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**RENEWAL APPLICATION
APPENDIX J1**

ACTIVE INSTITUTIONAL CONTROLS DURING POST-CLOSURE

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7 **Acronyms**

8	CH	contact-handled
9	CFR	Code of Federal Regulations
10	DOE	U.S. Department of Energy
11	EPA	U.S. Environmental Protection Agency
12	LWA	Land Withdrawal Act
13	<u>NMED</u>	<u>New Mexico Environment Department</u>
14	<u>RH</u>	<u>remote-handled</u>
15	SWB	standard waste box
16	TRU	transuranic
17	WIPP	Waste Isolation Pilot Plant

1 **RENEWAL APPLICATION**
2 **APPENDIX J1**

3 **ACTIVE INSTITUTIONAL CONTROLS DURING POST-CLOSURE**

4 Introduction

5 Under the requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.118(b), the following
6 activities identified as active institutional controls during post-closure are incorporated into the
7 Post-Closure Plan.

8 The post-closure requirements of this Renewal Application ~~permit~~ include 20.4.1.500 NMAC,
9 incorporating:

- 10 • 40 CFR §264.117(a)(1), which requires that

11 “Post-closure care for each hazardous waste management unit subject to the requirements
12 of §264.117 through 264.120 must begin after completion of closure of the unit and
13 continue for 30 years after that date...”

- 14 • 40 CFR §264.601, which requires that

15 “A miscellaneous unit must be...maintained and closed in a manner that will ensure
16 protection of human health and the environment...”

- 17 • and 40 CFR §264.603, which requires that

18 “A miscellaneous unit that is a disposal unit must be maintained in a manner that
19 complies with §264.601 during the post-closure care period.”

20 The containment requirements for a disposal system for **transuranic (TRU)** radioactive wastes
21 are defined in Title 40 CFR §191.13 (U.S. Environmental Protection Agency **[EPA]** 1993).
22 40 CFR §191.14 is titled Assurance Requirements. With regard to the active institutional
23 controls aspect of Assurance Requirements, 40 CFR §191.14 states the following:

24 “To provide the confidence needed for long-term compliance with the
25 requirements of §191.13, disposal of spent fuel or high-level or transuranic wastes
26 shall be conducted in accordance with the following provisions... (a) Active
27 institutional controls over disposal sites should be maintained for as long a period
28 of time as is practicable after disposal; however, performance assessments that
29 assess isolation of the wastes from the accessible environment shall not consider
30 any contribution from active institutional controls for more than 100 years after
31 disposal...”

1 40 CFR §191.12 states the following:

2 “Active institutional controls mean:

- 3 1) controlling access to a disposal site by any means other than passive institutional
4 controls,
5 2) performing maintenance operations or remedial actions at a site,
6 3) controlling or cleaning up releases from a site, or
7 4) monitoring parameters related to disposal system performance.”

8 **Purpose:** This Renewal Application Appendix describes the design of a system that the
9 Permittees will implement for compliance with the requirements of 20.4.1.500 NMAC
10 (incorporating 40 CFR §264.118(b)) and 40 CFR §191.14(a) to control access to the Waste
11 Isolation Pilot Plant (**WIPP**) disposal site and implement maintenance and remedial actions
12 pertaining to the site access controls. In addition, this Renewal Application Appendix addresses
13 the scheduling process for control of inspection, maintenance, and periodic reporting related to
14 long-term monitoring. Long-term monitoring addresses the monitoring of disposal system
15 performance, as required by 40 CFR §191.14(b), and environmental monitoring, in accordance
16 with this Renewal Application ~~Permit~~ and the Consultation and Cooperation Agreement between
17 the U.S. Department of Energy (**DOE**) and the state of New Mexico. The scheduling process
18 will also address evaluation of testing activities related to the permanent marker system design
19 contained within the passive institutional controls (~~not required by this permit~~).

20 Implementation of active institutional controls at the WIPP will commence when final facility
21 closure is achieved, as specified in ~~Module H~~ and Renewal Application Chapter I.
22 Implementation of active institutional controls marks the transition from the active life of the
23 facility (which ends upon certification of closure) to the post-closure care period, as specified in
24 20.4.1.500 NMAC (incorporating 40 CFR §264 Subpart G). The Permittees will continue the
25 imposition of active institutional controls under this Renewal Application ~~Permit~~ until the New
26 Mexico Environment Department (NMED) approves the post-closure certification specified in
27 ~~Module VI~~ and Renewal Application Chapter J.

28 Decommissioning activities include decontamination and site restoration. The decontamination
29 effort will be completed prior to sealing of the shafts to allow disposal of all derived waste
30 (radioactive and/or mixed waste derived from TRU/TRU-mixed waste received at the WIPP)
31 into the repository. The implementation of active institutional controls upon certification of
32 facility closure will prevent human intrusion into the repository. The Permittees’ restoration
33 efforts will return the land disturbed by the WIPP activities to a stable ecological state that will
34 assimilate with the surrounding undisturbed ecosystem. Necessary exceptions to returning the
35 site to its full pre-WIPP condition include measurements associated with long-term monitoring.

36 **Scope:** The active institutional control requirements include a means of controlling access to the
37 site of the repository’s surface footprint (the repository area projected to the surface) and
38 maintenance, including corrective actions, for access control system components. Active control

1 of access to the site will be exercised by the Permittees for the duration of the post-closure care
2 period. Although the Permittees are only required to maintain active institutional controls until
3 approval of the post-closure certification by NMED, the Permittees will continue active
4 institutional controls for at least ~~one hundred~~ (100)-years after final facility closure to satisfy
5 other regulatory requirements. Control of access will prevent intrusion into the disposed waste
6 by deep drilling or mining for natural resources. This Renewal Application also specifies a
7 process for scheduling activities related to the long-term monitoring of the repository. Some of
8 the activities supporting the monitoring programs will be initiated during the active life of the
9 facility to establish databases. These activities are planned to continue beyond closure through
10 the time after removal of the site structures and return of the land disturbed by the WIPP
11 activities to a stable ecological state that will assimilate with the surrounding undisturbed
12 ecosystem. Long-term monitoring requirements will be necessarily integrated with efforts
13 toward returning the land to a stable ecological state.

14 **Background:** The WIPP was sited and designed as a research and development facility to
15 demonstrate the safe disposal of radioactive wastes. The wastes are derived from DOE defense-
16 related activities. Specifically, the mission of the WIPP project is to conduct research,
17 demonstration, and siting studies relevant to the permanent disposal of ~~transuranic~~ (TRU) wastes.
18 Most of these wastes will be contaminated with hazardous constituents, making them mixed
19 wastes.

20 The **Land Withdrawal Act (LWA)** addresses the disposal phase of the WIPP project, the period
21 following closure of the site, and the removal of the surface facilities. The LWA set aside
22 10,240 acres (4,144 hectares) located in Eddy County, 26 miles (42 kilometers) east of Carlsbad,
23 New Mexico, as the WIPP site. A 277-acre (112-hectare) portion within the 10,240 acres (4,144
24 hectares) is bounded by a barbed wire fence. This fenced area contains the surface facilities and
25 the mined salt piles for the WIPP site. Figure J1-1 is a cutaway illustrating the spatial
26 relationship of the surface facilities and the underground repository.

27 Upon receipt of the necessary certifications and permits from the EPA and the **NMED** ~~New~~
28 ~~Mexico Environment Department~~, the Permittees ~~will begin disposal~~ **are disposing** of contact-
29 handled (**CH**) and remote-handled (**RH**) TRU and TRU mixed waste in the WIPP. This waste
30 emplacement and disposal phase **Disposal Phase** will continue until the regulated capacity of the
31 repository of 6,200,000 cubic feet (175,588 cubic meters) of TRU and TRU mixed waste has
32 been reached, and as long as the Permittees comply with the requirements of the Permit. For the
33 purposes of this Renewal Application Permit, this time period is assumed to be 25 years from
34 initial waste receipt in 1999. The waste will be shipped from DOE facilities across the country
35 in specially designed transportation containers certified by the Nuclear Regulatory Commission.
36 The transportation routes from these facilities to the WIPP have been predetermined. The CH
37 TRU mixed waste will be packaged in 55-gallon (208-liter), 85-gallon (320-liter), 100-gallon
38 (379-liter) steel drums, standard waste boxes (**SWBs**), and/or ten drum overpacks (~~TDOPs~~). An
39 SWB is a steel container having a free **and internal** volume of approximately 65 cubic feet
40 (1.8 cubic meters). Figure J1-2 shows the general arrangement of a seven-pack of drums and an
41 SWB as received in a **CH** Contact-Handled Package. **Remote-handled** RH TRU mixed waste

1 inside a **RH** Remote-Handled Package is contained in one or more of the allowable **RH** containers
2 described in Renewal Application Appendix M1.

3 Upon receipt and inspection of the waste containers in the waste handling building, the
4 containers will be moved into the repository 2,150 feet (655 meters) below the surface. The
5 containers will then be transported to a disposal room **within a Hazardous Waste Disposal Unit**
6 **referred to as a panel**. (See Figure J1-1 for room and panel arrangement). The initial **There are**
7 seven disposal rooms are in **a panel** Panel 1. Panel 1 is the first of eight panels planned to be
8 excavated. ~~Special supports and ground control corrective actions have been implemented in~~
9 ~~Panel 1 to ensure its stability.~~ Upon filling an entire panel, that panel will be closed to isolate it
10 from the rest of the repository and the ventilation system. During the period of time it takes to
11 fill a given panel, an additional panel will be excavated. Sequential excavation of Panels 2
12 through 8 will ensure that these individual panels remain stable during the entire time a panel is
13 being filled with waste. Ground control maintenance and evaluation with appropriate corrective
14 action will be required to ensure that Panels 9 and 10 (ventilation and access drifts in the
15 repository) remain stable.

16 Decontamination of the WIPP facility will commence with a detailed radiation survey of the
17 entire site. Contaminated areas and equipment will be evaluated and decontaminated in
18 accordance with applicable requirements. Where decontamination efforts identify areas that
19 meet clean closure standards for permitted container storage units and are below radiological
20 release criteria, routine dismantling and salvaging practices will determine the disposition of the
21 material or equipment involved. Material and equipment that do not meet these standards and
22 criteria will be emplaced in the access entries (Panels 9 and/or 10). Upon completion of
23 emplacement of the contaminated facility material, the entries will be closed and the repository
24 shafts will be sealed. Final repository closure includes sealing the shafts leading to the
25 repository. Figure J1-3 illustrates the shaft sealing arrangement. Certification of closure will
26 end disposal operations and initiate the post-closure care period for implementation of active
27 institutional controls.

28 J1.1 Active Institutional Controls

29 Active institutional controls during post-closure consist of three elements:

- 30
- controlling access to a disposal site,
 - 31 • performing maintenance operations or remedial actions at a site, and
 - 32 • controlling or cleaning up releases from a site.

33 The LWA has removed the WIPP site from public use as a site for mining and other types of
34 mineral resource extraction. Since any type of exploration activity would require authorization,
35 the issuance of approval to intrude upon the repository is precluded by the LWA. The existence
36 of the LWA as law permits meeting the requirements of the first element above by implementing
37 low technology barriers. These barriers include a posted fence and active surveillance at a
38 frequency that denies sufficient time for an individual or organization to intrude into the
39 repository undetected using today's drilling technology. Maintenance and remedial actions at

1 the WIPP site will be conducted by the Permittees at the time of implementing the access
2 controls for the site. The control or cleanup of releases from the site will be conducted as part of
3 the operational program prior to sealing of the shafts. This is necessary to ensure that all derived
4 waste is disposed of within the repository prior to shaft sealing.

5 The Permittees shall maintain the access controls. This requirement includes the maintenance
6 and corrective actions necessary to ensure that the fence and patrol requirements (surveillance)
7 are met. The active institutional controls to be implemented by the Permittees after final closure
8 are the following:

- 9 1. A fence line will be established to control access to the repository footprint area on the
10 surface. A standard four-strand (three barbed and one unbarbed, in accordance with
11 the Bureau of Land Management specifications) wire fence will be erected along the
12 perimeter of the repository surface footprint. To provide access to the repository
13 footprint during construction of the berm (which may be built in multiple sections
14 simultaneously), the fence will have gates placed approximately midway along each of
15 the four sides. These gates will remain locked with access controlled by the
16 Permittees. The western gate will be 20 feet (6 meters) wide. The remaining three
17 gates will each be 16 feet (4.9 meters) wide. Additional fencing will be constructed
18 where appropriate for remote locations that are used for disposal system monitoring.
19 Such fences will meet the same construction specifications as the repository footprint
20 perimeter fence.
- 21 2. Unpaved roadways 16 feet (4.9 meters) wide will be established along the perimeter of
22 the barbed wire fence as well as along the WIPP site boundary. These roadways will
23 be constructed so as to provide ready vehicle access to any point around the fenced
24 perimeter and the site boundary. These roadways will facilitate inspection and
25 maintenance of the fenceline and will allow visual observation of the repository
26 footprint and the site boundary to the extent permitted by the lay of the land. These
27 roadways will connect to the paved south access road. Roads to remote sites will also
28 be constructed and maintained where appropriate.
- 29 3. The fence line will be posted with signs having, as a minimum, a legend reading
30 "Danger—Unauthorized Personnel Keep Out" (20.4.1.500 NMAC (incorporating 40
31 CFR §264.14[c])) and warning against entering the area without specific permission of
32 the Permittees. The legend must be written in English and Spanish. The signs must
33 be legible from a distance of at least 25 feet (7.6 meters). The size of the visual
34 warning and the spacing of the warning signs will be sufficiently large and close to
35 ensure that one or more of the signs can be seen from any approach prior to an
36 individual actually making contact with the fence line. In no case will the spacing be
37 greater than 300 feet (91.5 meters).
- 38 4. The Permittees will ensure that periodic inspection and expedited corrective
39 maintenance are conducted on the fence line, its associated warning signs, and
40 roadways.

- 1 5. The Permittees will provide for routine periodic patrols and surveillance of all areas
2 controlled by or under the authority of the Permittees by personnel trained in security
3 surveillance and investigation.
- 4 6. The Permittees will implement the periodic monitoring requirements of the long-term
5 monitoring system.
- 6 7. The Permittees will submit a **P**ermit modification request for any proposed
7 modifications to the active institutional controls appropriate for access control, as
8 specified in 20.4.1.900 NMAC (incorporating 40 CFR 270.42).
- 9 8. The Permittees will immediately take appropriate action to address abnormal
10 conditions identified during periodic surveillance and inspections. Abnormal
11 conditions include any natural or human-caused conditions which would affect the
12 integrity of the active institutional controls.
- 13 9. Reports addressing activities associated with the performance of the active access
14 controls after final closure will be prepared periodically according to applicable
15 requirements by the Permittees for submittal to the appropriate regulatory and
16 legislative authorities.

17 J1.1.1 Repository Footprint Fencing

18 Access to an area approximately 2,780 feet by 2,360 feet (875 meters by 720 meters) will be
19 controlled by a four-strand barbed wire fence. A single gate will be included along each side of
20 the fence for access. These gates will remain locked with access controlled by the Permittees.
21 Around the perimeter of the fence, an unpaved roadway 16 feet (4.9 meters) wide will be cut to
22 allow for patrolling of the perimeter. Figure J1-4 is an illustration of the fence line in relation to
23 the repository footprint. Patrolling of the perimeter is based upon the need to ensure that no
24 mining or well drilling activity is initiated that could threaten the integrity of the repository.
25 Fencing off an area larger than the disposal area footprint would not significantly reduce the risk
26 of intrusion but would interfere with cattle grazing established prior to the LWA. The LWA
27 states that the Secretary of Energy can allow grazing to continue where it was established prior to
28 enactment of the LWA. Based upon current drilling technologies, discussions with local well
29 drilling organizations, and observation of well drilling activities in the WIPP vicinity, it typically
30 requires at least two to three days for a driller to set up a deep drilling rig and commence actual
31 drilling operations. Attaining the 2,150-foot (655-meter) depth that would approach the
32 repository horizon takes at least another week to 10 days. Based upon current drilling practices,
33 patrolling the fenced area two to three times weekly would identify any potential drilling activity
34 well before any breach of the repository could occur. Therefore, the perimeter fence will be
35 patrolled three times weekly after final closure.

36 Construction of access control systems using higher technology than described is not required.
37 Likewise, continuous surveillance whether human or electronic is not required.

1 J1.1.2 Surveillance Monitoring

2 The Permittees will conduct periodic surveillance of the site and the repository footprint during
3 the post-closure period. Unpaved roadways around the WIPP site boundary and around the
4 repository footprint will facilitate such surveillance. Contractual arrangements with a local
5 organization such as the Eddy County Sheriff's Department may be established which would
6 provide some distinct advantages. Among the advantages are the following:

- 7 • deputies are trained in patrol and surveillance activities,
- 8 • deputies are authorized to arrest members of the general public who are found to be
9 violating trespassing laws,
- 10 • the liability associated with apprehension, attempted apprehension, or circumstances
11 arising from attempts would remain with the Sheriff's Department, and
- 12 • the general area to be patrolled is already a part of the Sheriff's area of responsibility.

13 Surveillance will consist of drive-by patrolling around the fenced perimeter a minimum of three
14 times per week. In the course of the patrol, particular note will be taken of the fence integrity.
15 In addition, the locked condition of each gate will be checked to ensure that gate integrity is
16 maintained and there is no evidence of tampering. Surveillance will also include visual
17 observation of the entire enclosed area for any signs of human activity. Additionally,
18 surveillance patrols will be conducted around the site boundary's perimeter for signs of
19 unauthorized human activities. A routine summary of each month's surveillance activity will be
20 prepared documenting the date and time of each patrol and any unusual circumstances that may
21 have been observed. This surveillance routine will continue throughout the post-closure care
22 period.

23 J1.1.3 Maintenance and Remedial Actions

24 Anticipated maintenance and remedial action issues during the post-closure care period are
25 minimal and should encompass such issues as

- 26 • fence and road maintenance,
- 27 • repair of any damage that occurs,
- 28 • response to evidence of potential erection of drilling equipment, and
- 29 • response to unauthorized entry into prohibited areas.

30 The Permittees will provide maintenance services within a reasonable time after the need is
31 identified during routine patrolling activity. Any observed vandalism or unauthorized entry will
32 be investigated and action will be taken as the circumstances warrant.

1 J1.1.4 Control and Clean-up of Releases

2 The decontamination process and disposal of the derived waste will be completed prior to sealing
3 the shafts and final facility closure. With the location of the WIPP repository at 2,150 feet (655
4 meters) below the surface and with panels closed and shafts sealed, the potential for releases of
5 radioactive material or hazardous constituents following the sealing of the shafts is precluded.
6 There will be no credible pathway for releases from the repository other than human intrusion.
7 Routine patrols in accordance with access control requirements will preclude human intrusion
8 into the repository during the post-closure period.

9 J1.1.5 Groundwater Monitoring

10 Groundwater monitoring is the only monitoring program ~~required by the Permit~~ that will be
11 conducted throughout the post-closure care period. The post-closure groundwater monitoring
12 requirements are specified in ~~Permit Module VI~~ and Renewal Application Chapter L.

13 J1.2 Additional Post-Closure Activities

14 With the certification of closure of WIPP and return of the land disturbed by the WIPP activities
15 to a stable ecological state that will assimilate with the surrounding undisturbed ecosystem,
16 continuous occupancy of the site for operational and security purposes will cease. Any
17 additional activities will be imposed through the ~~a Post-Closure Care Permit~~ post-closure care
18 permit issued by NMED after certification of closure.

19 J1.3 Quality Assurance

20 The quality assurance and quality control plan will be applied to the procurement of materials for
21 and the erection of the fence lines enclosing the repository footprint. In particular, quality
22 control inspection of the placement and tensioning of the barbed wire and chain link fabric will
23 be applied and utilized to provide reasonable assurance that the fencing structures will function
24 during the post-closure care period with normal maintenance.

25 Quality assurance and quality control will also be applied to the sampling and analyses
26 supporting the environmental monitoring program. Contractors collecting samples and
27 laboratories conducting analyses for the Permittees shall be qualified in accordance with
28 guidelines prescribed in the most current edition of the Permittees' quality assurance program
29 document at the time that the contracts are awarded.

1 J1.4 List of References

- 2 ~~EPA (U.S. Environmental Protection Agency). 1993. 40 CFR Part 191 Environmental Radiation~~
3 ~~Protection Standards for the Management and Disposal of Spent Nuclear Fuel, High Level and~~
4 ~~Transuranic Radioactive Waste; Final Rule. *Federal Register*, Vol. 58, No. 242, pp. 66398-~~
5 ~~66416, December 20, 1993. Office of Radiation and Indoor Air, Washington, D.C.~~
- 6 ~~U.S. Congress. 1992. Waste Isolation Pilot Plant Land Withdrawal Act. Public Law 102-579,~~
7 ~~106 Stat. 4777, October 1992. 102nd Congress, Washington, D.C.~~

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FIGURES

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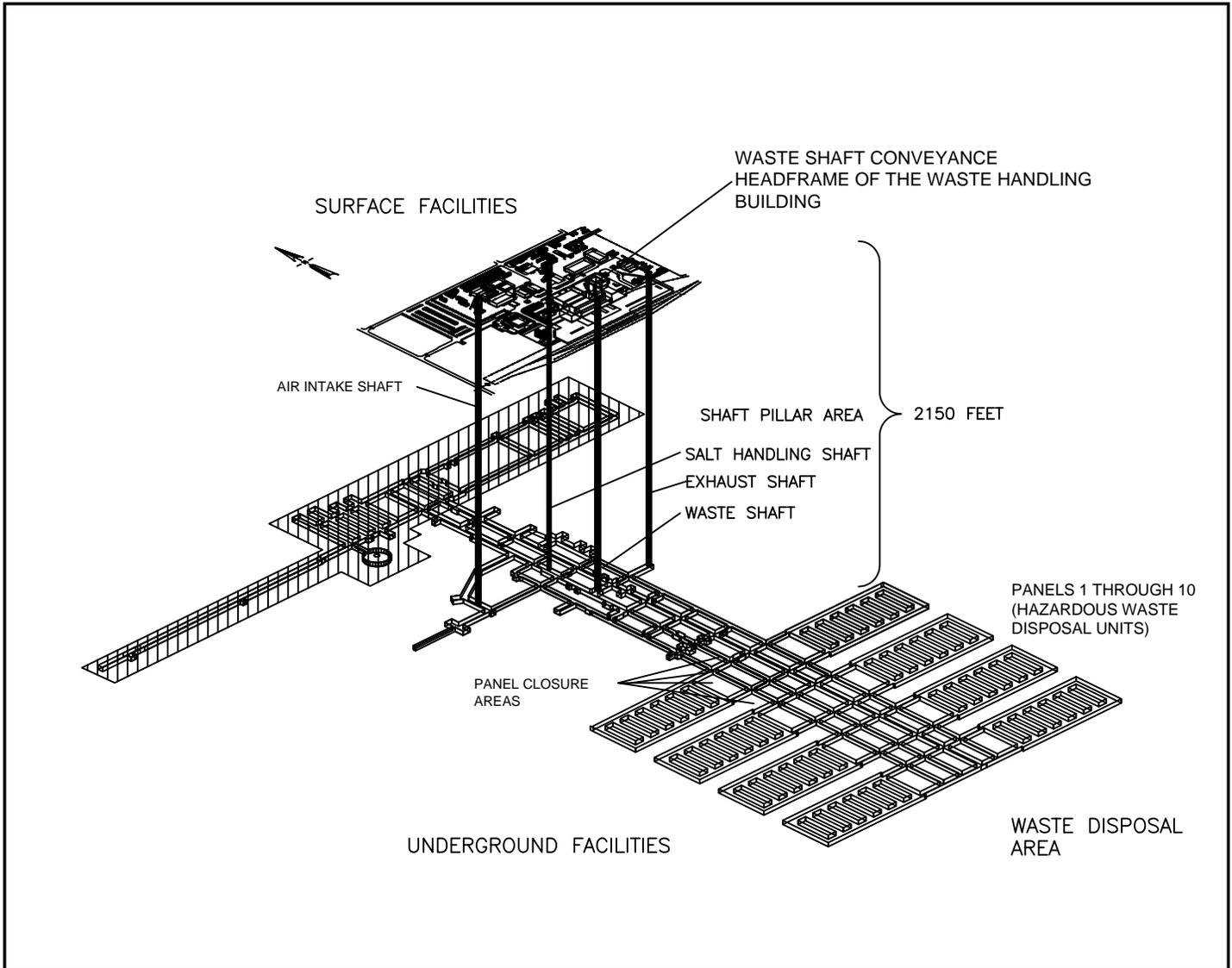


Figure J1-1
Spatial View of WIPP Surface and Underground Facilities

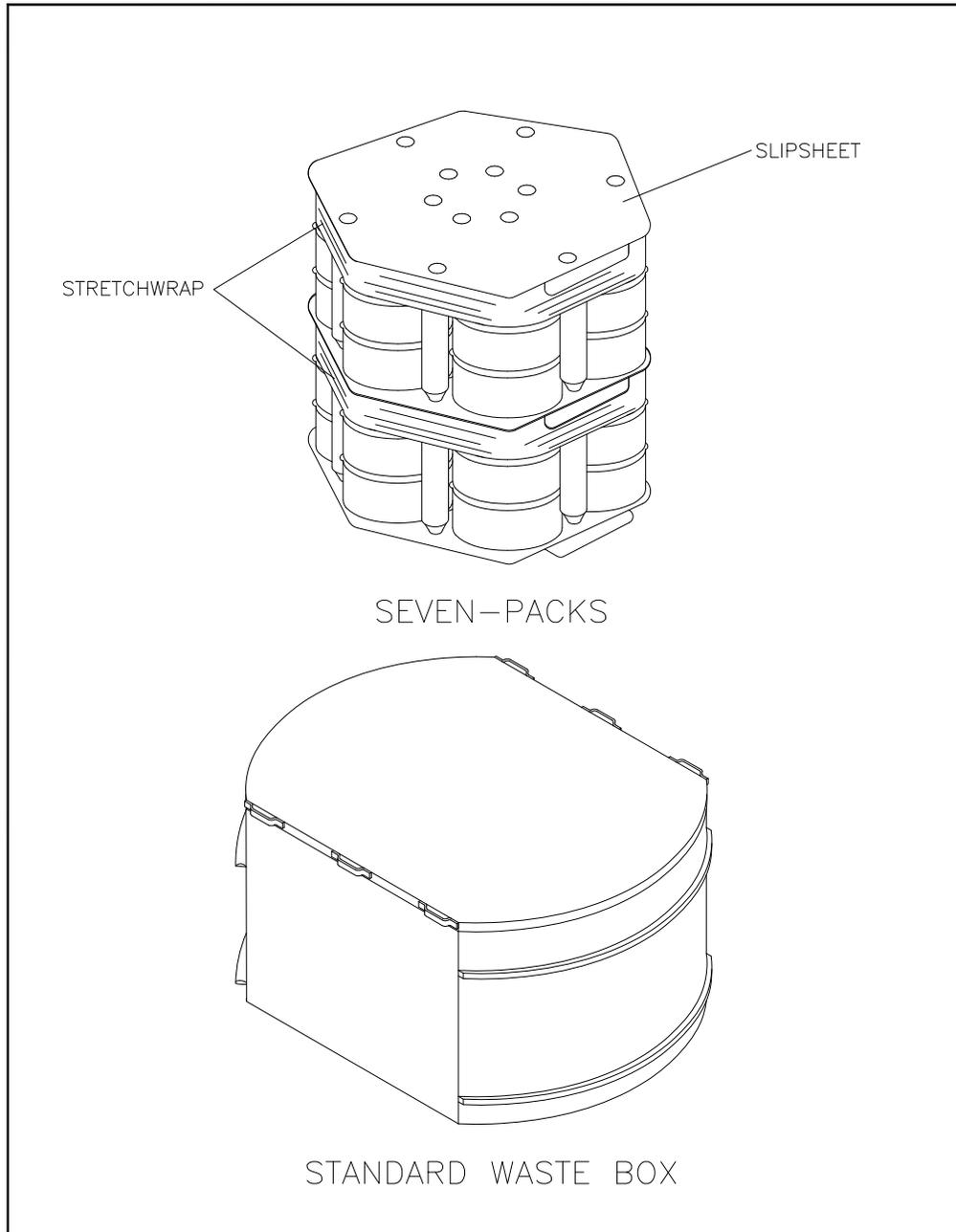
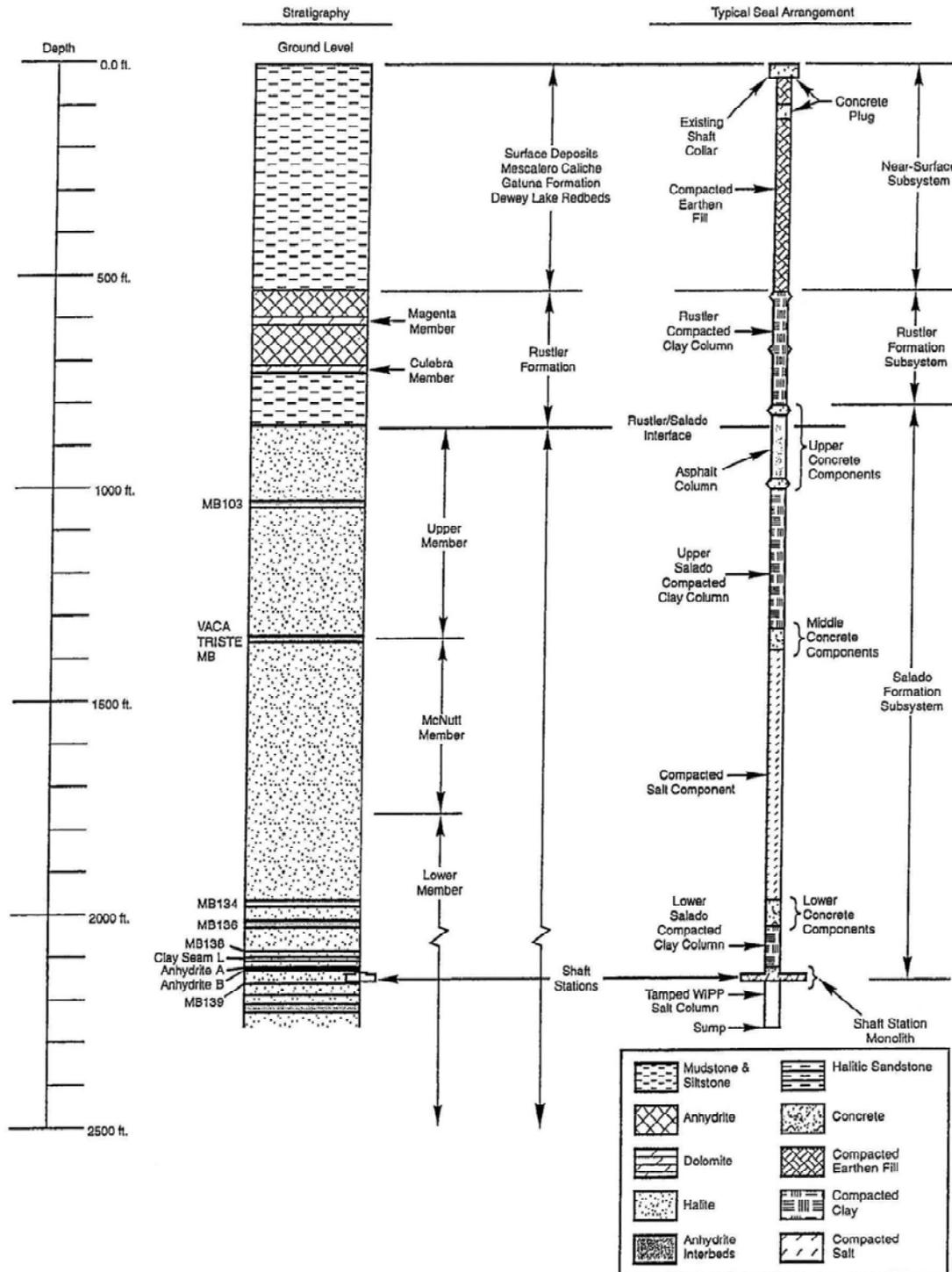
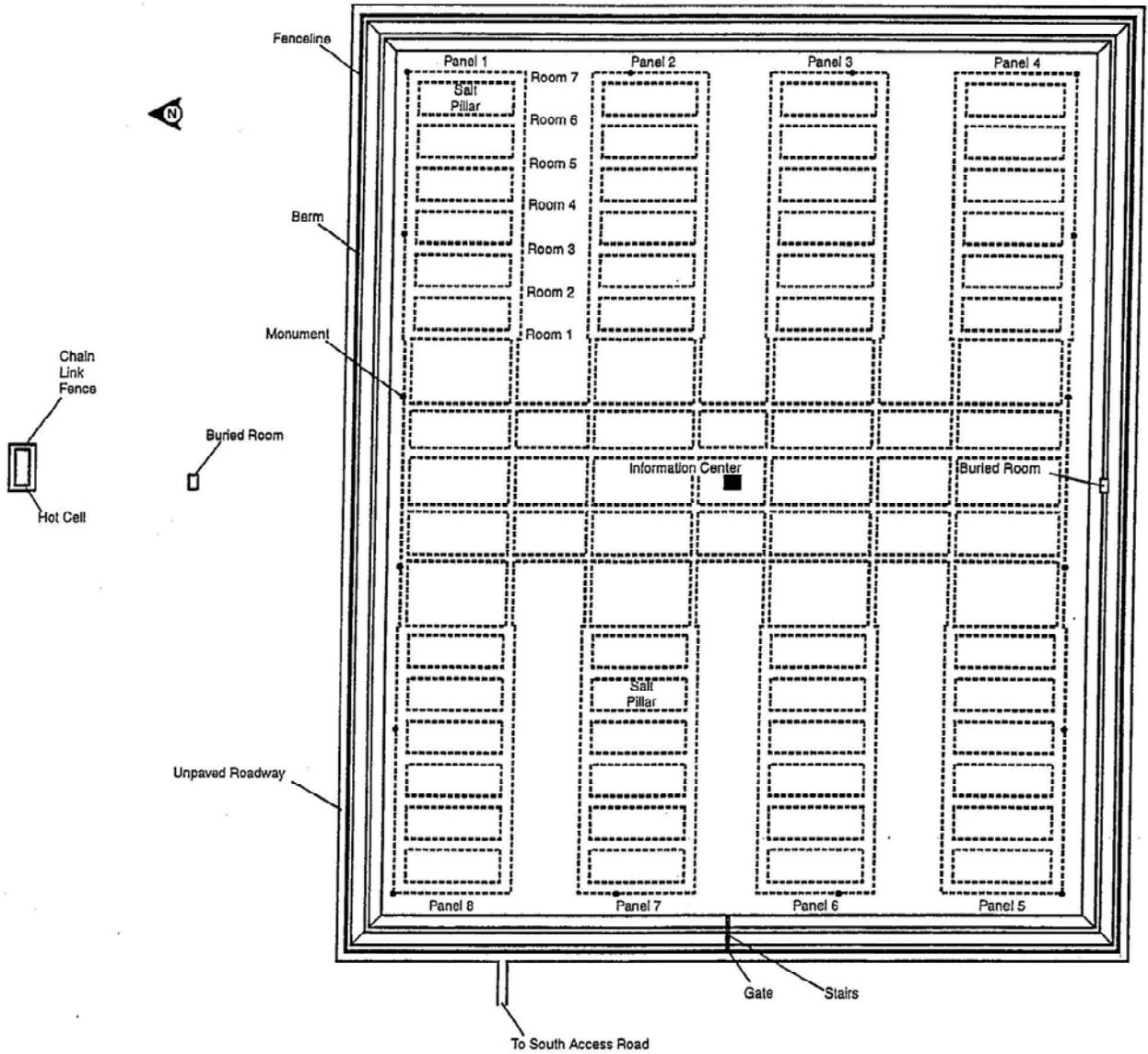


Figure J1-2
Standard Waste Box and Seven-Pack Configuration



CCA-AIC306-0

Figure J1-3
 Typical Shaft Sealing System



CCA-AIC307-0

Figure J1-4
Perimeter Fenceline and Roadway