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**RENEWAL APPLICATION  
CHAPTER E**

**PREPAREDNESS AND PREVENTION**

Waste Isolation Pilot Plant  
Hazardous Waste Facility Permit  
Draft Renewal Application  
May 2009

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**RENEWAL APPLICATION**  
**CHAPTER E**  
**PREPAREDNESS AND PREVENTION**  
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1 the PA system, the plectrons, and the portable two-way radios provide backup surface  
2 communications.

3  
4 The Site Notification System (SNS) consists of pagers in the possession of office wardens and  
5 plectrons located in various buildings. The SNS pagers and plectrons are tone-activated radio  
6 receivers that are activated by the two-way radio system. To generate a tone on the pagers and  
7 plectrons or to send a verbal message, the radio operator enters a security code into the two-way  
8 radio system and begins broadcasting. The SNS pagers are portable and battery-operated. The  
9 plectrons are portable and can be plugged into a standard electrical circuit or powered from  
10 internal batteries that are continuously recharged when connected to the electrical circuit.

11  
12 A plant radio station in the Guard and Security Building, one located in the Emergency  
13 Operations Center in the Safety and Emergency Services Building, and one in the Central  
14 Monitoring Room (CMR), allow two-way radio communication with on-site personnel and with  
15 mobile/portable WIPP facility radios operating on and off the WIPP site. The two-way radio  
16 also allows one-way emergency notification on the portable SNS pagers and plectrons. The two-  
17 way radio system located in the CMR is supplied with power from the uninterruptible power  
18 supply if the off-site power supply fails.

19  
20 There are various alarm systems used at the WIPP facility. The PA system has two alarm tones  
21 in use, a yelp and a gong. Its signals are produced in the master PA console by a tone generator  
22 and are transmitted sitewide over the paging channel of the system, overriding its normal use.  
23 The signals are intermittent and of high intensity. The evacuation tone is a yelp tone and is used  
24 for, and limited to, situations requiring immediate, rapid, and complete (or selective area)  
25 evacuation. The evacuation tone is initiated manually on the surface. In the underground, the  
26 evacuation tone may be initiated manually or automatically by underground fire detection and  
27 alarm systems. This tone is also a yelp tone. It is accompanied with strobe lights for high noise  
28 areas. These alarm signals take priority over other signals on the paging channel but do not  
29 affect the intercom channels. Evacuation alarms using the PA system, local and plant-wide, also  
30 can be initiated manually from the CMR in the Support Building. The audible alarm signals are  
31 supplemented by warning lights in high ambient-noise areas underground, such as active mining  
32 areas. These alarms are supplied with power from the uninterruptible power supply if the off-site  
33 power supply fails. The PA system may also produce a gong tone followed by a message. Local  
34 fire alarms are bell tones.

35  
36 Whenever TRU mixed wastes are handled, two persons, at a minimum, are involved in the  
37 operation. The Waste Handling Building (WHB) contains readily accessible telephones and PA  
38 stations throughout. The mine phones are the main means of communication underground,  
39 although the PA system is also available.

40  
41 Underground communication and alarm systems will be arranged to meet the requirements of 30  
42 CFR Part 57. Telephones or other two-way communication equipment with instructions for their  
43 use will be provided for communications from underground to the surface. These  
44 communications are typically moved to ensure communications are maintained close to the work  
45 areas. Alarm systems capable of promptly warning every person underground, will be provided

1 and maintained in operating condition. If persons are assigned to work areas beyond the warning  
2 capabilities of the system, provisions will be made to alert them in a proper manner to provide  
3 for their safe evacuation. Typically, these provisions include a flashing light capable of being  
4 seen easily. As part of the preoperational inspection, prior to initiating waste handling operations  
5 underground, waste handling personnel verify that underground communications are ready and  
6 are working. If they are not working, repairs are initiated.

7  
8 Table F-6 in the Contingency Plan, Renewal Application Chapter F, describes the capabilities  
9 and locations of the various internal communication systems.

10  
11 E-1a(2) External Communications

12 20.4.1.500 NMAC (incorporating 40 CFR §264.32(b)), requires that a communications device be  
13 available for contacting outside agencies for emergency assistance. In addition, 20.4.1.500  
14 NMAC (incorporating 40 CFR §264.34(b)), requires that if just one employee is on the premises,  
15 the employee must have immediate access to a device capable of summoning outside help. TRU  
16 mixed waste handling operations are not conducted at the WIPP facility when only one person is  
17 present on the premises. TRU mixed waste handling operations are conducted by two or more  
18 persons. The security officers and staff from Facility Operations are also present at the WIPP  
19 facility during TRU mixed waste handling operations. When no TRU mixed waste handling  
20 operations are being conducted at the WIPP facility, at a minimum, the security officers and staff  
21 from Facility Operations are present. As discussed below, the WIPP facility has the required  
22 external communication devices and will operate in a manner that fully complies with these  
23 regulations.

24  
25 The external communication systems, designed to provide two-way communication with outside  
26 agencies or for summoning emergency assistance from off site, include the commercial  
27 telephone system and two-way radios.

28  
29 Direct dialing through any telephone located above or below ground allows contact with outside  
30 agencies. Failure of a single telephone station does not affect the balance of the telephone  
31 system. Sixty percent of the direct-dial incoming and outgoing lines are routed via a microwave  
32 system located on the edge of the parking lot. The remaining 40 percent of the direct-dial lines  
33 are routed to Carlsbad by means of a buried cable. In the unlikely event that both routing modes  
34 are inoperable, direct dial telephone capability still exists via cellular telephone or Satellite  
35 Communications (**SATCOM**) linkage in the Emergency Operations Center.

36  
37 Plant radio stations in the Guard and Security Building and in the Emergency Operations Center  
38 in the Safety and Emergency Services Building allow two-way radio communication with the  
39 CMR, the Eddy County and Lea County Sheriff's Departments, the New Mexico State Police,  
40 and the Otis Fire Response Teams. Communication is available with the Lea County Sheriff's  
41 Department, the Hobbs Fire Department, the Carlsbad Medical Center, and the Columbia  
42 Regional Hospital via the Eddy County dispatcher. Another base station is in the CMR, however  
43 it is not normally used to communicate with offsite agencies. Radios are not inspected, instead,  
44 they are operated daily and repaired if they fail.

1  
2 Table F-6 in the Contingency Plan, Renewal Application Chapter F, describes the capabilities  
3 and locations of the various external communication systems.  
4

5 E-1a(3) Emergency Equipment

6 Contingency Plan, (Renewal Application Chapter F), describes the capabilities and locations of  
7 the fire-suppression equipment and systems. Table F-7 lists the types of fire-suppression  
8 systems by structure. Figure F-5 displays the underground locations of emergency equipment.  
9 Figure F-6 shows the fire-water distribution system on the surface. Figure F-7 shows the  
10 underground fuel area fire protection system. The information contained in these tables and  
11 figures in the Contingency Plan, Renewal Application Chapter F, demonstrates that the WIPP  
12 facility has the portable fire extinguishers, fire-control equipment (including special  
13 extinguishing equipment that use foam, inert gas, or dry chemicals), spill-control equipment, and  
14 decontamination equipment needed for compliance with the requirements of 20.4.1.500 NMAC  
15 (incorporating 40 CFR §264.32(c)).  
16

17 E-1a(4) Water for Fire Control

18 20.4.1.500 NMAC (incorporating 40 CFR §264.32(d)), requires that the WIPP facility be  
19 equipped with water at an adequate volume and pressure to supply water-hose streams, foam-  
20 producing equipment, automatic sprinklers, or water-spray systems. The following discussion on  
21 fire control systems at the WIPP facility demonstrates the Permittees commitment to comply  
22 with this requirement.  
23

24 The primary function of the WIPP facility water system is to supply water for domestic use and  
25 fire protection. Water is furnished by the Double Eagle Water Company, owned by the City of  
26 Carlsbad. Wells located 30 miles (mi) (48.3 kilometers [km]) north of the WIPP facility are the  
27 source of the water. Water is supplied by gravity flow through a 24 inch (in.) (61 centimeter  
28 [cm]) diameter pipeline to a junction point about 13 mi (20.9 km) north of the site at U.S.  
29 Highway 62/180. This line is sized to provide 6,000 gallons (gal) (22,712 liters [L]) per minute  
30 for use by others, in addition to the peak flow rate required by the WIPP facility. Controls at the  
31 junction point give the WIPP facility priority over flows to all other users. A 10 in. (25 cm)  
32 diameter pipeline supplies water by gravity flow from the tie-in point to the WIPP facility.  
33

34 At the WIPP facility, the water enters a pair of 180,000-gal (681,372-L) aboveground storage  
35 tanks located adjacent to the Pumphouse. These tanks are 32 ft (9.75 m) in diameter and are  
36 constructed of welded steel. The water level in each tank is monitored in the CMR. One tank  
37 stores water for use by the facility's fire-water system. The other tank stores water for use by the  
38 facility's domestic water system and to reserve approximately 100,000 gal (378,540 L) of water  
39 for use by the fire-water system. Separate sets of pumps for the domestic water and fire-water  
40 systems are provided in the Pumphouse. During a fire, the fire-water pump is automatically  
41 started, and available domestic water is used first. Upon depletion of the domestic-water  
42 inventory, the domestic-water pumps are automatically shut off, and the dedicated fire-water  
43 reserve is available for fire-suppression use only. The primary fire-water pump is a 100-percent-

1 capacity electric pump. A 100-percent-capacity diesel fire-water pump provides backup in case  
2 of a power failure or when maintenance is required on the electric pump. Each fire-water pump  
3 is rated at 1,500 gal (5,678 L) per minute at 125 pounds (lb) (56.7 kilograms [kg]) per square in.  
4

5 The following buildings are connected to and protected by the wet-pipe sprinkler system: the  
6 Pumphouse, the Guard and Security Building, the Support Building, the WHB, the Exhaust Filter  
7 Building, the TRUPACT Maintenance Facility, the Engineering Building, the Safety and  
8 Emergency Services Building, the Training Building, and several other warehouse and  
9 maintenance buildings. The physical layout of the facilities allows for full hose stream access by  
10 firefighters. There is no firefighting water-supply system underground. Instead, the  
11 underground is equipped with fire extinguishers of various types and in various locations  
12 (including vehicles) and a fire truck with a 125 lb (56.7 kg) chemical extinguisher. The  
13 underground fuel station is equipped with an automatic, 1,000-lb (453.5 kg) chemical  
14 extinguishing systems. Only dry chemical materials or water are used to fight fires involving  
15 TRU mixed waste.  
16

#### 17 E-1b Aisle Space Requirement

18 20.4.1.500 NMAC (incorporating 40 CFR §264.35), requires that a facility maintain sufficient  
19 aisle space to allow the unobstructed movement of personnel, fire protection equipment, spill  
20 control equipment, and decontamination equipment to areas of the facility during an emergency  
21 (other than a permanent disposal stack). Aisle space for each regulated unit is specified below.  
22

#### 23 Waste Handling Building Container Storage Unit (~~WHB Unit~~) and Parking Area Container 24 Storage Unit (Parking Area Unit) 25

26 During TRU mixed waste handling operations, sufficient room is maintained for unobstructed  
27 movement of personnel, fire-protection equipment, spill control equipment, or decontamination  
28 equipment to areas in the WHB Unit.  
29

30 Waste containers will remain inside the Contact-Handled (**CH**) or Remote-Handled (**RH**)  
31 Packages in the Parking Area Unit until TRU mixed waste handlers are prepared to handle them.  
32 As shown in Figure M1-1 in Renewal Application Appendix M1, there is ready access to all  
33 areas within the WHB Unit where hazardous wastes are handled. Waste containers are unloaded  
34 from the Contact-Handled Package in to the WHB Unit (see Figure M1-12 in Renewal  
35 Application Appendix M1). The WHB Unit can handle the unloading of four CH Packages at  
36 one time. Single RH TRU mixed waste canisters are unloaded from the RH-TRU 72-B casks in  
37 the Transfer Cell of the WHB Unit where they are transferred to facility casks (see Figures  
38 M1-23 and M1-24 in Renewal Application Appendix M1). **The** RH TRU mixed waste drums in  
39 CNS 10-160B casks, which may contain up to 10 55-gallon drums configured in two 5-drum  
40 baskets (see Figure M1-25 in Renewal Application Appendix M1), are unloaded from the cask  
41 staged in the Cask Unloading Room into the Hot Cell.  
42

43 At all times, written procedures ensure that loaded CH or RH Packages, facility pallets,  
44 containment pallets, and waste containers in the WHB Unit and Parking Area Unit are managed

1 in a manner to prevent obstructing the movement of personnel, fire-protection equipment, spill-  
2 control equipment, and decontamination equipment.  
3

4 For CH TRU mixed waste, an aisle space of at least 44 in. (1.1 m) between loaded facility or  
5 containment pallets will be maintained in all CH waste storage areas of the WHB Unit. For RH  
6 TRU mixed waste, a minimum of 44 in. (1.1 m) between loaded casks in the RH Bay will be  
7 maintained. A maximum of two loaded casks may be stored in the RH Bay at one time.

8 Implementation of written procedures ensures that loaded casks, transfer cars, and canisters are  
9 managed in the RH Bay in a manner to allow the movement of personnel, fire-protection  
10 equipment, spill-control equipment, and decontamination equipment. Within the Hot Cell, waste  
11 containers are not stored in multiple rows; similarly, within the Transfer Cell, the canister is  
12 located in a rack on the Transfer Cell Shuttle Car. Thus, aisle space does not apply to these  
13 areas. Aisle space requirements also do not apply to empty casks in racks. When CH or RH  
14 Packages contain waste in the Parking Area Container Storage Unit, the Permittees shall  
15 maintain a minimum spacing of 4 ft (1.2 m) between trailers loaded with CH or RH Packages or  
16 between CH or RH Packages not on trailers.  
17

#### 18 Underground Hazardous Waste Disposal Units (HWDUs) 19

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

31 Proper airflow distribution to all areas of the underground is achieved through a multi-step  
32 process. Tests and balances of the underground ventilation system are conducted on a periodic  
33 basis with the frequency depending on changes that are occurring in the configuration of the  
34 underground. These tests and balances physically measure airflow, pressure, and system  
35 resistance. Computer modeling is performed to determine the configuration necessary to achieve  
36 any desired underground airflow distribution. Administrative procedures are used as the means  
37 of assuring control of the configuration of the ventilation control devices such as bulkheads,  
38 doors, fans, and air regulators needed to achieve the desired configuration. Underground Facility  
39 Operations makes daily checks of air quality in all parts of the repository where personnel will be  
40 working. Air quantity checks are made on an as-needed basis as changing conditions warrant  
41 such checks.  
42

1 E-2 Preventive Procedures, Structures, and Equipment

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

8  
9 E-2a Unloading Operations

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

16  
17 CH TRU Mixed Waste

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

29  
30 An overhead 6-ton (5.4-metric ton) crane and adjustable center-of-gravity lift fixture transfer  
31 TRU mixed waste containers from the Contact Handled Package to a pallet on the WHB Unit  
32 floor. The facility pallet is a fabricated steel structure designed to securely hold waste  
33 containers. Each facility pallet has a rated load capacity of 25,000 lb (11,340 kg). The upper  
34 surface of the facility pallet has two recesses sized to accept the waste containers, ensuring that  
35 the containers are held in place. Up to four SWBs, four 7-packs of 55-gallon drums, four  
36 4-packs consisting of 85-gallon drums, four 3-packs of 100-gallon drums, or two TDOPs may be  
37 placed on a facility pallet. Each stack of waste containers is strapped down to holding bars in the  
38 top reinforcement plate of the facility pallet to avoid spillage during movement. Two rectangular  
39 tube openings in the bed allow the facility pallet to be securely lifted by forklift. In order to  
40 assure a facility pallet is not overloaded, operationally it will hold the contents of two  
41 Contact Handled Packages, as specified in Renewal Application Appendix M1.

42

1 The WIPP facility has the capability to handle each of the CH TRU containers singly using  
2 forklifts and single container attachments. In such cases, the container would be loaded on the  
3 waste shaft conveyance and moved underground as a single unit.  
4

5 All unloading equipment is inspected in accordance with the schedule shown in Renewal  
6 Application Chapter D, Tables D-1 and D-1a. Cranes that are used in the unloading and  
7 handling of TRU mixed waste have been designed and constructed so that they will retain their  
8 loads in the event of a loss of power. Cranes in the WHB Unit are also designed to withstand a  
9 design basis earthquake without moving off of their rails and without dropping their load.  
10 Lowering loads is a priority activity after a disruptive event.  
11

12 The following is a summary of the activities, structures, and equipment that were developed to  
13 prevent hazards in transporting TRU mixed waste.  
14

15 Palletized CH TRU mixed waste is either transferred by a 13-ton (11.8-metric ton) forklift or the  
16 facility transfer vehicle, which is designed with an adjustable bed height that is used to transfer  
17 the facility pallets to the special pallet-support stands in the waste shaft conveyance.  
18

19 The waste hoist system in the waste shaft and all waste shaft furnishings are designed to resist  
20 the dynamic forces of the hoisting system, which are greater than the seismic forces on the  
21 underground facilities. In addition the waste shaft conveyance headframe is designed to  
22 withstand the design-basis earthquake (~~DBE~~). Maximum operating speed of the hoist is 500 ft  
23 (152.4 m) per minute. During loading and unloading operations, the waste hoist is steadied by  
24 fixed guides. The waste hoist is equipped with a control system that will detect malfunctions or  
25 abnormal operations of the hoist system, such as overtravel, overspeed, power loss, or circuitry  
26 failure. The control response is to annunciate the condition and shut the hoist down. Operator  
27 response is required to recover from the automatic shutdown. Waste hoist operation is  
28 continuously monitored by the CMS. A battery powered FM transmitter/receiver allows  
29 communication between the hoist conveyance and the hoist house.  
30

31 The waste hoist has two pairs of brake calipers acting on independent brake paths. The hoist  
32 motor is normally used for braking action of the hoist. The brakes are used to hold the hoist in  
33 position during normal operations and to stop the hoist under emergency conditions. Each pair  
34 of brake calipers is capable of holding the hoist in position during normal operating conditions  
35 and stopping the hoist under emergency conditions. In the event of power failure, the brakes will  
36 set automatically.  
37

38 The hoist is protected by a fixed automatic fire suppression system. Portable fire extinguishers  
39 are also provided on the hoist floor and in equipment areas.  
40

41 Once underground, the facility pallet is removed from the hoist cage by the underground waste  
42 transporter (see Figure M2-6 in Renewal Application Appendix M2), a commercially available  
43 articulated diesel vehicle. The trailer is designed specifically for transporting palletized TRU  
44 mixed waste and is sized to accommodate the facility pallet. All motorized waste handling  
45 equipment is equipped with on-board fire-suppression systems.  
46

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

5  
6 ~~AH CH~~ **Contact-handled** TRU mixed waste transport equipment is inspected at a frequency  
7 indicated in [Renewal Application Chapter D](#), Table D-1.

8  
9 RH TRU Mixed Waste

10  
11 Cranes and forklifts that are used to unload and handle RH TRU mixed waste have been  
12 designed and constructed to retain their loads in the event of a loss of power. RH TRU mixed  
13 waste received in an RH-TRU 72-B cask is unloaded from the trailer in the RH Bay, using the  
14 RH Bay Overhead Bridge Crane, and is placed on the cask transfer car. The cask transfer car  
15 moves the RH-TRU 72-B cask into the Cask Unloading Room, where a bridge crane lifts the  
16 cask from the cask transfer car and lowers it into the Transfer Cell and onto the Transfer Cell  
17 shuttle car. The Transfer Cell shuttle car moves the RH-TRU 72-B cask into position for  
18 transferring the canister to the facility cask.

19  
20 RH TRU mixed waste received in a CNS 10-160B cask is unloaded from the trailer in the RH  
21 Bay using the RH Bay overhead bridge crane and is placed on the cask transfer car. The cask  
22 transfer car moves the CNS 10-160B cask into the Facility Cask Unloading Room. The Hot Cell  
23 crane lifts the two drum carriage units from the CNS 10-160B cask in the Facility Cask  
24 Unloading Room into the Hot Cell, where the drums are transferred into RH TRU mixed waste  
25 facility canisters using the Overhead Powered Manipulator or Hot Cell Crane. The facility  
26 canisters are then lowered into a shielded insert on the Transfer Cell Shuttle Car in the Transfer  
27 Cell. The Transfer Cell Shuttle Car moves the shielded insert into position for transferring the  
28 facility canister to the facility cask.

29  
30 A remotely-operated fixed hoist grapple lifts the canister from the RH-TRU 72-B cask or from  
31 the shielded insert on the Transfer Cell shuttle car and transfers the canister into the facility cask  
32 located on the facility cask transfer car in the Facility Cask Loading Room. The facility cask is  
33 rotated to a horizontal position on the Facility Cask Transfer Car and the Facility Cask Transfer  
34 Car moves onto the waste shaft conveyance and is lowered underground.

35  
36 Once underground, the RH TRU mixed waste handling forklift lifts the facility cask from the  
37 Facility Cask Transfer Car and carries the facility cask to the Horizontal Emplacement and  
38 Retrieval Equipment (**HERE**). After placing the facility cask on the HERE, the canister is  
39 emplaced in the wall of the disposal room.

40  
41 Pertinent RH TRU mixed waste transport equipment is inspected at a frequency indicated in  
42 [Renewal Application Chapter D](#), Table D-1a.

43  
44 Figures of RH TRU mixed waste emplacement equipment are included in Renewal Application  
45 Appendices M1 and M2.

1  
2 E-2b Runoff

3 The following description of procedures, structures, or equipment used at the WIPP facility to  
4 prevent runoff from TRU mixed waste handling areas to other areas of the facility or  
5 environment or to prevent flooding is required by 20.4.1.900 NMAC (incorporating 40 CFR  
6 §270.14(b)(8)(ii)).

7  
8 The WHB Unit is a physical barrier that will prevent TRU mixed waste spills from reaching the  
9 environment before a cleanup could be initiated and completed. A detailed description of the  
10 WHB containment capability for the CH Bay and RH Complex is contained in Renewal  
11 Application Appendix M1. Secondary containment is also provided by the shipping containers  
12 while waste are within them. These are sealed vessels with no open vents and therefore cannot  
13 leak.

14  
15 TRU Transuranic mixed waste received for emplacement at the WIPP facility must be certified  
16 ~~under this Permit's Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (TSDF-~~  
17 ~~WAC)~~ as non-liquid waste; in some cases, the Permit~~tees~~ allows up to one percent residual  
18 liquids. ~~The TSDF-WAC~~ There are procedural controls that must be met at by the certified  
19 characterization program ~~generator or storage site~~ and the data must be verified by the WIPP  
20 facility staff prior to acceptance for the Disposal Phase and shipment to the WIPP facility.  
21 Renewal Application Chapter B contains information regarding Treatment, Storage, and  
22 Disposal Facility Waste Acceptance Criteria (TSDF-WAC) requirements for shipping and  
23 discusses receipt and verification of the TRU mixed waste at the WIPP facility. Derived waste  
24 must also meet ~~an~~ applicable TSDF-WAC requirements prior to disposal. Calculations in  
25 Renewal Application Appendix M1 demonstrate that one percent residual liquid in TRU mixed  
26 waste containers is easily contained by the WHB Unit floor.

27  
28 The WIPP facility does not lie within a 100-year floodplain. There are no major surface-water  
29 bodies within 5 mi (8 km) of the site, and the nearest river, the Pecos River, is approximately  
30 12 mi (19 km) away. The general ground elevation in the vicinity of the surface facilities  
31 (approximately 3,400 ft ~~{(1,036 m)}~~ above mean sea level) is about 500 ft (152 m) above the  
32 riverbed and 400 ft (122 m) above the 100-year floodplain. Protection from flooding or ponding  
33 caused by probable maximum precipitation (PMP) events is provided by the diversion of water  
34 away from the WIPP facility by a system of peripheral interceptor berms and dikes.  
35 Additionally, grade elevations of roads and surface facilities are designed so that storm water  
36 will not collect on the site under the most severe conditions.

37  
38 Repository shafts are elevated at least 6 in. (15.2 cm) to prevent surface water from entering the  
39 shafts. The floor levels of all surface facilities are above the levels calculated for local flooding  
40 due to PMP events. Therefore, flooding of WIPP facility roads and surface structures is not  
41 expected from the flooding of surface waters as a result of PMP events or because of site-runoff  
42 design.

43  
44 Flood-control structures are inspected as part of a general facility inspection at least annually.  
45 During this inspection, the structures are checked to assure there has been no wind or rain

1 erosion or animal-caused damage that would cause the structures to fail. Further, the areas  
2 around the structures are inspected to ensure they are free of vegetation, debris, or other items  
3 that would impede the diversion of water. Experience with these structures has shown that  
4 annual structural inspections are adequate for the climate and soil conditions at the WIPP  
5 facility; however, inspections are also conducted after severe natural events, such as severe  
6 storms and a design basis earthquake.

7  
8 Whenever TRU mixed waste is outside the WHB Unit, it will be contained in CH or RH  
9 Packages. TRU mixed waste containers are only unloaded from the shipping containers inside  
10 the WHB Unit and shipping containers are never opened outside this facility; therefore, TRU  
11 mixed waste is not expected to reach the outside environment or other parts of the facility from  
12 the TRU mixed waste handling facilities in non-flood circumstances. Flooding of the TRU  
13 mixed waste handling facilities is prevented by drainage ditches and berms such that there is no  
14 mechanism that might transport TRU mixed waste to the outside environment and between parts  
15 of the WIPP facility. Neither is there a mechanism to allow TRU mixed waste to find its way to  
16 an area of the WIPP site where it would be carried off site by flood or precipitation waters.

#### 17 18 E-2c Water Supplies

19 At the WIPP facility, water supplied by a local water company enters a pair of 180,000-gal  
20 (681,372-L) aboveground storage tanks located adjacent to the Pumphouse. The 360,000-gal  
21 (1,362,744-L) combined capacity of the tanks is used as the potable water source and for fire  
22 control. These tanks are 32 ft (9.8 m) in diameter and are constructed of welded steel. The water  
23 level in each tank is inspected daily. Potable water is piped to the site and stored in tanks until  
24 distributed by pipe to the fire hydrants and buildings. Managing the potable water supply in this  
25 manner prevents the contamination of the supply by TRU mixed waste.

#### 26 27 E-2d Equipment and Power Failure

28 The following description of procedures, structures, or equipment used at the facility to mitigate  
29 effects of equipment failure and power outages is required by 20.4.1.900 NMAC (incorporating  
30 40 CFR §270.14(b)(8)(iv)). The specific systems and facilities related to the protection of  
31 human health and the environment during waste handling and management operations are  
32 discussed in the in Renewal Application Appendix M1.

33  
34 Utility power is fed to the WIPP site by two separate feeds in a ring bus configuration. This  
35 provides the capability to supply uninterrupted, redundant power to the site upon the loss of one  
36 feed. A redundant Southwestern Public Service (SPS) power feed has been installed. In the  
37 event that normal utility power is lost, on-site diesel generators will provide alternating current  
38 (AC) power to important WIPP facility electrical loads. Uninterruptible power supply (UPS)  
39 units are also on line providing power to important monitoring systems.

40  
41 If utility power fails, the exhaust filter system goes into the fail position, and the system high-  
42 efficiency particulate-air filter dampers are placed into filtration position. When power is  
43 restored by the diesel generators, a decision is made whether to remain in filtration mode and

1 energize a filtration fan or to realign the dampers into the minimum exhaust mode. Without any  
2 indication of a radiological release, the decision is usually the latter. TRU mixed waste handling  
3 and related operations cease upon loss of utility power and are not resumed until normal utility  
4 power is returned. All waste handling equipment will "fail safe," meaning that it will retain its  
5 load during a power outage.

6  
7 In case of a loss of utility power, backup power to predetermined loads can be supplied by either  
8 of the two on-site diesel generators. Each of these units provide 480 volts (V) of power with a  
9 high degree of reliability and are sized to feed the selected loads. Each of the diesel generators  
10 can carry all preselected monitoring loads plus operation of the Air Intake Shaft hoist for  
11 personnel evacuation and other selected backup loads. The diesel generators can be brought on  
12 line within 30 minutes.

13  
14 Upon loss of normal power, the diesel generators are manually started from the local control  
15 panel or from the CMR. The starter system is a 24-V battery system with a 300-ampere-hour  
16 capacity. Although it is standard practice to start the diesel generators from the local control  
17 panel, each unit can be remotely started from the CMR when the generator start switch is placed  
18 in the "remote" position. The diesel generators and associated breakers can be monitored in the  
19 CMR, thus providing the ability to feed selected facility loads from the backup power source, in  
20 sequence, without exceeding generator capacity. The on-site fuel storage capacity is sufficient  
21 for the operation of one generator at an expected load of 62 percent for three days. Additional  
22 fuel supplies are readily available within a few hours by tank truck, allowing on-line refueling  
23 and continued operation.

24  
25 There is a Central UPS, located in the Support Building, that supplies power to selected loads  
26 located in the Support Building and WHB Unit. The Central UPS provides back-up power to  
27 equipment associated with radiation monitoring, communications, and central monitoring  
28 systems. In addition, individual UPSs are provided for the selected equipment associated with  
29 these same systems, but are located remotely from the Support Building and the WHB Unit. The  
30 CMR is also connected to the Central UPS.

31  
32 In case of loss of AC power input to the UPSs, the dedicated batteries were designed to supply  
33 power to a fully loaded UPS for 30 minutes. It is expected that the AC power input to the UPS  
34 will be restored within 30 minutes, either from the off-site electric utility or from the site back-up  
35 power generator system.

36  
37 Human health and the environment are protected during a loss of off-site power by a  
38 combination of factors:

- 39  
40
- 41 • The underground filtration system fails in the "filter" mode so that no releases of  
contaminated particulates will occur
  - 42 • The UPS maintains all monitoring systems and alarms in waste handling areas so that  
43 fires or pressure loss will be detected and an appropriate response initiated

- 1 • Generators are brought on line within 30 minutes, at which time hoisting can be initiated  
2 so that personnel do not have to stay underground for extended lengths of time.
- 3 • Decisions to evacuate underground personnel will be made in accordance with the  
4 requirements of the Mine Safety and Health Administration (**MSHA**)
- 5 • The waste hoist brakes set automatically so that loads do not fall
- 6 • Cranes retain their loads so that spills do not occur from dropped containers
- 7 • Communication systems are maintained
- 8 • The emergency operations center is powered if it is needed.

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

17  
18 The CMS components of the WHB Unit and the Support Building are powered from the central  
19 UPS. The UPS features automatic switching without a loss of power from primary power to  
20 alternate power to battery backup power. The components located throughout the facility are  
21 powered by various electrical switchboards, with UPS battery backup.

22  
23 The major components of the system are interconnected by means of a redundant network. The  
24 network is the communications medium for the CMS and consists of network cables routed  
25 throughout the facility. The network is designed such that no single point failure will cause  
26 failure of the entire network. Parameters or status are monitored by Local Processing Units  
27 strategically located throughout the surface and underground facility.

28  
29 In addition, a number of automatic checks are performed on the internal processes associated  
30 with system components and network communications. If any fault is detected, the system has  
31 the capability to remove a component from the network and alert the CMR Operator (**CMRO**) of  
32 the fault. The status of the network is continuously monitored by the CMRO 24 hours per day,  
33 seven days per week. If a fault occurs, the CMRO initiates an AR within the Work Control  
34 system to correct the problem.

35  
36 The RH Complex is included in the WHB. The Central UPS supplies power to the WHB which  
37 includes the RH Complex. The RH Bay, Hot Cell and Transfer Cell equipment are serviced by  
38 dual 1,300 KW diesel powered generators located between the exhaust shaft and the WHB. The  
39 generators provide backup power to both CH and RH waste handling operations. The RH waste

1 handling equipment is designed to stop as a result of loss of power in a fail-safe condition.  
2 Power from the back-up generators may be utilized to place RH TRU mixed waste containers in  
3 process into a safe configuration. During a total power outage condition selected RH loads can  
4 be powered by the Central UPS. Within a short time selected RH loads at 480 ~~V~~ volts and below  
5 can be powered by the Backup Diesel Generators. The backup central UPS for the WHB would  
6 also supply backup power to the RH Complex.

7  
8 E-2e Personnel Protection

9 The following description of procedures, structures, or equipment used at the facility to prevent  
10 undue exposure of personnel to hazardous waste is required by 20.4.1.900 NMAC (incorporating  
11 40 CFR §270.14(b)(8)(v)).

12  
13 Procedures used at the WIPP facility to prevent undue exposure of personnel to hazardous waste  
14 and the sections in this Renewal Application Chapter where these procedures are discussed in  
15 detail are listed below.

- 16  
17 • The TSDF-WAC ~~are criteria~~ is designed to prevent the shipment or acceptance of TRU  
18 mixed waste exhibiting the characteristics of ignitability, corrosivity, or reactivity.
  
- 19 • Written procedures to prevent the addition of materials to the TRU mixed waste that  
20 could exhibit incompatibility or the characteristics of reactivity and/or ignitability are  
21 discussed in Section E-3 of ~~this Renewal Application Chapter~~.
  
- 22 • TRU mixed waste handling operations are conducted so that the need for TRU mixed  
23 waste handling personnel to touch the TRU mixed waste containers during unloading,  
24 overpacking (if necessary), and emplacement operations is minimized. Appropriate  
25 personal protective equipment (**PPE**) will be used depending on locations and operations  
26 (e.g., steel-toed shoes, hard hat, safety glasses inside a crane operating envelope; steel-  
27 toed shoes, hard hat, mine lamp, self rescuer, and safety glasses in the Underground).
  
- 28 • Tagout/Lockout and work authorization procedures, discussed in Renewal Application  
29 Chapter D, Section D-1, prohibit WIPP facility personnel from utilizing TRU mixed  
30 waste handling equipment that is temporarily out of service and prevent inappropriate use  
31 of TRU mixed waste handling equipment that is not operational for all uses.
  
- 32 • A system for monitoring and inspecting monitoring equipment, safety and emergency  
33 systems, security devices, and operating and structural equipment is in place to prevent,  
34 detect, or respond to environmental or human health hazards caused by hazardous waste.  
35 The inspection/monitoring requirements are described in Renewal Application  
36 Chapter D.
  
- 37 • Adequate aisle space is maintained for emergency response purposes, as discussed in  
38 Section E-1b of ~~this Renewal Application Chapter~~.

- Procedures to protect personnel from hazardous and/or TRU mixed waste during nonroutine events are detailed in Renewal Application Chapter 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 Renewal Application Appendices M1 and M2; Section E-2a of this Renewal Application Chapter 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 Renewal Application Appendices M1 and M2. Section E-2a of this Renewal Application Chapter 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 (Renewal Application Appendix 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 is 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 Renewal Application Chapter and the Contingency Plan, Renewal Application Chapter F.

- 1       • The WIPP facility is well equipped with spill-response equipment, transport vehicles,  
2       emergency medical equipment and rescue vehicles, fire detection, fire-suppression and  
3       firefighting equipment (including water for fire control), PPE, emergency lighting and  
4       backup power, and showers and eye-wash fountains. These are discussed in Sections  
5       E-1a, E-2c and E-2d of this Renewal Application Chapter and are listed in the  
6       Contingency Plan, Renewal Application Chapter F.
- 7       • The surface and underground ventilation systems, discussed in Renewal Application  
8       Appendix M2, are designed to provide personnel with a suitable environment during  
9       routine operations.

#### 10 E-2f Releases to Atmosphere

11 The following description of procedures, structures, or equipment used at the facility to prevent  
12 releases to the atmosphere is required by 20.4.1.900 NMAC (incorporating 40 CFR  
13 §270.14(b)(8)(vi)).

14  
15 ~~All~~ TRU Transuranic mixed waste will be contained. TRU Transuranic mixed waste container  
16 vents employ particulate filters that prevent particulate releases to the atmosphere. The nature of  
17 the waste itself also mitigates potential releases to the atmosphere. Lead and other heavy metals,  
18 which could exhibit the characteristic of toxicity, may be present in some TRU mixed waste  
19 forms. The metal in the TRU mixed waste, most of which is lead in monolithic form, is present  
20 in bricks and shielding rather than in particulate form. The primary sources of other metals are  
21 sheets, rods, plating, equipment parts, or solidified sludges.

22  
23 A release of hazardous waste or hazardous constituents to the air that may have adverse effects  
24 on human health or the environment is unlikely. Although VOCs could be present in the TRU  
25 mixed waste emplaced within the unit and could potentially be a source of release to the air, the  
26 volatile organic compound monitoring plan described in Renewal Application Chapter N will be  
27 used to confirm that there is no adverse effects on human health and the environment.

#### 28 29 E-2g Flammable Gas Concentration Control

30 Gas concentrations in the mine and around the underground HWDUs are controlled by  
31 mechanically induced ventilation. There are two primary ventilation fans and three filtration  
32 fans. If only one primary ventilation fan is ventilating the mine, it typically will be set to draw  
33 260,000 ft<sup>3</sup> (7,358 m<sup>3</sup>) per minute of air through the mine, which is sufficient to adequately  
34 ventilate all active areas in the mine. If both primary fans are operating, they will typically be set  
35 to draw 425,000 ft<sup>3</sup> (12,028 m<sup>3</sup>) per minute of air through the mine. The filtration fans are  
36 interlocked so that only one filtration fan can operate at any time in the filtration mode. One  
37 filtration fan is normally set to draw 60,000 ft<sup>3</sup> (1,698 m<sup>3</sup>) per minute of air through the mine.  
38 The air is routed through the underground facility with bulkhead doors and dampers to achieve  
39 the most efficient use of the air in ventilating for possible gases and maintaining required  
40 differential pressures in the underground facility.

41

1 The WIPP Mine Ventilation Plan ~~are~~ **is** updated a least once a year or more often to  
2 accommodate changing underground conditions. Dead end drifts are fairly common in  
3 underground mines. Ventilation to accessible dead end drifts is provided by auxiliary fans and  
4 ducts to the extent necessary. Minimum requirements for air quantity, quality, and air flow  
5 velocity depend on the level of activity in a given area and are ~~governed by~~ **consistent with**  
6 Federal (30 CFR §57, Subpart G) and State regulations. Compliance with those regulations is  
7 monitored by facility personnel and through frequent inspections by regulatory authorities.  
8

9 The WIPP **Permittees** ~~Industrial Hygienist~~ **is** ~~are~~ responsible for monitoring and/or testing the air  
10 in the underground. The tests are on an as needed basis, in areas where chemicals are stored, and  
11 in areas where people are working that may contain hazardous concentrations of airborne fumes,  
12 mists, or vapors. All surveys are recorded; records contain location, time, job description, or  
13 occurrences associated with the contaminants, and the identification of instruments used.  
14

15 ~~Underground Facility Operations checks~~ **The Permittees check** the underground air quality on a  
16 daily basis in all open drifts utilizing instrumentation which indicates Oxygen, Carbon  
17 Monoxide, and Flammable Gas concentration. The results of the monitoring are entered in the  
18 Shift Log Daily. If conditions are found that exceed established criteria, additional notification is  
19 made to the CMR. Appropriate actions are taken to determine the type of gases and impact on  
20 mine activities. The readings taken during specific tests for unusual conditions are recorded in  
21 the Daily Shift Log. ~~All the m~~ **M**onitoring performed by **the Permittees** ~~Underground Facility~~  
22 ~~Operations~~ is in accordance with MSHA (30 CFR §57).  
23

24 Portable air monitoring equipment is used to assure access to all areas where air quality may be  
25 of concern. Two types of measuring systems are used at the WIPP: Draeger Pump Systems and  
26 Portable Air Monitoring Instruments. Prior to use, all instruments must have certification of  
27 current calibration and check gases must also be certified as accurate within one percent of the  
28 label concentration. Instruments are used within the guidelines established by the manufacturers  
29 and are accompanied with suitable temperature, barometric and relative humidity measurements  
30 (as required). Functional testing of instruments must be done before each use and the results  
31 must fall within the ranges specified in air monitoring procedures. Gases that are to be tested  
32 include oxygen, methane, carbon monoxide, hydrogen sulfide, sulphur dioxide, nitrogen dioxide,  
33 and chlorine. Alarm levels are set for each gas. Typical settings are as follows: O<sub>2</sub>: 19.5%  
34 LOW; 23.0% HIGH; CH<sub>4</sub>: 0.25%; CO: 25 ppm; H<sub>2</sub>S: 10 ppm; SO<sub>2</sub>: 2 ppm; NO<sub>2</sub>: 1 ppm; Cl<sub>2</sub>: 0.5  
35 ppm. When alarm levels are reached, Industrial Safety is contacted to evaluate the conditions  
36 and to determine the appropriate actions. Equipment operation is by trained personnel only, or  
37 under the supervision of trained personnel. Air Quality sampling is performed as often as needed  
38 to assure safe working conditions. If conditions are worsening, or action has been taken to  
39 mitigate high levels of contamination, the frequency of measurement is increased. Underground  
40 air quality is checked at the beginning of the day when personnel are underground.  
41

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

43 20.4.1.900 NMAC (incorporating 40 CFR §270.14(b)(9)), requires a description of precautions  
44 taken to prevent accidental ignition or reaction of ignitable, reactive, or incompatible TRU mixed

1 waste as required to demonstrate compliance with 20.4.1.900 NMAC (incorporating 40 CFR  
2 §270.15(c)), and 20.4.1.500 NMAC (incorporating 40 CFR §264.17). Because the TRU mixed  
3 waste (including the container) received at the facility during the Disposal Phase and any derived  
4 TRU mixed waste have been demonstrated to be compatible and do not exhibit the  
5 characteristics of ignitability, reactivity, or corrosivity, the WIPP facility is in full compliance  
6 with these regulations.  
7