guide 151.1-2; and lists HAZMAT for facilities of concern that must be retained for further analysis in an EPHA.

NWP has developed generally adequate procedures for developing and maintaining the EPHS, EPHA, and EALs that incorporate the requirements of DOE Order 151.1C and recommendations of DOE Guide 151.1-2. The procedures establish the administrative and management requirements for developing, reviewing, approving, and maintaining the documents.

NWP developed a site EPHA that generally incorporates the provisions of the EPHA development and maintenance procedure, but the consequence analyses in the EPHA do not provide technically sound results. The EPHA documents a full spectrum of event analyses, including beyond design basis events

for planning responses to OEs. However, NWP does not justify the use of meteorological input parameters that differ from the guide and HotSpot modeling assumptions (contrary to the EPHA development and maintenance procedure) were used to develop the radiological material consequence analyses, resulting in unrealistic consequence assessment determinations (see **OFI-NWP-11**).

Furthermore:

- NWP uses stability class F with a wind speed of 6.8 meters/second for the average weather condition rather than the DOE Guide 151.1-2 recommendation of stability class D with a wind speed of 4.5 meters/second.
- NWP uses a wind speed of 2.2 meters/second for the adverse weather condition rather than the DOE Guide 151.1-2 recommendation of 1 meter/second.
- A receptor height value of 0 meters was used rather than the default value of 1.5 meters that is recommended by the HotSpot software documentation for the breathing zone near the ground.
- A wind reference height of 2 meters was used rather than the HotSpot-recommended reference height of 10 meters.

NWP's use of these input parameters, without appropriate justification, resulted in doubling the PAC distances (8.5 km vs. 4.4 km) offsite and a predicted potential for very high radiological exposures to onsite workers and responders, as noted during the LSPTs.

EA also identified that NWP has not granted permission for NARAC personnel to access the site's real-time weather data (see **Deficiency D-NWP-1** and **OFI-NWP-11**). DOE Order 151.1C requires all DOE HAZMAT sites to have access to NARAC, or have procedures in place to activate or request NARAC capabilities, and to provide NARAC with the site meteorological data and information on source terms for actual or potential release of HAZMAT to the atmosphere in a timely manner to facilitate near real-time computations. The CAT representative who contacted NARAC during the LSPTs was unable to provide this information until the end of the LSPTs.

NWP developed site EALs that generally incorporate the provisions of the development and maintenance procedure. EALs developed for applicable event scenarios contained in the EPHA do not provide all the information decision makers need to implement actions to protect onsite personnel. Significantly, PAs for onsite employees do not indicate areas in terms of the distances for evacuation and shelter-in-place as stated in the EPHA. Instead, the EALs only indicate to evacuate the immediate area and shelter-in-place nonessential WIPP personnel, with no consideration of dose consequences at onsite receptors of interest (see **Finding F-NWP-1** and **OFI-NWP-12**).

Additionally, EA identified the following inconsistencies among WP 12-9, WP 12-ER4916 (*Consequence Assessment Procedure*), EA12ER3002-4-0 (*CAT Checklist*), and the EPHA:

- WP 12-9 and WP 12-ER4916 indicate that the CAT representative provides consequence assessment support by conducting timely initial assessments through the development of dispersion model products that provide areas where PAC would be exceeded and the estimated plume arrival time; however, the checklist does not require the development of a dispersion model as a timely initial assessment.
- WP 12-ER4916, which the CAT representatives use during an event, uses different dispersion model inputs than the EPHA. For example, the CAT representative uses:
  - Contour values of 1 rem, 0.1 rem, and 0.001 rem, rather than 100 rem, 1 rem, and 0.1 rem as used in the EPHA

    - A receptor height value of 1.5 meters, rather than the 0 meters used for all consequence analyses in the EPHA
    - A wind reference height that varies between 2 meters to 20 meters depending on location of a release, rather than the 2 meters used for all consequence analyses in the EPHA.
- The WP 12-9 and EA12ER3002-4-0 identify the consequence assessment capabilities by "CAT representative," while the procedure identifies them as a "Consequence Assessment Representative (CAR)."

Overall, NWP has effective methods for tracking and screening the HAZMAT present on site. NWP has also developed an EPHS that incorporates the relevant order requirements, and procedures for the development and maintenance of the EPHS and EALs also incorporate order requirements. However, EA noted that the EPHA makes use of different meteorological parameters from the guide and plume modeling assumptions that are different from the vendor recommendations. Collectively, this has resulted in doubling the PAC distances offsite and predicting unrealistically high radiological exposures to onsite workers and responders, unnecessarily complicating protective action implementation. Additionally, NWP has developed site EALs for each applicable event scenario contained in the EPHA, but they do not provide specific actions or direction needed to protect onsite personnel. Further, EA identified many inconsistencies among NWP procedures/checklists and the EPHA.

5.3 Plans and Procedures

Objectives:
NWP documents the emergency management program in an emergency plan that also describes the provisions for a response to an Operational Emergency. NWP has issued emergency plan implementing procedures (EPIPs) to describe how emergency plans must be implemented. NWP provides predetermined protective actions for onsite personnel and the public and procedures to implement the separate protective actions of evacuation and sheltering of employees. (Paraphrased from DOE Order 151.1C.)

NWP has made significant improvements in WP 12-9, *WIPP Emergency Management Plan* over the past two years. During 2014, NWP issued a major WP 12-9 revision to address all topical areas as described in DOE Guide 151.1-3, *Programmatic Elements*. During 2015, NWP issued another WP 12-9 revision that combines the previous NWP and CBFO WIPP emergency plans to provide a single comprehensive plan and eliminate differences in the previous plans caused by different update schedules. That revision was approved for training at the time of this assessment, and with few exceptions describes a sound approach for identifying and responding to OEs, consistent with DOE Order 151.1C. The most significant exception is the lack of a site evacuation plan, as further described below.

NWP has developed a set of EPIPs to implement nearly all emergency management program elements described in WP 12-9 using processes that promote the availability of complete, up-to-date, and easy to use procedures. NWP has developed a set of emergency response procedures for its command centers (CMR, ICP, and EOC) that include position-specific checklists to guide ERO members in implementing WP 12-9 and to provide a means to record completed response actions. NWP develops and maintains its emergency response procedures using a writer's guide and a verification and validation process that incorporates DOE conduct-of-operations good practices and provides up-to-date procedures at all key venues through the NWP document control process. This approach has resulted in user friendly, up-to-date, and readily available emergency response procedures.

Nevertheless, some aspects of WP 12-9 are not included in the set of EPIPs. Most significantly, the procedures do not describe how to execute a site evacuation, and a procedure to implement PAs for site building occupants is still under development. The site evacuation plan, as described in WP 12-9, is

limited to the identification of vehicles used during the evacuation. Plans and procedures do not describe where to send evacuees or the conduct of contamination control, decontamination, and personnel accountability (see **Finding F-NWP-1** and **OFI-NWP-1**).

EA noted other operational concepts described in WP 12-9 that are not included in the EPIPs (see **OFI-NWP-1**).

- WP 12-9 states that PAs will be provided in terms of distance; however, for evacuations, the EALs contained in WP 12-ER3906, *Categorization and Classification*, say to evacuate the "immediate area," which in some cases could mean either a building or the site according to the EPHA analysis.
- WP 12-9 calls for the use of thermoluminescent and self-reading dosimetry as a means to manage and record exposures during emergencies, but does not describe how to perform the procedure.
- WP 12-9 discusses requirements for emergency exposure levels in units of rem, but there are no implementing mechanisms to correlate site instrumentation units (DAC-Hours and disintegrations per minute) with units of rem.
- WP 12-9 describes the EOC activation process to include safe routing instructions after determining the occurrence of an OE, but the sequence in EA12ER4926-1-0, *CMR Expanded Staffing Checklist*, activates the EOC before a determination that an OE occurred and any associated PAs, potentially exposing ERO members to a radioactive plume that is above PAC.
- WP 12-9 states that habitability monitoring will occur at locations housing ERO members and sheltered employees; however, no procedures describe how to perform habitability monitoring at the CMR, the onsite EOC, and employee shelter locations.

Other weaknesses noted in WP 12-9 and EPIPs include (see **OFI-NWP-1** and **OFI-NWP-13**):

- WP 12-9 and EPIPs for personnel accountability do not reflect a timeliness goal for completion; DOE Guide 151.1-4, *Response Elements* recommends a timeframe of 30-45 minutes to avoid unnecessary search and rescue operations.
- NWP procedures allow NWP to provide PAs directly to ranchers and oil field workers in public spaces; DOE Order 151.1C requires notification of offsite governmental authorities regarding PARs for public protection, rather than DOE contacting offsite citizens directly.
- A severe event assessment and report per the instructions provided in DOE's 2013 operating experience for *Improving Department of Energy Capabilities for Mitigating Beyond Design Basis Events* (Operating Experience-1) is incomplete, although NWP considered Operating Experience-1 during the ongoing major upgrade of the WIPP emergency management program.
- NWP has not reviewed its emergency response procedures for compliance with the National Response Framework.

Overall, NWP has made significant improvements in its emergency management program through significant upgrades to WP 12-9 and implementing procedures over the past two years. For most operational concepts described in WP 12-9, NWP has developed response procedures that are readily available, up-to-date, and user friendly. Nevertheless, some actions, such as a site evacuation procedure and instructions for employees sheltered in place, have not been developed and issued. Additionally, other tasks, such as personnel accountability goals, performing a review of procedures per the instructions provided in Operating Experience-1, and reviewing procedures for compliance with the National Response Framework, remain outstanding.

5.4 Training, Drills, and Exercises

Objectives:
NWP provides training and periodic drills to all workers who may be required to take protective actions and provides initial and annual refresher training for the instruction of and demonstration of proficiency by all personnel comprising the ERO. NWP has an adequate number of experienced and trained personnel available on demand for timely and effective performance of ERO functions. NWP offers emergency-related information and training on site-specific conditions and hazards to offsite personnel who may be required to respond to an emergency and invites offsite organizations to participate in a site exercise every three years. NWP validates all elements of the emergency management program over a five-year period and site-level emergency response organization elements and resources participate in a minimum of one exercise annually. Exercise packages contain appropriate information, such as exercise scope, objectives, evaluation criteria, and controller and evaluator instructions. NWP tracks and completes corrective actions for issues identified as a result of drills and exercises. (Paraphrased from DOE Order 151.1C.)

Training and Drills

NWP appropriately requires all site workers to complete general employee training annually, which provides instructions on the proper response to emergencies and alarm signals. NWP also held numerous PA drills over the past two years, with multiple drills focusing on underground evacuation, plus drills featuring a site evacuation, and shelter-in-place drills for the six aboveground zones at the site. However, EA noted a few limitations in the training and drills. The training materials provide limited information on assembly and staging areas, provide incorrect information on shelter-in-place actions, and do not mention facility emergency response procedures (see **OFI-NWP-14**). EA also noted that the underground worker evacuation drills had many fewer participants than the normal number of workers typically underground, thus limiting the drills' usefulness in replicating the time and complexities associated with an actual evacuation. NWP recognized this issue and recently restructured the drill program to increase the number of workers participating in underground evacuation drills by varying the start times and holding no-notice drills. In addition, WP 12-9 and the *WIPP Three-Year Drill and Exercise Plan* require an annual site evacuation drill and two underground evacuation drills, but do not mention holding shelter-in-place drills to ensure that employees are able to take all appropriate PAs (see **OFI-NWP-15**).

NWP offers emergency-related information and training on site-specific conditions and hazards to offsite emergency response personnel who may be required to respond to an emergency. NWP provided these organizations (including nearby fire departments and local government officials) with a briefing on all hazards and offsite interfaces in early 2015 and requires this briefing be offered periodically. NWP also informally invites offsite emergency response organizations to attend site emergency management training courses, and a few offsite personnel attended the emergency response controller and evaluator training course.

NWP revised the emergency management training program in 2014 to provide a coordinated program of training and drills for developing and maintaining the proficiency of the ERO. NWP instituted an active drill program that provides numerous opportunities for the ERO to receive training on most potential emergencies. Procedures clearly describe the methods for conducting drills and providing timely documentation of the results. The drills often include team training to better familiarize the ERO with the overall emergency response. Although the onsite fire department frequently participates in facility-level drills involving a fire response and a fire department IC, NWP does not include drills involving a joint response by the fire department and protective force with a protective force IC and a HAZMAT component (see **OFI-NWP-16**).

The ERO training courses discuss the various aspects of the emergency program; however, the training provided to key field response personnel (i.e., both fire and protective force ICs, and the radiation control engineers/managers) does not discuss consequence assessment. As a result, these personnel are not trained on understanding the plume projections sent to them by the CAT representative in the EOC. In addition, consequence assessment training lacks the rigor necessary to ensure that CAT representatives make appropriate decisions and take the proper actions to protect emergency responders, workers, and the public. The CAT representatives are not required to read or understand the EPHA, which serves as the foundation of the emergency management program and is a critical component to their position-specific duties. Further, CAT representatives are not required to complete training on the dispersion model programs used to generate the plume projections. Of significance, there is no required training on interpreting HAZMAT plume projections to clearly explain those projections and ensure implementation of appropriate PAs and PARs (see **OFI-NWP-17**). Although WP 12-17, *WIPP Emergency Management Training Program*, requires ERO members to demonstrate proficiency in the performance of their duties, no procedures describe how this proficiency will be determined or documented. Consistent with DOE Order 151.1C requirements, WP 12-17 also states to provide refresher training to ERO personnel at least annually, but refresher training is offered only every two years (see **Finding F-NWP-3** and **OFI-NWP-18**).

The NWP Emergency Management Section tracks the qualification status for personnel assigned to EOC positions but not for the rest of the ERO positions. WP 12-17 states that the affected cognizant managers will ensure that personnel assigned to these ERO positions complete the required training; however, EA noted that numerous ERO members had not completed their training (see **Finding F-NWP-3**).

Overall, NWP provides training to all workers and holds periodic drills for workers to practice taking the relevant PAs. NWP also provides briefings to offsite responders and invites them to attend the site's emergency management training. Further, NWP modified the ERO training program and started an active drill program. However, EA noted limitations in the training provided to workers and the requirements to conduct shelter-in-place drills. NWP does not conduct joint drills with the fire department and protective force for emergencies involving a HAZMAT and security concern. EA also noted weakness in consequence assessment and refresher training, proficiency demonstrations, and tracking of training completion.

Exercises

NWP revised the exercise program in 2014 to test the site emergency management program more comprehensively. NWP conducts at least one exercise annually and invites offsite response organizations to participate in an exercise each year. NWP provides exercise controllers with suitable guidelines for interacting with players and employs a critique process that fosters a critical assessment of the exercise. NWP uses the DOE emergency management guide definitions for weaknesses and deficiencies and provides for the appropriate disposition of these types of issues.

NWP has used drills and exercises to validate numerous aspects of the emergency management program over the last two years and developed the *WIPP Three-Year Drill and Exercise Plan,* intended to outline how NWP will validate the emergency management program over the period. NWP held exercises in 2014 and 2015 that included all of the ERO components and validated many of the program elements. However, EA noted several weaknesses in the completeness of the three-year plan. For example, the plan does not discuss how to test the response program elements over the three-year period. The plan also discusses including a spectrum of hazards in exercises, but it omits a transportation accident from the list of hazards and does not discuss how to incorporate the various hazards into exercises over time. Further, the plan does not include several requirements from DOE Order 151.1C, such as annual participation of the site ERO components and rotating the basis for the site exercise between the two facilities in the

EPHA. As a result, the plan does not adequately document how NWP will validate all elements of the emergency management program over a three-year period (see **OFI-NWP-19**).

Exercise packages contain appropriate content, such as the exercise scope, scenario, time line of key events, simulations, and technical data injects. The scenario material is consistent with the exercise objectives, and the exercises are designed to test and demonstrate the site's integrated emergency response capability. The evaluation criteria in NWP exercise packages are observable and measurable, and they produce after-action reports that clearly document the results of the exercise. WP 12-ER.13, *WIPP Drills and Exercises,* provides definitions used to categorize findings as either deficiencies (direct impact) or weaknesses (indirect impact); however, EA noted that the descriptions of the issues in the after-action reports did not correlate with the significance level assigned by NWP, which was based on additional information not provided in the after-action reports. For example, NWP twice categorized an issue that directly impacted the ability to provide PAs on site via the public address system as a weakness, rather than as a deficiency per their definitions, and did not mention that a project to upgrade the public address system was already under way. Further, NWP categorized an issue regarding the inoperability of underground emergency lighting and reflectors that were spaced too far apart as an opportunity for improvement, rather than as a deficiency, and did not mention that a project to upgrade the underground lighting and reflectors was under way. NWP also categorized an issue regarding not providing PARs to offsite organizations on an emergency notification form as an opportunity for improvement, rather than as a deficiency, and did not mention that the CMR called the affected offsite parties and provided the PARs verbally (see **OFI-NWP-20**).

NWP identified numerous issues during the drills and exercises held over the last two years. WP 12-9 states to document and track issues identified by exercises using the site issues management system. The plan also states that issues identified during drills that need specific attention may also be tracked using the issues management system; in contrast, DOE Order 151.1C requires appropriate and timely improvements be made in response to issues identified during drills and exercises. NWP entered the findings and improvement items from the Horizon-14 exercise into the issues management system, but NWP entered only a few of the several findings and numerous improvement items identified in drills over the last two years (see **Finding F-NWP-4** and **OFI-NWP-21**). NWP plans to create a WIPP Emergency Management Drill and Exercise / Readiness Assurance Working Group tasked with entering the appropriate issues from drill and exercise after-action reports into the issues management system.

Overall, NWP has established a comprehensive exercise program that validated many aspects of the emergency management program over the last two years. NWP prepared detailed exercise packages and after action reports, and noted numerous issues requiring resolution. However, the *WIPP Three-Year Drill and Exercise Plan* does not describe the validation of all elements of the program over a three-year period. EA also noted discrepancies between the issue descriptions and the significance assigned to the issues in after action reports. Further, NWP does not enter most issues identified during drills into the site issues management system that require corrective action.

6.0 FINDINGS AND DEFICIENCIES

Findings are deficiencies that warrant a high level of attention on the part of management. If left uncorrected, findings could adversely affect the DOE mission, the environment, worker safety or health, the public or national security. A deficiency is an inadequacy in the implementation of an applicable requirement or performance standard that is found during an appraisal. Deficiencies may serve as the basis for one or more findings.

Cognizant DOE managers must use site- and program-specific issues management processes and

systems developed in accordance with DOE O 226.1 to manage and approve these corrective action plans and track them to completion. The contractor must prepare, implement, and track to completion corrective actions to address findings identified in EA appraisal reports. Findings and other deficiencies identified in appraisal reports are managed in accordance with established issues management systems (DOE O 226.1) and quality assurance programs (DOE O 414.1 and 10 CFR Part 830).

Findings

Finding F-NWP-1: NWP has not fully developed predetermined PAs implementing procedures that identify areas that exceed PAC or a procedure to implement a site evacuation plan. (DOE Order 151.1C)

Finding F-NWP-2: NWP did not provide accurate and timely consequence assessments during the LSPTs, resulting in the lack of safe route information, initial plume projections, and estimates of exposure at receptors of interest. (DOE Order 151.1C)

Finding F-NWP-3: NWP does not provide initial training to develop some specific emergency response capabilities, provide annual refresher training, ensure that required training is completed, or describe how the ERO will demonstrate proficiency. (DOE Order 151.1C)

Finding F-NWP-4: NWP does not always incorporate corrective actions into the emergency management program for significant issues identified during drills. (DOE Order 151.1C)

Deficiencies

Deficiency D-NWP-1: NWP has not granted access to NARAC personnel for direct access to WIPP-specific meteorological data to perform accurate and near real-time consequence assessments. (DOE Order 151.1C)

7.0 OPPORTUNITIES FOR IMPROVEMENT

Opportunities for improvement are suggestions offered in Independent Oversight appraisal reports that may assist cognizant managers in improving programs and operations. While they may identify potential solutions to findings and deficiencies identified in appraisal reports, they may also address other conditions observed during the appraisal process. Opportunities for improvement are provided only as recommendations for line management consideration; they do not require formal resolution by management through a corrective action process. These potential enhancements are not intended to be prescriptive or mandatory. Rather, they are suggestions offered by EA that may assist site management in implementing best practices or provide potential solutions to issues identified during the conduct of the assessment. In some cases, OFIs address areas where program or process improvements can be achieved through minimal effort.

Carlsbad Field Office

OFI-CBFO-1: To improve Federal oversight of the response, consider:

- Delegating to the SFO select emergency manager decision-making authority and responsibilities that include:
  - Verifying or confirming categorization/classification decisions
  - Verifying or confirming onsite PAs and offsite PAR decisions

    - Overseeing the facility/site response and providing guidance and operational direction to the facility/site management
    - Coordinating the tactical response to an event with Tribal, State, and local governments
- Specifying the delegation of authority for when the DOE/CBFO Manager is unavailable.

Nuclear Waste Partnership, LLC

OFI- NWP-1: To improve the completeness and effectiveness of WP 12-9, EPIPs, and checklists, consider:

- Revising EA12ER4926-1-0, *CMR Expanded Staffing Checklist*, to order the EOC activation step (step 8) after categorization and classification reviews are performed and initial PAs are determined (steps 9 and 10)
- Revising WP 12-9 and appropriate EPIPs/checklists to reflect a goal to complete personnel accountability (the Mine Safety Health Administration gives 1-hour to evacuate the underground while DOE guidelines recommend 30-45 minutes to complete personnel accountability). A realistic goal should be established considering WIPP's activities.
- Revising CMR EPIPs/checklists with expectations for periodic briefings in the CMR to enhance communications and situational awareness
- Revising CMR EPIPs/checklists to standardize the most effective and useful way to collect and record data for making WebEOC entries
- Revising WP 12-ER3906 attachments by adding notes to reflect required categorization, classification, and notification completion times
- Revising CMR EPIPs/checklists to assign the task of maintaining time lines for tasks with timeliness requirements or periodic activities, such as event categorization/classification, initial offsite notifications, offsite notification updates, periodic briefings, and completion of personnel accountability
- Revising equipment maintenance protocols to include facsimile clock changes when time changes occur (e.g., daylight to standard time)
- Revising WP 12-9, appropriate EPIPs, and written agreements as necessary to establish protocols for a site evacuation that includes authority to initiate a site evacuation, contamination control, decontamination processes, personnel accountability, and an offsite assembly location
- Revising personnel accountability protocols to account for "essential" personnel
- Revising appropriate EPIPs/checklists to reflect the need for habitability checks at command centers and in shelters, using such equipment as readily accessible portable air monitors
- Revising appropriate EPIPs/checklists to correlate site instrumentation readings with emergency exposure guidelines
- Revising EALs to indicate site PAs in terms of distance in feet rather than the subjective term of "immediate area" currently used
- Revising appropriate EPIPs/checklists to reflect the use of dosimetry during a radiological release
- Establishing an agreement with appropriate offsite authorities to reflect the plans for NWP to provide PAs directly to members of the public.

OFI-NWP-2: Consider improving operations at the ICP by:

- Assigning a facility shift engineer or alternate to support ICP operations at the IC's request
- Ensuring that only the IC wears a vest indicating that he/she is serving in that capacity.

OFI-NWP-3: Consider revising EA12ER4922-1-0, *IC Checklist*, to include:

- Keeping the CMR apprised of the current ICP and staging area locations
- Requesting the distance to PAC to confirm that the ICP and staging area for offsite assets are in safe locations for unprotected personnel based on 360 degrees around the point of release, with consideration for the predominant wind direction if different than the existing wind direction
- Requesting the distance for the potential radiological dose to exceed 25 rem and obtaining CM concurrence before entering that area as required by WP 12-ER3903, *Termination, Reentry, and Recovery*
- Conducting periodic habitability checks at the ICP and staging area.

OFI-NWP-4: Consider expanding the site communication systems by:

- Modifying the radio system to provide dedicated channels for emergency response and fire department activities
- Supplying the IC with a headset to improve the ability to hear the conference calls with the EOC and FSM and to allow other members of the ICP to listen in on these conference calls.

OFI-NWP-5: Consider developing a fire department procedure that discusses the allowable methods for providing information on injured workers that protects their privacy.

OFI-NWP-6: To make clear the DOE expectation that news releases be released within one hour of declaration of an event, include this expectation in the PAO checklist and joint information center guidance.

OFI-NWP-7: To better meet the DOE objective of providing accurate, candid, and timely information and to minimize the potential for confusion or misinterpretation by workers and the public, modify the guidance for the joint information center to discuss both appropriate and inappropriate social media content.

OFI-NWP-8: Consider improving communications among response facilities, field response elements, and offsite command centers to provide a common operating picture of the emergency response and shared situational awareness among all teams by:

- Providing adequate radio and cellular phone coverage on site and offsite
- Fully implementing the WebEOC automated information management system at all response venues (CMR, EOC, ICP, SOC and appropriate offsite response facilities)
- Defining information flow processes within WIPP's response facilities and field response elements (e.g., who has responsibility for capturing, validating, and disseminating specific event information and how the information is documented and accessed)
- Fostering interoperability with offsite response facilities (i.e., joint information center, local and state EOCs, and the DOE Headquarters EOC) and enabling access to unclassified emergency response information, such as notification forms, emergency status updates, plume projections, significant events data, and field monitoring data
- Expanding the use of computerized information management systems that are capable of rapidly interfacing with other systems that may be vital during an emergency response, to communicate a common operating picture and shared situational awareness by:
  - Providing a real-time perception of what is occurring at the incident scene(s)
  - Providing awareness of what the ERO is doing in relation to the incident(s)
  - Enabling the ERO to predict changes to the incident(s)
  - Supporting ERO objectives that forecast future actions
- Defining expected actions for achieving and maintaining situational awareness among all teams.

OFI-NWP-9: Improve the accuracy, timeliness, and quality of all consequence assessments by:

- Providing timely initial consequence assessments that include safe routing information and estimates of exposures at onsite and offsite receptors of interest
- Providing and maintaining worst-case consequence assessment model files on the CAT dispersion modeling computer that correspond to each EPHA-identified emergency event for use during drills, exercises, and actual emergency events
- Stressing the importance of developing and providing near real-time NARAC plume projections to the ERO.

OFI-NWP-10: Consider improving control of drills and exercises by:

- Staffing each responder venue with a controller knowledgeable enough to answer responder questions and provide information on the status of the exercise
- Ensuring that controllers use headphones, when appropriate, so players do not hear controller radio traffic during exercises
- Emphasizing during controller training the importance of providing players earned information, and the availability of the controller network for controllers to obtain additional guidance when needed.

OFI-NWP-11: Improve the quality of ongoing consequence assessments by:

- Revising the meteorological input parameters in the EPHA development and maintenance procedure
- Granting permission for NARAC personnel to access the site's real-time weather data.

OFI-NWP-12: Improve PA planning by revising the EALs to include:

- Evacuation and/or shelter-in-place distances corresponding to PAC distances identified in the EPHA
- Dose concentrations triggering PAs at critical onsite receptors of interest (e.g., CMR, fire department, ICP, EOC).

OFI-NWP-13: To determine the state of preparedness for large-scale or beyond design basis events, consider the adequacy of plans and procedures by:

- Conducting a severe event assessment and issuing a report per the instructions provided in Operating Experience-1
- Conducting a review of WP 12-9 and EPIPs for compliance with the National Response Framework.

OFI-NWP-14: Consider revising the general employee training to include information on the following:

- A more detailed description of the locations of alternate assembly and staging areas
- The process used to notify workers if they are to report to an alternate location
- The mandatory actions to be taken during a shelter-in-place PA to enhance effectiveness (such as closing door and windows, securing ventilation systems, and refraining from eating or drinking)
- The facility emergency response procedures that contain building evacuation maps and shelter-in-place locations.

OFI-NWP-15: Consider revising WP 12-9 and the *WIPP Three-Year Drill and Exercise Plan* to include requirements for periodic shelter-in-place drills.

OFI-NWP-16: Consider expanding the drill program to include drills involving joint responses by the fire department and protective force to a scenario involving a security concern with a HAZMAT component and a protective force representative serving as the IC.

OFI-NWP-17: Consider modifying the ERO training and drill programs to include:

- Emphasizing the completeness and accuracy of informational briefings, notifications, and records during training and drill activities
- Revising the EM-104, *WIPP ERO Awareness Training* course taken by key field responders to include information on consequence assessment and plume projections
- Requiring the CAT representatives to read and understand the EPHA
- Enhancing the CAT representative training by stressing:
  - The importance of using accurate source terms in dispersion modeling to provide better dispersion transport information for PA decision-making
  - The importance of conducting an independent and thorough quality assurance check of all model inputs and outputs for accuracy
  - The importance of reviewing and understanding the consequence analyses and associated EAL statements contained in the EPHA
  - The need to thoroughly validate EALs and PA decision-making
  - The necessity of understanding and interpreting the generated plume projections
  - The importance of providing the EOC cadre with a clear explanation of the expected dose consequences predicted by the plume projections
  - The necessity of providing the EOC cadre and offsite authorities with plume projections that are based on the DOE PAC
- Adding training for the CAT representatives on the dispersion model programs used to generate the plume projections
- Increasing the frequency of drills for the CAT representatives until they demonstrate proficiency in performing their response tasks.

OFI-NWP-18: Consider revising WP 12-17 to include an annual refresher training course and a description of the process for determining and documenting that ERO members are proficient in performing their duties.

OFI-NWP-19: Consider revising the *WIPP Three-Year Drill and Exercise Plan* to include a matrix that shows how:

- Each response program element will be tested over a three-year period
- The spectrum of hazards at the site (including a transportation accident) will be tested over a set period of time
- Each site-level ERO component will participate in at least one exercise annually
- The basis for the site exercise will be rotated between the EPHA facilities (i.e., the underground and Waste Handling Building).

OFI-NWP-20: Consider including a more comprehensive description of the issues, including corrective actions already under way, in after-action reports to support the significance level assigned by NWP.

OFI-NWP-21: Consider enhancing the effective resolution of issues identified in drills and exercise by:

- Expediting the creation of the WIPP Emergency Management Drill and Exercise/Readiness Assurance Working Group
- Evaluating the findings and improvement items from past drills for issues to be entered into the site issues management system.

APPENDIX A
SUPPLEMENTAL INFORMATION

Dates of Review

Onsite: October 20-22, November 2-5, 2015, and December 7-10, 2015

Office of Enterprise Assessments (EA) Management

Glenn S. Podonsky, Director, Office of Enterprise Assessments
William A. Eckroade, Deputy Director, Office of Enterprise Assessments
Thomas R. Staker, Director, Office of Environment, Safety and Health Assessments
William E. Miller, Deputy Director, Office of Environment, Safety and Health Assessments
Patricia Williams, Director, Office of Worker Safety and Health Assessments
Gerald M. McAteer, Director, Office of Emergency Management Assessments

Quality Review Board

William A. Eckroade
Karen L. Boardman
John S. Boulden III
Thomas R. Staker
William E. Miller
Patricia Williams
Gerald M. McAteer
Michael A. Kilpatrick

EA Site Lead for WIPP

Jeff Snook

EA Reviewers

Randy Griffin – Team Lead
Kurt Runge
John Bolling
Deb Johnson
Teri Lachman
Thomas Rogers

APPENDIX B
KEY DOCUMENTS REVIEWED, INTERVIEWS, AND OBSERVATIONS

Documents Reviewed

- DOE/WIPP-07-3372, *WIPP Documented Safety Analysis*, Rev. 4, 11/13
- DOE/WIPP-08-3378, *WIPP Emergency Planning Hazards Assessment*, Rev. 3, 6/13
- DOE/WIPP-08-3378, *Draft WIPP Emergency Planning Hazards Assessment*, Rev. 5, undated
- EA12ER3002-4-0, *CAT Checklist*, Rev. 1, 11/2/15
- EA12ER4922-1-0, *IC Checklist*, Rev. 0, 9/15/15
- EA12ER4926-1-0, *CMR Expanded Staffing Checklist*, Rev. 1, 10/8/15
- WP 04-AD3025, *Mine Accident Notifications*, Rev. 4, 5/18/15
- WP 12-ER3903, *Termination, Reentry, and Recovery*, Rev. 14, 6/22/15
- WP 12-ER3906, *Categorization and Classification*, Rev. 14, 11/5/14
- WP 12-ER3906, *Categorization and Classification*, Rev. 15, draft
- WP 12-ER3907, *Offsite Emergency Notifications*, Rev. 0, 11/3/14
- WP 12-ER4916, *Consequence Assessment*, Rev. 21, 4/30/15
- WP 12-ER4925, *CMR Incident Recognition and Initial Response*, Rev. 0, 6/5/15
- WP 12-ER4926, *CMR Expanded Staffing Operations*, Rev. 1, 10/8/15
- WP 12-ER4929, *General Building Occupant Emergency Response Procedure*, Rev. 0, Approved for Training
- WP 12-9, *WIPP Emergency Management Plan*, Rev. 42, Approved for Training
- WP 12-11, *Development and Maintenance of an EPHS*, Rev. 5, 12/27/12
- WP 12-12, *Development and Maintenance of an EPHA*, Rev. 6, 5/6/15
- WP 12-13, *Development and Maintenance of EALs*, Rev. 5, 5/6/15
- WP 12-17, *WIPP Emergency Management Training Program*, Rev. 1, 11/9/15
- WP 12-ER.13, *WIPP Drills and Exercises*, Rev. 0, 11/20/14
- WP 15-PS.2, *Procedure Writer's Guide*, Rev. 11, 2/16/15
- WP 15-PS3004, *Procedure Verification and Validation*, Rev. 0, 2/16/15
- WP 15 PS3002, *Controlled Document Processing*, Rev. 34, 2/16/15
- *WIPP Three-Year Drill and Exercise Plan*, Rev. 1, 7/22/15

Interviews

- NWP Emergency Management and Security Department Manager
- NWP Emergency Management Section Lead Drill Coordinator
- NWP Emergency Management Section ERO Training Officer
- NWP Emergency Management Section Manager
- NWP Emergency Management Section Senior Exercise Planner
- NWP Emergency Management Technical Analyst
- Emergency Planners

Observations

- Central Monitoring Room Response
- Consequence Assessment Response
- Emergency Operations Center Response
- Incident Command Response
- Simulation Cell