CHAPTER E

PREPAREDNESS AND PREVENTION

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CHAPTER E

PREPAREDNESS AND PREVENTION

E-1 Preparedness and Prevention Requirements

Preparedness and Prevention Requirements are as described in the following sections.

E-1a Equipment Requirements

The WIPP facility is well equipped with internal and external communications systems, emergency equipment, and water for fire control. As shown in the following sections, the Permittees fully commit to meeting the requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.32 and §264.34).

E-1a(1) Internal Communications

20.4.1.500 NMAC (incorporating 40 CFR §264.32(a)), requires a facility to have an internal communications or alarm system capable of providing immediate emergency instructions (voice or signal) to facility personnel. In addition, 20.4.1.500 NMAC (incorporating 40 CFR §264.34(a)), requires that employees have immediate access to an internal alarm or emergency communication device when handling transuranic (**TRU**) mixed waste. The following discussions show that the WIPP facility is well equipped for internal communications and that the Permittees fully commit to complying with the regulations.

The intraplant communication systems, designed to provide immediate emergency instructions to facility personnel, include two-way communication by the public address (**PA**) system and its intercom phones and paging channels, an intraplant telephone system, mine phones, pagers and plectrons, portable two-way radios, and local and facility wide alarm systems. The procedures for notifying facility personnel in an emergency are contained in the Contingency Plan, Permit Attachment F of this Permit.

The intercom system (with an integral PA system) consists of handset stations and loudspeaker assemblies, with multiple amplifiers. The system has multiple channels in the main buildings. Initial communication between parties within the plant can be established by using the paging channel. Each designated location has a single set of electrically isolated speakers and a handset. In order to cover most areas in the plant, loudspeakers are properly oriented, and volume levels are adjusted. If one station fails, the remaining stations are isolated from the out-of-service unit to prevent a failure in the remaining system.

Private branch automatic exchange two-way communication is provided between any two telephones located above or below ground. Direct dialing to outside telephones and direct dialing to WIPP facility telephones are provided by this system. Failure of a single telephone station does not affect the balance of the telephone system. If the telephone system should fail, the PA system, the plectrons, and the portable two-way radios provide backup surface communications.

The Site Notification System (**SNS**) consists of pagers in the possession of office wardens and plectrons located in various buildings. The SNS pagers and plectrons are tone-activated radio receivers that are activated by the two-way radio system. To generate a tone on the pagers and plectrons or to send a verbal message, the radio operator enters a security code into the two-way radio system and begins broadcasting. The SNS pagers are portable and battery-operated. The plectrons are portable and can be plugged into a standard electrical circuit or powered from internal batteries that are continuously recharged when connected to the electrical circuit.

A plant radio station in the Guard and Security Building, one located in the Emergency Operations Center in the Safety and Emergency Services Building, and one in the Central Monitoring Room (**CMR**), allow two-way radio communication with on-site personnel and with mobile/portable WIPP facility radios operating on and off the WIPP site. The two-way radio also allows one-way emergency notification on the portable SNS pagers and plectrons. The two-way radio system located in the CMR is supplied with power from the uninterruptible power supply if the off-site power supply fails.

There are various alarm systems used at the WIPP facility. The PA system has two alarm tones in use, a yelp and a gong. Its signals are produced in the master PA console by a tone generator and are transmitted sitewide over the paging channel of the system, overriding its normal use. The signals are intermittent and of high intensity. The evacuation tone is a yelp tone and is used for, and limited to, situations requiring immediate, rapid, and complete (or selective area) evacuation. The evacuation tone is initiated manually on the surface. In the underground, the evacuation tone may be initiated manually or automatically by underground fire detection and alarm systems. This tone is also a yelp tone. It is accompanied with strobe lights for high noise areas. These alarm signals take priority over other signals on the paging channel but do not affect the intercom channels. Evacuation alarms using the PA system, local and plantwide, also can be initiated manually from the CMR in the Support Building. The audible alarm signals are supplemented by warning lights in high ambient-noise areas underground, such as active mining areas. These alarms are supplied with power from the uninterruptible power supply if the off-site power supply fails. The PA system may also produce a gong tone followed by a message. Local fire alarms are bell tones.

Whenever TRU mixed wastes are handled, two persons, at a minimum, are involved in the operation. The WHB contains readily accessible telephones and PA stations throughout. The mine phones are the main means of communication underground, although the PA system is also available.

Underground communication and alarm systems will be arranged to meet the requirements of 30 CFR Part 57. Telephones or other two-way communication equipment with instructions for their use will be provided for communications from underground to the surface. These communications are typically moved to ensure communications are maintained close to the work areas. Alarm systems capable of promptly warning every person underground, will be provided and maintained in operating condition. If persons are assigned to work areas beyond the warning capabilities of the system, provisions will be made to alert them in a proper manner to provide for their safe evacuation. Typically, these provisions include a flashing light capable of being

seen easily. As part of the preoperational inspection, prior to initiating waste handling operations underground, waste handling personnel verify that underground communications are ready and are working. If they are not working, repairs are initiated.

Table F-6 in Permit Attachment F describes the capabilities and locations of the various internal communication systems.

E-1a(2) External Communications

20.4.1.500 NMAC (incorporating 40 CFR §264.32(b)), requires that a communications device be available for contacting outside agencies for emergency assistance. In addition, 20.4.1.500 NMAC (incorporating 40 CFR §264.34(b)), requires that if just one employee is on the premises, the employee must have immediate access to a device capable of summoning outside help. TRU mixed waste handling operations are not conducted at the WIPP facility when only one person is present on the premises. TRU mixed waste handling operations are conducted by two or more persons. The security officers and staff from Facility Operations are also present at the WIPP facility during TRU mixed waste handling operations. When no TRU mixed waste handling operations are being conducted at the WIPP facility, at a minimum, the security officers and staff from Facility Operations are present. As discussed below, the WIPP facility has the required external communication devices and will operate in a manner that fully complies with these regulations.

The external communication systems, designed to provide two-way communication with outside agencies or for summoning emergency assistance from off site, include the commercial telephone system and two-way radios.

Direct dialing through any telephone located above or below ground allows contact with outside agencies. Failure of a single telephone station does not affect the balance of the telephone system. Sixty percent of the direct-dial incoming and outgoing lines are routed via a microwave system located on the edge of the parking lot. The remaining 40 percent of the direct-dial lines are routed to Carlsbad by means of a buried cable. In the unlikely event that both routing modes are inoperable, direct dial telephone capability still exists via cellular telephone or Satellite Communications (**SATCOM**) linkage in the Emergency Operations Center.

Plant radio stations in the Guard and Security Building and in the Emergency Operations Center in the Safety and Emergency Services Building allow two-way radio communication with the CMR, the Eddy County and Lea County Sheriff's Departments, the New Mexico State Police, and the Otis Fire Response Teams. Communication is available with the Lea County Sheriff's Department, the Hobbs Fire Department, the Carlsbad Medical Center, and the Columbia Regional Hospital via the Eddy County dispatcher. Another base station is in the CMR, however it is not normally used to communicate with offsite agencies. Radios are not inspected, instead, they are operated daily and repaired if they fail.

Table F-6 in Permit Attachment F describes the capabilities and locations of the various external communication systems.

E-1a(3) Emergency Equipment

Contingency Plan (Permit Attachment F) describes the capabilities and locations of the fire-suppression equipment and systems. Table F-7 lists the types of fire-suppression systems by structure. Figure F-5 displays the underground locations of emergency equipment. Figure F-6 shows the fire-water distribution system on the surface. Figure F-7 shows the underground fuel area fire protection system. The information contained in these tables and figures in Permit Attachment F demonstrates that the WIPP facility has the portable fire extinguishers, fire-control equipment (including special extinguishing equipment that use foam, inert gas, or dry chemicals), spill-control equipment, and decontamination equipment needed for compliance with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.32(c)).

E-1a(4) Water for Fire Control

20.4.1.500 NMAC (incorporating 40 CFR §264.32(d)), requires that the WIPP facility be equipped with water at an adequate volume and pressure to supply water-hose streams, foam-producing equipment, automatic sprinklers, or water-spray systems. The following discussion on fire control systems at the WIPP facility demonstrates the Permittees commitment to comply with this requirement.

The primary function of the WIPP facility water system is to supply water for domestic use and fire protection. Water is furnished by the Double Eagle Water Company, owned by the City of Carlsbad. Wells located 30 miles (mi) (48.3 kilometers [km]) north of the WIPP facility are the source of the water. Water is supplied by gravity flow through a 24 inch (in.) (61 centimeter [cm]) diameter pipeline to a junction point about 13 mi (20.9 km) north of the site at U.S. Highway 62/180. This line is sized to provide 6,000 gallons (gal) (22,712 liters [L]) per minute for use by others, in addition to the peak flow rate required by the WIPP facility. Controls at the junction point give the WIPP facility priority over flows to all other users. A 10 in. (25 cm) diameter pipeline supplies water by gravity flow from the tie-in point to the WIPP facility.

At the WIPP facility, the water enters a pair of 180,000-gal (681,372-L) aboveground storage tanks located adjacent to the Pumphouse. These tanks are 32 ft (9.75 m) in diameter and are constructed of welded steel. The water level in each tank is monitored in the CMR. One tank stores water for use by the facility's fire-water system. The other tank stores water for use by the facility's domestic water system, and to reserve approximately 100,000 gal (378,540 L) of water for use by the fire-water system. Separate sets of pumps for the domestic water and fire-water systems are provided in the Pumphouse. During a fire, the fire-water pump is automatically started, and available domestic water is used first. Upon depletion of the domestic-water inventory, the domestic-water pumps are automatically shut off, and the dedicated fire-water reserve is available for fire-suppression use only. The primary fire-water pump is a 100-percent-capacity electric pump. A 100-percent-capacity diesel fire-water pump provides backup in case of a power failure or when maintenance is required on the electric pump. Each fire-water pump is rated at 1,500 gal (5,678 L) per minute at 125 pounds (lb) (56.7 kilograms [kg]) per square in.

The following buildings are connected to and protected by the wet-pipe sprinkler system: the Pumphouse, the Guard and Security Building, the Support Building, the WHB, the Exhaust Filter Building, the TRUPACT Maintenance Facility, the Engineering Building, the Safety and Emergency Services Building, the Training Building, and several other warehouse and maintenance buildings. The physical layout of the facilities allows for full hose stream access by firefighters. There is no firefighting water-supply system underground. Instead, the underground is equipped with fire extinguishers of various types and in various locations (including vehicles) and a fire truck with a 125 lb (56.7 kg) chemical extinguisher. The underground fuel station is equipped with an automatic, 1,000-lb (453.5 kg) chemical extinguishing systems. Only dry chemical materials or water are used to fight fires involving TRU mixed waste.

E-1b Aisle Space Requirement

20.4.1.500 NMAC (incorporating 40 CFR §264.35), requires that a facility maintain sufficient aisle space to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to areas of the facility during an emergency (other than a permanent disposal stack). Aisle space for each regulated unit is specified below.

Waste Handling Building Container Storage Unit (WHB Unit) and Parking Area Container Storage Unit (Parking Area Unit)

During TRU mixed waste handling operations, sufficient room is maintained for unobstructed movement of personnel, fire-protection equipment, spill control equipment, or decontamination equipment to areas in the WHB Unit.

Waste containers will remain inside the Contact-Handled (**CH**) or Remote-Handled (**RH**) Packages in the Parking Area Unit until TRU mixed waste handlers are prepared to handle them. As shown in Figure M1-1 in Permit Attachment M1, there is ready access to all areas within the WHB Unit where hazardous wastes are handled. Waste containers are unloaded from the Contact-Handled Package in to the WHB Unit (see Figure M1-12 in Permit Attachment M1). The WHB Unit can handle the unloading of four CH Packages at one time. Single RH TRU mixed waste canisters are unloaded from the RH-TRU 72-B casks in the Transfer Cell of the WHB Unit where they are transferred to facility casks (see Figures M1-23 and M1-24 in Permit Attachment M1). RH TRU mixed waste drums in CNS 10-160B casks, which may contain up to 10 55-gallon drums configured in two 5-drum baskets (see Figure M1-25 in Permit Attachment M1), are unloaded from the cask staged in the Cask Unloading Room into the Hot Cell.

At all times, written procedures ensure that loaded CH or RH Packages, facility pallets, containment pallets, and waste containers in the WHB Unit and Parking Area Unit are managed in a manner to prevent obstructing the movement of personnel, fire-protection equipment, spill-control equipment, and decontamination equipment.

For CH TRU mixed waste, an aisle space of at least 44 in. (1.1 m) between loaded facility or containment pallets will be maintained in all CH waste storage areas of the WHB Unit. For RH TRU mixed waste, a minimum of 44 in. (1.1 m) between loaded casks in the RH Bay will be

maintained. A maximum of two loaded casks may be stored in the RH Bay at one time. Implementation of written procedures ensures that loaded casks, transfer cars, and canisters are managed in the RH Bay in a manner to allow the movement of personnel, fire-protection equipment, spill-control equipment, and decontamination equipment. Within the Hot Cell, waste containers are not stored in multiple rows; similarly, within the Transfer Cell, the canister is located in a rack on the Transfer Cell Shuttle Car. Thus, aisle space does not apply to these areas. Aisle space requirements also do not apply to empty casks in racks. When CH or RH Packages contain waste in the Parking Area Container Storage Unit, the Permittees shall maintain a minimum spacing of 4 ft (1.2 m) between trailers loaded with CH or RH Packages or between CH or RH Packages not on trailers.

Underground Hazardous Waste Disposal Units (HWDUs)

The mined areas underground are all maintained to provide free access to the repository and to the face of the waste disposal areas in the active panels. As specified in 30 CFR 57, adequate access is provided for movement of personnel, fire equipment, or spill-controlled equipment to any area of operations during an emergency or response action, as provided in the facility Contingency Plan (Permit Attachment F). These items are subject to inspection by Federal mine inspectors at least quarterly. Waste emplacement occurs sequentially on a room-by-room basis until each room in a HWDU panel has been filled with waste. Derived waste will be emplaced in the disposal rooms along with the TRU mixed waste. Once panel closure has been effected, the waste is considered disposed of, and access is no longer provided beyond the panel closure barrier to closed HWDUs.

Proper airflow distribution to all areas of the underground is achieved through a multi-step process. Tests and balances of the underground ventilation system are conducted on a periodic basis with the frequency depending on changes that are occurring in the configuration of the underground. These tests and balances physically measure airflow, pressure, and system resistance. Computer modeling is performed to determine the configuration necessary to achieve any desired underground airflow distribution. Administrative procedures are used as the means of assuring control of the configuration of the ventilation control devices such as bulkheads, doors, fans, and air regulators needed to achieve the desired configuration. Underground Facility Operations makes daily checks of air quality in all parts of the repository where personnel will be working. Air quantity checks are made on an as-needed basis as changing conditions warrant such checks.

E-2 Preventive Procedures, Structures, and Equipment

The WIPP facility has been designed and will be operated to fully meet each of the requirements of 20.4.1.900 NMAC (incorporating 40 CFR §270.14(b)(8)), to prevent hazards associated with unloading operations, prevent runoff from hazardous waste handling areas, prevent contamination of water supplies, mitigate the effects of equipment and power failures, prevent undue exposure of personnel to hazardous waste, and prevent releases to the atmosphere. The individual regulatory requirements are discussed below.

E-2a Unloading Operations

The WIPP facility's equipment, structures, and procedures are specially designed for the safe handling of TRU mixed waste. Permit Attachments M1 and M2 detail how CH and RH TRU mixed waste is handled, including unloading and transport operations. The following is a summary of the activities, structures, and equipment that were developed to prevent hazards in unloading of TRU mixed waste, as required by 20.4.1.900 NMAC (incorporating 40 CFR §270.14(b)(8)(i)).

CH TRU Mixed Waste

The TRUPACT-II shipping container has a gross loaded weight of 19,265 lbs (8,737 kgs). The HalfPACT shipping container has a gross loaded weight of 18,100 lbs (8,210 kgs). The gross loaded weight is defined as the weight of the payload and the weight of the Contact Handled Package itself. The Contact Handled Packages have forklift pockets at the bottom of the container specifically for lifting the container with a forklift (see Figure M1-8 in Permit Attachment M1). The 13 ton (11.8 metric tons) electric forklift unloads the TRUPACT-II from the trailer and transfers it to an unloading dock in the WHB Unit. The unloading dock is designed to accommodate the Contact Handled Package and functions as a work platform, providing TRU mixed waste handling and health physics personnel with easy access to the container during unloading operations.

An overhead 6-ton (5.4-metric ton) crane and adjustable center-of-gravity lift fixture transfer TRU mixed waste containers from the Contact Handled Package to a pallet on the WHB Unit floor. The facility pallet is a fabricated steel structure designed to securely hold waste containers. Each facility pallet has a rated load capacity of 25,000 lb (11,340 kg). The upper surface of the facility pallet has two recesses sized to accept the waste containers, ensuring that the containers are held in place. Up to four SWBs, four 7-packs of 55-gallon drums, four 4-packs consisting of 85-gallon drums, four 3-packs of 100-gallon drums, or two TDOPs may be placed on a facility pallet. Each stack of waste containers is strapped down to holding bars in the top reinforcement plate of the facility pallet to avoid spillage during movement. Two rectangular tube openings in the bed allow the facility pallet to be securely lifted by forklift. In order to assure a facility pallet is not overloaded, operationally it will hold the contents of two Contact Handled Packages, as specified in Permit Attachment M1.

The WIPP facility has the capability to handle each of the CH TRU containers singly using forklifts and single container attachments. In such cases, the container would be loaded on the waste shaft conveyance and moved underground as a single unit.

All unloading equipment is inspected in accordance with the schedule shown in Tables D-1 and D-1a. Cranes that are used in the unloading and handling of TRU mixed waste have been designed and constructed so that they will retain their loads in the event of a loss of power. Cranes in the WHB Unit are also designed to withstand a design basis earthquake without moving off of their rails and without dropping their load. Lowering loads is a priority activity after a disruptive event.

The following is a summary of the activities, structures, and equipment that were developed to prevent hazards in transporting TRU mixed waste.

Palletized CH TRU mixed waste is either transferred by a 13-ton (11.8-metric ton) forklift or the facility transfer vehicle, which is designed with an adjustable bed height that is used to transfer the facility pallets to the special pallet-support stands in the waste shaft conveyance.

The waste hoist system in the waste shaft and all waste shaft furnishings are designed to resist the dynamic forces of the hoisting system, which are greater than the seismic forces on the underground facilities. In addition the waste shaft conveyance headframe is designed to withstand the design-basis earthquake (**DBE**). Maximum operating speed of the hoist is 500 ft (152.4 m) per minute. During loading and unloading operations, the waste hoist is steadied by fixed guides. The waste hoist is equipped with a control system that will detect malfunctions or abnormal operations of the hoist system, such as overtravel, overspeed, power loss, or circuitry failure. The control response is to annunciate the condition and shut the hoist down. Operator response is required to recover from the automatic shutdown. Waste hoist operation is continuously monitored by the CMS. A battery powered FM transmitter/receiver allow communication between the hoist conveyance and the hoist house.

The waste hoist has two pairs of brake calipers acting on independent brake paths. The hoist motor is normally used for braking action of the hoist. The brakes are used to hold the hoist in position during normal operations and to stop the hoist under emergency conditions. Each pair of brake calipers is capable of holding the hoist in position during normal operating conditions and stopping the hoist under emergency conditions. In the event of power failure, the brakes will set automatically.

The hoist is protected by a fixed automatic fire suppression system. Portable fire extinguishers are also provided on the hoist floor and in equipment areas.

Once underground, the facility pallet is removed from the hoist cage by the underground waste transporter (see Figure M2-6 in Permit Attachment M2), a commercially available articulated diesel vehicle. The trailer is designed specifically for transporting palletized TRU mixed waste and is sized to accommodate the facility pallet. All motorized waste handling equipment is equipped with on-board fire-suppression systems.

The underground waste transporter is equipped with a fire suppression system, rupture-resistant diesel fuel tanks, and reinforced fuel lines to minimize the potential for a fire involving the fuel system. Waste containers will be placed into underground HWDUs using a forklift and attachments.

All CH TRU mixed waste transport equipment is inspected at a frequency indicated in Table D-1.

RH TRU Mixed Waste

Cranes and forklifts that are used to unload and handle RH TRU mixed waste have been designed and constructed to retain their loads in the event of a loss of power. RH TRU mixed waste received in an RH-TRU 72-B cask is unloaded from the trailer in the RH Bay, using the RH Bay Overhead Bridge Crane, and is placed on the cask transfer car. The cask transfer car moves the RH-TRU 72-B cask into the Cask Unloading Room, where a bridge crane lifts the cask from the cask transfer car and lowers it into the Transfer Cell and onto the Transfer Cell shuttle car. The Transfer Cell shuttle car moves the RH-TRU 72-B cask into position for transferring the canister to the facility cask.

RH TRU mixed waste received in a CNS 10-160B cask is unloaded from the trailer in the RH Bay using the RH Bay overhead bridge crane and is placed on the cask transfer car. The cask transfer car moves the CNS 10-160B cask into the Facility Cask Unloading Room. The Hot Cell crane lifts the two drum carriage units from the CNS 10-160B cask in the Facility Cask Unloading Room into the Hot Cell, where the drums are transferred into RH TRU mixed waste facility canisters using the Overhead Powered Manipulator or Hot Cell Crane. The facility canisters are then lowered into a shielded insert on the Transfer Cell Shuttle Car in the Transfer Cell. The Transfer Cell Shuttle Car moves the shielded insert into position for transferring the facility canister to the facility cask.

A remotely-operated fixed hoist grapple lifts the canister from the RH-TRU 72-B cask or from the shielded insert on the Transfer Cell shuttle car and transfers the canister into the facility cask located on the facility cask transfer car in the Facility Cask Loading Room. The facility cask is rotated to a horizontal position on the Facility Cask Transfer Car and the Facility Cask Transfer Car moves onto the waste shaft conveyance and is lowered underground.

Once underground, the RH TRU mixed waste handling forklift lifts the facility cask from the Facility Cask Transfer Car and carries the facility cask to the Horizontal Emplacement and Retrieval Equipment (**HERE**). After placing the facility cask on the HERE, the canister is emplaced in the wall of the disposal room.

Pertinent RH TRU mixed waste transport equipment is inspected at a frequency indicated in Table D-1a.

Figures of RH TRU mixed waste emplacement equipment are included in Attachments M1 and M2.

E-2b Runoff

The following description of procedures, structures, or equipment used at the WIPP facility to prevent runoff from TRU mixed waste handling areas to other areas of the facility or environment or to prevent flooding is required by 20.4.1.900 NMAC (incorporating 40 CFR §270.14(b)(8)(ii)).

The WHB Unit is a physical barrier that will prevent TRU mixed waste spills from reaching the environment before a cleanup could be initiated and completed. A detailed description of the WHB containment capability for the CH Bay and RH Complex is contained in Permit Attachment M1. Secondary containment is also provided by the shipping containers while waste are within them. These are sealed vessels with no open vents and therefore cannot leak.

TRU mixed waste received for emplacement at the WIPP facility must be certified under this Permit's Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (**TSDF-WAC**) as nonliquid waste; in some cases, the Permit allows up to one percent residual liquids. The TSDF-WAC are procedural controls that must be met at the generator or storage site and the data must be verified by the WIPP facility staff prior to acceptance for the Disposal Phase and shipment to the WIPP facility. Permit Module II and Permit Attachment B contain information regarding TSDF-WAC requirements for shipping and discusses receipt and verification of the TRU mixed waste at the WIPP facility. Derived waste must also meet all TSDF-WAC requirements prior to disposal. Calculations in Permit Attachment M1 demonstrate that one percent residual liquid in TRU mixed waste containers is easily contained by the WHB Unit floor.

The WIPP facility does not lie within a 100-year floodplain. There are no major surface-water bodies within 5 mi (8 km) of the site, and the nearest river, the Pecos River, is approximately 12 mi (19 km) away. The general ground elevation in the vicinity of the surface facilities (approximately 3,400 ft [1,036 m] above mean sea level) is about 500 ft (152 m) above the riverbed and 400 ft (122 m) above the 100-year floodplain. Protection from flooding or ponding caused by probable maximum precipitation (**PMP**) events is provided by the diversion of water away from the WIPP facility by a system of peripheral interceptor berms and dikes. Additionally, grade elevations of roads and surface facilities are designed so that storm water will not collect on the site under the most severe conditions.

Repository shafts are elevated at least 6 in. (15.2 cm) to prevent surface water from entering the shafts. The floor levels of all surface facilities are above the levels calculated for local flooding due to PMP events. Therefore, flooding of WIPP facility roads and surface structures is not expected from the flooding of surface waters as a result of PMP events or because of site-runoff design.

Flood-control structures are inspected as part of a general facility inspection at least annually. During this inspection, the structures are checked to assure there has been no wind or rain erosion or animal-caused damage that would cause the structures to fail. Further, the areas around the structures are inspected to ensure they are free of vegetation, debris, or other items that would impede the diversion of water. Experience with these structures has shown that annual structural inspections are adequate for the climate and soil conditions at the WIPP facility; however, inspections are also conducted after severe natural events, such as severe storms and a design basis earthquake.

Whenever TRU mixed waste is outside the WHB Unit, it will be contained in CH or RH Packages. TRU mixed waste containers are only unloaded from the shipping containers inside the WHB Unit and shipping containers are never opened outside this facility; therefore, TRU

mixed waste is not expected to reach the outside environment or other parts of the facility from the TRU mixed waste handling facilities in nonflood circumstances. Flooding of the TRU mixed waste handling facilities is prevented by drainage ditches and berms such that there is no mechanism that might transport TRU mixed waste to the outside environment and between parts of the WIPP facility. Neither is there a mechanism to allow TRU mixed waste to find its way to an area of the WIPP site where it would be carried off site by flood or precipitation waters.

E-2c Water Supplies

At the WIPP facility, water supplied by a local water company enters a pair of 180,000-gal (681,372-L) aboveground storage tanks located adjacent to the Pumphouse. The 360,000-gal (1,362,744-L) combined capacity of the tanks is used as the potable water source and for fire control. These tanks are 32 ft (9.8 m) in diameter and are constructed of welded steel. The water level in each tank is inspected daily. Potable water is piped to the site and stored in tanks until distributed by pipe to the fire hydrants and buildings. Managing the potable water supply in this manner prevents the contamination of the supply by TRU mixed waste.

E-2d Equipment and Power Failure

The following description of procedures, structures, or equipment used at the facility to mitigate effects of equipment failure and power outages is required by 20.4.1.900 NMAC (incorporating 40 CFR §270.14(b)(8)(iv)). The specific systems and facilities related to the protection of human health and the environment during waste handling and management operations are discussed in the in Permit Attachment M1.

Utility power is fed to the WIPP site by two separate feeds in a ring bus configuration. This provides the capability to supply uninterruptible, redundant power to the site upon the loss of one feed. A redundant Southwestern Public Service (**SPS**) power feed has been installed. In the event that normal utility power is lost, on-site diesel generators will provide alternating current (**AC**) power to important WIPP facility electrical loads. Uninterruptible power supply (**UPS**) units are also on line providing power to important monitoring systems.

If utility power fails, the exhaust filter system goes into the fail position, and the system high-efficiency particulate-air filter dampers are placed into filtration position. When power is restored by the diesel generators, a decision is made whether to remain in filtration mode and energize a filtration fan or to realign the dampers into the minimum exhaust mode. Without any indication of a radiological release, the decision is usually the latter. TRU mixed waste handling and related operations cease upon loss of utility power and are not resumed until normal utility power is returned. All waste handling equipment will "fail safe," meaning that it will retain its load during a power outage.

In case of a loss of utility power, backup power to predetermined loads can be supplied by either of the two on-site diesel generators. Each of these units provide 480 volts (**V**) of power with a high degree of reliability and are sized to feed the selected loads. Each of the diesel generators can carry all preselected monitoring loads plus operation of the Air Intake Shaft hoist for

personnel evacuation and other selected backup loads. The diesel generators can be brought on line within 30 minutes.

Upon loss of normal power, the diesel generators are manually started from the local control panel or from the CMR. The starter system is a 24-V battery system with a 300-ampere-hour capacity. Although it is standard practice to start the diesel generators from the local control panel, each unit can be remotely started from the CMR when the generator start switch is placed in the "remote" position. The diesel generators and associated breakers can be monitored in the CMR, thus providing the ability to feed selected facility loads from the backup power source, in sequence, without exceeding generator capacity. The on-site fuel storage capacity is sufficient for the operation of one generator at an expected load of 62 percent for three days. Additional fuel supplies are readily available within a few hours by tank truck, allowing on-line refueling and continued operation.

There is a Central UPS, located in the Support Building, that supplies power to selected loads located in the Support Building and WHB Unit. The Central UPS provides back-up power to equipment associated with radiation monitoring, communications, and central monitoring systems. In addition, individual UPSs are provided for the selected equipment associated with these same systems, but are located remotely from the Support Building and the WHB Unit. The CMR is also connected to the Central UPS.

In case of loss of AC power input to the UPSs, the dedicated batteries were designed to supply power to a fully loaded UPS for 30 minutes. It is expected that the AC power input to the UPS will be restored within 30 minutes, either from the off-site electric utility or from the site back-up power generator system.

Human health and the environment are protected during a loss of off-site power by a combination of factors:

- The underground filtration system fails in the “filter” mode so that no releases of contaminated particulates will occur
- The UPS maintains all monitoring systems and alarms in waste handling areas so that fires or pressure loss will be detected and an appropriate response initiated
- Generators are brought on line within 30 minutes, at which time hoisting can be initiated so that personnel do not have to stay underground for extended lengths of time.
- Decisions to evacuate underground personnel will be made in accordance with the requirements of the Mine Safety and Health Administration (**MSHA**)
- The waste hoist brakes set automatically so that loads do not fall
- Cranes retain their loads so that spills do not occur from dropped containers

- Communication systems are maintained
- The emergency operations center is powered if it is needed.

The CMS is a computerized system that collects, records, and displays data for all critical facility systems. The system is designed to provide a centralized, integrated location for collecting, monitoring, and storing facility parameters and is informed from signals provided by the seismic, meteorological, radiological effluent, and fire detection and alarm systems. Additionally, the CMS monitors heating, ventilation, air conditioning and electrical system status. Certain control functions of the underground ventilation fans, major facility electrical systems, and the backup diesel generators can be performed by the CMS from the CMR. The CMS can be set to alarm upon failure of the equipment monitored.

The CMS components of the WHB Unit and the Support Building are powered from the central UPS. The UPS features automatic switching without a loss of power from primary power to alternate power to battery backup power. The components located throughout the facility are powered by various electrical switchboards, with UPS battery backup.

The major components of the system are interconnected by means of a redundant network. The network is the communications medium for the CMS and consists of network cables routed throughout the facility. The network is designed such that no single point failure will cause failure of the entire network. Parameters or status are monitored by Local Processing Units strategically located throughout the surface and underground facility.

In addition, a number of automatic checks are performed on the internal processes associated with system components and network communications. If any fault is detected, the system has the capability to remove a component from the network and alert the CMR Operator (**CMRO**) of the fault. The status of the network is continuously monitored by the CMRO 24 hours per day, seven days per week. If a fault occurs, the CMRO initiates an AR within the Work Control system to correct the problem.

The RH Complex is included in the WHB. The Central UPS supplies power to the WHB which includes the RH Complex. The RH Bay, Hot Cell and Transfer Cell equipment are serviced by dual 1,300 KW diesel powered generators located between the exhaust shaft and the WHB. The generators provide backup power to both CH and RH waste handling operations. The RH waste handling equipment is designed to stop as a result of loss of power in a fail-safe condition. Power from the back-up generators may be utilized to place RH TRU mixed waste containers in process into a safe configuration. During a total power outage condition selected RH loads can be powered by the Central UPS. Within a short time selected RH loads at 480 volts and below can be powered by the Backup Diesel Generators. The backup central UPS for the WHB would also supply backup power to the RH Complex.

E-2e Personnel Protection

The following description of procedures, structures, or equipment used at the facility to prevent undue exposure of personnel to hazardous waste is required by 20.4.1.900 NMAC (incorporating 40 CFR §270.14(b)(8)(v)).

Procedures used at the WIPP facility to prevent undue exposure of personnel to hazardous waste and the sections in this permit application where these procedures are discussed in detail are listed below.

- The TSDF-WAC are criteria designed to prevent the shipment or acceptance of TRU mixed waste exhibiting the characteristics of ignitability, corrosivity, or reactivity.

- Written procedures to prevent the addition of materials to the TRU mixed waste that could exhibit incompatibility or the characteristics of reactivity and/or ignitability are discussed in Section E-3 of this Permit Attachment.

- TRU mixed waste handling operations are conducted so that the need for TRU mixed waste handling personnel to touch the TRU mixed waste containers during unloading, overpacking (if necessary), and emplacement operations is minimized. Appropriate personal protective equipment (**PPE**) will be used depending on locations and operations (e.g., steel-toed shoes, hard hat, safety glasses inside a crane operating envelope; steel-toed shoes, hard hat, mine lamp, self rescuer, and safety glasses in the Underground).

- Tagout/Lockout and work authorization procedures, discussed in Section D-1, prohibit WIPP facility personnel from utilizing TRU mixed waste handling equipment that is temporarily out of service and prevent inappropriate use of TRU mixed waste handling equipment that is not operational for all uses.

- A system for monitoring and inspecting monitoring equipment, safety and emergency systems, security devices, and operating and structural equipment is in place to prevent, detect, or respond to environmental or human health hazards caused by hazardous waste. The inspection/monitoring requirements are described in Permit Attachment D.

- Adequate aisle space is maintained for emergency response purposes, as discussed in Section E-1b of this Permit Attachment.

- Procedures to protect personnel from hazardous and/or TRU mixed waste during nonroutine events are detailed in Permit Attachment F.

The following discusses the structures and equipment that prevent undue exposures of personnel at the WIPP facility to hazardous constituents:

- The WIPP facility was sited and designed to be protective of human health and ensure safe operations during the Disposal Phase.

- TRU mixed waste containers are required to meet shipping/structural requirements.

- The shipping container, forklifts, unloading dock, crane, facility pallets, containment pallets, facility transfer vehicle, waste shaft conveyance, and underground waste transporter were designed or selected for use in order to minimize the need for CH TRU mixed waste handling personnel to come into contact with CH TRU mixed waste. Each of these items is discussed in detail in Permit Attachments M1 and M2; Section E-2a of this Permit Attachment discusses prevention of hazards to personnel during unloading operations.

- The shipping containers, forklifts, cranes, cask shuttle, transfer cars, manipulators, Hot Cell, waste shaft conveyance, and HERE were designed or selected for use in order to minimize the need for RH TRU mixed waste handling personnel to come into contact with RH TRU mixed waste. These items are discussed in Permit Attachments M1 and M2. Section E-2a of this Permit Attachment discusses in detail prevention of hazards to personnel during unloading operations.

- The hood ventilation system, used during the initial opening of Contact Handled Packages, is used to vent any potential release of radioactive contaminants into the ventilation system of the WHB Unit (Permit Attachment M1).

- Differential air pressure between the RH TRU mixed waste handling locations in the RH Complex protects workers and prevents potential spread of contamination during handling of RH TRU mixed waste. Airflow between key rooms in the WHB are controlled by maintaining differential pressures between the rooms. The CH Receiving Bay is maintained with a negative pressure relative to outside atmosphere. The RH Receiving Bay is maintained with a requirement to be positive pressure relative to the CH Receiving Bay. The RH Hot Cell is maintained with a negative differential pressure relative to the RH Receiving Bay. The Hot Cell ventilation is exhausted through high-efficiency particulate air filters prior to venting through the WHB filtered exhaust.

- The WIPP facility has internal and external communications and alarm systems to notify personnel of emergency situations and provide instructions for response, evacuation, etc. as discussed in this Permit Attachment and Permit Attachment F.

- The WIPP facility is well equipped with spill-response equipment, transport vehicles, emergency medical equipment and rescue vehicles, fire detection, fire-suppression and firefighting equipment (including water for fire control), PPE, emergency lighting and backup power, and showers and eye-wash fountains. These are discussed in Sections E-1a, E-2c and E-2d of this Permit Attachment and are listed in Permit Attachment F.

- The surface and underground ventilation systems, discussed in Permit Attachment M2, are designed to provide personnel with a suitable environment during routine operations.

E-2f Releases to Atmosphere

The following description of procedures, structures, or equipment used at the facility to prevent releases to the atmosphere is required by 20.4.1.900 NMAC (incorporating 40 CFR §270.14(b)(8)(vi)).

All TRU mixed waste will be contained. TRU mixed waste container vents employ particulate filters that prevent particulate releases to the atmosphere. The nature of the waste itself also mitigates potential releases to the atmosphere. Lead and other heavy metals, which could exhibit the characteristic of toxicity, may be present in some TRU mixed waste forms. The metal in the TRU mixed waste, most of which is lead in monolithic form, is present in bricks and shielding rather than in particulate form. The primary sources of other metals are sheets, rods, plating, equipment parts, or solidified sludges.

A release of hazardous waste or hazardous constituents to the air that may have adverse effects on human health or the environment is unlikely. Although VOCs could be present in the TRU mixed waste emplaced within the unit and could potentially be a source of release to the air, the volatile organic compound monitoring plan described in Permit Attachment N will be used to confirm that there is no adverse effects on human health and the environment.

E-2g Flammable Gas Concentration Control

Gas concentrations in the mine and around the underground HWDUs are controlled by mechanically induced ventilation. There are two primary ventilation fans and three filtration fans. If only one primary ventilation fan is ventilating the mine, it typically will be set to draw 260,000 ft^3 (7,358 m^3) per minute of air through the mine, which is sufficient to adequately ventilate all active areas in the mine. If both primary fans are operating, they will typically be set to draw 425,000 ft^3 (12,028 m^3) per minute of air through the mine. The filtration fans are interlocked so that only one filtration fan can operate at any time in the filtration mode. One filtration fan is normally set to draw 60,000 ft^3 (1,698 m^3) per minute of air through the mine. The air is routed through the underground facility with bulkhead doors and dampers to achieve the most efficient use of the air in ventilating for possible gases and maintaining required differential pressures in the underground facility.

The WIPP Mine Ventilation Plan are updated a least once a year or more often to accommodate changing underground conditions. Dead end drifts are fairly common in underground mines. Ventilation to accessible dead end drifts is provided by auxiliary fans and ducts to the extent necessary. Minimum requirements for air quantity, quality, and air flow velocity depend on the level of activity in a given area and are governed by Federal (30 CFR §57, Subpart G) and State regulations. Compliance with those regulations is monitored by facility personnel and through frequent inspections by regulatory authorities.

The WIPP Industrial Hygienist is responsible for monitoring and/or testing the air in the underground. The tests are on an as needed basis, in areas where chemicals are stored, and in areas where people are working that may contain hazardous concentrations of airborne fumes,

mists, or vapors. All surveys are recorded; records contain location, time, job description, or occurrences associated with the contaminants, and the identification of instruments used.

Underground Facility Operations checks the underground air quality on a daily basis in all open drifts utilizing instrumentation which indicates Oxygen, Carbon Monoxide, and Flammable Gas concentration. The results of the monitoring are entered in the Shift Log Daily. If conditions are found that exceed established criteria, additional notification is made to the CMR. Appropriate actions are taken to determine the type of gases and impact on mine activities. The readings taken during specific tests for unusual conditions are recorded in the Daily Shift Log. All the monitoring performed by Underground Facility Operations is in accordance with MSHA (30 CFR §57).

Portable air monitoring equipment is used to assure access to all areas where air quality may be of concern. Two types of measuring systems are used at the WIPP: Draeger Pump Systems and Portable Air Monitoring Instruments. Prior to use, all instruments must have certification of current calibration and check gases must also be certified as accurate within one percent of the label concentration. Instruments are used within the guidelines established by the manufacturers and are accompanied with suitable temperature, barometric and relative humidity measurements (as required). Functional testing of instruments must be done before each use and the results must fall within the ranges specified in air monitoring procedures. Gases that are to be tested include oxygen, methane, carbon monoxide, hydrogen sulfide, sulphur dioxide, nitrogen dioxide, and chlorine. Alarm levels are set for each gas. Typical settings are as follows: O_2: 19.5% LOW; 23.0% HIGH; CH_4: 0.25%; CO: 25 ppm; H_2S: 10 ppm; SO_2: 2 ppm; NO_2: 1 ppm; Cl_2: 0.5 ppm. When alarm levels are reached, Industrial Safety is contacted to evaluate the conditions and to determine the appropriate actions. Equipment operation is by trained personnel only, or under the supervision of trained personnel. Air Quality sampling is performed as often as needed to assure safe working conditions. If conditions are worsening, or action has been taken to mitigate high levels of contamination, the frequency of measurement is increased. Underground air quality is checked at the beginning of the day when personnel are underground.

E-3 Prevention of Reaction of Ignitable, Reactive, and Incompatible Waste

20.4.1.900 NMAC (incorporating 40 CFR §270.14(b)(9)), requires a description of precautions taken to prevent accidental ignition or reaction of ignitable, reactive, or incompatible TRU mixed waste as required to demonstrate compliance with 20.4.1.900 NMAC (incorporating 40 CFR §270.15(c)), and 20.4.1.500 NMAC (incorporating 40 CFR §264.17). Because the TRU mixed waste (including the container) received at the facility during the Disposal Phase and any derived TRU mixed waste have been demonstrated to be compatible and do not exhibit the characteristics of ignitability, reactivity, or corrosivity, the WIPP facility is in full compliance with these regulations.