

**Independent Oversight Review of
Site Preparedness for
Severe Natural Phenomena Events at the
Waste Isolation Pilot Plant**



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Table of Contents

1.0	Purpose.....	1
2.0	Scope.....	1
3.0	Background.....	2
4.0	Methodology.....	3
5.0	Results.....	3
5.1	Objective 1: Scenario Analysis.....	4
5.2	Objective 2: HAZMAT Release Determination.....	5
5.3	Objective 3: Emergency Equipment and Facilities.....	7
5.4	Objective 4: Offsite Response Interfaces.....	26
6.0	Conclusions.....	34
7.0	Findings.....	35
8.0	Opportunities for Improvement.....	35
9.0	Unresolved Items.....	42
10.0	Items for Follow-up.....	42
	Appendix A: Supplemental Information.....	A-1
	Appendix B: Referenced Documents and Interviews.....	B-1

Acronyms

AC	Alternating Current
ARM	Area Radiation Monitor
BDBE	Beyond Design Basis Event
BNA	Baseline Needs Assessment
CAM	Continuous Air Monitor
CBFO	DOE Carlsbad Field Office
CFR	Code of Federal Regulations
CMR	Central Monitoring Room
CMRO	Central Monitoring Room Operator
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
EAL	Emergency Action Level
EAS	Emergency Alert System
EC	Emergency Coordinator
ED	Emergency Director
EMG	Emergency Management Guide
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
EPHA	Emergency Planning Hazards Assessment
EPHS	Emergency Planning Hazards Survey
ERO	Emergency Response Organization
ERT	Emergency Response Team
EST	Emergency Services Technician
EUA	Exclusive Use Area
FSM	Facility Shift Manager
GE	General Emergency
HAZMAT	Hazardous Material
HEPA	High Efficiency Particulate Air
HSS	Office of Health, Safety and Security
HVAC	Heating, Ventilation, and Air Conditioning
HWFP	Hazardous Waste Facility Permit
kW	Kilowatt
LFM	Lead Federal Manager
m	Meter
MCI	Mass-Casualty Incident
MOU	Memorandum of Understanding
mph	miles per hour
MRT	Mine Rescue Team
NARAC	National Atmospheric Release Advisory Center
NFPA	National Fire Protection Association
NIMS	National Incident Management System
NNSA	National Nuclear Security Administration
NPE	Natural Phenomena Event
OFI	Opportunity for Improvement
PA	Public Address
PAC	Protective Action Criteria
PAG	Protective Action Guide
PAR	Protective Action Recommendation

PPA	Property Protection Area
PPE	Personal Protective Equipment
RADCON	Radiological Control
RAP	Radiological Assistance Program
RCRA	Resource Conservation and Recovery Act
RCT	Radiological Control Technician
SCBA	Self-Contained Breathing Apparatus
TRU	Transuranic
TSR	Technical Safety Requirement
UPS	Uninterruptible Power Supply
USAR	Urban Search and Rescue
UVFS	Underground Ventilation and Filtration System
WDA	Waste Disposal Area
WHB	Waste Handling Building
WIPP	Waste Isolation Pilot Plant
WTS	Washington TRU Solutions, LLC

Independent Oversight Review of Site Preparedness for Severe Natural Phenomena Events at the Waste Isolation Pilot Plant

1.0 PURPOSE

The Office of Enforcement and Oversight (Independent Oversight), within the Office of Health, Safety and Security (HSS), conducted an independent review of the U.S. Department of Energy (DOE) Waste Isolation Pilot Plant (WIPP) preparedness for severe natural phenomena events (NPEs). The HSS Office of Safety and Emergency Management Evaluations performed this review to evaluate the processes for identifying emergency response capabilities and maintaining them in a state of readiness in case of a severe NPE.

This report discusses the scope, background, results, and conclusions of the review and identifies two findings and several opportunities for improvement (OFIs).

2.0 SCOPE

The scope of this review involves those aspects of the emergency management program that relate to emergency preparedness for a severe NPE. The primary areas of interest are the identification of needed site response capabilities and their state of readiness. The WIPP facilities of interest are:

- Emergency Operations Center (EOC)
- Alternate EOC
- Central Monitoring Room (CMR)
- Alternate CMR
- Waste Handling Building (WHB)
- Waste Disposal Area (WDA).

The WIPP site emergency response functions of interest include offsite emergency medical, fire response, security response, personnel decontamination, and field monitoring. The scope of this review included portions of the following emergency management program elements:

- Technical planning basis
- Plans and procedures
- Emergency response organization (ERO)
- Emergency facilities and equipment
- Offsite response interfaces.

The DOE Carlsbad Field Office (CBFO) has oversight and contractual responsibility for the DOE-owned WIPP site. WIPP is classified as a DOE non-reactor hazard category 2 facility. The site's mission is to provide a safe and permanent disposal location for DOE-owned transuranic (TRU) and TRU mixed wastes. The 10,240-acre site is located in Eddy County in southeastern New Mexico, 26 miles east of Carlsbad. The site is located in an area of low population density with the area surrounding the facility primarily used for grazing and the mining of potash, oil, and gas resources. With the exception of existing leases, DOE does not allow mineral resource mining within the WIPP site boundary.

The WIPP site consists of surface structures, shafts, and subsurface structures designed to receive and handle TRU waste. The WHB is the surface location for the receipt and unloading of generator-prepared

waste containers from DOE-owned and Nuclear Regulatory Commission-certified U.S. Department of Transportation Type B shipping containers. The waste containers are unloaded and transferred from the surface to the underground area through the waste shaft using the waste shaft conveyance. The surface entry/egress from the waste shaft conveyance and the waste hoist system and support structure are located within the WHB. The waste containers are removed from the waste shaft conveyance 2150 feet below the surface at the waste shaft station, where they are transported to their final disposal location.

Washington TRU Solutions, LLC (WTS) is the management and operating contractor. WTS performs the unloading and transfer of the shipping containers and emplacement into a disposal location, as well as maintenance of the surface and underground facilities.

Independent Oversight assessed both the comprehensiveness of the response capabilities identified by the site's analyses and the site's level of preparedness in terms of attaining and maintaining the needed response capabilities. Of particular interest was the site's preparedness for responding to plausible severe NPEs. The scope of the review was consistent with Objectives 1 through 4 of HSS Criteria, Review, and Approach Document 45-51, *Emergency Management Program Inspection Criteria, Approach, and Lines of Inquiry, Targeted Review of Site Preparedness for Severe NPEs*. As stated in the *Plan for the Independent Oversight Review of Site Preparedness for Severe NPEs at the WIPP*, dated June 2012, the purpose of the review was to determine whether:

- 1) The site analyzes plausible scenarios representing severe NPEs to determine the capabilities needed for an effective emergency response.
- 2) The site has a means for determining quickly whether an event results in the loss of a significant quantity of hazardous material (HAZMAT) and is beyond the site's capability to respond.
- 3) The site's emergency response capabilities are in a state of readiness to perform its required emergency response functions during plausible NPEs.
- 4) The site's planning is adequate for obtaining and integrating offsite response assets for events beyond the site's response capability.

3.0 BACKGROUND

Numerous examples of severe NPEs and other catastrophic events, such as earthquakes, tornadoes, floods, wildland fires, and manmade disasters, have emphasized the need to adequately plan and prepare for a large-scale event that could degrade or overwhelm a site's emergency response capability. Emergency planners at DOE sites determine needed site emergency response capabilities based on site-specific attributes, such as types and forms of HAZMAT, demographics, and geography, using a variety of deterministic analyses. The primary means for determining needed response capabilities are the emergency planning hazards assessments (EPHAs), although other site response capability needs are to be further analyzed in the fire department's baseline needs assessments (BNAs) and security vulnerability assessments. The analysis contained in the EPHAs should describe a spectrum of events that represent plausible HAZMAT release scenarios, such as operator errors, mechanical failures, fires, and explosions from unintentional or intentional initiators.

The facility-specific documented safety analysis (DSA) report contains scenarios used by site personnel to reduce risk to acceptable levels; these scenarios are referred to as design basis events. When establishing a facility design, DSAs generally do not analyze events that exceed in severity the parameters defined for the design basis event. Such "beyond design basis events" (BDBEs) include severe NPEs that represent the upper end of the consequence spectrum for which DOE facilities are required to prepare, in accordance with DOE Order 151.1C, *Comprehensive Emergency Management System*.

To prepare for a BDBE, emergency response staff must plan a means to provide for immediately protecting personnel, mitigating the consequences of a potential HAZMAT release, and establishing appropriate short-term recovery actions. Preparations include alternate emergency response facilities, redundant and diverse communications systems if an event renders the primary facilities and equipment unavailable, and other site-specific planning and response capabilities needed for a comprehensive emergency management program.

Some response capabilities that emergency planners may identify as necessary for the most severe and low-probability events would be a financial burden to maintain on site or could be rendered unavailable if such an event occurred. Therefore, emergency planners must pre-determine a means to acquire these necessary capabilities from external sources, such as surrounding communities, state authorities, and offsite DOE and national assets. Consequently, preparation for such an event may require the site to establish documented agreements with offsite entities that identify the necessary capabilities, determine mechanisms to bring those capabilities to bear when and where they are needed, and develop procedures to receive and integrate them into the emergency response.

4.0 METHODOLOGY

Independent Oversight evaluated the processes for identifying emergency response capabilities and maintaining them in a state of readiness in case of a severe NPE. DOE Order 151.1C identifies the functional emergency response requirements for a DOE site, and the emergency management guides (EMGs) associated with DOE Order 151.1C provide guidance for implementing these requirements. Independent Oversight also referenced other applicable DOE, Federal, state, and local requirements when determining compliance.

This review evaluated the comprehensiveness of the response capabilities identified in the EPHA analysis performed by WTS. Of particular interest is WIPP's preparedness for responding to plausible severe NPEs. Considerations for this review include:

- The severity of events that serve as the basis for the WIPP site's emergency response capability
- The timely recognition that an event exceeds the WIPP site's response capability
- The ability of WTS to perform required emergency response functions during severe NPE
- The planning for obtaining offsite response assets and the mechanisms for acquiring and integrating offsite response assets when needed.

This assessment was accomplished by reviewing the documentation that establishes and governs the WIPP emergency management program processes, such as emergency plans, procedures, safety basis documents, checklists, records, memoranda of understanding (MOUs), state permits, and mutual aid agreements; interviewing key personnel; and performing walkdowns of facilities and equipment.

5.0 RESULTS

The following sections discuss the observations made by Independent Oversight during this review, keyed to the objectives in HSS Criteria, Review, and Approach Document 45-51.

5.1 Objective 1: Scenario Analysis

The site analyzes plausible scenarios representing severe NPEs to determine the capabilities needed for an effective emergency response.

Independent Oversight reviewed the process and procedures that WTS uses to develop the emergency planning hazards survey (EPHS) and EPHA, as well as the WIPP EPHS, EPHA, and DSA report. Independent Oversight reviewed the EPHS and EPHA to determine the accuracy and adequacy of analyses conducted for severe NPEs. Additionally, Independent Oversight reviewed the DSA to determine the consistency of the BDBEs identified in the DSA and the EPHA. Further, Independent Oversight reviewed the EPHA to determine whether it identified the needed emergency response capabilities for severe NPEs and served as the basis for event classification and pre-planned protective actions.

Independent Oversight determined that the site adequately analyzes plausible scenarios representing severe NPEs to establish the capabilities needed for an effective emergency response. However, due to weaknesses in the *Development and Maintenance of an EPHA* procedure (WP 12-12), the EPHA does not contain predicted consequences for all significant receptors of interest.

DOE Order 151.1C requires development of a hazards survey to examine the features and characteristics of the facility or activity and identify generic emergency events and conditions, including NPEs such as earthquakes and tornadoes, and the potential impacts of such emergencies. This order also requires that if the hazards survey identifies specific HAZMAT and quantities that, if released, could result in an operational emergency, the potential release of these materials requires further analysis in an EPHA. Additionally, DOE Guide 151.1-2, *Technical Planning Basis EMG*, recommends that analyses in the EPHA calculate the consequences at specific receptors of interest (i.e., facility boundary, onsite receptor locations, site boundary, and offsite locations of interest) and calculate the maximum distances at which consequences exceed the applicable protective action criteria (PAC) used to develop default initial protective actions.

WTS developed procedures that provide detailed instructions on the methodology, content, roles, and responsibilities for developing the EPHS, EPHA, and emergency action levels (EALs); however, Independent Oversight identified concerns with the EPHA procedure. The *Development and Maintenance of an EPHS* procedure (WP 12-11) contains adequate instructions that results in appropriate qualitative assessment determinations and appropriately identifies wind, tornado, flood, earthquake, and wildland fire as natural phenomena initiating events. The *Development and Maintenance of EALs* procedure (WP 12-13) provides adequate instructions for the development and approval of EALs. With some exceptions, the *Development and Maintenance of an EPHA* procedure adequately serves as an EPHA technical review guideline and generally incorporates the requirements of DOE Order 151.1C and the guidance of DOE Guide 151.1-2. However, Independent Oversight identified the following weaknesses in the *Development and Maintenance of an EPHA* procedure:

- The procedure does not identify natural phenomena initiating events or severe NPEs for consideration and consequence assessment analysis during the development of the EPHA.
- The procedure limits receptors of interest to the property protection area (PPA), the exclusive use area (EUA), and the off-limits area and does not consider other significant receptors of interest (such as local ranchers or fixed access control barricades) in the prediction of exposure consequences during a radiological release. (See Section 8.0, **OFI-1**.)

WTS developed the *DOE WIPP EPHS Report* (WP 12-RP.01), which adequately documents the EPHS results in accordance with the *Development and Maintenance of an EPHS* procedure. The EPHS provides detailed information for each building within the WIPP site and identifies the WHB and the WDA as the only facilities needing a quantitative assessment due to the radiological material quantities in these facilities. Additionally, the EPHS adequately identifies hazardous conditions resulting from NPEs (i.e., wind, tornado, flood, earthquake, wildland fire, and snowstorms).

WTS developed the *WIPP EPHA* (DOE/WIPP-08-3378) in accordance with the *Development and Maintenance of an EPHA* procedure. The EPHA documents accurate quantitative assessments that are consistent with the NPE scenarios contained in the *WIPP DSA* (DOE/WIPP 07-3372). The EPHA includes a consequence analysis for WHB structural collapse caused by an earthquake, high winds, heavy snow, or hail and indicates that the malevolent act analysis bounds a severe NPE. Additionally, WTS appropriately based the ERO capability on the resultant EPHA consequence analyses. However, because of the weaknesses in the EPHA development procedure, discussed above, the EPHA does not contain predicted consequences at all significant receptors of interest. (See Section 8.0, **OFI-1**.)

Overall, WTS developed an EPHS that identifies hazardous conditions resulting from NPEs and accurately analyzes these events in the EPHA. WTS appropriately used the EPHA results to establish the needed capabilities of the ERO. However, the EPHA does not contain dose consequences for all of the significant receptors of interest.

5.2 Objective 2: HAZMAT Release Determination

The site has a means for determining quickly whether an event results in the loss of a significant quantity of HAZMAT and is beyond the site's capability to respond.

Independent Oversight reviewed the EAL statements contained in the WIPP EPHA to determine whether WTS based the EALs on the documented consequence analyses. Independent Oversight also reviewed the *Categorization and Classification of Operational Emergencies* procedure (WP 12-ER3906), which the Facility Shift Manager (FSM) uses to make initial protective action and protective action recommendation (PAR) decisions and to ensure that the EALs are technically based on the EPHA conclusions. Additionally, Independent Oversight reviewed the EALs to determine their usability during plausible severe NPEs (e.g., seismic event destroying multiple facilities on site) that would overwhelm the site's response capability.

Independent Oversight determined that the site has a means for deciding quickly whether an event results in the loss of a significant quantity of radiological material and is beyond the site's capability to respond. However, WTS has not developed EALs specific to an NPE or severe NPE, and more importantly, WTS has not fully developed pre-determined protective actions and PARs that are technically based and ensure the health and safety of workers and the public.

DOE Order 151.1C requires the development of EALs for the potential operational emergencies identified in the EPHA, which must include protective actions corresponding to each EAL. Additionally, DOE Guide 151.1-2 recommends that EALs contain event indicators that are prompt, unambiguous, and reliably associated with the event or condition. Further, DOE Order 151.1C requires that protective actions be determined for onsite personnel and the public, that procedures be developed to implement the separate protective actions of evacuation and sheltering of employees, and that methods be developed for providing timely recommendations to appropriate state, tribal, or local authorities on protective actions, such as sheltering, evacuation, relocation, and food control.

WTS has developed comprehensive EALs for most of the events identified in the EPHA and has an adequate means for determining quickly whether an event results in the loss of a significant quantity of radiological material and is beyond the site's capability to respond. However, WTS has not fully developed pre-determined protective actions and PARs that are technically based and ensure the health and safety of workers and the public.

The *Development and Maintenance of EALs* procedure adequately provides instructions on developing and updating EALs using the EPHA results; however, the *Categorization and Classification of Operational Emergencies* procedure contains an incomplete EAL set. For most of the events analyzed in the EPHA, WTS developed a comprehensive set of EALs based on building- or activity-specific symptoms and event initiators. Although the EPHA includes a consequence analysis for a WHB collapse caused by an NPE and a malevolent act event representative of a severe NPE, WTS did not develop EALs specific to an NPE or severe NPE. Additionally, WTS developed generic EALs for NPEs; however, these EALs are for HAZMAT facilities other than the WHB or the WDA (the only WIPP facilities containing HAZMAT) and only pertain to operational emergencies not requiring further classification. Further, the generic EALs do not compensate for possible incompleteness in the EAL set or unforeseen conditions, such as cascading events or loss of essential instrumentation during an emergency, where the personnel responsible for event classification need criteria for declaring the level of emergency that most closely corresponds to the apparent conditions. (See Section 8.0, **OFI-2**.)

In addition to emergency event classification, the EALs provide onsite protective actions and offsite PARs for analyzed events. DOE Order 151.1C contains additional direction regarding protective actions and PARs that states, "Protective actions must be promptly and effectively implemented or recommended for implementation, as needed, to minimize the consequences of emergencies and to protect the health and safety of workers and the public."

Additionally, the DOE Guide 151.1-4, *Response Elements*, states:

- "Assumptions made by the facility as a basis for public protection planning should be clearly identified."
- "Potential PARs (sheltering, evacuation, relocation, food control, etc.) should be described, as should evacuation routes for site personnel and offsite public."
- "Depending on type and duration of emergencies that could occur at or impact a facility/site, effective sheltering or transporting of onsite personnel for evacuation purposes may be desirable or even necessary. Pre-designation of the location for these potential shelter and rally points for evacuation is critical in order to support onsite direction and coordination actions (e.g., temporary billeting, transportation) and for obtaining accurate accountability of all potentially affected personnel. Understanding the peak, onsite number of personnel which could potentially be affected by the emergency will help determine the size/type of sheltering facility, numbers/types of vehicles needed to support their evacuation, and the optimum personnel accountability system to be used."

In contradiction to the these requirements and guidance, WTS's onsite protective actions and offsite PARs provided in the EALs do not fully consider facility or site conditions for the analyzed events. The EAL tables provide instructions to evacuate site personnel within the immediate area and direct all others to remain indoors, with no consideration of the indoor air quality or habitability of facilities that are likely to be impacted by the initiating event. The PARs stated in the EALs recommend that offsite agencies either shelter in place or evacuate those unable to shelter in place. The pre-determined PARs are not technically based and are not coordinated with offsite authorities to establish well-defined areas for evacuation and shelter-in-place protective actions.

Dropping a waste assembly down the mine shaft and a malevolent act scenario are events intended to represent the upper bound for a catastrophic site event and have the potential for endangering the health and safety of workers and the public – that is, having consequences for which the Environmental Protection Agency (EPA) guidance mandates evacuations. The consequence analyses contained in the EPHA for these events indicate the potential for the following doses:

- Lethal dose concentrations within the PPA – 1500 rem at 30 meters (m); 390 rem at 100 m
- High dose concentrations within the EUA – 75 rem at 300 m
- Dose concentrations exceeding the EPA 400R92001, *Manual of Protective Action Guides (PAGs) and Protective Actions for Nuclear Incidents*, level of 1 rem out to 8510 m.

WTS has not developed a comprehensive protective action decision-making procedure or process that aids EAL users in determining whether evacuation or shelter in place is the most appropriate protective action for the event conditions.

Finding F-1: WTS has not fully developed pre-determined protective actions that are technically based and ensure the health and safety of workers and the public, as required by DOE Order 151.1C, Contractor Requirements Document, Section 14.

Overall, WTS developed an EAL implementing procedure that is adequate for most analyzed events; however, WTS did not develop EALs for NPEs analyzed in the EPHA. Further, the generic EALs for NPEs do not consider a resulting release of HAZMAT and apply only to non-HAZMAT facilities. Additionally, the pre-planned protective actions for an NPE indicate sheltering workers and the public outside the immediate area of release, despite potentially high radiation levels and the unavailability of effective shelters.

5.3 Objective 3: Emergency Equipment and Facilities

The site's emergency response capabilities are in a state of readiness to perform the required emergency response functions during plausible NPEs.

Independent Oversight reviewed the systems and equipment associated with the EOC, Alternate EOC, CMR, and Alternate CMR, as well as three key emergency response functions (fire response, personnel decontamination, and field monitoring) that are among the critical functions needed for response to an emergency caused by a severe NPE. These systems and equipment include:

- Normal and backup power systems
- Communication systems
- Consequence assessment systems
- Personal protective equipment (PPE)
- Radiation survey equipment
- HAZMAT detection equipment
- Decontamination equipment.

In addition, Independent Oversight reviewed response capabilities at two WIPP nuclear facilities (WHB and WDA), as well as the site's ERO and protective force planning for responding to a severe NPE.

The WIPP site relies on two emergency response command centers to coordinate and manage the response to an emergency, the CMR and the EOC. The CMR, located in the Support Building, serves as

the initial emergency response center and the incident command post for site emergencies. A CMR Operator (CMRO) staffs the CMR continuously and coordinates the day-to-day operations at WIPP. Workers report onsite emergencies to the CMRO, who gathers specific information relating to the incident, notifies the FSM, and activates the EOC and Emergency Response Team (ERT), if needed. The FSM, who relocates to the CMR, directs the site emergency response and mitigation activities until termination of the emergency. If the CMR staff is required to relocate, a workstation in the Guard and Security Building serves as the Alternate CMR.

The EOC, located in the Safety and Emergency Services Building, is responsible for providing public information and developing dose assessments, in addition to providing support to the FSM during an emergency. If the EOC staff is required to relocate, an Alternate EOC is located in the Skeen-Whitlock Building in Carlsbad, New Mexico.

Three emergency response functions provide critical capabilities needed to respond to a severe NPE. WTS maintains a Fire Brigade that consists of a minimum of five responders – an incident commander (typically the FSM) and four fire fighters. The ERT, composed of employee volunteers, supplements the Fire Brigade during emergency responses above ground. The site also has two volunteer Mine Rescue Teams (MRTs), with at least six members on each team, that respond to underground emergencies. The First Line Initial Response Team, composed of employee volunteers, supplements the MRTs and serves as a backup for the ERT. The Fire Brigade provides manual fire suppression, emergency medical services (EMS), and HAZMAT response capabilities for aboveground emergencies. The MRT provides first aid, gas detection, search and recovery, ventilation, fire control, and mine mapping services for underground emergencies. If the WIPP MRTs are unavailable, MOUs are in place with two local potash mines to activate their MRTs for an emergency at WIPP.

The decontamination shower trailer, used for large-scale contamination events at the WIPP site, is currently out of service; a replacement trailer is in the procurement process. In the interim, the Fire Brigade can provide gross decontamination services.

Field monitoring at the WIPP site is limited to radiological hazards, because no significant onsite chemical hazards exist. Radiological control technicians (RCTs) obtain monitoring data from filters at established air monitoring stations and provide the data to the consequence assessment support personnel at the WIPP EOC.

Independent Oversight determined that the site's emergency response capabilities are in an adequate state of readiness to perform the required emergency response functions during plausible NPEs, although weaknesses were found in most areas. The site's strategy for meeting this objective relies on a timely site evacuation and staffing of the Alternate EOC in Carlsbad, New Mexico. This strategy is necessary because the buildings that house the onsite command centers are less robust than the WHB; therefore, the onsite command centers will be lost during an NPE that exceeds the WHB design basis, and the onsite command centers are not sufficiently distant from the WHB to allow personnel to remain on site during the worst-case radiological release scenarios. Nevertheless, Independent Oversight noted limitations in the site's ability to perform the following tasks:

- Restore power to command centers using onsite generators
- Rescue underground personnel
- Account for site workers
- Test EOC and Alternate EOC equipment
- Inspect Fire Brigade protective suits
- Communicate with the public, offsite organizations, and MRTs

- Perform large-scale decontamination.

Independent Oversight also identified specific areas for improvement in emergency plans, response procedures, and the ERO training program.

Normal and Backup Power Systems

Independent Oversight reviewed normal and backup power supplies for the EOC, Alternate EOC, CMR, Alternate CMR, WHB, and WDA. Independent Oversight analyzed the reliability of power supplies by reviewing system design documents and inspection, maintenance, and test program procedures against industry and DOE standards for the design, maintenance, and testing of emergency power supply systems. Independent Oversight determined the capability to provide long-term emergency power through a review of generator refueling plans. Independent Oversight reviewed battery-backed systems to determine their service times and to identify the equipment lost during a long-term loss of alternating current (AC) power. Independent Oversight reviewed design, maintenance, and test documents; interviewed personnel; and performed system walkdowns to make its conclusions.

DOE Order 151.1C does not contain prescriptive requirements for normal and backup power systems supporting command systems and response equipment; rather, this order requires provisions for an alternate location if the primary command center is not available. In addition, DOE Order 151.1C requires the site to maintain facilities and equipment adequate to support critical response functions and ensure that the facilities and equipment are available and operable. DOE Guide 151.1-4 recommends that the command center have alternate power supplies and that the alternate command center be located to minimize the risk of losing both facilities from the same severe NPE due to habitability concerns. DOE Guide 151.1-4 defines a habitable command center as one capable of remaining operable and life-supporting for an extended period under accident conditions and maintaining its structural integrity under various design basis events, including a severe NPE. A habitable command center must maintain a breathable atmosphere, provide sufficient shielding from radioactive material and other HAZMAT, and have a backup emergency power supply. Additionally, DOE Guide 151.1-4 establishes performance criteria for equipment to undergo periodic inspections, operational checks, calibration, preventive maintenance, and testing in accordance with the manufacturer's recommendations or industry standards.

Independent Oversight used DOE-STD-3003-2000, *Backup Power Sources for DOE Facilities*, as the benchmark for determining backup power supply reliability. This DOE standard applies National Fire Protection Association (NFPA)-110, *Standard for Emergency and Standby Power Systems*; NFPA-111, *Standard on Stored Electrical Energy Emergency and Standby Power Systems*; and applicable Institute of Electrical and Electronics Engineers standards to engine generators and uninterruptible power supply (UPS) systems, for equipment that protects the public, site workers, and the environment. The DOE standard establishes general and detailed requirements for reliable backup and emergency sources, regardless of the type of DOE facility using backup power systems for important equipment. The DOE standard identifies nuclear safety systems, radiation monitors and alarms, fire protection systems, security systems, data processing equipment, and emergency lighting as examples of important equipment. Importantly, the standard's requirements apply only if contractual documents, procurement documents, or the authorization basis for a facility invokes the standard. Although CBFO and WTS do not invoke the DOE standard, the WIPP *Electrical System Design Description* (SDD ED00) states that the backup power system shall comply with NFPA-110. However, WTS personnel were not able to explain how the backup power system complies with NFPA-110, because WTS has not identified the designated NFPA-110 level, classification, or type for this system. (See Section 8.0, **OFI-3**.)

A public utility company provides normal power to the WIPP site and the Alternate EOC, located at the Skeen-Whitlock Building in Carlsbad, New Mexico. At the WIPP site, two utility substations provide

115-kilovolt electrical power from the north and the south to the onsite plant substation. Two feeders from multiple generating stations power each utility substation such that a loss of one generating source does not interrupt power to the site. The onsite plant substation distributes normal power to WIPP facilities in a dual loop with manual cross-connect capability. Area substations, located at the various surface facilities, power the surface facilities and two underground substations power the underground.

In case of a loss of normal power to the WIPP site, two 1100-kilowatt (kW) diesel generators can supply backup power to manually selected loads. The generators are collocated in separate enclosures within the site boundary near the WHB. The generators' output can provide power to any of the applied site loads, so long as total loads do not exceed the generators' capacity. Integral 400-gallon tanks provide diesel fuel for the generators, allowing approximately 4.5 hours of operation at 100 percent load.

Facility operations personnel manually start the diesel generators from the CMR or the diesel generator enclosure in case of a loss of normal power. For most equipment, the CMRO dispatches operators to implement the *Surface Backup Power Distribution* procedure (WP 04-ED1341) and establish load priorities. Operators provide power to priority loads without overloading the generators by manually aligning breakers at the switchgear and motor control centers. However, the *Surface Backup Power Distribution* procedure does not provide the kW rating of listed loads to facilitate proper management of generator loading. (See Section 8.0, **OFI-4**.) Additionally, based on the response to the loss of an offsite substation in June 2010 (WF10-171, *Debrief for Loss of Offsite Power to Plant Substation B on 06/07/2010*), manually aligning the breakers is likely to take hours to complete. Hazardous conditions on site would also delay operators in completing breaker alignments because operators would have to traverse the site to perform the actions. (See Section 8.0, **OFI-3**.) In addition, WIPP facilities do not have receptacles to allow the connection of mobile generators, and WTS does not include mobile generators as part of their alternate energy plans.

During a loss of all AC power, battery-backed power provides continuous power to critical loads and consists of a central 80 kW UPS, currently loaded at approximately 35 percent of capacity; small individual UPS units; and individual batteries. Limitations of the UPS systems include an expected 30-minute service time at 100 percent capacity and decreased reliability if ambient temperatures are above 104 degrees Fahrenheit. The central UPS is located in an air-conditioned environment in the Support Building and provides continuous backup power to the following equipment:

- Communications: telephone control panel, public address (PA) system, and intercom system
- WHB radiation alarms: continuous air monitors (CAMs) and area radiation monitors (ARMs)
- Central Monitoring System, used to control some important equipment and monitor the systems' status in the Support Building, diesel generator enclosures, and WHB
- Seismic trip alarm, which opens WHB ventilation fan breakers when seismic/tornado ventilation dampers close
- Network computers and equipment in the Support Building computer room.

Individual UPS units provide continuous backup power to the following equipment:

- EOC emergency lighting
- Selected EOC receptacles
- Underground radiation alarms (CAMs and ARMs).

Batteries provide normal or backup power to the following equipment:

- Mine pager phone system, the primary means of communication within the mine and between the mine and the surface
- Emergency lights, other than in the EOC
- Fire alarm and monitoring panels.

The above-mentioned equipment, with battery-backed power, adequately enables the implementation of protective actions from the CMR or EOC for at least 30 minutes in case of a loss of AC power. Communication systems for alerting personnel to a radioactive material release on the surface or underground, system status indicators needed for CMRO/FSM decision-making, and some security monitoring equipment are also available without overloading the battery-backed power systems. In addition, WTS has developed the *Diesel Generators 1 and 2 Local Alarm Response* procedure (WP 04-ED4301) and the *Central UPS Unit 2* procedure (WP 04-ED4542) to direct operator actions to identify and correct generator and central UPS problems.

WTS conducts an adequate test and maintenance program for optional standby power supplies that includes the following actions:

- Performing generator load tests monthly using a load bank and a minimum 30-minute load run.
- Performing quarterly, annual, and five-year maintenance activities on the diesel generator mechanical and electrical systems.
- Testing UPS systems annually and performing semiannual maintenance and inspection activities in accordance with manufacturer specifications.
- Testing fire alarm panels and emergency lighting batteries in accordance with the applicable NFPA standard.

WTS also adequately plans for the long-term refueling of diesel generators by:

- Measuring the fuel tank level monthly by drop stick and ordering sufficient fuel to replenish the supply to approximately 7200 gallons.
- Ordering typically 6000 gallons monthly, primarily for underground vehicles and machines, to ensure frequent fuel turnover and a fresh reserve of diesel fuel.
- Maintaining a five-year contract with a local diesel fuel supplier, requiring that fuel be delivered within 24 hours and that the fuel supplier have contracts in place with other suppliers to meet the 24-hour delivery requirement.
- Dispensing fuel from the underground storage tank into a 500-gallon mobile fuel tank to transport fuel to the generators.
- Maintaining the capability to refill the generator fuel tank while the generator is operating.

Overall, the WIPP site has an adequate normal power supply and capability to provide backup power to priority loads from optional standby diesel generators. Further, UPS and batteries provide continuous power for at least 30 minutes to equipment needed to support implementation of protective actions. WTS adequately tests and maintains backup power equipment to ensure that it will perform as expected. WTS has in place refueling plans to sustain long-term operations using the onsite generators. However, WTS may not be able to restore critical power within 30 minutes due to system limitations and required operator actions, particularly if a radiological material release is in progress.

Communication Systems

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

DOE Order 151.1C requires that equipment adequate to support an emergency response be available, operable, and maintained and that tests of the communication systems used to contact offsite agencies be performed at least annually. This order further requires that sites have the capability to notify employees of an emergency and to facilitate the safe evacuation or sheltering of employees. In addition, NFPA-1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, discusses testing incoming telephone lines daily in facilities where 911-type calls are answered. DOE Guide 151.1-4 provides additional guidance for communication systems and states that the systems that provide notifications and activate the ERO should be tested and maintained regularly. The Guide also states that alternate command centers should have the same communications capabilities as the primary command center and that backup communications, such as cellular and/or satellite telephones and radios, should be available and periodically tested. In addition, the Guide specifies that sites should integrate their communication systems with offsite responders and should periodically verify all emergency telephone and facsimile numbers with offsite agencies.

The CMRO uses a variety of appropriate methods for notifying employees of an emergency and facilitating the safe evacuation or sheltering of employees. The plant PA system is the primary method the CMRO uses to communicate emergency notifications and protective action instructions to workers. The plant PA system broadcasts through a series of speakers inside buildings, inside the mine, and outdoors. Additionally, a mine pager phone system with over 100 telephones underground is available to communicate emergency instructions to underground workers. Further, the CMRO can activate the underground evacuation signal system, consisting of electric horns and strobe lights, to initiate an immediate evacuation of the mine. The CMRO can also broadcast emergency information over all radio channels and can access all of the notification systems from several locations throughout the site in addition to the CMR. WTS performs a monthly test of the plant PA system, mine pager phone system, and underground evacuation signal system and appropriately documents the testing results.

The WIPP radio system provides an adequate mobile communications link that allows interoperability with local responders. Radios are the primary method for communications in the field; over 75 radios are in operation, consisting of hand-held units, three vehicle-mounted units in the Fire Brigade apparatus, and two base stations. WTS uses a trunked radio system, which consists of three repeaters located on a tower within the site and provides five channels used by site personnel and for sitewide alerts. The Fire Brigade can also contact offsite mutual aid agencies using additional channels programmed on their radios. The radio system provides coverage for the aboveground portion of the WIPP site and a 20-mile radius surrounding the site, although coverage is limited within buildings and near sand dunes. Backup generators provide the repeaters with power when needed to ensure continued operation. The radio system can operate in simplex mode (limited to line-of-sight and reduced range) if all of the repeaters fail.

WTS performs appropriate periodic maintenance on the radio system and tests most of the radio components. WTS checks the frequencies on the radio system repeaters annually; the remaining components of the radio system do not require periodic maintenance. The CMRO conducts weekly tests between their hand-held radio units and the CMR radio base station. The Fire Brigade uses their hand-held radio units daily and completes a weekly test with the Carlsbad Medical Center to confirm the

operability of their vehicle-mounted radios. The RCTs also use their hand-held radios daily and verify their operability when assigned to field monitoring duties. The EOC cadre uses hand-held radios as part of their communication methods, but the Emergency Management organization does not periodically test their operability. (See Section 8.0, **OFI-5**.)

The ERO venues are well equipped with telephones and facsimile machines, but backup communication options are limited for a few groups. All ERO locations are equipped with an adequate number of telephones and facsimile machines. CBFO allows the use of cellular telephones at the WIPP site and most ERO members have them, although cellular telephones generally do not work in the EOC and Alternate CMR. The Fire Brigade vehicles and most RCTs have cellular telephones, although coverage is sporadic once the Fire Brigade or RCTs leave the WIPP site. Some ERO groups have limited options for backup communication systems if their primary system becomes inoperable. If the telephone system were unavailable, the EOC cadre's sole means of communication would be hand-held radios, which provide limited coverage inside buildings and may not be operable (as previously mentioned). The RCTs and Fire Brigade rely on radios and cellular telephones when operating away from the WIPP site; however, inconsistent cellular telephone coverage and terrain issues that interfere with radio reception could leave the RCTs and Fire Brigade with no means of communication in some offsite locations. (See Section 8.0, **OFI-6**.)

WTS periodically tests most telephones and facsimile machines; however, tests on infrequently-used equipment either are not performed or do not consistently ensure that the equipment will operate as intended. The CMROs use their telephones and facsimile machines daily and test the operability of their cellular telephone weekly. In addition, the Fire Brigade performs weekly tests of the cellular telephones kept in their vehicles, and the RCTs verify the operability of their cellular telephones when assigned to field monitoring duties. Although Emergency Management uses an informal *Site EOC Checklist* to test the EOC equipment, the checklist does not include both facsimile machines and does not ensure that tests verify the operability of all equipment. Furthermore, WTS does not periodically test the operability of the equipment in the Alternate EOC. (See Section 8.0, **OFI-5**.)

WTS uses a variety of appropriate methods to activate the ERO. The CMRO activates the EOC cadre using the plant PA system (during normal working hours), followed by the automated notification system that transmits a message to the various devices registered in the system for each EOC cadre member (i.e., pagers, office telephones, cellular telephones, and home telephones) and records the receipt of positive responses from the cadre. If the automated notification system should fail, the CMRO can contact the EOC members individually using the on-call contact roster. The CMRO also notifies the Fire Brigade, ERT, and RCTs using the plant PA system, radios, and individual pagers. If the MRT is needed, the FSM contacts the two MRT captains directly, who in turn contact their team members using work and cellular telephone numbers.

Most of the ERO participates in effective periodic notification tests. The Fire Brigade conducts and documents an announced pager test daily that includes all members of the ERT. Emergency Management performs and documents an announced weekly test of the EOC paging system, which includes all EOC members. In addition, Emergency Management performs additional unannounced tests periodically for the EOC cadre, and Independent Oversight found them to be effective. The *WIPP Emergency Management Program* (WP 12-9) states that WTS will always have two MRTs available when miners are underground; however, WTS does not test the notification process for the MRTs to ensure that the WIPP MRT members or the two local potash mine MRTs, covered by MOUs, can be contacted in a timely fashion. (See Section 8.0, **OFI-7**.)

WTS uses event logs in the EOC, Alternate EOC, and CMR to capture information about an ongoing emergency, but WTS performs limited testing of the equipment used to generate the logs. The CMRO

keeps an event log using a whiteboard, prints a copy of the log periodically, and faxes the log to the EOC. Additionally, the EOC Data Recorder uses a computer to generate a separate event log to share emergency-related information within the EOC on a video monitor and within the Alternate EOC using a projector and screen. The CMRO adequately tests the whiteboard print function during quarterly drills and exercises. Emergency Management uses an informal checklist to test the EOC computer and video monitor used for the event log, but the checklist does not ensure that the equipment will function as intended. Further, WTS does not test the operability of the equipment used for the event log in the Alternate EOC. (See Section 8.0, **OFI-5**.)

The CMRO operates the emergency reporting telephone system but does not test the system to ensure continuous operability. The CMR has one incoming telephone line for emergency calls; emergency calls also ring simultaneously in the Guard and Security Building, which also houses the Alternate CMR. If the CMRO has to evacuate, protective force personnel in the Guard and Security Building can answer the emergency calls until the CMRO arrives. The CMRO receives approximately one call per week on the emergency line but does not perform daily tests as suggested by NFPA-1221 to ensure that the emergency line is operable. (See Section 8.0, **OFI-5**.)

The FSM provides notifications to offsite organizations via telephone and facsimile, but WTS does not test the effectiveness of the notification process or ensure the validity of contact information. The FSM contacts each offsite organization individually via telephone and provides the information listed on the notification form. The EOC Safety Representative then sends the notification form via facsimile to the Joint Information Center, located at the Skeen-Whitlock Building in Carlsbad, which in turn sends the notification form via facsimile to the offsite organizations. The CMROs indicated that the notifications would also include the closest residence, J.C. Mills Ranch, and would include verbal emergency instructions. However, CBFO does not have an agreement with Eddy County or Lea County that allows WTS to provide direct notifications to the public and CBFO does not otherwise have the legal authority to implement offsite protective actions for members of the public. (See Section 8.0, **OFI-8**.) Furthermore, WTS does not test whether the offsite notification process can provide necessary emergency information in the timeframes specified by DOE Order 151.1C and does not validate that the telephone and facsimile numbers for the offsite organizations are correct. (See Section 8.0, **OFI-9**.)

Overall, communication systems (i.e., emergency calls, employee notifications, offsite notifications, and ERO communications) are ready to facilitate information flow during severe NPEs. The redundancy in the communication systems for most critical emergency response functions increases the likelihood that one or more systems can perform each function in case of any disruptions caused by a severe NPE. Nonetheless, limitations in equipment testing and backup communication options for the EOC, Fire Brigade, and RCTs somewhat diminish the robustness of the communication systems. More significantly, WTS allows emergency instructions be given directly to members of the public without the requisite authority to do so and does not test the notification processes for offsite organizations and the MRTs.

Consequence Assessment Systems

Independent Oversight reviewed the consequence assessment processes and dispersion modeling software programs to determine whether the site has established and maintained an adequate consequence assessment system with overall responsibility for initial and ongoing emergency response and provisions for generating timely and useful information for decision-makers. Independent Oversight also interviewed consequence assessment personnel to examine their understanding of the processes and modeling software programs.

DOE Order 151.1C requires the establishment of provisions to adequately assess the potential or actual onsite and offsite consequences of an emergency event. This order also requires that consequence assessments be timely throughout an emergency, be integrated with event classification and protective action processes, incorporate monitoring of specific indicators and field measurements, and be coordinated with Federal, state, local, and tribal organizations.

The *Consequence Assessment Dose Projection* procedure (WP 12-ER4916) provides guidance to the EOC consequence assessment personnel in estimating the potential dose consequence from a release or suspected release of radioactive material. The FSM performs the initial phase of the consequence assessment process (event recognition, categorization/classification, and initial protective actions) using the EALs, and is generally not reliant on consequence assessment personnel to perform an initial dispersion plume projection. However, because event-specific EALs for NPE and severe NPE scenarios are not available (see Section 5.2), the FSM may need to rely on the consequence assessment personnel (who may not be available) to provide a timely initial assessment.

The *Consequence Assessment Dose Projection* procedure appropriately directs consequence assessment personnel to use source term data from the EPHA and/or actual source term data obtained from the field, if known, to determine initial real-time event consequences. Additionally, the procedure provides a comprehensive process for obtaining a plume projection using dispersion modeling software programs, initially using the HotSpot Health Physics Code program and later using the more accurate National Atmospheric Release Advisory Center (NARAC) program, as necessary. Further, the procedure provides a comprehensive process for performing hand calculations to obtain estimated dose consequences in case of a power outage. Consequence assessment personnel also have the capability to obtain real-time meteorological data using the WIPP intranet.

Consequence assessment personnel can also perform consequence assessment activities at the Alternate EOC, if necessary. The Alternate EOC contains two computers, with all required software, for use by the consequence assessment personnel. As an additional backup method, all consequence assessment personnel possess NARAC accounts and can develop projected plume plots using any Internet-enabled computer, if Internet connectivity is available.

Overall, the *Consequence Assessment Dose Projection* procedure provides a comprehensive process for consequence assessment personnel to conduct plume projection modeling or perform hand calculations to obtain estimated dose consequences. The consequence assessment personnel have available a variety of locations (i.e., EOC, Alternate EOC, and any Internet-enabled computer) to access dispersion modeling software, as well as the ability to perform hand calculations, increasing the probability that consequence assessment activities can continue during severe NPEs. The FSM performs the initial consequence assessment and protective action decision-making using the EALs; however, the FSM may rely on the consequence assessment personnel to provide a timely initial assessment for radiological releases caused by an NPE or severe NPE.

Personal Protective Equipment

Independent Oversight reviewed the essential PPE used by the Fire Brigade, MRT, and RCTs who perform decontamination, along with the processes for any required maintenance and periodic testing of the equipment.

DOE Order 151.1C requires that adequate PPE be available and operable to meet the needs determined by the results of the EPHA. In addition, DOE Guide 151.1-4 states that periodic inspections and testing of equipment should be carried out in accordance with the manufacturer's instructions.

WTS provides a sufficient assortment of PPE for RCTs and personnel undergoing the decontamination process. The RCTs' PPE consists of anti-contamination clothing, surgical gloves, and respirators, which are stored in radiological emergency lockers at two locations at the WIPP site and controlled with a tamper seal. The lockers also contain modesty clothing for personnel undergoing decontamination. The RCTs inventory the lockers quarterly or whenever a tamper seal is broken, and they formally document the inventory results as required.

The MRTs are adequately equipped with PPE that is consistent with the identified hazards underground at the WIPP site. Based on the hazards that an MRT might encounter, fire-retardant clothing and self-contained breathing apparatus (SCBA) units are available for use. A qualified and trained MRT member tests and repairs the SCBA units monthly. The MRTs refill their SCBA units using an oxygen compressor, specific for their SCBA units, located in the Safety and Emergency Services Building, which WTS tests quarterly to verify that the oxygen meets quality standards.

The Fire Brigade is suitably equipped with SCBA for the HAZMAT they might encounter at WIPP. Emergency services technicians (ESTs) conduct periodic inspections of the SCBA units, including weekly status checks and monthly inspections, and refill the SCBA units using a breathing air compressor located in Building 463. During a recent quarterly test of the breathing air compressor, an offsite laboratory determined that the quality of the breathing air did not meet established limits, and the ESTs tagged the compressor as out of service. The MRT oxygen compressor cannot be used to refill the Fire Brigade SCBA units, so the Fire Brigade is using an offsite vendor to refill their SCBA units until WTS repairs the breathing air compressor.

The Fire Brigade also has protective suits available for use as required by the *WIPP Hazardous Waste Facility Permit (HWFP)*, but does not test or inspect the protective suits. The *WIPP HWFP* requires that the emergency equipment at the site include four Level A suits, four Level B suits, and four acid protective suits. Although no hazards currently exist at the WIPP site that would require use of these protective suits and the Fire Brigade does not plan to use the suits (either on site or off site), the Fire Brigade does respond to offsite events where other responders may use these types of suits. Procedure WP 12-FP0033, *Inspection of Emergency Response Equipment*, requires the ESTs to inventory the suits weekly but does not list any specific testing or inspections to ensure that the suits will provide the intended protection. The manufacturer's recommendations for testing the protective suits typically include an annual pressure-test and periodic visual inspections. This type of testing ensures the integrity of the suit and confirms that the suit has not developed leaks that would harm the user. The Fire Brigade recognizes that the suits are not in a useable condition but keeps the suits in the inventory due to the *WIPP HWFP* requirement. Consequently, the suits, while available, may not be safe for responders to use. (See Section 8.0, **OFI-10**.)

Overall, appropriate PPE for response to a severe NPE is available for the RCTs, personnel undergoing decontamination, and the MRTs. The Fire Brigade properly maintains their SCBA and ensures the availability of the protective suits as required by the *WIPP HWFP*. However, there is no requirement or procedure to ensure the manufacturer's recommendations (or other appropriate standard) is followed to ensure the operability of the protective suits.

Radiation Survey Equipment

Independent Oversight reviewed the radiation survey equipment used by the RCTs, along with the relevant inventory checklists and processes used to perform any required maintenance and periodic testing of the equipment.

DOE Order 151.1C requires that adequate radiation survey equipment be available and operable to meet the needs determined by the results of the EPHA. In addition, DOE Guide 151.1-4 states that sites should perform periodic inspections and testing of equipment in accordance with the manufacturer's instructions.

WTS developed procedures that adequately provide emergency monitoring and radiological control (RADCON) instructions to personnel during normal operations and radiological events or incidents on the WIPP site, as recommended in DOE Guide 151.1-4. The RCTs monitor for radiological airborne and surface contamination hazards associated with the most significant scenarios identified in the EPHA – i.e., those that could lead to a site area emergency or general emergency (GE) – and appropriately maintain and calibrate the equipment. WTS tasks the RCTs with collecting dose readings within the PPA and from three fixed air-sampling stations within the EUA. RCTs are responsible for monitoring, sampling, and ensuring that the capability (e.g., procedures, equipment) to perform these responsibilities is maintained in a state of readiness. RCTs obtain radiological equipment needed to conduct surveys each day from the TRU Packaging Transporter (known as TRUPACT) Maintenance Facility and deploy from their work locations to conduct surface contamination surveys and air sampling operations during an emergency event. The equipment consists of air samplers and both beta-gamma and alpha Geiger counters to detect ionizing radiation, meeting the needs identified by the EPHA. RADCON personnel conduct inspections, operational checks, and testing as required by *RADCON Administration* procedure (WP 12-HP3000), manufacturer's instructions, and industry standards. Qualified maintenance technicians perform calibration and preventive maintenance on the equipment in accordance with approved procedures. Additionally, RADCON maintains inventory checklists to ensure that equipment and supplies are readily available.

Overall, RADCON processes ensure adequate monitoring of radiological airborne and surface contamination during emergency events. Additionally, an adequate quantity of operable and calibrated radiation survey equipment is available to respond to an onsite radiological release caused by a severe NPE.

HAZMAT Detection Equipment

Independent Oversight reviewed the HAZMAT detection equipment used by the WIPP site, along with the processes for calibrating the equipment.

The Fire Brigade and MRTs appropriately monitor for airborne hazardous chemicals and calibrate the equipment. DOE Order 151.1C requires that detectors adequate to support an emergency response must be available, operable, and maintained. The sole airborne hazardous chemical for the most significant scenarios identified in the EPHA (i.e., those that could lead to a site area emergency or GE) is beryllium, which would be encountered in conjunction with a significant radiological release. Since the PAC for the radiological release encompasses the PAC for the associated beryllium release, WTS does not maintain a real-time monitoring capability for beryllium. As part of its emergency response equipment, the Fire Brigade uses a four-gas monitor to detect carbon monoxide, hydrogen sulfide, combustible gases and vapors, and oxygen-deficient and oxygen-rich atmospheres. Due to oil and natural gas drilling in the local area, the Fire Brigade also carries an additional hydrogen sulfide detector that provides a more accurate measurement. The MRTs also use a four-gas monitor to detect similar substances (nitrogen dioxide instead of hydrogen sulfide). The Fire Brigade's four-gas monitor is included in the site industrial hygiene equipment pool, which ensures that monitors are calibrated every three months. The Fire Brigade replaces their hydrogen sulfide detector annually, before calibration would be required. The MRTs calibrate their four-gas monitors with appropriate calibration gases before each use.

Overall, an adequate quantity of operable and calibrated HAZMAT detection equipment is available to respond to a hazardous environment caused by a severe NPE.

Decontamination Equipment

Independent Oversight reviewed WTS's preparations for a large-scale contamination event, along with the relevant procedures.

WTS is minimally equipped to provide gross decontamination in support of a large-scale contamination event. DOE Order 151.1C requires that decontamination equipment adequate to support an emergency response must be available, operable, and maintained. The *WIPP HWFP* lists the decontamination shower equipment required at the site, which includes a self-contained decontamination shower trailer, a portable decontamination shower, and a disposable decontamination shower. Procedure WP 12-HP1316, *Decontamination Facility Operations*, requires an annual inspection of the decontamination shower equipment, and the RCTs participate in this inspection to maintain familiarity with the equipment. During the last annual inspection, the decontamination shower trailer developed leaks, and WTS tagged it as out of service. In addition, WTS permanently attached the portable decontamination shower to the decontamination shower trailer several years ago; it is also now out of service. Further, the disposable decontamination shower is no longer present at the WIPP site. WTS expects to purchase a new decontamination shower trailer by the end of fiscal year 2012. In the interim, the Fire Brigade can conduct gross decontamination using the nozzles on one fire engine and a ladder to create an emergency low-pressure deluge that can remove contamination from clothed workers, although the Fire Brigade has not practiced this technique. Consequently, WTS has limited capabilities for responding to a large-scale contamination event. (See Section 8.0, **OFI-11**.)

Overall, WTS currently has minimal equipment and limited experience with responding to a large-scale contamination event that may result from a severe NPE.

Emergency Operations Center

Independent Oversight reviewed the EOC's documented capability to withstand analyzed severe NPEs and its ability to survive and enable the ERO to remain in a safe environment, while performing its emergency response functions. Key systems of interest included normal and backup power supplies.

The Safety and Emergency Services Building, which houses the EOC, is adequately constructed using the Uniform Building Code applicable at the time of construction. It is designed to withstand a 91 miles per hour (mph) wind but would not likely survive the earthquake, tornado, or snow load established as the design basis events for the nearby WHB. Further, the EOC is not equipped with a habitability system to filter out airborne radiological materials or detection and alarm equipment to monitor its atmosphere and warn personnel of dangerous conditions. Instead, WTS relies on the protective actions identified in EALs to determine whether the EOC must relocate to the Alternate EOC in Carlsbad. However, as described in Section 5.2.1, the EALs do not clearly establish areas requiring evacuation.

Public utilities provide normal power to the EOC via the WIPP electrical distribution system, with diesel generators and a small UPS unit available for backup power. In case of a loss of normal power, a small UPS unit provides continuous power to the EOC emergency lights and some receptacles for at least 30 minutes. The EOC (Safety and Emergency Services Building) is not a designated priority load in WTS procedures, so power may be lost once the UPS unit is exhausted. (See Section 8.0, **OFI-4**.)

Overall, WTS equips the EOC with sufficient normal power supplies; however, the EOC would likely not survive a severe NPE, not be habitable for a significant radiological release, and not be functional after 30 minutes following a loss of normal power. As an acceptable action, the ERO would relocate to the Alternate EOC under these conditions.

Alternate Emergency Operations Center

Independent Oversight reviewed the Alternate EOC's documented capability to withstand analyzed severe NPEs and its ability to survive and enable the ERO to remain in a safe environment while performing its emergency response functions. Key systems of interest included normal and backup power supplies.

The Skeen-Whitlock Building, which houses the Alternate EOC, is adequately constructed using the Uniform Building Code applicable at the time of construction. It is designed to withstand up to a 91 mph wind, but would not likely survive a severe NPE, such as an earthquake, a tornado, or the snow load established as the design basis events for the WHB. The Alternate EOC is located in Carlsbad, New Mexico, approximately 26 miles from the WIPP site, which minimizes the risk of losing both the EOC and Alternate EOC as a result of the same severe NPE and making habitability systems at the Alternate EOC unnecessary. Commercial power is the only power available at the Alternate EOC equipment; the Alternate EOC has no backup power capability. (See Section 8.0, **OFI-3**.)

Overall, the Alternate EOC would likely not survive a severe NPE, but its location, approximately 26 miles from the EOC, minimizes the risk of losing both facilities from the same severe NPE. CBFO equips the Alternate EOC with sufficient normal power but does not provide backup power capability.

Central Monitoring Room

Independent Oversight reviewed the CMR's documented capability to withstand analyzed severe NPEs and its ability to survive and enable the ERO to remain at this pre-designated incident command post in a safe environment while performing its emergency response functions. Key areas of interest included normal and backup power supplies.

The CMR, located in the Support Building, serves as the initial emergency response center for WIPP site emergencies. The Support Building is adequately constructed using the Uniform Building Code applicable at the time of construction. It is designed to withstand a 99 mph wind but would not likely survive the earthquake, tornado, or snow load established as the design basis events for the adjacent WHB. During a HAZMAT release, the CMR air filtration system removes radioactive airborne contaminants and pressurizes the atmosphere inside the building to preclude infiltration of contaminated air into the CMR. Although the filtration system is adequately tested, it relies on the CMR HVAC that would be inoperable during a loss of AC power. In addition, the CMR has no detection and alarm equipment to monitor the atmosphere and warn personnel of dangerous conditions. Instead of relying on the CMR air filtration system, WTS uses the protective actions identified in EALs to determine whether the CMR personnel must relocate to an alternate location. However, as previously discussed in section 5.2.1, the EALs do not clearly establish areas requiring evacuation. The designated alternate location for the CMR is the Guard and Security Building, which is not far enough from the CMR to preclude its loss from the same severe NPE. The loss of the CMR and Alternate CMR represents the loss of all pre-designated incident command posts and the efficient capability to provide sitewide protective action instructions.

Public utilities provide normal power to the CMR via the WIPP electrical distribution system. Diesel generators provide backup power to the CMR as part of the Support Building. The central UPS provides continuous power to essential surface loads, such as the Central Monitoring System, radiation detection and alarm systems, and sitewide communications, for at least 30 minutes in case of a loss of normal power. The Support Building also houses the central UPS system in an environmentally controlled room to improve UPS reliability by keeping its ambient temperatures below 104 degrees Fahrenheit. However,

operators establishing AC power from onsite generators face the same impediments described previously when manually aligning breakers to power the Support Building. (See Section 8.0, **OFI-3**.)

Overall, the CMR is adequately equipped with normal and backup power supplies. However, the CMR would not likely survive a severe NPE, would require evacuation for the most severe radiological releases, and would only be assured of backup power for 30 minutes after a loss of normal power.

Alternate Central Monitoring Room

Independent Oversight reviewed the Alternate CMR's documented capability to withstand analyzed severe NPEs and its ability to survive and enable the ERO to remain in a safe environment, while performing its emergency response functions. Key areas of interest included normal and backup power supplies.

The Guard and Security Building, which houses the Alternate CMR, is adequately constructed using the Uniform Building Code applicable at the time of construction. It is designed to withstand a 91 mph wind but would not likely survive the earthquake, tornado, or snow load established as the design basis events for the nearby WHB. Further, the Alternate CMR is not equipped with a habitability system to filter out airborne radiological materials or detection and alarm equipment to monitor its atmosphere and warn personnel of dangerous conditions. Instead, WTS relies on the protective actions identified in EALs to determine whether the Alternate CMR personnel must relocate to an ad hoc safe location.

Public utilities provide normal power to the Alternate CMR via the WIPP electrical distribution system, with diesel generators as the sole means of backup power. The same impediments described previously would also apply when providing backup power from the diesel generators. (See Section 8.0, **OFI-3**.)

Overall, WTS equips the Alternate CMR with sufficient normal power and a backup power capability, but the Alternate CMR and CMR would be equally affected by a severe NPE, a significant radiological material release, or a loss of normal power.

Waste Handling Building

Independent Oversight reviewed the WHB's documented capability to withstand analyzed severe NPEs and its ability to receive protective action information, implement planned protective actions, and conduct and report personnel accountability after a facility evacuation. Independent Oversight reviewed design, maintenance, and test documents for key systems; reviewed emergency plans and response procedures; interviewed cognizant personnel; and performed walkdowns of the facility. Key systems of interest included communications, power supplies, and facilities and equipment used to perform protective actions, such as assembly stations, shelters, accountability mechanisms, ventilation system controls, abnormal operating procedures, and safe shutdown protocols.

The WHB is a hazard category 2 nuclear facility where WTS receives radioactive TRU waste, removes it from its shipping container, prepares it for disposal, and transfers it to the underground area via the waste shaft. The WHB is a steel frame structure with insulated steel siding. Portions of the WHB, such as the hot cell complex and shielded storage room, consist of thick concrete for shielding. The WHB is designed and constructed for a design basis earthquake having a 0.1 gravitational force peak acceleration; a design basis tornado having 183 mph winds and a translational velocity of 41 mph; and a snow load of 27 pounds per square foot.

The highest consequence WHB emergencies concern unfiltered releases of TRU waste. Such a release could result from a breach in the WHB confinement system, which consists of the building structure and

ventilation system, coincident with a dispersion mechanism, such as a TRU waste assembly drop or a fire. Facility indicators of this event consist of direct observation, CAM alarms, building room differential pressures, and fire alarms. In case of radiation alarms or an observed NPE damaging TRU waste containers, WTS procedure WP 12-ER4903, *Radiological Event Response*, directs the CMRO to sound an alarm, known as the intro alarm, and announce an evacuation of the immediate area. Although these instructions are appropriate, they do not specify the analyzed safe evacuation distance determined by the EPA, identify the event as a classifiable operational emergency, or reference the appropriate EAL for implementation. (See Section 8.0, **OFI-4**.)

For high winds and tornados, the *Severe Weather Response* procedure (WP 12-ER4901) appropriately directs the CMRO to sound the intro alarm and announce that personnel should seek shelter in a permanent building in rooms without windows and outside walls. For tornados, the procedure instructs personnel to go to the most interior part of the first floor of permanent buildings and close the WHB tornado doors. For earthquakes, the *Earthquake/Seismic Response* procedure (WP 12-ER4910) directs the CMRO to sound the intro alarm and make an announcement to suspend operations. However, the procedure does not provide instructions on whether surface employees should take protective actions within the building or evacuate buildings. (See Section 8.0, **OFI-4**.)

The most significant system in the WHB that would not operate during a loss of AC power is the ventilation system, which would then allow radioactive particles to migrate to undesirable locations because the cascading room pressure differentials are lost. The WTS *Heating, Ventilation, and Air Conditioning (HVAC) Alarm Response* procedure (WP 04-HV4021) appropriately directs suspension of waste handling operations in the WHB for this condition. Upon loss of AC power, the central UPS system provides continuous backup power to WHB communication systems, ARMs, CAMs, emergency lights, and CMR monitoring capability of the ventilation system and building differential pressures for at least 30 minutes and enables implementation of protective actions during a loss of AC power. Also, the *Surface Backup Power Distribution* procedure appropriately identifies the plant air compressors (for HVAC damper control air) and the WHB HVAC system (for fans) as priority loads. However, power restoration could take more than 30 minutes and may not be possible if the initiating event damages the collocated generators or distribution system or during a radiological material release that puts operator safety at risk. (See Section 8.0, **OFI-3**.)

WTS has an adequate set of procedures to define and achieve safe shutdown in the WHB. The *WIPP Technical Safety Requirements (TSRs)* document (DOE/WIPP 07-3373) establishes operational modes, such as waste handling, waste storage, disposal, and standby. WTS uses the *Facility Mode Compliance* procedure (WP 04-AD3001) for making TSR-based mode changes to place WHB activities in a safe shutdown condition, which requires WTS to suspend waste handling and transport activities and secure lids on any opened waste containers.

WTS developed pre-fire plans for the WHB to provide external responders with important information they need for a safe and effective response. WTS has recently issued comprehensive instructions for developing and maintaining sitewide pre-fire plans for surface structures in the *Developing and Modifying Pre-Fire Plans* procedure (WP 12-FP3004). However, the WHB pre-fire plan, *Pre-Fire Surveys for Building 411*, does not contain all of the content required by the governing procedure, such as utility considerations (e.g., locations of utility shutoff valves, fire control panels, and elevator) and external site considerations (e.g., access impediments). In addition, WTS self-identified weaknesses in maintaining the 11 controlled copies. Further, the procedure requires periodic building walkdowns for pre-fire plan maintenance but does not specify the frequency. (See Section 8.0, **OFI-4**.)

WTS adequately implements building protective actions and personnel accountability via an Office Warden program. WTS assigns Office Wardens to buildings or defined areas within buildings to train

residents on building emergency plans; maintain the building emergency plan and supporting equipment; and, during emergencies, warn personnel, perform building sweeps, perform actions to improve the effectiveness of sheltering, and conduct and report personnel accountability. WTS procedure WP 12-ER4907, *Evacuation/Shelter-in-Place*, specifies most of the Office Warden emergency response duties, although it does not assign building sweep duties. (See Section 8.0, **OFI-4**.) WTS has established designated assembly areas within the WIPP boundary fence; outside the boundary fence near the east, west, and north exit points; and at a remote location, two miles from the site. WTS padlocks all but the main gate exit with security personnel equipped to open alternate exits, if necessary. WTS uses personnel rosters to perform accountability after building evacuations and badge reader printouts to perform accountability after a site evacuation. However, WTS cannot quickly process the 300-plus employees through the badge reader during a radiological material release, and the badge reader does not receive backup power if AC power is lost. For this scenario, WTS will use paper rosters for personnel accountability. Further, WTS plans to use commuter buses, parked in the WIPP parking lot, and personal automobiles to transport employees during a site evacuation. WTS is currently planning how to control site evacuees in order to complete personnel accountability procedures and surveys of potentially contaminated personnel and vehicles before they are released from WTS control. However, the *WIPP Emergency Management Program* does not reflect the remote assembly area, and the *Office Warden Program* procedure (WP 12-ER3005) is in draft form pending resolution of the aforementioned planning activities. Finally, WTS does not staff the Office Warden positions using a duty roster or similar means to ensure continuous coverage when they are not on site, but rather relies on the primary Office Wardens to arrange for alternates when they will be absent from the site. (See Section 8.0, **OFI-4**.)

Overall, construction of the WHB is adequate to survive all but the most severe NPEs. WTS provides the WHB with sufficient backup power and a long-term refueling capability. WTS also has adequate capabilities to protect WHB employees during operational emergencies and adequate procedures to respond to operational emergencies and place the WHB in a safe shutdown condition, although Independent Oversight noted some weaknesses in several response procedures.

Waste Disposal Area

Independent Oversight reviewed the WDA's documented capability to withstand analyzed severe NPEs and its ability to receive protective action information, implement planned protective actions, and conduct and report personnel accountability after an evacuation. Independent Oversight reviewed design, maintenance, and test documents for key systems; reviewed emergency plans and response procedures; interviewed cognizant personnel; and performed walkdowns of the facility. Key systems of interest included communications, power supplies, and facilities and equipment used to perform protective actions, such as assembly stations, shelters, accountability mechanisms, ventilation system controls, abnormal operating procedures, and safe shutdown protocols.

The WDA is a hazard category 2 nuclear facility where WTS transports and permanently stores TRU waste in salt formations 2150 feet below the surface. Because the WDA is an underground facility, the design basis tornado, design basis earthquake, wind, and snow load events that apply to WIPP surface structures are not applicable. Further, except for intense rain, flooding is not a concern because the Pecos River is the closest river, 12 miles from the WIPP site, and the site is 400 feet above the river's historic flood plain. The WTS *High Precipitation Rate Alarm Response* procedure (WP 04-GC4021) governs monitoring of conditions from intense rains, and a retention pond will collect surface water runoff under such conditions.

The highest consequence WDA emergencies concern unfiltered releases of TRU waste. Such a release could result from a breach in the underground ventilation and filtration system (UVFS) coincident with a dispersion mechanism resulting from a waste assembly dropped down the waste shaft or, to a lesser

extent, from a collision of an underground transport vehicle with a resulting fire. Facility indicators of this event consist of direct observation, CAM alarms, differential pressures within the underground area, and fire alarms. Evacuation of the WDA is the only immediate protective action response required.

Normal and backup power supplies provide the underground equipment with adequate power to support implementation of most protective actions:

- Surface AC power provides normal power to the underground area via redundant underground substations.
- Twelve-volt batteries provide the only power to the mine pager phone system; WTS tests essential phones daily and replaces batteries or phones that fail the test.
- UPS units or batteries provide backup power to the underground emergency lights, the radiation detection and alarm systems, and the fire monitoring and alarm panels.
- Helmet lamps, which last for approximately 20 hours, and strobe lights stored underground provide additional underground lighting in case of a sustained loss of all AC power.

The most significant systems in the underground area that would not operate during a loss of AC power are the UVFS and hoists. The loss of AC power or control air aligns the ventilation system dampers to the filtered mode so that high efficiency particulate air (HEPA) filters remove any radioactive material before it exhausts to the surface, thus protecting surface personnel from an underground radioactive release. The loss of forced ventilation does not pose an immediate problem for underground personnel because the high volume of air and natural ventilation in the underground would sustain life for extended periods; however, intake air from natural ventilation contains the same air contaminants as the surface air, and there is no intake filtration capability. (See Section 8.0, **OFI-12**.) Loss of AC power to the hoists causes the brakes to engage, stops the hoist, and forces any personnel in the mine or in the hoist to remain in place until WTS restores AC power from normal, fixed backup, or another source of AC power or establishes an alternate means of rescue. Currently, WTS does not have the immediate capability to rescue personnel from the underground in the event of total loss of offsite AC power with a concurrent loss of onsite backup AC power. While WIPP has MOUs in place with other mines in the immediate vicinity of WIPP and within the state, WIPP has not determined whether those resources have portable compatible equipment that could be readily deployed. (See Section 8.0, **OFI-12**.)

WTS has an adequate set of procedures to define and achieve safe shutdown in the WDA. The *WIPP TSRs* document establishes operational modes, and WTS uses the *Facility Mode Compliance* procedure for making mode changes to place WDA activities in a safe shutdown condition, which requires WTS to suspend waste handling and transporting activities, including placement of magnesium oxide on top of waste containers. In addition, WTS has developed adequate alarm response procedures that direct operators to place systems in safe mode in anticipation of cases where operators cannot clear the cause for equipment alarms. For example:

- The *Compressed Air System Alarm Response* procedure (WP 04-CA4001) directs the CMRO to shift the UVFS to filtration mode.
- The *Radiation Monitoring System Alarm Response* procedure (WP 04-EM4200) directs shutdown of underground activities in the active waste disposal room and a manual shift of the UVFS to filtration mode.
- The *UVFS Alarm Response* procedure (WP 04-VU4605) directs suspension of underground operations if both HEPA units are clogged and directs verification of allowable operating modes during this condition.

- The *Earthquake/Seismic Response* procedure directs the CMRO to sound the intro alarm and make an announcement to suspend operations and to send underground personnel to their assembly area.

WTS adequately implements protective actions for underground personnel using the *Underground Access Control* procedure (WP 04-AD3013). The CMRO communicates protective actions to the underground area via the mine pager phone system. For shelter-in-place protective actions, WTS uses four designated underground assembly stations where supervisors or managers conduct and report the results of personnel accountability. For evacuations, the underground controller, who is at the surface, performs personnel accountability using a rigorous brass tag system. The underground controller reports the results of personnel accountability to the CMRO via the mine phone pager system or hand-held radio. Although these protocols account for personnel evacuating the underground, they do not account for underground personnel who evacuate the WIPP site. WTS self-identified this weakness and is currently working on a solution. (See Section 8.0, **OFI-4**.)

Overall, the WDA is unaffected by most severe NPEs. WTS provides the WDA with adequate normal and backup power and adequately tests underground power supplies. WTS also has adequate capabilities to protect WDA workers during operational emergencies and adequate procedures to respond to operational emergencies and place the WDA in a safe shutdown condition. WTS is working on improvements in the personnel accountability procedures to account for underground evacuees who must also evacuate the site. However, for a loss of all AC power, the hoist's brakes engage and will preclude hoist movement until normal, backup, or another form of AC power is restored to release the brakes. Currently, WTS does not have the immediate capability to rescue personnel from the underground without AC power restored to the hoist brakes and has not determined whether offsite resources have portable compatible equipment that could be readily deployed.

Emergency Response Organization

Independent Oversight reviewed the ERO capabilities that are critical for response to an emergency caused by a severe NPE.

DOE Order 151.1C requires that an ERO be established and maintained for each facility/site. This order also requires that the ERO establish effective control at the scene of an emergency event and integrate ERO activities with those of local agencies and organizations that provide onsite response services. Additionally, DOE Guide 151.1-4 recommends that the Emergency Director (ED) position in the ERO have unilateral authority and responsibility to implement the emergency plan and allows the ED position to be transferred to more senior officials once the ERO is fully staffed. Further, DOE Guide 151.1-3, *Programmatic Elements EMG*, recommends developing emergency management training and drill programs to ensure that personnel are prepared to respond to, manage, mitigate, and recover from HAZMAT emergencies on site.

The *WIPP Emergency Management Program* adequately provides the framework for the ERO and assigns responsibility for initial and ongoing emergency response and consequence mitigation and determination for the site. WTS further implements ERO assignments using the *WIPP HWFP Resource Conservation and Recovery Act (RCRA) Contingency Plan* (NM4890139088-TSDF), the WP 12-ER series of emergency response procedures, and standard operation guidelines. The *WIPP Emergency Management Program* also adequately defines roles and responsibilities, qualification requirements, and response expectations for each ERO cadre position. Position-specific procedures and checklists provide adequate guidance to ERO personnel (such as the FSM, Crisis Manager, Safety Representative, and support staff) for making required emergency notifications, determining event categorizing and classification, and communicating information. WTS has designated the on-duty FSM as the ED and as

the site RCRA Emergency Coordinator (EC), with full authority and responsibility for coordinating all emergency response measures. Additionally, WTS and CBFO staff an onsite EOC to provide operational, technical, and tactical support during an emergency event. However, WTS does not allow the FSM to transfer the ED position to a more senior official (such as the EOC Crisis Manager) once the WIPP EOC is staffed and operational, reducing the FSM's ability to focus on the site-level response. (See Section 8.0, **OFI-13**.)

The *WIPP HWFP RCRA Contingency Plan* lists specific ERO positions of Assistant Chief Office Warden, Office Warden, CMRO, ESTs, ERT, Fire Brigade, First Line Initial Response Team, and MRTs. Training for these functions as well as the RCRA Emergency Coordinator is in HWFP Training Plan. The plan also states that the EOC staff does not require specific RCRA training, but WTS requires the EOC staff to complete training courses related to their duties as recommended by the EMG. Independent Oversight identified that an adequate number of experienced personnel, including designated alternates, are available on demand for timely and effective performance of ERO functions. However, WTS does not require decision-making ERO personnel (i.e., FSMs, EOC Crisis Managers, and Safety Representatives) to read and understand the EPHA. As a result, the ERO may not have the knowledge needed to understand the event scenario analyses and the resulting EALs, protective actions, and PARs developed from the analyses. (See Section 8.0, **OFI-14**.)

Overall, the procedures used by the ERO adequately provide guidance, define roles and responsibilities, and outline processes used to assess event consequences. Trained ERO personnel are available for emergency events; however, decision-making ERO personnel are not required to read and understand the EPHA. Further, WTS does not allow the FSM to transfer the ED function to the Crisis Manager, reducing the FSM's effectiveness in coordinating the site-level response to an emergency.

Protective Force

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

Protective force emergency planning adequately addresses nearly all operational emergency events. WTS provides the operational and manpower elements for the protective force, in addition to the planning and oversight elements. WTS also organizes the protective force in shifts, with each shift under the supervision of a lieutenant. Each shift contains all of the disciplines necessary for a full security response, including site access control personnel. The protective force works under various agreements with local law enforcement agencies to ensure effective integration of supplemental personnel, equipment, and capabilities. The CBFO has memoranda of agreement with local sheriff offices in Eddy and Lea counties and the City of Carlsbad Police Department to request and receive law enforcement assistance. WTS does not intend to use local law enforcement agencies to supplement WTS personnel during an emergency event and has no pre-planned protocols with offsite agencies for protective force support. Additionally, CBFO and the Federal Bureau of Investigation recently determined that an agreement between CBFO and the Federal Bureau of Investigation field office, located in Roswell, New Mexico, was no longer necessary and mutually agreed to terminate the agreement. Nonetheless, WTS has not developed response plans or procedures to support security operations after a severe NPE, as further discussed in Section 5.4.1, Response and Recovery Operations.

Overall, the protective force is ready to provide full security services and appropriately interacts with offsite local law enforcement personnel in case of a severe NPE. WTS does not intend to use local law enforcement agencies to supplement onsite WTS personnel during an emergency event and thus has not developed protocols for that possibility.

5.4 Objective 4: Offsite Response Interfaces

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

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

Independent Oversight determined that the site's planning is mostly adequate for obtaining and integrating offsite response assets for events beyond the site's response capability. However, WTS has not fully developed an emergency management program that coordinates offsite response planning, as required by DOE Order 151.1C and RCRA Title 40 Code of Federal Regulations (CFR) 264, Subpart D, *Contingency Plan and Emergency Procedures*. Importantly, Eddy County and Lea County representatives identified the need for WIPP-specific emergency response planning with specific attention to how to effectively notify offsite populations requiring protective actions for a radiological release. Significant offsite planning issues include:

- WTS has not demonstrated effective planning, coordination, and response capabilities to assist local governments in identifying the radiological plume, relocation area, and food control boundaries after a radiological emergency.
- Assumptions used by WTS as a basis for public protection planning are incorrect or contradictory; PARs for the worst-case radiological event do not reflect DOE guidance, which indicates that evacuating the public is usually justified when the projected dose to an individual exceeds 1 rem.
- WTS has not developed plans and procedures that state the anticipated actions of each interface agency to implement PARs, appropriately considering that offsite authorities have very limited capabilities for implementing WIPP PARs.
- CBFO and WTS have not adequately planned for recovery operations with offsite agencies, including the necessary methods for determining the affected offsite area after a radiological release and ensuring a mutual understanding of the assessment methods used, the expected type of results, and the bases for any PARs that the site may issue.

Offsite Interactions

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

The *WIPP Emergency Management Program* appropriately documents a clear and comprehensive understanding of required offsite relationships and includes detailed listings of Federal, state, and local organizations with emergency response or regulatory control responsibilities relevant to the WIPP site. CBFO and WTS hold periodic interface meetings with offsite organizations to exchange information and address any response issues as part of routine planning activities. Likewise, WTS periodically invites offsite organizations to participate in site-level exercises designed to test interfaces and capabilities and regularly incorporates offsite participation in exercises, such as the annual functional exercises. Additionally, WTS routinely provides emergency response assistance to the surrounding communities, based on available resources at the time of request. Emergency responders typically respond at least twice a month to motor vehicle accidents as first responders and transfer care to other responding units.

Offsite authorities are properly aware of assistance available from DOE/National Nuclear Security Administration (NNSA) national assets. The most visible asset is the Region 4 Radiological Assistance Program (RAP), which covers New Mexico and four other states. Additionally, the *DOE Region 4 RAP Response Plan* accurately explains radiological monitoring and assessment services available from the Region 4 RAP teams (assembled from personnel located at WIPP, Los Alamos National Laboratory, Sandia National Laboratories, and Pantex). Also, WIPP RAP teams have participated in several noteworthy offsite interactions during the last two years, which further familiarized officials with available DOE assistance and included coordination with the State of New Mexico on several actual events.

Although state and county authorities are aware of the assistance available from RAP, WTS has not included the Region 4 RAP teams in a WIPP fixed-facility exercise as required by DOE Order 151.1C. Additionally, WTS did not provide a plan or procedure to demonstrate that effective offsite radiological assessment, monitoring, and decontamination processes exist after a significant radiological material release. Furthermore, neither the *WIPP Emergency Management Program* nor state and county emergency plans discuss the offsite field monitoring resources needed to assist local governments in identifying the radiological plume, relocation area, and food control boundaries after a WIPP radiological emergency.

Importantly, WTS and the State of New Mexico do not have offsite field monitoring teams, and in the absence of a written plan or procedure that defines how offsite monitoring of actual or perceived radiological hazards will occur, performance of the response function will likely default to the DOE RAP. CBFO, the State of New Mexico, or local government can request RAP assistance after an incident involving the offsite release of radiological materials from the site. Nevertheless, no protocol or procedure integrates WIPP field monitoring concepts of operation with other potential offsite monitoring teams, which may include State of New Mexico agencies, the New Mexico National Guard 64th Civil Support Team, the DOE Region 4 RAP, EPA Region VI, or other Federal agencies. Furthermore, Eddy County stated that the county expects a WIPP RAP team response for any GE, in recognition of the very limited offsite monitoring capability of the state and the county. However, the availability of the WIPP RAP team is not guaranteed because that team could be deployed elsewhere, requiring deployment of another RAP team many hours away. (See Section 8.0, **OFI-15** and **OFI-16**.)

In response to the offsite monitoring issue, the NNSA Office of Emergency Management (NA-41) has stated that the next revision of DOE Order 151.1C should clarify the interface between site responsibilities, RAP responsibilities, and offsite organization responsibilities.

Overall, WTS appropriately documents a clear and comprehensive understanding of required offsite relationships and frequently interacts with response agencies and organizations capable of augmenting site response resources. However, the site has not demonstrated the appropriate planning, coordination,

and response capabilities to assist local governments in identifying the radiological plume, relocation area, and food control boundaries after a WIPP radiological emergency.

Support Agreements

DOE Order 151.1C and RCRA 40 CFR 264, Subpart D require that emergency plans and procedures document arrangements agreed to by local police departments, fire departments, hospitals, contractors, and state and local ERTs to coordinate emergency services. Specific to WIPP, the operator of an underground mine must also document any agreements for the services of MRTs, as required by Mine Safety and Health Administration 30 CFR §49.2(a), *Availability of MRTs*.

WTS has established an appropriate interface with each offsite entity that has agreed to provide support during WIPP site emergencies. Additionally, the *WIPP Emergency Management Program* describes and identifies the mechanisms for integrating local agencies and other external organizations into the site response. These mechanisms include policy letters, agreements, and MOUs between CBFO and external agencies. Local agencies entering into agreements with CBFO include area hospitals, local fire services, and local law enforcement agencies. Furthermore, the WIPP site benefits from a statewide mutual aid agreement with all government entities, widely referred to as the *State of New Mexico Intrastate Mutual Aid System* (NM Stat § 12-10B). This mutual aid agreement makes it unnecessary for CBFO and WTS to execute mutual assistance agreements with all potential offsite response organizations, although it allows for such agreements if desirable.

CBFO has adequate agreements with Intrepid Potash, Inc., and Mosaic Potash that provide for mutual aid and assistance in the form of MRTs in case of a mine disaster or other circumstance at any of the six mines. This provision ensures that WTS will have two MRTs available at all times when miners are underground.

Likewise, CBFO has signed suitable MOUs with regional hospitals to receive and medically treat chemically and radiologically contaminated injured site personnel. The Carlsbad Medical Center is the closest major hospital to WIPP and is the primary hospital that would treat injured personnel. If a mass-casualty incident (MCI) occurs at WIPP, the Carlsbad Medical Center (a level 3 trauma center) coordinates with other hospitals to transfer and subsequently treat patients, depending on the type of injury and extent of contamination. Additionally, although not a trauma center, Lea Regional Medical Center, located in Hobbs, has agreed to mutual assistance and emergency support. All regional hospitals are accessible by ambulance and medical helicopter; the ground transportation time from WIPP to the closest hospital is approximately 45 minutes. Additionally, air ambulance service is available for WIPP patient transport, depending on flight weather conditions.

WTS has also appropriately planned for an MCI. The *WIPP EMS Standard Operation Guidelines* (216.00) specifies possible MCI transport modes, in order of priority. These include one ambulance for primary EMS needs within the WIPP site and a rescue vehicle that serves as a backup ambulance. Additionally, CBFO has MOUs with Eddy County, the City of Carlsbad, and the City of Hobbs for ambulance and EMS resources. The New Mexico State EOC can assist local officials with deployment of additional resources when local governments exhaust their EMS resources (e.g., personnel and ambulances). In addition, the New Mexico Department of Health coordinates with local governments, as necessary, for other resources (e.g., ambulances or medical helicopters) located outside the initial response region. Nonetheless, WTS does not rely on any additional ambulance support within the first 45 minutes of a response.

DOE Order 151.1C does not specifically address the need to have an agreement with a level 1 trauma center to receive and medically treat chemically and radiologically contaminated injured WIPP site

personnel. However, the risk of death for a severely injured person is 25 percent lower if the patient receives care at a level 1 trauma center. Importantly, the nearest level 1 trauma centers are the University of New Mexico Hospital, located in Albuquerque, New Mexico, and the University Medical Center El Paso, located in El Paso, Texas, a distance of approximately 270 miles and 150 miles, respectively. Even so, CBFO may need to evaluate the need for an agreement with a level 1 trauma center to receive and treat contaminated injured personnel. (See Section 8.0, **OFI-17**.)

Lastly, DOE (the former Albuquerque Operations Office) signed a March 19, 1992, MOU with the State of New Mexico Department of Public Safety concerning mutual assistance and emergency management. This MOU, listed in the *WIPP Emergency Management Program* and the *WIPP HWFP RCRA Contingency Plan*, does not reflect numerous changes that have occurred within DOE in the past 20 years and contradicts some response concepts and actions found in WIPP documents that reference this MOU. (See Section 8.0, **OFI-18**.)

Overall, suitable written support agreements exist with offsite response agencies and organizations, including area hospitals, local fire services, and local law enforcement agencies. However, one MOU between DOE and the State of New Mexico Department of Public Safety is outdated and requires major revision or termination. Additionally, CBFO does not have an agreement with a level 1 trauma center to receive and medically treat chemically and radiologically contaminated injured WIPP site personnel; this shortcoming significantly increases the mortality risk for severely injured employees who would receive care at a non-trauma center.

Offsite Response Planning

DOE Order 151.1C and RCRA 40 CFR 264, Subpart D require that contractors at all DOE/NNSA facilities coordinate with state and local agencies and organizations responsible for offsite emergency response and for protection of the health and safety of the public. The site emergency management program can incorporate or invoke by reference existing plans, such as catastrophic earthquake plans or mass-casualty plans detailing compliance with Federal or state standards. Additionally, contractors must develop a methodology for informing the public of emergency plans and planned protective actions before and during emergencies. Furthermore, DOE Order 151.1C specifies that the PAGs promulgated by the EPA must be used as the basis for PAC involving radioactive material releases that impact the public.

WTS implements the *WIPP Emergency Management Program* using the *WIPP HWFP RCRA Contingency Plan*, the WP 12-ER series of emergency response procedures, administrative procedures, and the *BNA for the WIPP* (DOE/WIPP 11-3471); however, Independent Oversight concluded that WTS has not completed adequate offsite planning for significant WIPP emergency events. Importantly, offsite emergency planning must consider the following:

- An overarching factor in response planning is the location of the WIPP site, which is in a remote area of southeastern New Mexico with a low population density (approximately 16 permanent residents living within a 10-mile radius of the site).
- The nearest residents live at the J.C. Mills Ranch, approximately 3.5 miles from the center of the site.
- The most significant industrial developments in the area are the WIPP facilities, potash mining, and mineral exploration.
- Any mutual aid responders would likely require 45 minutes or more to respond to an onsite event.
- A severe NPE is likely to affect both the site and the surrounding counties, exacerbating the need to use scarce assets in the most prudent manner to accomplish national response priorities.

Several state and county emergency planning documents govern offsite emergency response for a major WIPP site emergency:

- The *State of New Mexico All-Hazard Emergency Operations Plan (EOP)* describes the state's planned responses to all hazards using the Department of Homeland Security *National Response Framework*.
- The *State of New Mexico All-Hazard EOP Catastrophic Incident Appendix* describes the state's approach for responding to catastrophic disasters.
- The *State of New Mexico Department of Homeland Security and Emergency Management Disaster Recovery Plan* provides guidance for coordinating state support to local and tribal governments, non-government organizations, volunteer agencies, and the private sector to enable community recovery from short-term and long-term disasters.
- Local EOPs for Eddy and Lea counties establish protocols for all local agencies involved in emergency operations.

The State of New Mexico, Eddy County, and Lea County have no specific emergency plans for WIPP operational emergencies. Additionally, in discussions with Independent Oversight, the Eddy County and Lea County Emergency Management Coordinators identified the need for fixed-facility planning, focused on WIPP radiological hazards. In addition, Eddy County recognized a shortcoming regarding how to notify offsite populations that must implement protective actions resulting from a WIPP radiological release. (See Section 8.0, **OFI-19**.)

RCRA 40 CFR 264, Subpart D states, "Whenever there is an imminent or actual emergency situation, the EC ... must immediately notify appropriate local authorities. He must be available to help appropriate officials decide whether local areas should be evacuated." Further, the EPA PAC guidance indicates that evacuating the public is usually justified when the projected dose to an individual exceeds 1 rem. The *WIPP Emergency Management Program* states that the spectrum of accidents analyzed in the sites' DSAs are bounding, so emergency response planning is based on the consequences of the DSA accidents and malevolent acts assuming only a moderate amount of material at risk. The *WIPP HWFP*, when addressing the issue of a hazardous waste release, concludes that an evacuation PAR for the general public is not necessary and that "A hazards assessment was conducted, which indicated no need for protective actions or EALs, as defined by the Permittees, for the hazardous waste contingencies that may occur at the WIPP facility. Therefore, no procedures are in place for evacuation of the public." These statements contradict the WIPP EPHA, which documents that a radiological material release is the primary concern for offsite emergency planning. Further, the WIPP EPHA and EALs (GE 1.9 and GE 4.1) provide consequence estimates for the worst-case radiological event that exceed a 1-rem total effective dose equivalent for approximately 5.3 miles and would require the implementation of offsite protective actions within the entire emergency planning zone. (See Section 8.0, **OFI-20**.)

Local governments confirmed that they are solely responsible for ordering the implementation of protective actions necessary to protect the public in the offsite areas impacted by a WIPP radiological release, based on timely PARs provided to the county notification points (Eddy County sheriff's office and City of Hobbs police and fire departments). Additionally, Eddy County authorities stated that they might request the WIPP site to assist in implementing offsite protective action measures, as needed. The *Categorization and Classification of Operational Emergencies* procedure provides pre-determined protective actions associated with EALs GE 1.9 and GE 4.1, which require the FSM to "evacuate the immediate area; all others remain indoors (onsite); provide PARs to outside agencies to shelter in place or evacuate those unable to shelter in place." However, Table 3 (Actions for Surface Operational Emergencies with EALs) and Table 5 (Actions for Surface Operational Emergencies with EALs) in this

procedure provides contradicting protective action instructions and requires the FSM to “notify local and state authorities outside the EUA (300 m) to evacuate to an upwind location or shelter in place residents in the downwind direction from the source of the release.” Regardless of the protective action used, offsite authorities have very limited capabilities for implementing the PARs and do not have plans and procedures that state the anticipated actions of each agency. The only viable method currently available is to dispatch a sheriff’s deputy to directly notify residents and the transient population within the emergency planning zone; this approach could put the deputy at risk of traversing the plume. Furthermore, WIPP has no plans and procedures for ensuring that offsite authorities have the following supporting information needed for evaluating and implementing the PARs:

- The time available for carrying out the protective action before the onset of the impact (i.e., plume arrival)
- The specific offsite areas where PAC may be exceeded, as determined from the quantity of material released, the event type, and the meteorological conditions, or from environmental sampling and monitoring results
- The relative effectiveness of the different possible protective actions, considering the material and the release type. (See Section 8.0, **OFI-21.**)

WTS has not established appropriate plans and procedures to close the nearby public roads in case of a severe NPE. Although WTS’s approach for defining the site boundary for the purpose of hazards assessment and offsite emergency response planning conforms to the intent of DOE Order 151.1C, emergency management guidance does not specifically address how to control public roads that cross DOE sites. However, DOE-STD-3009, *Preparation Guide for DOE Non-reactor Nuclear Facilities DSAs*, provides a definition of a site boundary as “a well-marked boundary of the property over which the owner can exercise control without the aid of outside authorities.” Independent Oversight evaluated the consistency of the site practices with current DOE policy, the adequacy of protective actions, and the demonstration of capability to establish control over the onsite access roads that the public habitually uses to traverse the site. Independent Oversight determined that the *WIPP Emergency Management Program* and the WP 12-ER series of emergency response procedures do not clearly and consistently describe the process for closing the site access roads. In addition, Independent Oversight identified several other issues regarding the road closure process:

- Depending on the extent of onsite damage, the WTS protective force could be dependent on outside agencies to control the north and south access roads during a severe NPE; outside agencies would need a considerable period of time to respond to WTS’s request for road closure assistance.
- During the time needed for the outside agencies to respond, the public may have access to potentially contaminated areas, would be unaware of the need to take protective actions, and could unknowingly spread contamination.
- The fixed barricades are located well inside the protective action zone (greater than 1 rem) for the worst-case emergencies.
- WTS has not tested road closure processes during evaluated exercises. (See Section 8.0, **OFI-22.**)

Finding F-2: WTS has not fully developed an effective integrated emergency management program that coordinates offsite response planning, including such PARs as sheltering, evacuation, relocation, and food control, as required by DOE Order 151.1C, Contractor Requirements Document, Sections 9, 14, 16, and 17, and RCRA 40 CFR 264, Subpart D.

Lastly, CBFO does not use the Lead Federal Manager (LFM) concept for emergency response, as promulgated in a March 24, 2003 memorandum from the Deputy Secretary of Energy. The memorandum sought to eliminate confusion among state and regional officials regarding who represents DOE/NNSA during emergencies and designated the Sandia Site Office Manager as the LFM for situations in the State of New Mexico. CBFO has no agreement to implement this concept, if still required.

Overall, the WIPP site's remote location limits its emergency response resources to site capabilities. Nearly all offsite mutual aid responders require 45 minutes or more to reach the site, and the state and local governments have very limited response planning specific to WIPP operational emergencies. Eddy County and Lea County representatives identified the need for specific emergency response planning, with attention to how to effectively notify offsite populations requiring protective actions in case of a WIPP radiological release. Most importantly, WTS's assumptions underlying public protection planning are incorrect or contradictory. Finally, response planning does not clearly identify the actions anticipated by each interface agency and the information needed to respond effectively.

Response and Recovery Operations

DOE Order 151.1C requires that recovery from a terminated operational emergency must include communication and coordination with state and local government and other Federal agencies; planning, management, and organization of the associated recovery activities; and ensuring the health and safety of the workers and public. Additionally, the contractor must have the means for estimating exposure to HAZMAT and for protecting workers and the public from exposure during reentry and recovery activities.

The *WIPP Emergency Management Program* fittingly captures the concept of operations, in which facility managers/supervisors and other key on-shift personnel immediately transition to an ERO after an operational emergency is declared. WTS appropriately use the hazards survey, EPHA, and other technical basis documents to identify the requisite skills and disciplines for mitigation of most emergency events at the site. Additionally, full authority and responsibility to implement the emergency plan resides with the FSM, operating out of the CMR, during an operational emergency response. Procedures, desk aids, and checklists require the FSM either to initially perform or to oversee initial response functions, including command and control in accordance with NIMS.

Additionally, a BNA process, performed in accordance with DOE Order 420.1B, *Facility Safety*, determined the necessary onsite fire and rescue support resources based on conclusions contained in the WIPP hazards survey and EPHA. The BNA concluded that:

- The WIPP Fire Brigade is capable of responding to most fire emergencies at the site using only WIPP assets.
- The minimum WIPP Fire Brigade staffing level, which is established at five members, accounts for multiple types of events, including an EMS incident in conjunction with a single event response, as well as contingencies for incident response through callback of off-duty personnel and reciprocal aid agreements.
- WTS maintains several formal agreements for fire fighting assistance with regional fire departments and with other Federal entities as identified in the *WIPP Emergency Management Program* and the *WIPP HWFP RCRA Contingency Plan*.
- The WIPP Fire Brigade currently has only one operable pumper (1995 Seagraves pumper) with the other onsite unit out of service (1984 General Motors Corporation pumper) pending replacement; efforts to replace the unit are awaiting funding. (See Section 8.0, **OFI-23**.)

Likewise, WTS adequately plans for wildland fires in accordance with DOE Guide 420.1-3, *Implementation Guide for DOE Fire Protection and Emergency Services Programs*. No wildland fires have occurred at the WIPP site, which encompasses roughly four square miles (16 sections) and covers an area of approximately 10,240 acres. The WIPP PPA is paved or covered with gravel and surrounded by a gravel road, so the site expects minimal damage from a wildland fire within the PPA. Further, WTS appropriately plans for wildland fires that could occur within the larger land withdrawal area. For example:

- A MOU between DOE and the Department of Interior provides Bureau of Land Management fire suppression resources to respond to wildland fires within the WIPP land withdrawal area.
- The *WIPP Fire Brigade Standard Operating Guidelines for Wildland/Urban Interface Fire Operations* (215.00) provides instructions for wildland fire fighting within the land withdrawal area.
- The WTS FSM stops hot work within the PPA to minimize the risk of a fire whenever Fire Brigade members support fire fighting outside of the PPA, as required by the *WIPP Fire Brigade Staffing* procedure (WP 04-AD3029).

Although WTS is able to perform mine search and rescue, as previously discussed, WTS has not documented provisions for other important technical rescue capabilities in accordance with the NFPA-1670, *Standard on Operations and Training for Technical Search and Rescue Incidents*. A variety of hazards, including earthquakes, manmade accidents, and terrorist activities, may result in the need for urban search and rescue (USAR) and could involve the location, extraction, and initial medical stabilization of victims trapped in confined spaces due to a structural collapse. Notably:

- The WTS Authority Having Jurisdiction determined that technical rescue capabilities for BDBEs are not necessary at WIPP.
- The Authority Having Jurisdiction's decision reflects the determination that the site does not need the capability for structural collapse search and rescue or trench and excavation rescue.
- WTS does not plan to have offsite organizations perform technical rescue activities at WIPP, other than mine search and rescue.
- The closest Federal Emergency Management Agency USAR team is the New Mexico-Task Force One (approximately 270 miles away), a 70-person USAR task force based in Albuquerque, New Mexico, with a publicized 4-hour dispatch time.
- The BNA does not identify and establish the levels of capabilities needed for conducting technical rescue operations. (See Section 8.0, **OFI-24**.)

WTS describes basic emergency event recovery operations in the *Termination, Reentry, and Recovery* procedure (WP 12-ER3903); however, Independent Oversight noted several limitations in response and short-term recovery planning for severe NPEs. For example:

- The *WIPP Continuity of Operations Plan* (WP 12-14) identifies mission-essential functions, which may be helpful in determining priorities for restoration and mitigation efforts during a severe NPE scenario; nevertheless, the plan documents only nominal reconstitution planning.
- Potential severe NPEs postulated for the WIPP site lack specific event response planning or procedures that include short-term recovery actions, such as considering infrastructure damage and outages that may impede the normal response of onsite or offsite responders. (See Section 8.0, **OFI-25**.)
- WTS does not demonstrate fundamental recovery plan preparation during functional exercises.

- WTS conducts some exercises that focus on severe NPEs, but none of these exercises postulates consequences that result in significant structural damage or building collapse and generate resource requirements that the WIPP site cannot meet.
- Eddy County and Lea County Emergency Management Coordinators stated that the counties have not participated in a WIPP fixed facility functional exercise or a tabletop exercise based on the worst-case radiological release scenario. (See Section 8.0, **OFI-26**.)

Overall, WTS uses the hazards survey, EPHA, and other severe NPE analyses to establish the offsite response assets necessary to respond to a design basis event, including events that require mine search and rescue. On the other hand, WTS has incomplete planning for response and short-term recovery activities related to a severe NPE. Independent Oversight also found that WIPP emergency planning documents do not include offsite recovery planning for determining the affected area after a radiological release and ensuring a mutual understanding of the assessment methods used, the type of results to expect, and the bases for any PARs that the WIPP site may issue. Additionally, WTS has not identified important technical rescue capabilities that the Fire Brigade may need after a severe NPE or how infrastructure damage and outages might affect the recall of onsite responders and mutual assistance from offsite responders, who may be prevented from responding due to the remote location of the site. Lastly, WTS does not conduct recovery exercises, and few exercises focus on the response to severe NPEs.

6.0 CONCLUSIONS

This review focused on selected emergency management programmatic elements, with an emphasis on the WIPP site's preparedness for severe NPEs. Independent Oversight determined that CBFO and WTS met the four objectives stated in the scope of this review.

Independent Oversight noted several positive program attributes demonstrating that CBFO and WTS have improved aspects of the emergency management program, enabling site responders to respond to a wide range of potential initiating events. WIPP RADCON processes ensure adequate monitoring of radiological airborne and surface contamination during emergency events, and an adequate quantity of operable and calibrated radiation survey equipment is available to respond to a radiological release caused by a severe NPE. Procedures for ERO positions adequately provide guidance to emergency response personnel, define roles and responsibilities of facility emergency response personnel, and outline processes used to assess event consequences. The WIPP site also has an adequate normal power supply and the capability to provide backup power to priority loads from standby diesel generators. Further, UPS units and batteries provide continuous power for at least 30 minutes to equipment needed to support implementation of protective actions. PPE for response to severe NPEs is available for the RCTs, personnel undergoing decontamination, and the MRTs, as is an adequate quantity of HAZMAT detection equipment.

However, Independent Oversight noted that although UPS and batteries are capable of providing continuous power for at least 30 minutes, system limitations and required operator actions make the restoration of AC power during a radiological release with 30 minutes unlikely. In addition, command centers do not have habitability systems to allow ERO personnel to remain within these facilities and perform their response duties. Finally, WTS has not adopted DOE-STD-3003-2000 as a requirement that establishes both general and detailed requirements for reliable backup and emergency power sources for such systems as nuclear safety systems, radiation monitors and alarms, fire protection systems, security systems, data processing equipment, and emergency lighting. This standard generally requires more robust testing than is currently being performed at WIPP on some of these systems.

Most significantly, Independent Oversight determined that the protective action and PAR processes, from development of the criteria to the notification of offsite authorities, is deficient. For onsite personnel, the protective actions do not consider indoor air quality or the habitability of facilities. For the public, the PARs do not contain the relevant information that offsite authorities need in order to make informed decisions, such as the time available for carrying out the protective action before the onset of the impact (i.e., plume arrival) and the specific offsite areas where PAC may be exceeded. (Finding #1)

Additionally, Independent Oversight noted several variances between the *WIPP HWFP RCRA Contingency Plan* and WIPP emergency management program documentation, including an erroneous statement that a hazards assessment was conducted, which indicated no need for protective actions or EALs, as defined by the Permittees, for the facility. However, the WIPP EPHA and additional documents refer to a radiological material release as the primary concern for offsite emergency planning, discuss PARs, and identify emergencies resulting in a GE classifications.

In addition, WTS, the State of New Mexico, and local governments do not have the offsite field monitoring teams necessary for defining contaminated areas, and they generally default to DOE RAP to perform these functions. There are no plans or procedures defining how to integrate these teams into the response or how to utilize the gathered data. Further, CBFO and WTS have not demonstrated the appropriate planning and coordination with state and local governments for closing nearby roads, identifying relocation areas, and defining food control boundaries after a radiological release. (Finding #2)

7.0 FINDINGS

Findings indicate significant deficiencies or safety issues that warrant a high level of management attention. If left uncorrected, such findings could adversely affect the DOE mission, the environment, the safety or health of workers or the public, or national security. Findings may identify aspects of a program that do not meet the intent of DOE policy.

Finding F-1: WTS has not fully developed pre-determined protective actions and PARs that are technically based and ensure the health and safety of workers and the public, as required by DOE Order 151.1C, Contractor Requirements Document, Section 14. (See Section 5.2.)

Finding F-2: WTS has not fully developed an effective integrated emergency management program that coordinates offsite response planning, including such PARs as sheltering, evacuation, relocation, and food control, as required by DOE Order 151.1C, Contractor Requirements Document, Sections 9, 14, 16, and 17, and RCRA 40 CFR 264, Subpart D. (See Section 5.4.)

8.0 OPPORTUNITIES FOR IMPROVEMENT

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

DOE Carlsbad Field Office

OFI-15: To improve offsite radiological assessment, monitoring, and decontamination of the public, consider:

- Developing protocols for establishing unified command among the organizations capable of providing offsite monitoring (RAP, New Mexico National Guard 64th Civil Support Team, and EPA Region VI), depending on each team's capabilities.
- Coordinating field monitoring methods to ensure that data is collected in a uniform manner consistent with Federal Radiological Monitoring and Assessment Center methods.
- Planning for a significant offsite monitoring effort that includes a phased response by the Federal Radiological Monitoring and Assessment Center that initially provides a Consequence Management Response Team to augment RAP.
- Planning for an appropriate transition to the Federal Radiological Monitoring and Assessment Center and the Interagency Modeling and Atmospheric Assessment Center.
- Evaluating field monitoring concepts of operation during WIPP exercises with other potential monitoring teams, which may include State of New Mexico agencies, the New Mexico National Guard 64th Civil Support Team, the DOE Region 4 RAP, EPA Region VI, or other Federal agencies.

Washington TRU Solutions, LLC

OFI-1: To improve the EPHA development procedure and to enhance the effectiveness of the EPHA, consider:

- Revising the *Development and Maintenance of an EPHA* procedure to include natural phenomena initiating events.
- Revising the *Development and Maintenance of an EPHA* procedure to include severe NPEs identified by the DSA.
- Identifying and including all significant receptors of interest in the *Development and Maintenance of an EPHA* procedure and the EPHA.
- Revising the EPHA to include dose consequence results for all significant receptors of interest.

OFI-2: To improve site-specific planning for implementing protective actions and PARs, consider:

- Developing event-specific EALs for NPE and severe NPE analyses contained in the EPHA.
- Including event-specific EALs for NPE and severe NPE that result in radiological material releases in the *Categorization and Classification of Operational Emergencies* procedure.
- Developing situation-specific EALs that indicate appropriate initial protective actions and PARs (sheltering or evacuation) for each scenario event analyzed.
- Developing generic (or discretionary) EALs that contain adequate judgment-based EAL statements to cover situations not addressed in facility-specific EALs.

OFI-3: To ensure that important equipment has a reliable backup power source, consider:

- Invoking DOE-STD-3003-2000 as a requirement for diesel generators and UPS systems.
- Documenting how the emergency diesel generators meet the NFPA-110 standard.
- Adding a UPS unit at the Alternate EOC to power essential equipment used during an emergency response.

- Determining how to protect operators while they are manually starting the diesel generators and aligning breakers during a radiological release.

OFI-4: To more fully describe the WIPP emergency management program and provide improved implementing guidance, consider the following updates to plans and procedures:

- Revise the *Surface Backup Power Distribution* procedure to identify the kW rating of listed loads or provide a similar tool to ensure that operators do not trip the generators due to an overload.
- Add the EOC as a priority load to the *Surface Backup Power Distribution* procedure.
- Revise the *Radiological Event Response* procedure to specify the safe evacuation distance determined by the EPA, identify the event as a classifiable operational emergency, and reference the appropriate EAL for implementation.
- Add instructions to the *Earthquake/Seismic Response* procedure for surface personnel to implement during an earthquake.
- Revise pre-fire plans to reflect all information required by the *Developing and Modifying Pre-Fire Plans* procedure.
- Include pre-fire plans in a document control program to ensure that WTS updates the controlled copies with the current revisions and that all locations specified by the procedure have controlled copies.
- Revise the *Developing and Modifying Pre-Fire Plans* procedure to specify the frequency of facility walkdowns to keep pre-fire plans current.
- Add the Office Warden duty to perform building sweeps to the *Evacuation/Shelter-in-Place* procedure.
- Revise the *WIPP Emergency Management Program* to describe the use of the remote offsite assembly area during a site evacuation.
- Expedite the completion of planning activities and publish the *Office Warden Program* procedure.
- Add a requirement for a duty roster to the *Office Warden Program* procedure to ensure continuous coverage of emergency response duties.
- Revise the *Underground Access Control* procedure and the draft *Office Warden Program* procedure to provide consistent instructions for accountability and reporting of personnel (surface and underground) who have exited the site during a site evacuation.

OFI-5: To strengthen the testing of ERO communication equipment, consider:

- Adding testing of the EOC hand-held radios and all facsimile machines to the *Site EOC Checklist*.
- Expanding the detail in the *Site EOC Checklist* to note the operability expected of the equipment (such as ability to transmit and receive a facsimile or create and display an event log).
- Creating a checklist for periodically testing the operability of all equipment in the Alternate EOC that notes the specific equipment to be tested and the operability expected of the equipment.
- Adding a requirement to periodically test the EOC and Alternate EOC equipment, using approved checklists.
- Adding a requirement for daily testing of the emergency reporting telephone system's operability.

OFI-6: To improve backup communication options for the ERO, consider:

- Boosting the radio signal strength inside the Safety and Emergency Services Building.
- Adding repeaters to broaden the radio system coverage around the WIPP site.

- Purchasing satellite telephones to supplement the radios and cellular telephones used by the RCTs and Fire Brigade.

OFI-7: Consider adding a requirement to periodically test the notification process for contacting the WIPP MRT captains, WIPP MRT members, and the two local potash mine MRTs.

OFI-8: Consider eliminating informal emergency notifications to the public unless covered by an agreement with a local government agency.

OFI-9: To ensure that WTS site can provide offsite notifications in the required timeframes, consider:

- Adding a requirement to periodically test the notification process with the offsite organizations.
- Periodically validating the telephone and facsimile numbers for the offsite organizations.

OFI-10: To ensure that the use of Fire Brigade’s protective suits do not endanger responders, consider:

- Removing the protective suits from the list of required emergency equipment in *WIPP HWFP*.
- Adding a requirement to test and inspect the suits in accordance with the manufacturer’s recommendations to procedure WP 12-FP0033.
- Tagging the protective suits as out of service until testing and inspection are completed.

OFI-11: To enhance the capabilities to respond to a large-scale contamination event, consider:

- Expediting the purchase of the replacement decontamination shower trailer.
- In the near term, testing the Fire Brigade’s ability to conduct gross decontamination.
- Including a demonstration of gross decontamination activities in the Fire Brigade training requirements.

OFI-12: To improve the state of preparedness for the safety and rescue of underground personnel, consider:

- Developing a procedure that instructs underground personnel how to manipulate underground bulkheads and equipment to reduce natural ventilation flow from the surface if a radiological material release is in progress above ground.
- Establishing a written agreement with appropriate local offsite mining companies that identifies underground personnel rescue equipment available for use in case of a prolonged loss of AC power at WIPP.

OFI-13: To improve the effectiveness of the WIPP ERO, consider:

- Transferring the ED function from the FSM to the EOC Crisis Manager once the EOC is operational.
- Revising the *WIPP HWFP RCRA Contingency Plan* to reflect the transfer of the ED function between the FSM and EOC Crisis Manager.
- Assigning the responsibility for the following activities to the EOC:
 - Coordinating with state and local governments.
 - Providing information to the public and media.
 - Activating and deploying offsite assets.
 - Providing strategic direction for the overall contractor response.
 - Communicating with the DOE Headquarters EOC.

- Allowing the FSM to focus on the site-level response, supported by the EOC.

OFI-14: To ensure decision-making ERO personnel understand the EPHA event scenarios that were analyzed and the resulting EALs, protective actions, and PARs, consider adding required reading of the EPHA into their position-specific ERO training requirements.

OFI-16: To improve offsite radiological support for Eddy County, Lea County, and the State of New Mexico, consider:

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

OFI-17: To improve EMS and MCI response capabilities, consider:

- Ensuring the University of New Mexico Hospital, located in Albuquerque, agrees to receive and medically treat chemically and radiologically contaminated injured WIPP site personnel at their level 1 trauma center (Los Alamos National Laboratory also has an agreement with the hospital).
- Incorporating the Centers for Disease Control and Prevention *Guidelines for Field Triage of Injured Patients*, 61(RR01), which serves as the basis for triage protocols to guide initial EMS providers through the decision steps to determine the most appropriate destination facility within the local trauma care system.

OFI-18: To eliminate the contradictions found in the 1992 MOU between DOE and the State of New Mexico Department of Public Safety concerning mutual assistance and emergency management, consider updating the agreement or remove it from the *WIPP Emergency Management Program* and the *WIPP HWFP RCRA Contingency Plan*.

OFI-19: To improve public protection planning for a WIPP site worst-case DSA and EPHA event, consider:

- Documenting assumptions made by WTS as the basis for public protection planning.
- Stating the anticipated actions of each interface agency and defining the information that each one needs to respond effectively to WIPP operational emergencies.
- Predetermining PARs (sheltering, evacuation, relocation, food control, etc.) and deciding how to communicate this information to the affected public before and during emergencies.
- Identifying geographic areas for offsite protective actions and other locations of significance with regard to a radiological release.
- Establishing the means for estimating exposure to a WIPP radiological release and protecting the public from exposure during reentry and recovery activities.

OFI-20: To improve site-specific planning for pre-determining protective actions for the surrounding public (residents and outdoor transients), consider:

- Reconciling the incorrect or contradictory public protective action assumptions and recommendations stated in the EPHA, the *Categorization and Classification of Operational Emergencies* procedure, the *WIPP Emergency Management Program*, and the *WIPP HWFP RCRA Contingency Plan*.
- Developing an emergency response procedure for protective actions, based on the EPA's *Manual of PAGs and Protective Actions for Nuclear Incidents* and the projected dose value for initiating public evacuation (1 rem).
- Ensuring that initial (early phase) PARs are based on predicted or potential radiological conditions in the environment rather than on actual measurements and primarily consider the dose that is avoided by taking the protective action.

OFI-21: To improve site-specific planning for implementing protective actions for the surrounding public (residents and outdoor transients), consider:

- Evaluating the installation of a public warning siren system around WIPP and using a combination of siren assemblies and coordinated emergency alarm activation by local and/or state government to inform and direct protective actions of the public.
- Integrating a public warning siren system with the existing State of New Mexico Emergency Alert System (EAS), which already includes provisions for adding the WIPP site as discussed in the *State of New Mexico EAS State EAS Plan*.
- Defining key protocols in a protective action procedure, such as notifications, activation of public notification methods, minimum information needed by offsite organizations to implement the PARs, and safety considerations for offsite responders required to perform route alerting.

OFI-22: To improve the understanding and implementation of road closures at the site, consider:

- Including a description of the concept of operations for road closures in the *WIPP Emergency Management Program*.
- Selecting barricade points based on the results of the current EPHA and DSA.
- Developing a special plan for New Mexico State Police, Eddy County Sheriff's Office, or Lea County Sheriff's Office to relieve the WTS officers at the barricades, if protective force officers are needed elsewhere on site.
- Adding tasks for the CMR or EOC personnel to follow up on the evacuation of the roadways; utilize properly trained and equipped personnel, such as radiation control technicians, to perform a sweep of the roadway (when conditions permit) in conjunction with field monitoring activities.
- Installing message reader boards, as an additional measure, at locations that members of the public can see as they approach the access roads.
- Conducting evaluated drills and exercises to demonstrate road closure within approximately one hour of declaration of an emergency that requires road closures.

OFI-23: To eliminate the vulnerabilities associated with having only one operable fire pumper on site, consider giving increased priority to replacing the out-of-service 1984 General Motors Corporation pumper.

OFI-24: To improve site-specific planning for technical rescue operations, consider:

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

OFI-25: To continue to improve site-specific planning for severe NPEs at the WIPP site, consider:

- Planning for response to NPEs that could have a significant and widespread impact on the site and surrounding community emergency response infrastructure.
- Integrating NPE response planning with applicable state and Federal catastrophic event plans.
- Referencing other appropriate site-specific emergency planning documents as annexes to the emergency plan (e.g., the heightened security conditions response plan and continuity-of-operations plan).
- Including the planning assumptions that severe NPEs overwhelm site and local response capabilities, adversely impact site safeguards and security measures, cause a long-term outage of critical site infrastructure and systems (e.g., power, water, and communications), and cause secondary events such as fires or landslides.
- Developing functional (e.g., protective force operations, power and utilities, fire protection, telecommunications, shift operations, and critical facilities/operations) emergency response procedures, matrices, or checklists needed to respond to a severe NPE.
- Developing an incident action plan template for a multiagency response at the WIPP site that includes a statement of objectives, NIMS/incident command system organization, tactics and assignments, and supporting materials (e.g., maps, communications plan, medical plan, traffic plan, and special precautions).
- Pre-determining the types of additional resources needed by the site, the availability of those resources, and logistical requirements once the resources arrive at the site.
- Triggering self-help response, including the identification of roles and responsibilities, life-saving skills among workers, and locations of medical and life-sustaining supplies currently on site.

OFI-26: To continue reinforcing the WIPP ERO and offsite responder skills and capabilities related to severe NPEs, consider:

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

9.0 UNRESOLVED ITEMS

A March 24, 2003, memorandum from the Deputy Secretary of Energy designated the Sandia Site Office Manager as the LFM for situations in the State of New Mexico, with the intention of eliminating confusion among state and regional officials regarding who represents DOE/NNSA during emergencies. CBFO has not adopted the LFM concept into their emergency response plans as directed. HSS Independent Oversight previously documented the LFM issue in the *Independent Oversight Review of Site Preparedness for Severe NPEs at the Los Alamos National Laboratory* (May 2012) and the *Independent Oversight Review of Site Preparedness for Severe NPEs at the Idaho National Laboratory* (July 2012). NA-43 is aware of this issue, and Independent Oversight recommends that CBFO consult with their line management to resolve the applicability of this memo to their site.

10.0 ITEMS FOR FOLLOW-UP

DOE Order 227.1, *Independent Oversight Program*, states that timely and appropriate action to address the findings and other deficiencies identified in HSS Independent Oversight appraisal reports must be taken and that corrective action plans must be developed and implemented for Independent Oversight appraisal findings. Cognizant DOE managers must use site- and program-specific issues management processes and systems developed in accordance with DOE Order 226.1B, *Implementation of DOE Oversight Policy*, to manage and track these corrective action plans to completion.

DOE Order 227.1 further states that the HSS Office of Enforcement and Oversight must establish and implement a tailored approach for following up on findings based on significance and complexity. The approach must include selected appraisals to review the timeliness and adequacy of corrective actions, verify and validate the effectiveness of the corrective actions, and confirm closure of findings.

Therefore, as part of its oversight activities, Independent Oversight will follow the closure of the findings identified in Section 7.0 and monitor the disposition of the OFIs, particularly those concerning protective actions, PARs, offsite planning, and radiological field monitoring. Because this review encompassed only selected emergency management elements identified in DOE Order 151.1C, future assessments should consider focusing, in part, on other elements of the emergency management program, including readiness assurance, exercises, and termination and recovery.

Appendix A Supplemental Information

Dates of Review

Scoping Visit:	June 5-7, 2012
Onsite Data Collection Visit 1:	June 25-28, 2012
Onsite Data Collection Visit 2:	July 9-11, 2012
Validation:	July 12, 2012

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Appendix B

Referenced Documents and Interviews

Referenced Documents

- 61(RR01), Centers for Disease Control and Prevention, Guidelines for Field Triage of Injured Patients, 1/13/12
- 215.00, WIPP Fire Brigade Standard Operating Guidelines for Wildland/Urban Interface Fire Operations, 7/11
- 216.00, WIPP EMS Standard Operation Guidelines, 2/12
- Department of Homeland Security, National Response Framework, 1/08
- DOE Guide 151.1-2, Technical Planning Basis EMG, 7/11/07
- DOE Guide 151.1-3, Programmatic Elements EMG, 7/11/07
- DOE Guide 151.1-4, Response Elements EMG, 7/11/07
- DOE Guide 420.1-3, Implementation Guide for DOE Fire Protection and Emergency Services Programs, 9/27/07
- DOE LFM Memorandum related to an Emergency Situation at or Near a DOE Field Site, 7/24/03
- DOE Order 151.1C, Comprehensive Emergency Management System, 11/2/05
- DOE Order 226.1B, Implementation of DOE Oversight Policy, 4/25/11
- DOE Order 227.1, Independent Oversight Program, 8/30/11
- DOE Order 420.1B, Facility Safety, 12/22/05
- DOE Region 4 RAP Response Plan, 7/05
- DOE/WIPP 07-3372, WIPP DSA, Rev. 3, 5/11
- DOE/WIPP 07-3373, WIPP TSRs, Rev. 3, 5/11
- DOE/WIPP 08-3378, WIPP EPHA, Rev. 2, 4/11
- DOE/WIPP 11-3471, BNA for the WIPP, 8/11
- DOE-STD-3003-2000, Backup Power Sources for DOE Facilities, 1/00
- DOE-STD-3009, Preparation Guide for DOE Non-reactor Nuclear Facilities DSAs, 3/06
- EPA 400R92001, Manual of PAGs and Protective Actions for Nuclear Incidents, 5/92
- HSS Criteria, Review, and Approach Document 45-51, Emergency Management Program Inspection Criteria, Approach, and Lines of Inquiry, Targeted Review of Site Preparedness for Severe NPEs, Rev. 0, 11/17/11
- Independent Oversight Review of Site Preparedness for Severe NPEs at the Idaho National Laboratory, 7/12
- Independent Oversight Review of Site Preparedness for Severe NPEs at the Los Alamos National Laboratory, 5/12
- Mine Safety and Health Administration Title 30 CFR §49.2(a), Availability of MRTs, 7/1/10
- NFPA-110, Standard for Emergency and Standby Power Systems, 2010
- NFPA-111, Standard on Stored Electrical Energy Emergency and Standby Power Systems, 2010
- NFPA-1670, Standard on Operations and Training for Technical Search and Rescue Incidents, 2009
- NFPA-1221, Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems, 2002
- NM Stat § 12-10B, State of New Mexico Intrastate Mutual Aid System, 12/15/08
- NM4890139088-TSDF, WIPP HWFP RCRA Contingency Plan, 5/8/12
- Plan for the Independent Oversight Review of Site Preparedness for Severe NPEs at the WIPP, 6/12
- Pre-Fire Surveys for Building 411, 2/13/10
- RCRA 40 CFR 264, Subpart D, Contingency Plan and Emergency Procedures, 1/31/85
- SDD ED00, Electrical System Design Description, Rev. 9, 2/9/10

- Site EOC Checklist, Rev. 5, undated
- State of New Mexico All-Hazard EOP, 7/07
- State of New Mexico Department of Homeland Security and Emergency Management Disaster Recovery Plan, 1/10
- State of New Mexico EAS State EAS Plan, 10/7/08
- WF10-171, Debrief for Loss of Offsite Power to Plant Substation B on 06/07/2010
- WIPP HWFP, 1/31/12
- WP 04-AD3001, Facility Mode Compliance, Rev. 30, 4/11/12
- WP 04-AD3013, Underground Access Control, Rev. 28, 12/29/10
- WP 04-AD3029, WIPP Fire Brigade Staffing, Rev. 2, 6/4/12
- WP 04-CA4001, Compressed Air System Alarm Response, Rev. 4, 3/15/12
- WP 04-ED1341, Surface Backup Power Distribution, Rev. 8, 8/16/11
- WP 04-ED4301, Diesel Generators 1 and 2 Local Alarm Response, Rev. 2, 2/5/04
- WP 04-ED4542, Central UPS Unit 2, 45P-UPS03/2, Rev. 0, 8/30/96
- WP 04-EM4200, Radiation Monitoring System Alarm Response, Rev. 15, 6/17/11
- WP 04-GC4021, High Precipitation Rate Alarm Response, Rev. 0, 11/11/99
- WP 04-HV4021, HVAC Alarm Response, Rev. 5, 9/28/10
- WP 04-VU4605, UVFS Alarm Response, Rev. 6, 7/22/02
- WP 12-9, WIPP Emergency Management Program, Rev. 33, 5/23/12
- WP 12-11, Development and Maintenance of an EPHS, Rev. 4, 1/14/11
- WP 12-12, Development and Maintenance of an EPHA, Rev. 4, 5/24/12
- WP 12-13, Development and Maintenance of EALs, Rev. 3, 1/14/11
- WP 12-14, WIPP Continuity of Operations Plan, 3/24/10
- WP 12-ER3002, EOC Activation, Rev. 19, 12/28/10
- WP 12-ER3005, Office Warden Program, undated draft
- WP 12-ER3903, Termination, Reentry, and Recovery, Rev. 6, 10/12/10
- WP 12-ER3906, Categorization and Classification of Operational Emergencies, Rev. 3, 6/17/11
- WP 12-ER4901, Severe Weather Response, Rev. 6, 8/29/11
- WP 12-ER4903, Radiological Event Response, Rev. 15, 5/10/11
- WP 12-ER4907, Evacuation/Shelter-in-Place, Rev. 9, 6/26/08
- WP 12-ER4910, Earthquake/Seismic Response, Rev. 7, 4/4/10
- WP 12-ER4916, Consequence Assessment Dose Projection, Rev. 17, 9/27/11
- WP 12-FP0033, Inspection of Emergency Response Equipment, Rev. 1, 5/14/12
- WP 12-FP3004, Developing and Modifying Pre-Fire Plans, Rev. 0, 11/17/11
- WP 12-HP1316, Decontamination Facility Operations, Rev. 1, 12/16/09
- WP 12-HP3000, RADCON Administration, Rev. 16, 4/18/11
- WP 12-RP.01, DOE WIPP EPHS Report, Rev. 4, 4/6/11.

Interviews

- CBFO Emergency Management Program Manager
- CBFO Fire Protection Engineer
- CBFO Security Manager
- City of Hobbs Fire Chief
- Eddy County Emergency Management Coordinator
- Lea County Emergency Management Coordinator
- WTS Advisory Scientist (Industrial Hygiene)

- WTS Buyer (Fuel)
- WTS Chief Office Warden
- WTS CMROs (2)
- WTS Electrical Cognizant Engineer
- WTS Emergency Management and Operations Supports Manager
- WTS Emergency Management Specialist
- WTS Emergency Services Coordinators (2)
- WTS EST
- WTS Engineering and Technical Services Manager
- WTS Facility Operations Manager
- WTS Fire Protection Engineer
- WTS Geotechnical and Mining Engineering Manager
- WTS Instrumentation and Controls Maintenance Manager
- WTS Inventory Control Manager (Fuel)
- WTS Nurse
- WTS On-Shift Facility Engineers
- WTS RADCON Engineers (2)
- WTS Radiological and Controls Superintendent
- WTS RADCON and Dosimetry Manager
- WTS Safety and Health Deputy Manager
- WTS Security and Emergency Services Deputy Manager
- WTS Security and Emergency Services Manager
- WTS Senior Engineer
- WTS Senior Training Coordinator
- WTS Surface Maintenance Manager
- WTS Systems Engineer (MRT)
- WTS Underground Operations Manager
- WTS Waste Operations Manager
- WTS WIPP RAP Team Coordinator.