ATTACHMENT A4 TRAFFIC PATTERNS

Waste Isolation Pilot Plant
Hazardous Waste Permit
March 2018

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ATTACHMENT A4

TRAFFIC PATTERNS

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TRAFFIC PATTERN

3 A4-1 Traffic Information and Traffic Patterns

- 4 Access to the WIPP facility is provided by two access roads that connect with U.S. Highway
- 5 62/180, 13 mi (21 km) to the north, and NM Highway 128 (Jal Highway), 4 mi (6.4 km) to the
- south (Figure A4-1). These access roads were built for the Permittees to transport TRU mixed
- waste to the site. Both access roads are owned and maintained by the Department of Energy
- 8 (DOE). Signs and pavement markings are located in accordance with the Uniform Traffic
- 9 Control Devices Manual. Access-road design designation parameters, such as traffic volume,
- are presented in Table A4-1.

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A4-2 Facility Access and Traffic

- Access to the facility for personnel, visitors, and trucks carrying supplies and TRU mixed waste
- is provided through a security checkpoint (vehicle trap). After passing through the security
- checkpoint, TRU mixed waste transport trucks will normally turn right (south) before reaching
- the Support Building and then left (east) to park in the parking area HWMU just east of the air
- locks (Figure A4-2). Outgoing trucks depart the same way they arrived, normally out of the west
- end of the parking area, north through the fence gate and out through the vehicle trap. An
- alternate inbound route is to continue straight ahead from the security checkpoint to the second
- road and to turn south to enter the truck parking area. The alternate outbound route is also the
- 20 reverse of this route. Salt transport trucks, which remove mined salt from the Salt Handling
- Shaft area, will not cross paths with TRU mixed waste transporters; instead, they will proceed
- from the Salt Handling Shaft northward to the salt pile. After passing through security, access
- for large equipment may be provided through the east gate. Figure A4-2 shows surface traffic
- 24 flow at the WIPP facility.
- The site speed limit for motor vehicles is 10 mph (16 kph) and 5 mph (8 kph) for rail movements.
- Speed limits are clearly posted at the entrance to the site and enforced by security officers.
- 27 There are no traffic signals. Stop signs are located at the major intersections of roadways with
- the main east-west road. Safety requirements are communicated to all site personnel via
- 29 General Employee Training within 30 days of their employment. Employee access to on-site
- facilities requires an annual refresher course to reinforce the safety requirements. Security
- officers monitor vehicular traffic for compliance with site restrictions, and provide instructions to
- off-site delivery shipments. Vehicular traffic other than the waste transporters use the same
- roads, but there will be no interference because there are two lanes available on the primary
- and alternate routes for waste shipments. Pedestrian traffic is limited to the sidewalks and
- prominently marked crosswalks. Site traffic is composed mostly of pickup trucks and electric
- carts with a frequency of perhaps 10 per hour at peak periods. Emergency vehicles are
- exercised periodically for maintenance and personnel training, with an average frequency of one
- each per day. They are used for their intended purpose on an as-required basis.
- The traffic circulation system is designed in accordance with American Association of State
- Highway and Transportation Officials (AASHTO) Site Planning Guides for lane widths, lateral
- clearance to fixed objects, minimum pavement edge radii, and other geometric features. Objects
- in or near the roadway are prominently marked.

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- On-site roads, sidewalks, and paved areas are used for the distribution and storage of vehicles
- and personnel and are designed to handle all traffic generated by employees, visitors, TRU
- mixed waste shipments, and movements of operational and maintenance vehicles. The facility
- 4 entrance and TRU mixed waste haul roads are designed for AASHTO H20-S16 wheel loading.
- 5 Service roads are designed for AASHTO H10 wheel loading. Access and on-site paved roads
- are designed to bear the anticipated maximum load of115,000 lbs (52,163.1 kg), the maximum
- 7 allowable weight of a truck/trailer carrying loaded Contact-Handled or Remote-Handled
- 8 Packages. The facility is designed to handle approximately eight truck trailers per day, each
- 9 carrying one or more Contact-Handled or Remote-Handled Packages. This is equivalent to
- 10 3,640 TRU mixed waste-carrying vehicles per year.
- The calculations to support the anticipated maximum load of 115,000 lbs. are shown below:
- Soil Resistance R (psi) is taken directly from the WIPP Soil Report and Bechtel calculation
- because there is no change.
- 14 A. Pavement Thickness
- The traffic frequency increase from 10 shipments per day to 10.15 shipments per day has only
- minimal impact on the Total Expanded Average Load (EAL) and the traffic index (TI) as shown
- below, both important parameters in pavement design.
- 18 Total EAL (TEAL):
- 13,780 ~ constant for 5 or more axles over 20 years, taken from Table 7-651.2A Highway
- 20 Design Manual (HDM).
- 21 TEAL = $13.780 \times 25 \text{vr.}/20 \text{vr.} = 17.225$
- Using 10.15 shipments per day $\sim 17,225 \times 10.15 = 174,834$
- 23 Conversion of EAL to Traffic Index (TI).
- ²⁴ For TEAL of 174,834 ~ TI = 7.5 (from HDM, Table 7-651.2B)
- 25 Asphalt Concrete Thickness TAC:
- 26 GE = $0.0032 \times TI \times (100 R) \dots R = 80$
- 27 GE Gravel Equivalent (Ft).
- 28 GE = $0.0032 \times 7.5 \times 20 = 0.48' \dots$ GfAC = $2.01 \Rightarrow$ TAC = $0.48/2.01 = 0.24' \Rightarrow$ use $2\frac{1}{2}$ " AC
- 29 Surface Course.
- 30 (Actually used: 3")
- Gf Gravel Equivalent Factor (constant from Table 7-651.2C from HDM).
- 32 B. Bituminous Treated Base
- 33 GE = $0.0032 \times TI \times (100 R) \dots R = 55 \sim caliche subbase \Rightarrow GE = 1.08' GEBTB = 1.08 2.01 \times 10^{-1} MeV$
- 34 0.21 = 0.66'
- TBTB = GEBTB/GfBTB = $0.66/1.2 = 0.55' \Rightarrow Use 4''$ BTB
- 36 GfBTB ~ taken from table 7-651.2C
- 37 C. Caliche Subbase ~ TCSB
- 38 GE = $0.0032 \times TI \times (100 R) \dots R = 50$ prepared subgrade
- 39 GE = 1.2

- 1 GECSB = $1.2 (0.21 \times 2.07) (0.33 \times 1.2) \Rightarrow 0.37'$
- 2 TCBS = $0.37/1.0 = 0.37' \sim 4\frac{1}{2}"$
- Based on the results of the above calculation, the site paved roads designated for waste
- 4 transportation are safe to be used by the heavier truckloads carrying shipping casks used in RH
- 5 TRU mixed waste transportation to the WIPP.

6 A4-3 Waste Handling Building Traffic

- 7 CH TRU mixed waste will arrive by tractor-trailer at the WIPP facility in sealed Contact Handled
- 8 Packages. Prior to unloading the packages from the trailer, security checks, radiological
- 9 surveys, and shipping documentation reviews will be performed. A forklift or Yard Transfer
- Vehicle will remove the Contact Handled Packages and transport them a short distance through
- an air lock that is designed to maintain differential pressure in the WHB. The forklift or Yard
- 12 Transfer Vehicle will place the shipping containers at one of the two TRUPACT-II unloading
- docks (**TRUDOCK**) inside the WHB or, in the case of the TRUPACT-III, at the payload transfer
- station in Room 108.
- The TRUPACT-II may hold up to two 55-gallon drum seven-packs, two 85-gallon drum four-
- packs, two 100-gallon drum three-packs, two standard waste boxes (SWB), or one ten-drum
- overpack (**TDOP**). A HalfPACT may hold seven 55-gallon drums, one SWB, or four 85-gallon
- drums. The TRUPACT-III holds a single SLB2. A six-ton overhead bridge crane or Facility
- 19 Transfer Vehicle with a transfer table will be used to remove the contents of the Contact
- 20 Handled Package. Waste containers will be surveyed for radioactive contamination and
- decontaminated or returned to the Contact Handled Package as necessary.
- Each facility pallet will accommodate four 55-gallon drum seven-packs, four SWBs, four 85-
- gallon drum four-packs, four 100-gallon drum three-packs, two TDOPs, or an SLB2. Waste
- containers will be secured to the facility pallet prior to transfer. A forklift or facility transfer vehicle
- will transport the loaded facility pallet the air lock at the Waste Shaft (Figures A4-3, A4-3a, and
- A4-3b). The facility transfer vehicle will be driven onto the waste shaft conveyance deck, where
- the loaded facility pallet will be transferred to the waste shaft conveyance and downloaded for
- 28 emplacement.
- 29 RH TRU mixed waste will arrive at the WIPP facility in a payload container contained in a
- shielded cask loaded on a tractor-trailer. Prior to unloading the cask from the trailer, radiological
- surveys, security checks, and shipping documentation reviews will be performed, and the trailer
- carrying the cask will be moved into the Parking Area or directly into the RH Bay of the Waste
- 33 Handling Building Unit.
- The cask is unloaded from the trailer in the RH Bay and is placed on the Cask Transfer Car.
- The Cask Transfer Car is used to move the cask to the Cask Unloading Room. At this point, a
- crane moves the waste to the Hot Cell or the Transfer Cell. Some RH TRU mixed waste may be
- moved to the Hot Cell for overpacking before being moved to the Transfer Cell. Once in the
- Transfer Cell, the Transfer Cell Shuttle Car moves the waste beneath the facility cask. A crane
- is used to move the waste from the Transfer Cell Shuttle Car into the facility cask. The Facility
- 40 Cask Transfer Car then moves the facility cask to the underground. A more detailed description
- of waste handling in the WHB is included in Attachment A1. Figures A4-5, A4-6 and A4-7 show
- 42 RH TRU mixed waste transport routes.

1 A4-4 Underground Traffic

- 2 The Permittees shall designate the traffic routes of TRU mixed waste handling equipment and
- construction equipment and record this designation on a map that is posted in a location where
- 4 it can be examined by personnel entering the underground. The map will be updated whenever
- the routes are changed. Maps will be available in facility files until facility closure. The ventilation
- and traffic flow path in the TRU mixed waste handling areas underground are restricted and
- 7 separate from those used for mining and haulage (construction) equipment, except that during
- waste transport in W-30, ventilation need not be separated north of S-1600 (Figures A4-4 and
- 9 A4-4a). In general, the Permittees restrict waste traffic to the intake ventilation drift to maximize
- isolation of this activity from personnel. The exhaust drift in the waste disposal area will normally
- not be used for personnel access. Non-waste and non-construction traffic is generally
- comprised of escorted visitors only and is minimized during each of the respective operations.
- Adequate clearances that exceed the mining regulations of 30 CFR §57 exist underground for
- safe passage of vehicles and pedestrians. Pedestrians/personnel are required to yield to
- vehicles in the WIPP underground facility. This condition is reinforced through the WIPP
- equipment operating procedures, the WIPP Safety Manual, the WIPP safety briefing required for
- all underground visitors, the General Employee Training annual refresher course, and the
- Underground annual refresher course that are mandated by 30 CFR §57, the New Mexico Mine
- 19 Code, and DOE Order 5480.20A.
- In addition, other physical means are utilized to safeguard pedestrians/personnel when
- underground such as:
- All equipment operators are required to sound the vehicle horn when approaching
- intersections.
- All airlock and bulkhead vehicle doors are equipped with warning bells or strobe lights to
- 25 alert personnel when door opening is imminent.
- Hemispherical mirrors are used at blind intersections so that persons can see around
- 27 corners.
- All heavy equipment is required to have operational back-up alarms.
- 29 Heavily used intersections are well lighted.
- Typically, the traffic routes during waste disposal in all Panels will use the same main access
- 31 drifts.
- All traffic safety is regulated and enforced by the Federal and State mine codes of regulations
- 33 (30 CFR §57 and New Mexico State Mine Code). The agencies that administer these codes
- make regular inspection tours of the WIPP underground facilities for the purpose of
- 35 enforcement.
- All underground equipment is designed for off-road use since all driving surfaces are excavated
- in salt. No loads on the underground roadways will exceed the bearing strength of in situ halite.

1 TABLES

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Traffic Parameter	North Access Road (No. of Vehicles, unless otherwise stated)	South Access Road (No. of Vehicles, unless otherwise stated)	On-Site Waste Haul Roads Contact-Handled and Remote-Handled Package Traffic)
Average Daily Traffic (ADT)b	800	800	8
Design Hourly Volume (DHV) ^c	144	144	NA ^g
Hourly Volume (Max. at Shift Change)	250	250	NA
Distribution (D)d	67%	67%	NA
Trucks (T) ^e	2%	2%	100%
Design Speed h,i	70 mph (113 kph)	60 mph (97 kph)	25 mph (40 kph)
Control of Access f	None	None	Full

- For WIPP personnel and TRU mixed waste shipments only.
- b ADT—Estimated number of vehicles traveling in both directions per day.
- ^c DHV—A two-way traffic count with directional distribution.
- d D—The percentage of DHV in the predominant direction of travel.
- e T—The percentage of ADT comprised of trucks (excluding light delivery trucks).
- ^f Control of Access—The extent of roadside interference or restriction of movement.
- ^g NA—Not applicable.
- h mph—miles per hour.
- i kph-kilometers per hour.

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FIGURES

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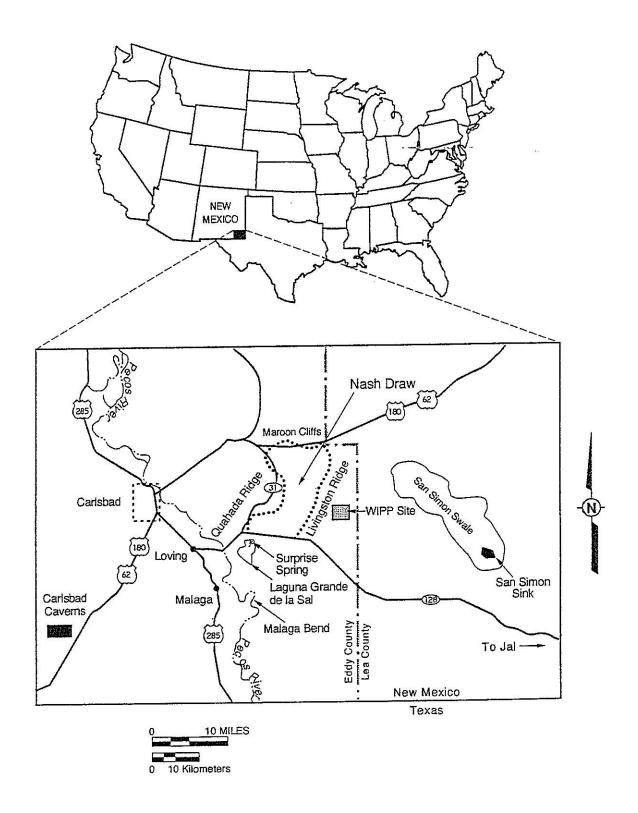


Figure A4-1
General Location of the WIPP Facility

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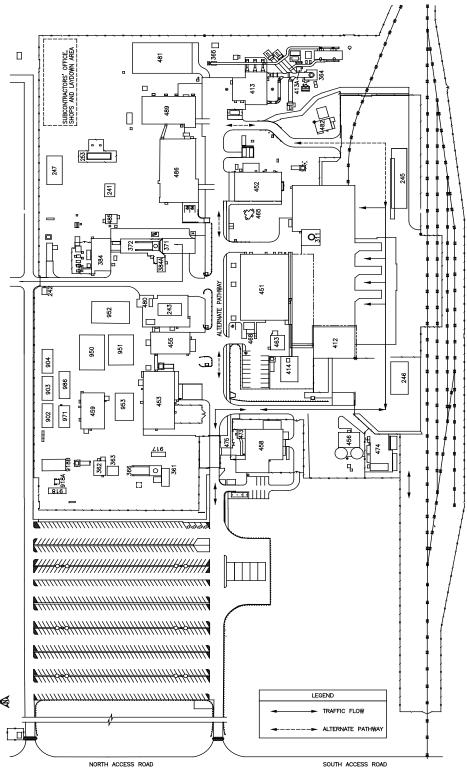


Figure A4-2 WIPP Traffic Flow Diagram

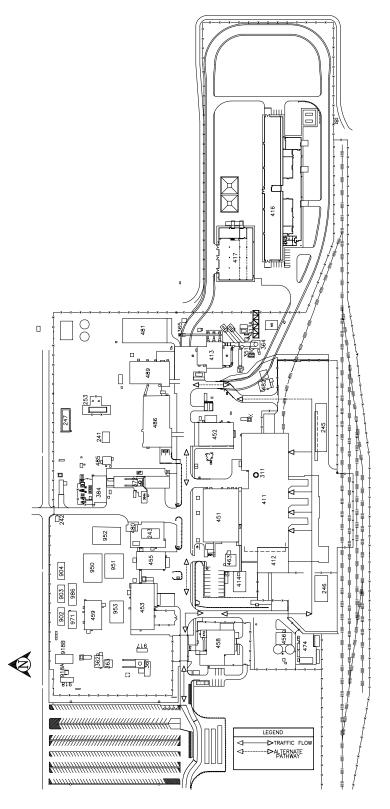


Figure A4-2-NFB WIPP Traffic Flow Diagram with Building 416

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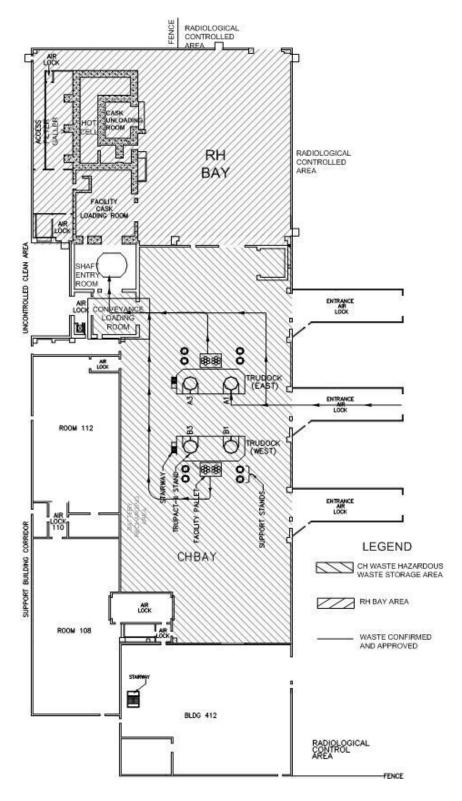


Figure A4-3
Waste Transport Routes in Waste Handling Building - Container Storage Unit

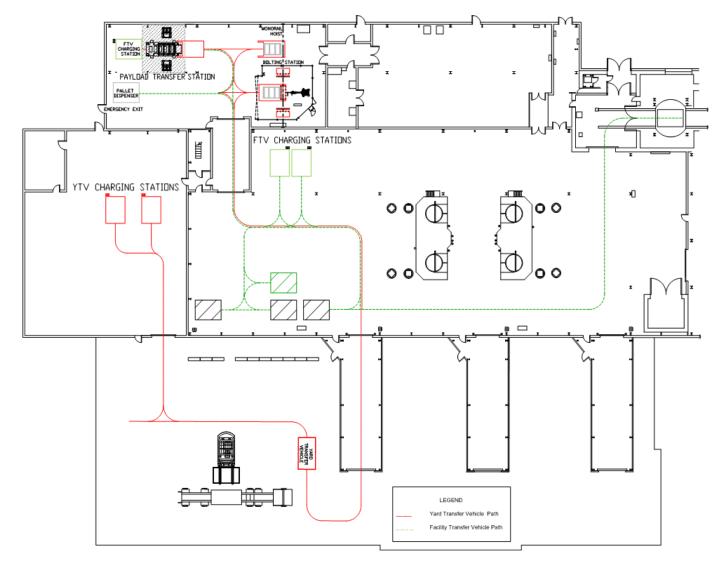


Figure A4-3a
Typical Transport Route for TRUPACT-III and Standard Large Box 2

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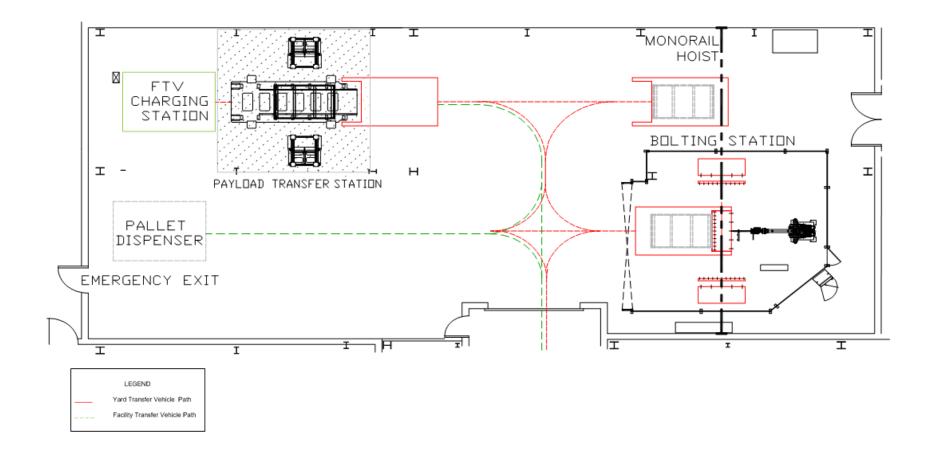


Figure A4-3b
Typical Transport Route for TRUPACT-III and Standard Large Box 2 in Room 108

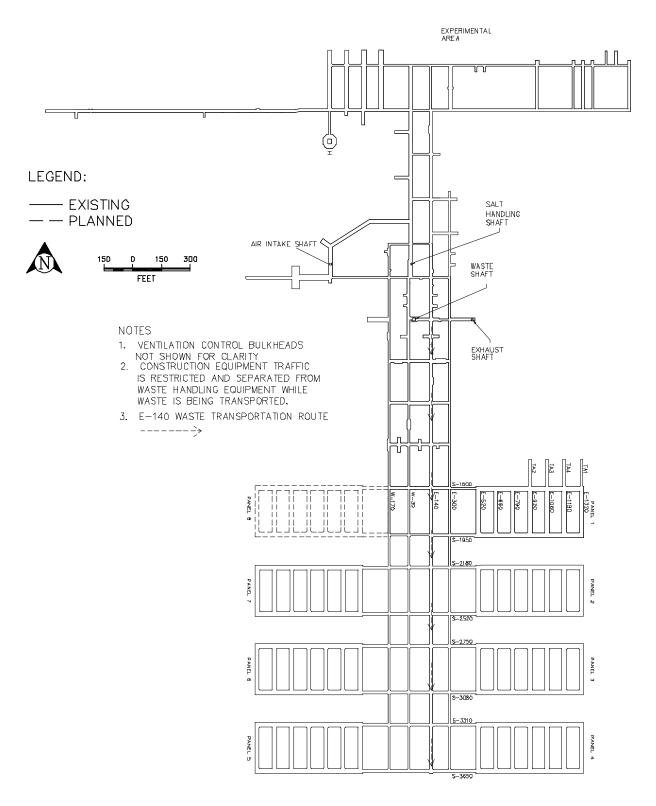


Figure A4-4
Typical Underground Transport Route Using E-140

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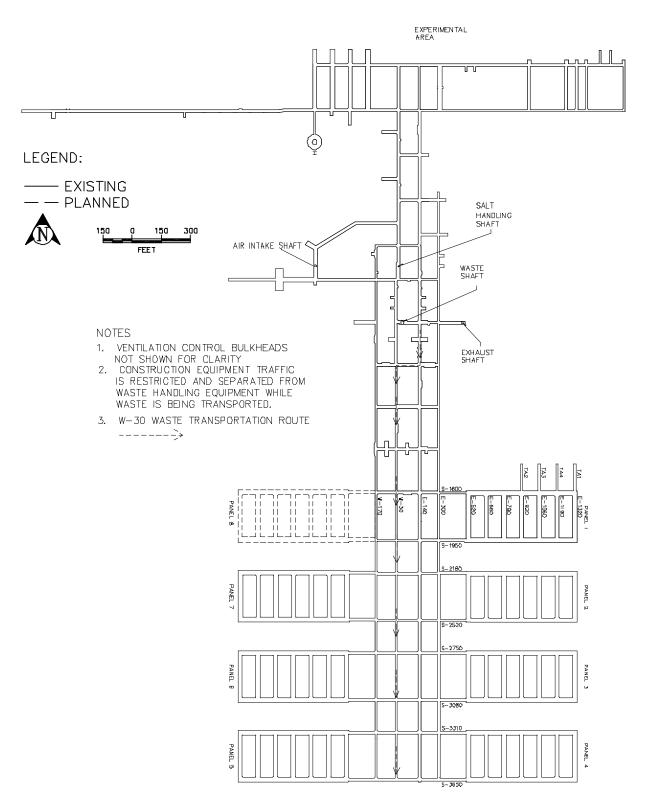


Figure A4-4a
Typical Underground Transport Route Using W-30

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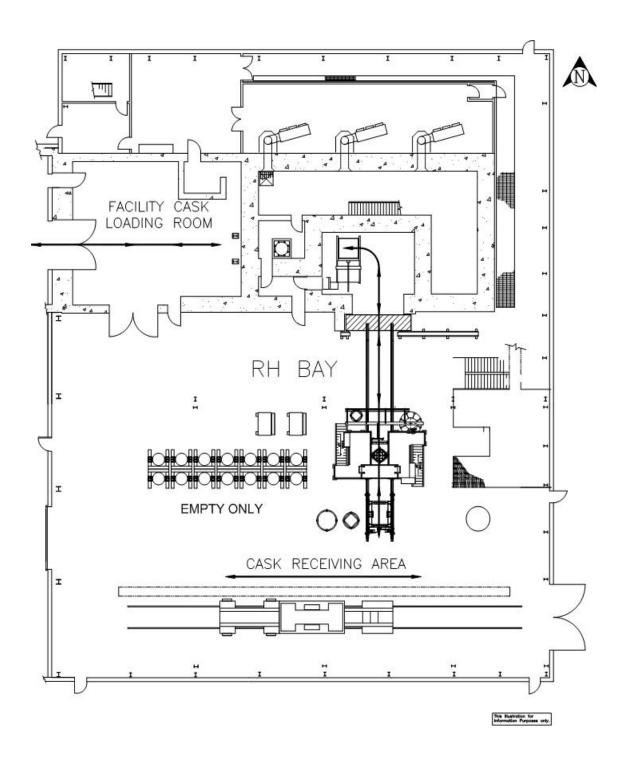
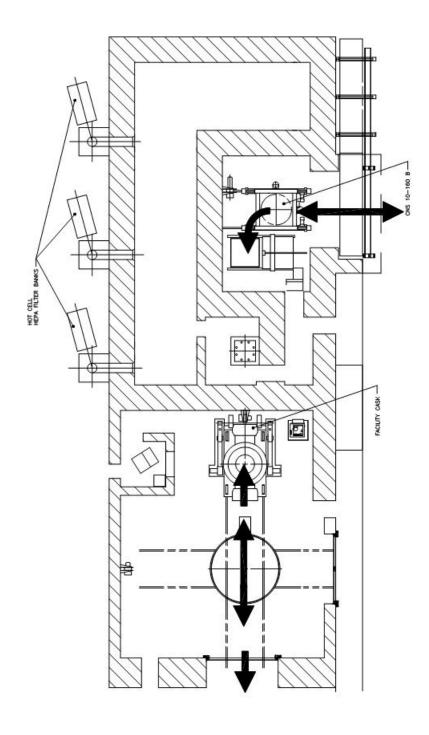


Figure A4-5 RH Bay Waste Transport Routes

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This Illustration for Information Purposes only.

CASK LOADING ROOM

Figure A4-6
RH Bay Cask Loading Room Waste Transport Route

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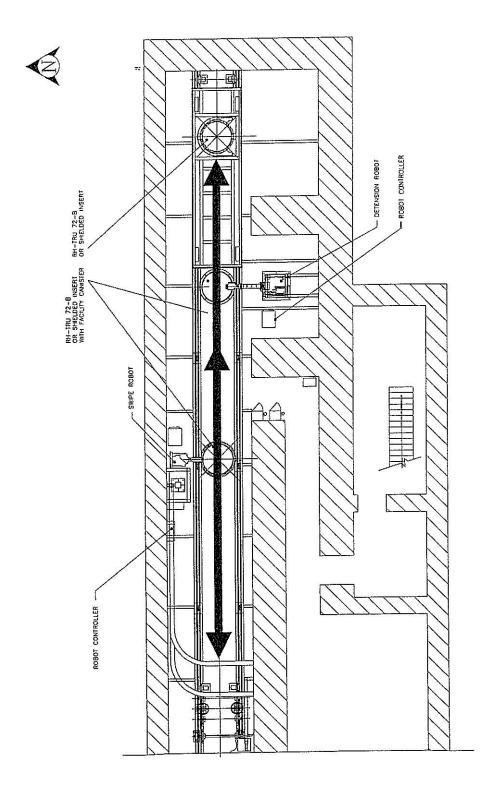


Figure A4-7 RH Bay Canister Transfer Cell Waste Transport Route

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