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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	SWB	standard waste box
14	TRU	transuranic
15	WIPP	Waste Isolation Pilot Plant



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 II 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  
28 Upon receipt of the necessary certifications and permits from the EPA and the NMED ~~New~~  
29 ~~Mexico Environment Department~~, the Permittees will begin disposal of contact-handled (CH)  
30 and remote-handled (RH) TRU and TRU mixed waste in the WIPP. This waste emplacement  
31 and disposal phase will continue until the regulated capacity of the repository of 6,200,000 cubic  
32 feet (175,588 cubic meters) of TRU and TRU mixed waste has been reached, and as long as the  
33 Permittees comply with the requirements of the hazardous waste facility permit issued by its  
34 regulator Permit. For the purposes of this Renewal Application Permit, this time period is  
35 assumed to be 25 years. The waste will be shipped from DOE facilities across the country in  
36 specially designed transportation containers certified by the Nuclear Regulatory Commission.  
37 The transportation routes from these facilities to the WIPP have been predetermined. The CH  
38 TRU mixed waste will be packaged in 55-gallon (208-liter), 85-gallon (320-liter), 100-gallon  
39 (379-liter) steel drums, standard waste boxes (SWBs), and/or ten drum overpacks (TDOPs). An  
40 SWB is a steel container having a free volume of approximately 65 cubic feet (1.8 cubic meters).  
41 Figure J1-2 shows the general arrangement of a seven-pack of drums and an SWB as received in  
42 a CH ~~Contact Handled~~ Package. Remote-handled RH TRU mixed waste inside a RH ~~Remote-~~  
43 ~~Handled~~ Package is contained in one or more of the allowable containers described in Renewal  
44 Application Appendix M1.

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

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

#### 26 J1.1 Active Institutional Controls

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

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

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

1 the operational program prior to sealing of the shafts. This is necessary to ensure that all derived  
2 waste is disposed of within the repository prior to shaft sealing.

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

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

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

#### 14 J1.1.1 Repository Footprint Fencing

15 Access to an area approximately 2,780 feet by 2,360 feet (875 meters by 720 meters) will be  
16 controlled by a four-strand barbed wire fence. A single gate will be included along each side of  
17 the fence for access. These gates will remain locked with access controlled by the Permittees.  
18 Around the perimeter of the fence, an unpaved roadway 16 feet (4.9 meters) wide will be cut to  
19 allow for patrolling of the perimeter. Figure J1-4 is an illustration of the fence line in relation to  
20 the repository footprint. Patrolling of the perimeter is based upon the need to ensure that no  
21 mining or well drilling activity is initiated that could threaten the integrity of the repository.

22 Fencing off an area larger than the disposal area footprint would not significantly reduce the risk  
23 of intrusion but would interfere with cattle grazing established prior to the LWA. The LWA  
24 states that the Secretary of Energy can allow grazing to continue where it was established prior to  
25 enactment of the LWA. Based upon current drilling technologies, discussions with local well  
26 drilling organizations, and observation of well drilling activities in the WIPP vicinity, it typically  
27 requires at least two to three days for a driller to set up a deep drilling rig and commence actual  
28 drilling operations. Attaining the 2,150-foot (655-meter) depth that would approach the  
29 repository horizon takes at least another week to 10 days. Based upon current drilling practices,  
30 patrolling the fenced area two to three times weekly would identify any potential drilling activity  
31 well before any breach of the repository could occur. Therefore, the perimeter fence will be  
32 patrolled three times weekly after final closure.

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

#### 35 J1.1.2 Surveillance Monitoring

36 The Permittees will conduct periodic surveillance of the site and the repository footprint during  
37 the post-closure period. Unpaved roadways around the WIPP site boundary and around the

1 repository footprint will facilitate such surveillance. Contractual arrangements with a local  
2 organization such as the Eddy County Sheriff's Department may be established which would  
3 provide some distinct advantages. Among the advantages are the following:

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

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

#### 20 J1.1.3 Maintenance and Remedial Actions

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

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

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

#### 30 J1.1.4 Control and Clean-up of Releases

31 The decontamination process and disposal of the derived waste will be completed prior to sealing  
32 the shafts and final facility closure. With the location of the WIPP repository at 2,150 feet (655  
33 meters) below the surface and with panels closed and shafts sealed, the potential for releases of  
34 radioactive material or hazardous constituents following the sealing of the shafts is precluded.  
35 There will be no credible pathway for releases from the repository other than human intrusion.

1 Routine patrols in accordance with access control requirements will preclude human intrusion  
2 into the repository during the post-closure period.

3 J1.1.5 Groundwater Monitoring

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

7 J1.2 Additional Post-Closure Activities

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

13 J1.3 Quality Assurance

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

19 Quality assurance and quality control will also be applied to the sampling and analyses  
20 supporting the environmental monitoring program. Contractors collecting samples and  
21 laboratories conducting analyses for the Permittees shall be qualified in accordance with  
22 guidelines prescribed in the most current edition of the Permittees' quality assurance program  
23 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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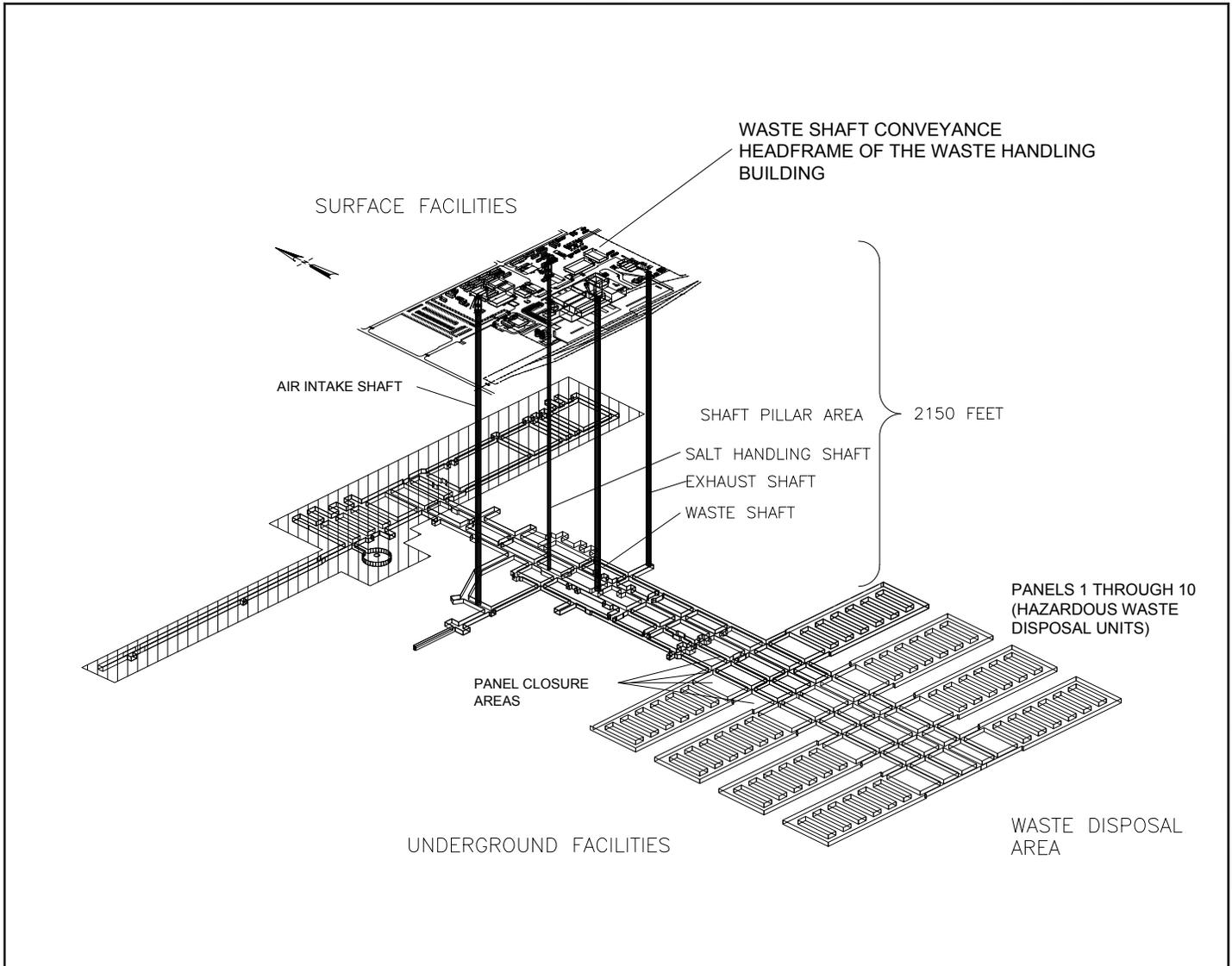


Figure J1-1  
Spatial View of WIPP Surface and Underground Facilities

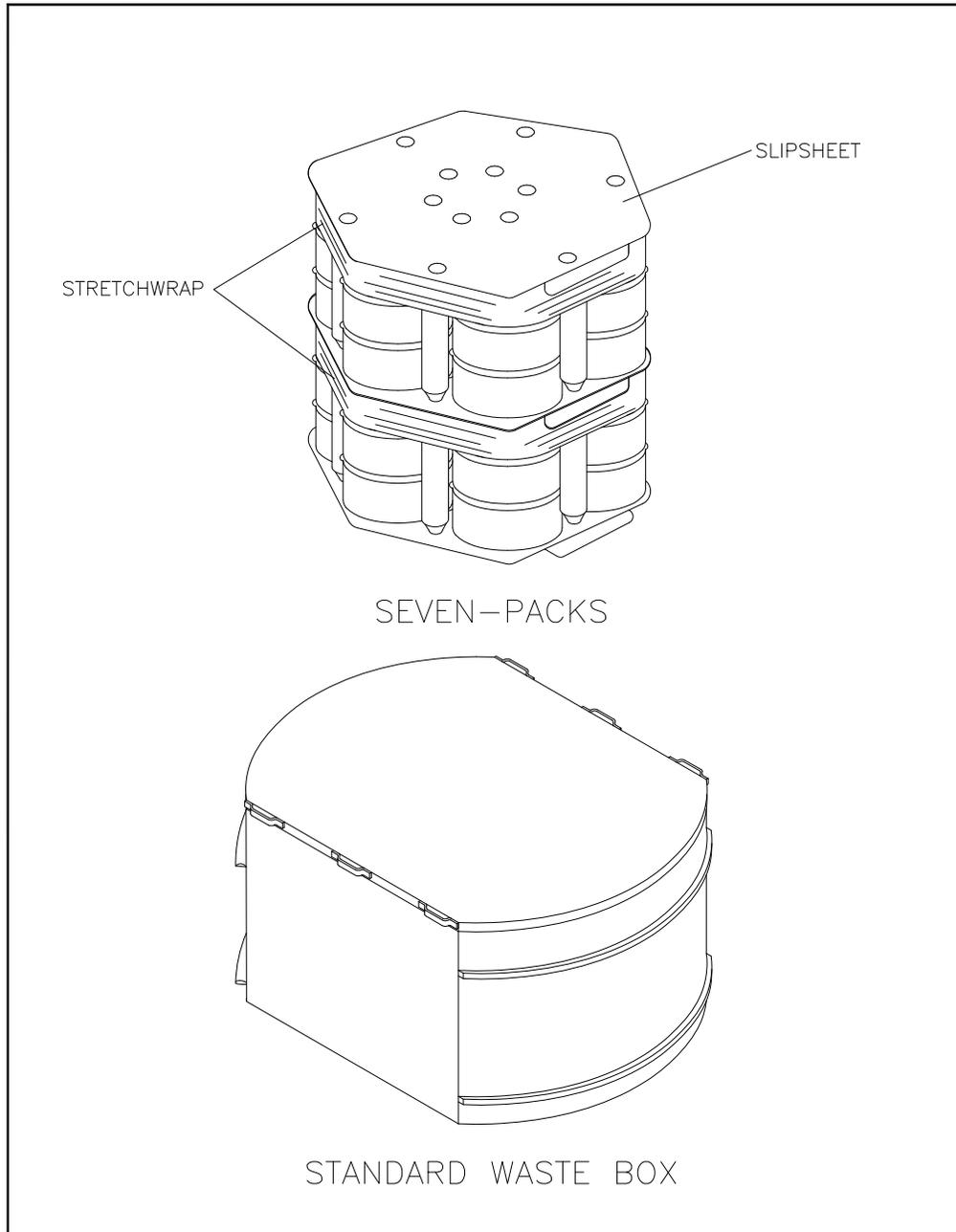
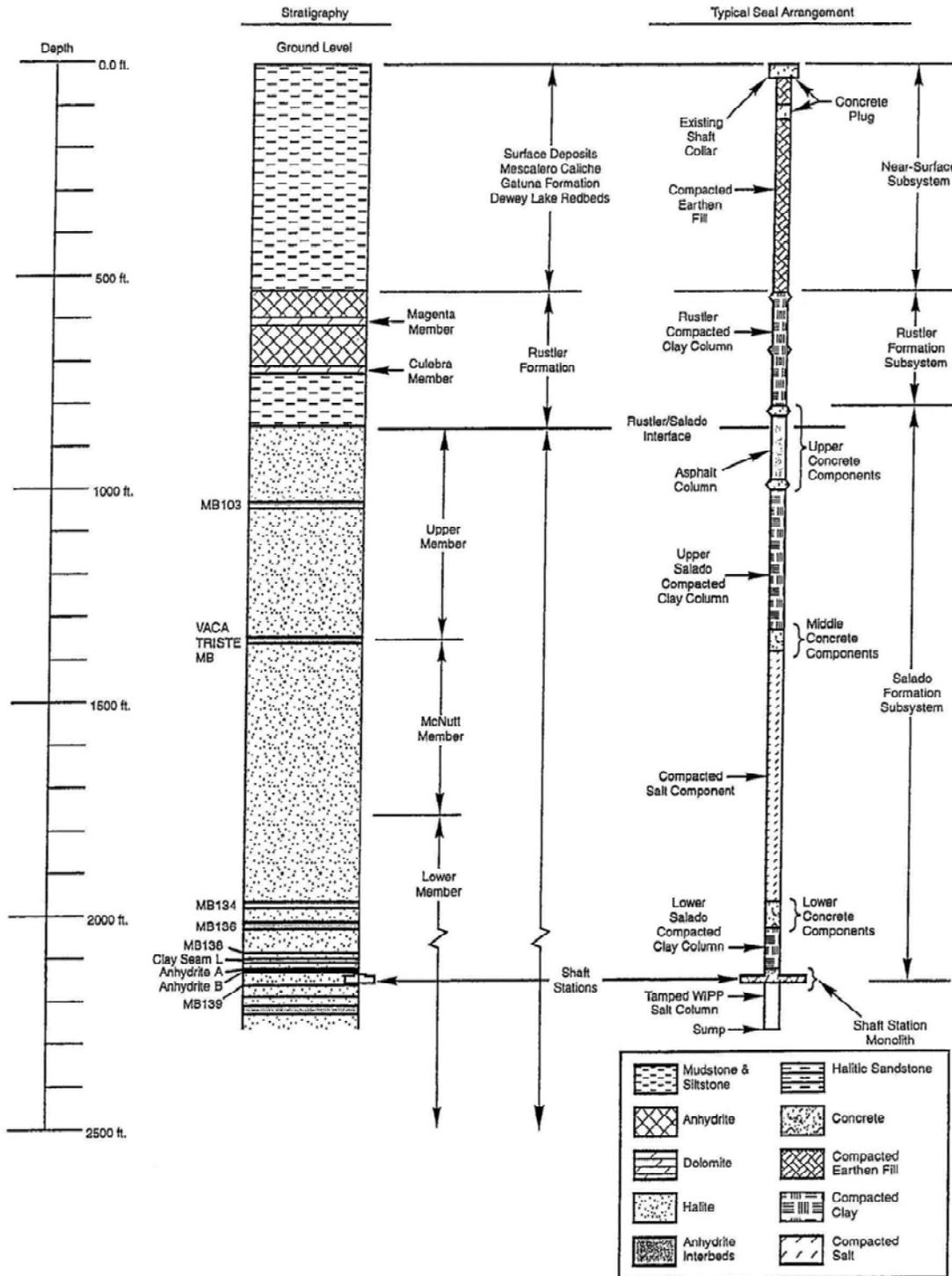
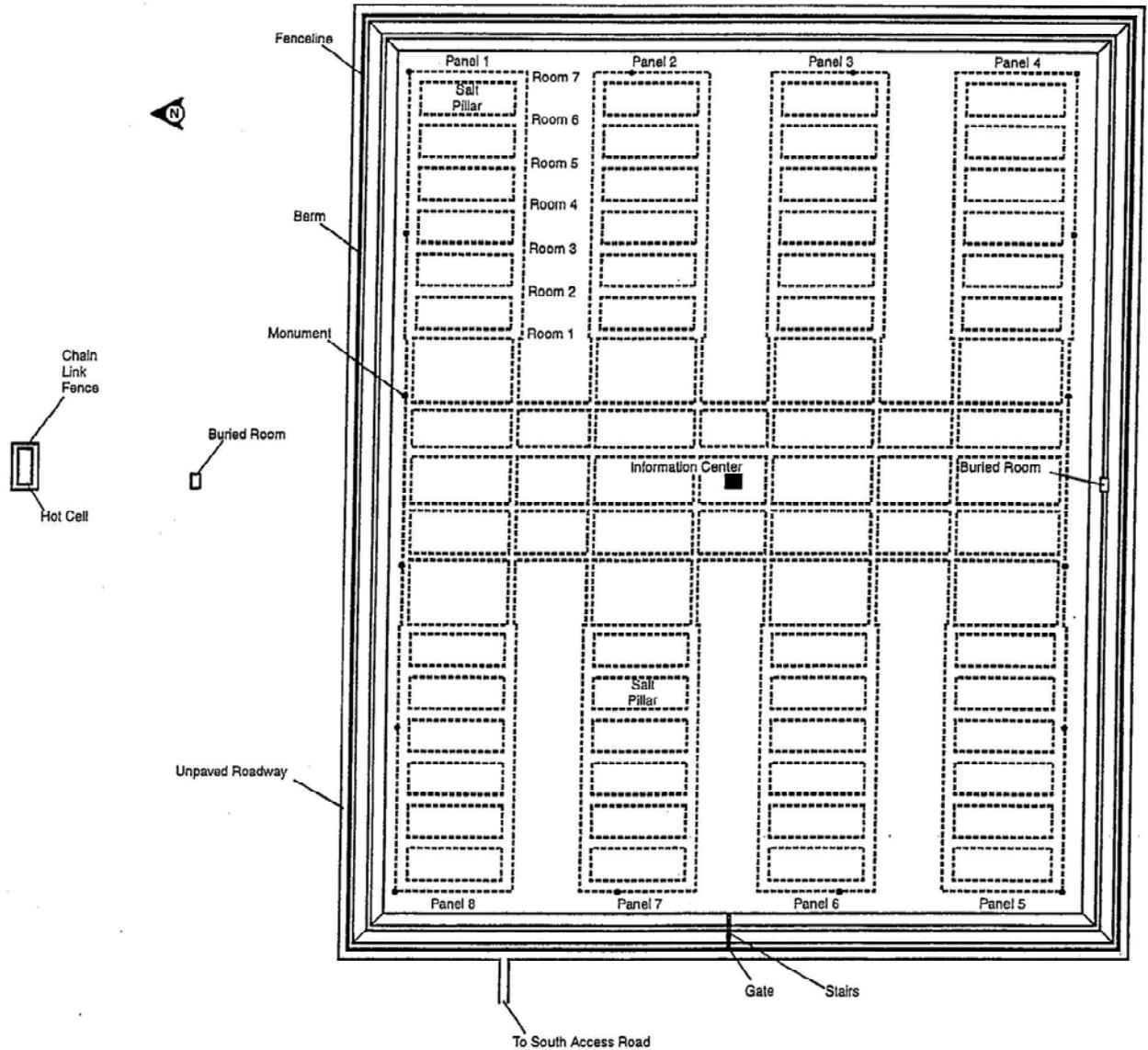


Figure J1-2  
Standard Waste Box and Seven-Pack Configuration



CCA-AIC306-0

Figure J1-3  
 Typical Shaft Sealing System



CCA-AIC307-0

Figure J1-4  
Perimeter Fenceline and Roadway