

**ATTACHMENT E**

**PREPAREDNESS AND PREVENTION**

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1 E-1b Aisle Space Requirement

2  
3 Waste Handling Building Container Storage Unit (WHB Unit) and Parking Area Container  
4 Storage Unit (Parking Area Unit)

5  
6 Waste containers will remain inside the Contact-Handled (CH) or Remote-Handled (RH)  
7 Packages in the Parking Area Unit until TRU mixed waste handlers are prepared to handle  
8 them. As shown in Figure M1-1 in Permit Attachment M1, there is ready access to all areas  
9 within the WHB Unit where hazardous wastes are handled. Waste containers are unloaded  
10 from the Contact Handled Package in to the WHB Unit (see Figure M1-12 in Permit  
11 Attachment M1). The WHB Unit can handle the unloading of four Contact Handled Packages at  
12 one time. Single RH TRU mixed waste canisters are unloaded from the RH-TRU 72-B casks in  
13 the Transfer Cell of the WHB Unit where they are transferred to facility casks (see Figures M1-  
14 23 and M1-24 in Permit Attachment M1). RH TRU mixed waste drums in CNS 10-160B casks,  
15 which may contain up to 10 drums configured in two 5-drum baskets (see Figure M1-25 in  
16 Permit Attachment M1), are unloaded from the cask staged in the Cask Unloading Room into  
17 the Hot Cell.

18  
19 At all times, written procedures ensure that loaded Contact Handled Packages, facility pallets,  
20 and waste containers are managed in the WHB Unit in a manner to prevent obstructing the  
21 movement of personnel, fire-protection equipment, spill-control equipment, and  
22 decontamination equipment. Written procedures ensure that in the WHB Unit and staging  
23 areas, Parking Area Unit and staging area, and TMF Staging Area the following are managed in  
24 a manner to prevent obstructing the movement of personnel, fire-protection equipment, spill-  
25 control equipment, and decontamination equipment:

- 26  
27 • Loaded CH or RH Packages  
28 • Facility pallets  
29 • Containment pallets  
30 • Other waste containers  
31 =

32 For CH TRU mixed waste, An aisle space of at least 44 in. (1.1 m) between loaded facility or  
33 containment pallets will be maintained in all CH TRU mixed waste storage and staging areas of  
34 the WHB Unit, and a minimum of 4 ft (1.2 m) of aisle space will be maintained between Contact  
35 Handled CH Packages in the outdoor Parking Area Unit. For RH TRU mixed waste, a minimum  
36 of 44 inches (1.1 m) between loaded casks in the RH Bay will be maintained. A maximum of  
37 two loaded casks may be stored in the RH Bay at one time. Implementation of written  
38 procedures ensures that loaded casks, transfer cars, and canisters are managed in the RH Bay  
39 in a manner to allow the movement of personnel, fire-protection equipment, spill-control  
40 equipment, and decontamination equipment. Within the Hot Cell, waste containers are not  
41 stored in multiple rows; similarly, within the Transfer Cell, the canister is located in a rack on the  
42 Transfer Cell Shuttle Car. Thus aisle space does not apply to these areas. Aisle space  
43 requirements also do not apply to empty casks in racks. In the Parking Area Container Storage

1 Unit or Parking Area Staging Area, when CH or RH Packages contain waste, the Permittees  
2 shall maintain a minimum spacing of 4 ft (1.2 m) between trailers loaded with CH or RH  
3 Packages or between CH or RH Packages not on trailers.  
4

5 E-2a Unloading Operations  
6

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

14 CH TRU Mixed Waste  
15

16 The TRUPACT-II shipping container has a gross loaded weight of 19,265 lbs (8,737 kgs). The  
17 HalfPACT shipping container has a gross loaded weight of 18,100 lbs (8,210 kgs). The gross  
18 loaded weight is defined as the weight of the payload and the weight of the Contact Handled  
19 Package itself. The Contact Handled Packages have forklift pockets at the bottom of the  
20 container specifically for lifting the container with a forklift (see Figure M1-8 in Permit  
21 Attachment M1). The 13 ton (11.8 metric tons) electric forklift unloads the TRUPACT-II from the  
22 trailer and transfers it to an unloading dock in the WHB Unit (~~see Figure M1-9 in Permit~~  
23 ~~Attachment M1~~). The unloading dock is designed to accommodate the Contact Handled  
24 Package and functions as a work platform, providing TRU mixed waste handling and health  
25 physics personnel with easy access to the container during unloading operations.  
26

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

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

1 The details of how CH TRU containers will be managed during verification and examination is  
2 discussed in Section E-2a(1).

3  
4 The details of how RH TRU containers will be managed during verification and examination is  
5 discussed in Section E-2a(2).

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

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

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

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

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

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

42  
43 Once underground, the facility pallet is removed from the hoist cage by the underground waste

1 transporter (see Figure M2-7 in Permit Attachment M2), a commercially available articulated  
2 diesel vehicle. The trailer is designed specifically for transporting palletized TRU mixed waste  
3 and is sized to accommodate the facility pallet. All motorized waste handling equipment is  
4 equipped with on-board fire-suppression systems.

5  
6 The underground waste transporter is equipped with a fire suppression system, rupture-  
7 resistant diesel fuel tanks, and reinforced fuel lines to minimize the potential for a fire involving  
8 the fuel system. Waste containers will be placed into underground HWDUs using a forklift and  
9 attachments.

10  
11 All CH TRU mixed waste transport equipment is inspected at a frequency indicated in Table  
12 D-1.

### 13 RH TRU Mixed Waste

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

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

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

40  
41 Once underground, the RH TRU mixed waste handling forklift lifts the facility cask from the  
42 Facility Cask Transfer Car and carries the facility cask to the Horizontal Emplacement and  
43 Retrieval Equipment (HERE). After placing the facility cask on the HERE, the canister is

1 emplaced in the wall of the disposal room.

2

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

5

6 Figures of RH TRU mixed waste emplacement equipment are included in Attachment M1.

7

1 E-2a(1) Verification and Examination of CH TRU

2  
3 Verification and examination of CH TRU mixed waste will occur either via radiography or  
4 through a review of the visual examination records on a statistically representative  
5 subpopulation of each waste stream in a shipment.

6  
7 After removal from the CH Package, each assembly will be tagged to indicate that verification  
8 and examination is required before storage or disposal. When containers are removed from  
9 assemblies, each container will be tagged to indicate that verification and examination is  
10 required. No containers from an unverified and unexamined shipment will be placed in the  
11 permitted storage area.

12  
13 Containers will be randomly selected for verification and examination. If verification and  
14 examination are performed via a review of the VE records from the shipments that have arrived  
15 at WIPP, the containers/packages will remain in an appropriate Staging Area within the WHB,  
16 TMF, or PAU until this review is complete. If verification and examination are performed via  
17 radiography the facility or containment pallet containing the container(s) for radiography will be  
18 moved to the TMF, the payload assembly will be disassembled if necessary, the container(s)  
19 radiographed and the payload assembly reassembled if necessary. Any container which is  
20 moved singly will be provided with adequate secondary containment (e.g., containment pallet).

21  
22 Once the payload assembly is reassembled, it will be returned to an appropriate staging area.  
23 When verification and examination is complete, the approved containers will have the tag  
24 removed indicating that the containers have been approved through the verification and  
25 examination process and the shipment can be placed into storage or downloaded to the  
26 repository.

27  
28 E-2a(2) Verification and examination of RH-TRU Mixed Waste Containers

29  
30 Verification and examination of RH-TRU mixed waste will occur through a review of the visual  
31 examination records on a statistically representative subpopulation of each waste stream in a  
32 shipment.

33  
34  
35 E-2b Runoff

36  
37 The WHB Unit is and the TMF provide a physical barrier that will prevent TRU mixed waste  
38 spills from reaching the environment before a cleanup could be initiated and completed. A  
39 detailed description of the WHB containment capability for the CH Bay Storage Area, Shielded  
40 Storage Area, CH Bay Staging Area, TMF Staging Area, Room 108 and Airlock 107 Staging  
41 Area and RH Complex is contained in Permit Attachment M1. Secondary containment is also  
42 provided by the shipping containers while waste are within them. These are sealed vessels with  
43 no open vents and therefore cannot leak.

1 TRU mixed waste received for emplacement at the WIPP facility must be certified under this  
2 Permit's Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (TSDF-WAC) as  
3 nonliquid waste; in some cases, the Permit allows up to one percent residual liquids. The  
4 TSDF-WAC are procedural controls that must be met at the generator or storage site and the  
5 data must be verified by the WIPP facility staff prior to acceptance for the Disposal Phase and  
6 shipment to the WIPP facility. Permit Module II and Permit Attachment B contain information  
7 regarding TSDF-WAC requirements for shipping and discusses receipt and verification of the  
8 TRU mixed waste at the WIPP facility. The verification and examination process to verify that  
9 the waste contains no ignitable, corrosive or reactive waste is detailed in Permit Attachment B7.  
10 Derived waste must also meet all TSDF-WAC requirements prior to disposal. Calculations in  
11 Permit Attachment M1 demonstrate that one percent residual liquid in TRU mixed waste  
12 containers is easily contained by the WHB Unit or TMF floor.  
13

14 Whenever TRU mixed waste is outside the WHB Unit, or TMF, it will be contained in Contact-  
15 or Remote-Handled Packages. TRU mixed waste containers are only unloaded from the  
16 shipping containers inside the WHB Unit and shipping containers are never opened outside this  
17 facility; therefore, TRU mixed waste is not expected to reach the outside environment or other  
18 parts of the facility from the TRU mixed waste handling facilities in non-flood circumstances.  
19 Flooding of the TRU mixed waste handling facilities is prevented by drainage ditches and berms  
20 such that there is no mechanism that might transport TRU mixed waste to the outside  
21 environment and between parts of the WIPP facility. Neither is there a mechanism to allow TRU  
22 mixed waste to find its way to an area of the WIPP site where it would be carried off site by  
23 flood or precipitation waters.  
24

#### 25 E-2d Equipment and Power Failure

26  
27 There is a Central UPS, located in the Support Building, that supplies power to selected loads  
28 located in the Support Building and WHB-Unit. The Central UPS provides back-up power to  
29 equipment associated with radiation monitoring, communications, and central monitoring  
30 systems. In addition, individual UPSs are provided for the selected equipment associated with  
31 these same systems, but are located remotely from the Support Building and the WHB-Unit.  
32 The CMR is also connected to the Central UPS.  
33

34 The CMS components of the WHB-Unit and the Support Building are powered from the central  
35 UPS. The UPS features automatic switching without a loss of power from primary power to  
36 alternate power to battery backup power. The components located throughout the facility are  
37 powered by various electrical switchboards, with UPS battery backup.  
38

39 The RH Complex is included in the WHB. The Central UPS supplies power to the WHB which  
40 includes the RH Complex. The RH Bay, Hot Cell and Transfer Cell equipment are serviced by  
41 dual 1,300 KW diesel powered generators located between the exhaust shaft and the WHB.  
42 The generators provide backup power to both CH and RH waste handling operations. The RH  
43 waste handling equipment is designed to stop as a result of loss of power in a fail-safe

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

7 E-2e Personnel Protection

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

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

- 16 ● The TSDF-WAC are criteria designed to prevent the shipment or acceptance of  
17 TRU mixed waste exhibiting the characteristics of ignitability, corrosivity, or  
18 reactivity.  
19
- 20 ● Waste streams will undergo verification and examination via radiography or the  
21 review of visual examination records as described in Attachment B7, to verify the  
22 physical form of the waste and that the waste contains no corrosive, ignitable, or  
23 reactive waste.  
24
- 25 ● Written procedures to prevent the addition of materials to the TRU mixed waste  
26 that could exhibit incompatibility or the characteristics of reactivity and/or  
27 ignitability are discussed in Section E-3 of this Permit Attachment.  
28
- 29 ● The shipping containers, forklifts, unloading dock, crane, facility pallets,  
30 containment pallets, facility transfer vehicle, waste hoist cage, and underground  
31 waste transporter were designed or selected for use in order to minimize the  
32 need for CH-TRU mixed waste handling personnel to come into contact with CH-  
33 TRU mixed waste. Each of these items are discussed in detail in Permit  
34 Attachments M1 and M2; Section E-2a of this Permit Attachment discusses  
35 prevention of hazards to personnel during unloading operations.  
36
- 37 ● The shipping containers, forklifts, cranes, cask shuttle, transfer cars,  
38 manipulators, Hot Cell, waste hoist cage, and HERE were designed or selected  
39 for use in order to minimize the need for RH TRU mixed waste handling  
40 personnel to come into contact with RH TRU mixed waste. These items are  
41 discussed in Permit Attachments M1 and M2. Section E-2a of this Permit  
42 Attachment discusses in detail prevention of hazards to personnel during  
43 unloading operations.

- 1 ● TRU mixed waste handling operations are conducted so that the need for TRU  
2 mixed waste handling personnel to touch the TRU mixed waste containers  
3 during unloading, verification and examination, overpacking (if necessary), and  
4 emplacement operations is minimized. Appropriate personal protective  
5 equipment (**PPE**) will be used depending on locations and operations (e.g., steel-  
6 toed shoes, hard hat, safety glasses inside a crane operating envelope; steel-  
7 toed shoes, hard hat, mine lamp, self rescuer, and safety glasses in the  
8 Underground).  
9
- 10 ● Tagout/Lockout and work authorization procedures, discussed in Section D-1,  
11 prohibit WIPP facility personnel from utilizing TRU mixed waste handling  
12 equipment that is temporarily out of service and prevent inappropriate use of  
13 TRU mixed waste handling equipment that is not operational for all uses.  
14
- 15 ● A system for monitoring and inspecting monitoring equipment, safety and  
16 emergency systems, security devices, and operating and structural equipment is  
17 in place to prevent, detect, or respond to environmental or human health hazards  
18 caused by hazardous waste. The inspection/monitoring requirements are  
19 described in Permit Attachment D.  
20
- 21 ● Adequate aisle space is maintained for emergency response purposes, as  
22 discussed in Section E-1b of this Permit Attachment.  
23
- 24 ● Procedures to protect personnel from hazardous and/or TRU mixed waste during  
25 nonroutine events are detailed in Permit Attachment F.  
26

27 The following discusses the structures and equipment that prevent undue exposures of  
28 personnel at the WIPP facility to hazardous constituents:  
29

- 30 ● The WIPP facility was sited and designed to be protective of human health and  
31 ensure safe operations during the Disposal Phase.  
32
- 33 ● TRU mixed waste containers are required to meet shipping/structural  
34 requirements.  
35
- 36 ● The shipping container, forklifts, unloading dock, crane, facility pallets,  
37 containment pallets, facility transfer vehicle, waste hoist cage, and underground  
38 waste transporter were designed or selected for use in order to minimize the  
39 need for TRU mixed waste handling personnel to come into contact with TRU  
40 mixed waste. Each of these items is discussed in detail in Permit Attachments  
41 M1 and M2; Section E-2a of this Permit Attachment discusses prevention of  
42 hazards to personnel during unloading operations.  
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- 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 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.