

ATTACHMENT H1
ACTIVE INSTITUTIONAL CONTROLS DURING POST-CLOSURE

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ACRONYMS

1		
2	CH	contact-handled
3	CFR	Code of Federal Regulations
4	DOE	U.S. Department of Energy
5	EPA	U.S. Environmental Protection Agency
6	LWA	Land Withdrawal Act
7	NMAC	New Mexico Administrative Code
8		
9	NMED	New Mexico Environment Department
10	SWB	standard waste box
11	TRU	transuranic
12	WIPP	Waste Isolation Pilot Plant

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Introduction

Under the requirements of 20.4.1.500 New Mexico Administrative Code (**NMAC**) (incorporating Title 40 of the Code of Federal Regulations (**CFR**) §264.118(b), the following activities identified as active institutional controls during post-closure are incorporated into the Post-Closure Plan.

The post-closure requirements of this permit include 20.4.1.500 NMAC, incorporating:

- 40 CFR §264.117(a)(1), which requires that
“Post-closure care for each hazardous waste management unit subject to the requirements of §264.117 through 264.120 must begin after completion of closure of the unit and continue for 30 years after that date...”
- 40 CFR §264.601, which requires that
“A miscellaneous unit must be...maintained and closed in a manner that will ensure protection of human health and the environment...”
- and 40 CFR §264.603, which requires that
“A miscellaneous unit that is a disposal unit must be maintained in a manner that complies with §264.601 during the post-closure care period.”

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

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

40 CFR §191.12 states the following:

- “Active institutional controls mean:
- 1) controlling access to a disposal site by any means other than passive institutional controls,
 - 2) performing maintenance operations or remedial actions at a site,
 - 3) controlling or cleaning up releases from a site, or

1 4) monitoring parameters related to disposal system performance.”

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

14 Implementation of active institutional controls at the WIPP site will commence when final facility
15 closure is achieved, as specified in Permit Part 6 and Permit Attachment G. Implementation of
16 active institutional controls marks the transition from the active life of the facility (which ends
17 upon certification of closure) to the post-closure care period, as specified in 20.4.1.500 NMAC
18 (incorporating 40 CFR Part 264, Subpart G). The Permittees will continue the imposition of
19 active institutional controls under this Permit until the New Mexico Environment Department
20 (**NMED**) approves the post-closure certification specified in Permit Part 7 and Permit
21 Attachment H.

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

30 **Scope:** The active institutional control requirements include a means of controlling access to
31 the site of the repository’s surface footprint (the repository area projected to the surface) and
32 maintenance, including corrective actions, for access control system components. Active control
33 of access to the site will be exercised by the Permittees for the duration of the post-closure care
34 period. Although the Permittees are only required to maintain active institutional controls until
35 approval of the post-closure certification by the NMED, the Permittees will continue active
36 institutional controls for at least 100 years after final facility closure to satisfy other regulatory
37 requirements. Control of access will prevent intrusion into the disposed waste by deep drilling or
38 mining for natural resources. This Attachment also specifies a process for scheduling activities
39 related to the long-term monitoring of the repository. Some of the activities supporting the
40 monitoring programs will be initiated during the active life of the facility to establish databases.
41 These activities are planned to continue beyond closure through the time after removal of the
42 site structures and return of the land disturbed by the WIPP activities to a stable ecological state
43 that will assimilate with the surrounding undisturbed ecosystem. Long-term monitoring
44 requirements will be necessarily integrated with efforts toward returning the land to a stable
45 ecological state.

1 **Background:** The WIPP facility was authorized by Congress as a research and development
2 facility to demonstrate the safe disposal of radioactive wastes. The wastes are derived from
3 DOE defense-related activities. Specifically, the mission of the WIPP Project is to conduct
4 research, demonstration, and siting studies relevant to the ~~facilitate~~ permanent disposal of TRU
5 wastes. Most of these wastes are contaminated with hazardous constituents, making them
6 mixed wastes.

7 The WIPP Land Withdrawal Act (**LWA**) addresses the disposal phase of the WIPP Project, the
8 period following closure of the site, and the removal of the surface facilities. The LWA set aside
9 10,240 acres (4,144 hectares) located in Eddy County, 26 miles (42 kilometers) east of
10 Carlsbad, New Mexico, as the WIPP site. A 277-acre (112-hectare) portion within the 10,240
11 acres (4,144 hectares) is bounded by a barbed wire fence. This fenced area contains the
12 surface facilities and the mined salt piles for the WIPP facility. Figure M-44 is a cutaway
13 illustrating the spatial relationship of the surface facilities and the underground repository.

14 After receiving the necessary certifications and permits from the EPA and the NMED, the
15 Permittees began disposal of contact-handled (**CH**) and remote-handled (**RH**) TRU and TRU
16 mixed waste in the WIPP facility. The Disposal Phase will continue until the initiation of final
17 facility closure when the Permit term expires, **unless a timely Renewal Application has been**
18 **submitted and the requirements of Permit Part 1, Section 1.7.3 have been met,** or Hazardous
19 Waste Disposal Units have received the final volume of waste as specified in Permit Part 4,
20 Table 4.1.1, remaining within the 6.2 million cubic feet (**ft³**) (175,564 cubic meters (**m³**)) of LWA
21 TRU waste volume limit, and as long as the Permittees comply with the requirements of the
22 Permit. At that time, final facility closure will be initiated as described in Renewal Permit
23 Attachment G. When the original Permit was issued, this time period was assumed to be 25
24 years. The waste is shipped from DOE facilities across the country in specially designed
25 transportation containers certified by the Nuclear Regulatory Commission. The transportation
26 routes from these facilities to the WIPP facility have been predetermined. The CH and RH TRU
27 mixed waste is packaged in approved containers as listed in Permit Part 3, Section 3.3.1 and
28 described in Permit Attachment A1.

29 Upon receipt and inspection of the waste containers in the Waste Handling Building Container
30 Storage Unit, the containers are moved into the repository 2,150 feet (655 meters) below the
31 surface. The containers are then transported to a disposal room. (See Figure M-44 for room and
32 panel arrangement.) Upon filling an entire panel, that panel will be closed to isolate it from the
33 rest of the repository and the ventilation system. During the period of time it takes to fill a given
34 panel, an additional panel will be excavated. Sequential excavation of panels will ensure that
35 these individual panels remain stable during the entire time a panel is being filled with waste.
36 Ground control maintenance and evaluation with appropriate corrective action will be required to
37 ensure that ventilation and access drifts in the repository remain stable.

38 Decontamination of the WIPP facility will commence with a detailed radiation survey of the
39 entire site. Radiologically contaminated areas and equipment will be evaluated and
40 decontaminated consistent with radiological control procedures pursuant to 10 CFR Part 835.
41 Hazardous waste decontamination, if needed, will be conducted in accordance with standard
42 20.4.1.500 NMAC (incorporating 40 CFR Part 264) or as prescribed by the Permit. Where
43 decontamination efforts identify areas that meet clean closure standards for permitted container
44 storage units and are below radiological control limits pursuant to 10 CFR Part 835, routine
45 dismantling and salvaging practices will determine the disposition of the material or equipment
46 involved. Material and equipment that do not meet these standards and criteria will be emplaced

1 in the final open disposal area after chemical compatibility is evaluated pursuant to Permit Part
2 2, Section 2.3.3.4 (as applicable). Upon completion of emplacement of the contaminated facility
3 material, the entries will be closed, and the repository shafts will be sealed. Final facility closure
4 includes sealing the shafts leading to the repository. Figure M-64 illustrates the shaft sealing
5 arrangement. Certification of closure will end disposal operations and initiate the post-closure
6 care period for implementation of active institutional controls.

7 H1.1 Active Institutional Controls

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

- 9 • controlling access to a disposal site,
- 10 • performing maintenance operations or remedial actions at a site, and
- 11 • controlling or cleaning up releases from a site.

12 The LWA has removed the WIPP site from public use as a site for mining and other types of
13 mineral resource extraction. Since any type of exploration activity would require authorization,
14 the issuance of approval to intrude upon the repository is precluded by the LWA. The existence
15 of the LWA as law permits meeting the requirements of the first element above by implementing
16 low technology barriers. These barriers include a posted fence and active surveillance at a
17 frequency that denies sufficient time for an individual or organization to intrude into the
18 repository undetected using today's drilling technology. Maintenance and remedial actions at
19 the WIPP site will be conducted by the Permittees at the time of implementing the access
20 controls for the site. The control or cleanup of releases from the site will be conducted as part of
21 the operational program prior to sealing of the shafts. This is necessary to ensure that derived
22 waste is disposed of within the repository prior to shaft sealing.

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

- 27 1. A fence line will be established to control access to the repository footprint area on the
28 surface. A standard four-strand (three barbed and one unbarbed, in accordance with the
29 Bureau of Land Management specifications) wire fence will be erected along the
30 perimeter of the repository surface footprint. To provide access to the repository footprint
31 during construction of the berm (which may be built in multiple sections simultaneously),
32 the fence will have gates placed approximately midway along selected legs of the fenced
33 area. These gates will remain locked with access controlled by the Permittees. The
34 gates will be wide enough to accommodate the equipment that will be used to build the
35 berm. Additional fencing will be constructed where appropriate for remote locations that
36 are used for disposal system monitoring. Such fences will meet the same construction
37 specifications as the repository footprint perimeter fence.
- 38 2. Unpaved roadways 16 feet (4.9 meters) wide will be established along the perimeter of
39 the barbed wire fence as well as along the WIPP site boundary. These roadways will be
40 constructed so as to provide ready vehicle access to any point around the fenced
41 perimeter and the site boundary. These roadways will facilitate inspection and
42 maintenance of the fenceline and will allow visual observation of the repository footprint

1 and the site boundary to the extent permitted by the lay of the land. These roadways will
2 connect to the paved south access road. Roads to remote sites will also be constructed
3 and maintained where appropriate.

- 4 3. The fence line will be posted with signs having, as a minimum, a legend reading
5 "Danger—Unauthorized Personnel Keep Out" (20.4.1.500 NMAC (incorporating 40 CFR
6 §264.14[c])) and warning against entering the area without specific permission of the
7 Permittees. The legend must be written in English and Spanish. The signs must be
8 legible from a distance of at least 25 feet (7.6 meters). The size of the visual warning
9 and the spacing of the warning signs will be sufficiently large and close to ensure that
10 one or more of the signs can be seen from any approach prior to an individual actually
11 making contact with the fence line. In no case will the spacing be greater than 300 feet
12 (91.5 meters).
- 13 4. The Permittees will ensure that periodic inspection and expedited corrective
14 maintenance are conducted on the fence line, its associated warning signs, and
15 roadways.
- 16 5. The Permittees will provide for routine periodic patrols and surveillance of areas
17 controlled by or under the authority of the Permittees by personnel trained in security
18 surveillance and investigation.
- 19 6. The Permittees will implement the periodic monitoring requirements of the long-term
20 monitoring system.
- 21 7. The Permittees will submit a Permit modification request for any proposed modifications
22 to the active institutional controls appropriate for access control, as specified in
23 20.4.1.900 NMAC (incorporating 40 CFR §270.42).
- 24 8. The Permittees will immediately take appropriate action to address abnormal conditions
25 identified during periodic surveillance and inspections. Abnormal conditions include any
26 natural or human-caused conditions which would affect the integrity of the active
27 institutional controls.
- 28 9. Reports addressing activities associated with the performance of the active access
29 controls after final closure will be prepared periodically according to applicable
30 requirements by the Permittees for submittal to the appropriate regulatory and legislative
31 authorities.

32 H1.1.1 Repository Footprint Fencing

33 The fenced area will be composed of two adjoining rectangular areas (See Figure M-65). One
34 rectangular area will be approximately 2,780 feet by 2,360 feet (875 meters by 720 meters),
35 covering the area over Panels 1-8. The second (adjoining) rectangular area will be
36 approximately 1,040 feet by 1,210 feet (317 meters by 369 meters) covering the area over
37 Panels 11 and 12. In the future, if more panels are proposed and permitted, the repository
38 footprint fencing areas will be updated. The fenced area will be controlled by a four-strand
39 barbed wire fence. Gates will be included as needed along the sides of the fence for access.
40 These gates will remain locked with access controlled by the Permittees. Around the perimeter
41 of the fence, an unpaved roadway 16 feet (4.9 meters) wide will be cut to allow for patrolling of

1 the perimeter. Figure M-65 is an illustration of the fence line in relation to the repository
2 footprint. Patrolling of the perimeter is based upon the need to ensure that no mining or well
3 drilling activity is initiated that could threaten the integrity of the repository.

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

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

17 H1.1.2 Surveillance Monitoring

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

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

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

1 H1.1.3 Maintenance and Remedial Actions

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

- 4 • fence and road maintenance,
- 5 • repair of any damage that occurs,
- 6 • response to evidence of potential erection of drilling equipment, and
- 7 • response to unauthorized entry into prohibited areas.

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

11 H1.1.4 Control and Clean-up of Releases

12 The decontamination process and disposal of the derived waste will be completed prior to
13 sealing the shafts and final facility closure. With the location of the WIPP repository at 2,150 feet
14 (655 meters) below the surface and with panels closed and shafts sealed, the potential for
15 releases of radioactive material or hazardous constituents following the sealing of the shafts is
16 precluded. There will be no credible pathway for releases from the repository other than human
17 intrusion. Routine patrols in accordance with access control requirements will preclude human
18 intrusion into the repository during the post-closure period.

19 H1.1.5 Groundwater Monitoring

20 Groundwater monitoring is the only monitoring program required by the Permit that will be
21 conducted throughout the post-closure care period. The post-closure groundwater monitoring
22 requirements are specified in Permit Part 7 and Permit Attachment L.

23 H1.2 Additional Post-Closure Activities

24 With the certification of closure of the WIPP facility and return of the land disturbed by the WIPP
25 activities to a stable ecological state that will assimilate with the surrounding undisturbed
26 ecosystem, continuous occupancy of the site for operational and security purposes will cease.
27 Any additional activities will be imposed through the Post-Closure Care Permit issued by the
28 NMED after certification of closure.

29 H1.3 Quality Assurance

30 The quality assurance and quality control plan will be applied to the procurement of materials for
31 and the erection of the fencelines enclosing the repository footprint. In particular, quality control
32 inspection of the placement and tensioning of the barbed wire and chain link fabric will be
33 applied and utilized to provide reasonable assurance that the fencing structures will function
34 during the post-closure care period with normal maintenance.

35 Quality assurance and quality control will also be applied to the sampling and analyses
36 supporting the environmental monitoring program. Contractors collecting samples and
37 laboratories conducting analyses for the Permittees shall be qualified in accordance with

1 guidelines prescribed in the most current edition of the Permittees' quality assurance program
2 document at the time that the contracts are awarded.

3 References

4 EPA (U.S. Environmental Protection Agency). 1993. 40 CFR Part 191 Environmental Radiation
5 Protection Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and
6 Transuranic Radioactive Waste; Final Rule. *Federal Register*, Vol. 58, No. 242, pp. 66398-
7 66416, December 20, 1993. Office of Radiation and Indoor Air, Washington, D.C.

8 U.S. Congress. 1992. Waste Isolation Pilot Plant Land Withdrawal Act as amended. Public Law
9 102-579, 106 Stat. 4777, October 1992. 102nd Congress, Washington, D.C.