CARD No. 41
Active Institutional Controls

41.A.1 BACKGROUND

Assurance requirements were included in the disposal regulations to compensate in a qualitative manner for the inherent uncertainties in projecting the behavior of natural and engineered components of the WIPP for many thousands of years (50 FR 38072). Section 194.41 is one of the assurance requirements in the Compliance Criteria. Active institutional controls (AICs) are defined in Section 191.12 as "controlling access to a disposal site by any means other than passive institutional controls (see **CARD 43—Passive Institutional Controls**), performing maintenance operations or remedial actions at a site, controlling or cleaning up releases from a site, or monitoring parameters related to disposal system performance."

41.A.2 REQUIREMENT

(a) "Any compliance application shall include detailed descriptions of proposed active institutional controls, the controls' location, and the period of time the controls are proposed to remain active. Assumptions pertaining to active institutional controls and their effectiveness in terms of preventing or reducing radionuclide releases shall be supported by such descriptions."

41.A.3 ABSTRACT

In reviewing DOE's compliance with Section 194.41, EPA sought a detailed description of DOE's proposed AICs and how those controls would be implemented. DOE proposed to construct a fence and roadway around the "footprint" of the repository (i.e., the surface perimeter of the underground waste panels), to post warning signs, to conduct routine patrols and surveillance, and to repair and/or replace physical barriers as needed. DOE also identified other measures that function as AICs, such as DOE's prohibition on resource exploration at the WIPP and the construction of long-term site markers. DOE stated that it would maintain the proposed AICs for a period of 100 years after closure of the WIPP, and that the WIPP performance assessment (PA) assumed that AICs would prevent human intrusion for that period.

EPA reviewed the CCA and supplementary materials to assess the completeness of the plan, including the schedule DOE will follow to implement AICs, and to determine whether DOE had adequately justified its assumption that AICs will prevent human intrusion into the WIPP for 100 years. EPA considered the justification to be adequate if DOE showed that it had established performance standards and procedures for AICs and made specific commitments to maintain or replace them.

41.A.4 COMPLIANCE REVIEW CRITERIA

To meet the requirements of the final compliance criteria, EPA expected the CCA to describe in detail the proposed AICs and their location and function, and to identify the period of time they are expected to remain active. EPA also expected DOE to provide detailed information regarding implementation of the controls, any assumptions pertaining to the effectiveness of active

controls, a justification for any credit for AICs used in PAs, and the methodology for determining the credit. EPA specified that PAs could not assume that AICs would be effective for a period longer than 100 years after disposal (see discussion under Section 194.41(b) below).

41.A.5 DOE METHODOLOGY AND CONCLUSIONS

DOE provided information in support of its demonstration of compliance with Section 194.41(a) in Chapter 7.1 (pp. 7-1 to 7-31) and Appendix AIC. In Appendix AIC, DOE described the AICs and their locations and provided a graphic representation (p. 17). Supplemental information from DOE in a letter dated February 7, 1997, elaborated on the implementation, maintenance, surveillance, and replacement of AICs (Docket A-93-02, Item II-I-07, Enclosure 1c.).

The proposed AICs principally consist of a barbed wire fence and an unpaved roadway. The barbed wire fence will surround a rectangular area approximately 2,780 feet x 2,360 feet and is intended to control access and indicate controlled ownership of the area above the repository "footprint." The fence will be marked with signs that indicate danger and prohibit entry or disturbance. The fence will be surrounded by an unpaved roadway 16 feet wide and will provide access for periodic site surveillance (drive by patrol 2-3 times a week), so that potential human intrusion into the repository can be detected before it occurs. The frequency of the site surveillance would preclude the setup of an activity (such as deep drilling) that could intrude on the repository.

In Chapter 7.1 (p. 7-6), DOE stated that the active controls will be implemented for at least 100 years. DOE also committed to maintaining surveillance of the site for at least 100 years (Appendix AIC, p. 16). The time line for implementation of AICs is found in Figure 7-1 of the CCA (p. 7-3). DOE's letter of 2/7/97 identifies the sequence of actions by which DOE will implement and maintain the AICs. This schedule addresses the design, fabrication, emplacement, inspection, surveillance, and maintenance of the active controls, as well as factors that may delay or adversely affect their implementation or long-term performance.

Also, the 2/7/97 letter cites the potential discovery of Native American archaeologic ruins during the site work for the construction of both the fence and the road as an example of a factor that could delay implementation of the AIC system, and incorporates this possibility in the implementation schedule (p. 1). The letter discusses minimum standards for and the feasibility of the proposed AICs (pp. 3-4). For example, DOE stated that it will conduct a survey of best available materials to determine the correct material for the fence (p. 3). At a minimum, DOE will use fencing that complies with the Bureau of Land Management's standard wire spacing used for the combination of cattle with deer, elk, moose, or antelope. DOE will consult national standards applicable to wire fencing and use them as minimum requirements with respect to material and configuration. Wire will be no less than class 3 (galvanized high tensile). Stress panels embedded in concrete will be placed every 80 rods (1,320 feet, the length of barb wire on a standard reel). Galvanized pipe posts will be placed at a minimum of intervals of 100 feet, with at least 4 to 5 steel T-posts in between galvanized pipe posts and 2 stays between T-posts.

DOE relied on long-term surveillance, maintenance, and corrective action at the WIPP site as the rationale for the effectiveness of AICs. Chapter 7.1.4 states that the assumption that AICs will be completely effective for 100 years is supported by the proposed design features alone (p. 7-28). In other words, DOE argued that it is well within its ability to maintain AICs for 100 years, and that the proposed controls would effectively deter activities that could lead to human intrusion. DOE noted that governments have successfully protected facilities of material importance for hundreds of years, and that DOE and its predecessor agencies have effectively controlled sites for over 50 years (p. 7-31). In addition, monitoring activities will involve on-site groundwater surveillance for 30 years after closure and subsidence monitoring for at least 100 years after closure. DOE also noted that the development of passive institutional controls at the site will occur concurrently with the AICs and so the development phase of PICs will function effectively as another AIC (Appendix AIC, p. 21).

41.A.6 EPA COMPLIANCE REVIEW

EPA reviewed the CCA for completeness, thoroughness, level of detail in light of the qualitative nature of assurance requirements, feasibility, and likely effectiveness. EPA first reviewed the descriptions of the proposed AICs in Chapter 7 and Appendix AIC. The information presented includes a graphic illustration of perimeter fences, unpaved roadways, gates, and access roads (Appendix AIC, Figure AIC-4, p. 17). Appendix AIC also includes descriptions of the fence, signs, roadway, inspections and maintenance, site surveillance, on-site monitoring, and the erection and testing of passive institutional controls (p. 12-19). DOE considered the implementation of passive institutional controls (specifically, site markers) to serve as an additional AIC at the WIPP site. EPA found this assertion to be acceptable because DOE's construction activities related to long-term markers will involve such controls as increased fencing, lighting, signs, security patrols, and a heightened personnel presence.

EPA then evaluated the location and effectiveness of the physical barriers and structures (i.e., fences, gates, and roadways). EPA evaluated the overall design, function, and reliability of the proposed AICs to determine whether they could perform their intended function for the required time period. EPA contacted fence and road contractors in southern New Mexico to gather information on the cost, feasibility, and life cycle requirements of the proposed fencing and roadway. EPA concluded on the basis of these contacts that the fencing described by DOE could last for many decades and that proposed controls such as the roadway and signs could be expected to be maintained for at least 100 years, given their relatively low cost and ease of repair/replacement. EPA then reviewed descriptions of other AICs proposed by DOE, including site patrols (to detect unwanted activities), site surveillance (to detect problems with physical barriers and structures), resulting corrective measures and remedial action, and land use restrictions.

Based on a preliminary review of the CCA, EPA determined that DOE had not provided sufficient detail about the schedule for implementing AICs, DOE's approach to maintenance and replacement of AICs, or the minimum standards that will be applied during the construction and maintenance of AICs. EPA communicated this lack of necessary information to DOE via letter dated December 19, 1996 (Docket A-93-02, Item II-I-01):

> The CCA should include a list or time line that outlines the major AIC milestones and actions that will [be] taken to protect the repository in the pre- and post-closure phases. The CCA should describe how long each individual measure will continue to be effective, how it will be actively maintained, and cite empirical evidence which supports the periods of times asserted for effectiveness. For instance, when the Department asserts that a perimeter fence will be maintained for a minimum of 100 years, the Department should also identify minimum requirements for fence performance, how this will be inspected/determined, and how often and by what mechanism maintenance or replacement will be performed.

As noted above, DOE responded to EPA's request for supplementary information via letter dated February 7, 1997 (Docket A-93-02, Item II-I-07, Enclosure 1c). The 2/7/97 supplement included a discussion of the scheduled steps for implementing AICs and more detail concerning specifications and standards that will be applied to the design of AICs. DOE also provided sample inspection checklists for site surveillance and maintenance and a discussion of training requirements that will be applied to site patrol personnel. DOE conducted a "capabilities survey" of regional security firms and concluded that the surveillance requirements for the WIPP site were within the scope of current local capabilities. EPA contacted the Eddy County Sheriff's Office and confirmed that, while the Sheriff's Office may be able to patrol the site after closure, the services of a private firm would have to be contracted for routine patrols.

EPA reviewed the proposed AICs by considering the types of activities that are expected to occur at the site during the first 100 years. DOE analyzed the following activities in Chapter 7.1.3.1: ranching, farming, hunting, scientific activities, utilities and transportation, groundwater pumping, surface excavation, potash exploration, hydrocarbon exploration, construction, and hostile and illegal activities (pp. 7-6 to 7-22). EPA determined that the activities list is adequate because the range of activities analyzed encompassed all of the types of activities expected in the area. In its analysis, DOE determined the types of impacts that these activities would have on the site. EPA found that the assessments provided by DOE were adequate since DOE covered all likely impacts from the various activities.

Finally, EPA examined the assumptions made by DOE to justify its assertion that AICs will be completely effective for 100 years. The assumptions are that: 1) the fence and signs will be maintained and will convey the message that the WIPP site is hazardous and protected; 2) legal prohibition on resource recovery activities will be enforced; and 3) the time required to initiate a resource extraction operation will allow routine site patrols to discover and halt such activities. The effectiveness of AICs was considered specifically in light of the fact that EPA intends for them to reduce radionuclide releases by preventing inadvertent human intrusion through drilling or mining.

EPA found the assumptions regarding longevity and efficacy of the proposed AICs to be acceptable. This finding was based on the fact that the types of inadvertent intrusion which AICs are designed to obviate are not casual activities, but require extensive resources, lengthy procedures for obtaining legal permission, and substantial time to set up at the site before beginning work. DOE's assumption that a fence and signage are effective controls was based on the Department's experience at the WIPP, to which DOE has limited access for more than a

decade with such measures as a secured perimeter fence. Also, it is a common practice with hazardous sites to impose access controls such as fencing and signs. EPA imposes similar requirements at other hazardous sites (e.g., Superfund sites).

DOE was given legal control over the WIPP site by the 1992 WIPP Land Withdrawal Act, and as a result has the authority to control land use at the site. A change in this authority would require an act of Congress, but EPA does not consider it likely that Congress would in any event cede Federal control over the WIPP site. Finally, EPA expects that routine surveillance of the site would detect any unwanted activities simply because of the substantial amount of time and resources involved in either the wholesale destruction and/or removal of the physical barriers or the setup of a resource extraction operation. On the basis of the detailed descriptions of AICs provided by DOE, EPA concluded that the AICs may be expected to be effective for 100 years after disposal.

41.B.1 REQUIREMENT

(b) "Performance assessments shall not consider any contributions from active institutional controls for more than 100 years after disposal."

41.B.2 ABSTRACT

DOE was not permitted to take credit for AICs in PAs for more than 100 years after disposal. This credit takes the form of a reduction in the rate of human intrusion. DOE stated that credit for AICs was limited to 100 years following disposal. EPA reviewed documentation of the PA on which DOE based compliance to verify that credit had not been applied for more than the allowed period.

41.B.3 COMPLIANCE REVIEW CRITERIA

As stated by the disposal regulations at Section 191.14(a) and the compliance criteria at Section 194.41(b), EPA determined that, for purposes of modeling disposal system performance, credit based on AICs' effectiveness would in no case be allowed to extend beyond 100 years after disposal. EPA expected that DOE would not propose credit for the effectiveness of AICs in the PA for longer than 100 years following disposal and that DOE would explain why credit is warranted for the proposed time frame.

41.B.4 DOE METHODOLOGY AND CONCLUSIONS

In Chapters 7.1 and 7.1.4, DOE stated that its PA assumed that AICs will prevent all human intrusion into the repository for 100 years (p. 7-28). DOE also stated its intent to retain control over the site for as long as practicable beyond that time (p. 7-31). DOE's implementation plan for AICs constituted the rationale for the proposed period of effectiveness of 100 years. In Chapter 7.1.4 (p. 7-28), DOE stated that "the assumption [for the credit] is supported by the proposed design features alone, (that is, fencing, postings, perimeter inspections, surveillance, and mitigation measures)." In other words, DOE assumed that AICs will be completely effective

because of their comprehensive nature and DOE's commitment to implementing them for the proposed period.

41.B.5 EPA COMPLIANCE REVIEW

EPA reviewed the CCA and the parameter inputs to the PA and determined that DOE did not assume credit for the effectiveness of AICs for more than 100 years after disposal. EPA found DOE's proposal that AICs will be completely effective for 100 years to be acceptable on the basis of the factual information and assumptions employed by DOE to justify the proposal. For further discussion, see the discussion under Section 194.41(a) above.

41.C REFERENCES

None.