Title 40 CFR Part 191
Subparts B and C
Compliance Recertification
Application
for the
Waste Isolation Pilot Plant

Passive Institutional Controls
(40 CFR § 194.43)

United States Department of Energy
Waste Isolation Pilot Plant

Carlsbad Field Office
Carlsbad, New Mexico

Passive Institutional Controls
(40 CFR § 194.43)

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Acronyms and Abbreviations

CCA	Compliance Certification Application
CRA	Compliance Recertification Application
DOE	U.S. Department of Energy
EPA	Environmental Protection Agency
PIC	passive institutional control
WIPP	Waste Isolation Pilot Plant

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43.0 Passive Institutional Controls (40 CFR § 194.43)

43.1 Requirements

§ 194.43 Passive Institutional Controls

(a) Any compliance application shall include detailed descriptions of the measures that will be employed to preserve knowledge about the location, design, and contents of the disposal system. Such measures shall include:

(1) Identification of the controlled area by markers that have been designed and will be fabricated and emplaced to be as permanent as practicable;

(2) Placement of records in the archives and land record systems of local, State, and Federal governments, and international archives, that would likely be consulted by individuals in search of unexploited resources. Such records shall identify:

(i) The location of the controlled area and the disposal system;

(ii) The design of the disposal system;

(iii) The nature and hazard of the waste;

(iv) Geologic, geochemical, hydrologic, and other site data pertinent to the containment of waste in the disposal system, or the location of such information; and

(v) The results of tests, experiments, and other analyses relating to backfill of excavated areas, shaft sealing, waste interaction with the disposal system, and other tests, experiments, or analyses pertinent to the containment of waste in the disposal system, or the location of such information.

(3) Other passive institutional controls practicable to indicate the dangers of the waste and its location.

(b) Any compliance application shall include the period of time passive institutional controls are expected to endure and be understood.

(c) The Administrator may allow the Department to assume passive institutional control credit, in the form of reduced likelihood of human intrusion, if the Department demonstrates in the compliance application that such credit is justified because the passive institutional controls are expected to endure and be understood by potential intruders for the time period approved by the Administrator. Such credit, or a smaller credit as determined by the Administrator, cannot be used for more than several hundred years and may decrease over time. In no case, however, shall passive institutional controls be assumed to eliminate the likelihood of human intrusion entirely.

43.2 Background

Regulations in 40 CFR Part 191 Subparts B and C (U.S. Environmental Protection Agency 1993) state that disposal systems shall be designed and built such that they provide a reasonable expectation that for 10,000 years (1) the undisturbed performance of the system will not result in an annual committed effective dose to any member of the public in excess of 15 millirem, (2) the levels of radioactive contamination in groundwater will not exceed limits specified by the standard in 40 CFR § 191.24, and (3) the probability of releases from all significant processes and events acting on the disposal system will not exceed the specifications in 40 CFR § 191.13(a).

40 CFR Part 191 Appendix C states "that inadvertent and intermittent intrusion by exploratory drilling for resources can be the most severe intrusion scenario assumed by the DOE." Subsequent to Part 191 requirements, 40 CFR § 194.32 (U.S. Environmental Protection Agency 1996) also requires that performance assessments include the effects of drilling. A goal of passive institutional controls (PICs) is to minimize the likelihood of inadvertent human activities that affect repository performance (U.S. Department of Energy 1996, Compliance Certification Application [CCA], Appendix PIC).

43.3 1998 Certification Decision

To meet the requirements for 40 CFR § 194.43, the U.S. Environmental Protection Agency (EPA) expected the U.S. Department of Energy (DOE) to describe the markers that would be placed at the Waste Isolation Pilot Plant (WIPP) site to warn future generations about the disposal system's design and contents, including the presence and hazards of radioactive waste. The markers were to be as permanent as practicable using current technology. The DOE also needed to describe individual markers in detail, including information demonstrating that the markers were as permanent as practicable. Permanence refers to the markers' ability to withstand both natural and human-initiated forces that could reasonably be expected to occur at the site. Markers did not need to be designed to withstand catastrophic, low-probability events, such as nuclear war or a comet strike, since any attempt to do so would undoubtedly strain the practicability of the design. Practicability refers to the DOE's ability to emplace markers using currently available resources and technology.

In addition to describing markers that would be fabricated and emplaced, the DOE was also expected to provide a timeline for implementing the markers. Finally, the DOE was permitted to propose a credit for PICs in the performance assessment. A credit must be based on the proposed effectiveness of PICs over time, and would take the form of reduced likelihood in the performance assessment of human intrusion over several hundred years.

The CCA, Chapter 7.0, Section 7.3.3.1.1 and Section 7.3.3.3; the CCA, Appendices PIC and EPIC; and supplemental information requested by the EPA contains the information supporting the DOE's compliance with this requirement.

The EPA determined that the DOE complied with the requirements of section 194.43 because the measures proposed in the CCA are comprehensive, practicable, and likely to endure and be understood for long periods of time. The EPA denied the DOE's request for credit for a 99% reduction in the likelihood of human intrusion into the WIPP during the first 700 years after closure. The EPA denied the credit because the DOE did not use an expert judgment elicitation to derive the credit. The EPA also established as a condition of the 1998 Certification Decision (U.S. Environmental Protection Agency 1998) that the DOE submit additional information concerning the schedule for completing PICs, fabrication of granite markers, and commitments by various recipients to accept WIPP records no later than the final recertification application.

A complete description of the EPA's 1998 Certification Decision for section 194.43 can be found in U.S. Environmental Protection Agency (1998).

43.4 EPA's Changes in the CRA-2004

In the 2004 Compliance Recertification Application (CRA-2004) (U.S. Department of Energy 2004), Chapter 7.0, Section 7.3.1 (Requirements for PICs), the DOE added language discussing Condition 4 of the EPA's 1998 Certification Decision. This condition requires the DOE to submit the following items prior to the final recertification application, which will be submitted before closure of the disposal system:

- A schedule for implementing PICs, which also describes the testing of all aspects of the conceptual design
- Documentation regarding the granite pieces for the proposed monuments
- Documentation regarding the archives and record centers maintaining the WIPP docket documents
- Documentation of a plan to ensure that the recipients of WIPP information continue to have access to docket documents and supplementary information

New information pertaining to the permanent markers portion of the PICs program and additional amendments to the planning process were also included in the CRA-2004, Chapter 7.0, Section 7.3.3 (Implementation of the PICs Program), which is documented in *Permanent Markers Testing Program Plan* (U.S. Department of Energy 2000).

The CRA-2004, Chapter 7.0, Section 7.3.3.1.1 assured the EPA that the permanent markers will be constructed of materials selected through an evaluation process; the berm design, including the materials of construction, will be refined; and the final design specifications will be provided to the EPA for approval prior to construction.

Examples of the types of files to be archived were added in the CRA-2004, Chapter 7.0, Section 7.3.3.1.2 (Records).

The CRA-2004, Chapter 7.0, Section 7.3.3.3 (PICs Timelines) discusses a new and revised schedule under which the DOE will implement its PICs program. The DOE referenced a letter sent to the EPA (Triay 2002) and the EPA's subsequent approval (Marcinowski 2002) of this revised timeline.

The DOE claimed no credit for the effectiveness of PICs for the 2004 Performance Assessment Baseline Calculation (U.S. Environmental Protection Agency 2006a). As indicated previously by the EPA, the DOE has the right to claim such credit in future recertification applications.

43.5 EPA's Evaluation of Compliance for the 2004 Recertification

The EPA concluded that the DOE adequately described changes that had been made in the PICs program and continued to comply with the requirements of section 194.43 (U.S. Environmental Protection Agency 2006b).

43.6 Changes or New Information Since the 2004 Recertification

In a letter dated January 11, 2007 (Moody 2007), the DOE requested an extension to start testing PICs 10 years before closure as identified in the DOE's letter of May 16, 2002 (Triay 2002), and agreed to in the EPA's letter of November 7, 2002 (Marcinowski 2002). This request for schedule extension by the DOE was to allow the maximum amount of time to determine the most updated design and materials technologies for implementation of PICs based upon projected closure dates. The EPA responded to the DOE's schedule extension request in a letter dated

March 7, 2008 (Reyes 2008). The EPA agreed to a modified schedule based on activities and current projections of the anticipated WIPP closure date. Table 43-1 is the revised list of approved schedule changes for PICs Testing.

Table 43-1. Approved Schedule Changes for PICs Testing[a]

Activity	Original Time Frame	November 2002 Time Frame	New (December 2007) Time Frame
Identification of suitable source material	1999–2004	2007	2014, but with an annual progress report
Submit plans for test marker system to EPA	2003	2007	2016, but with an annual progress report
Construction of berm and begin testing of berm and markers	2004–2009	2008	2018
Monitor performance of test berm and test markers	2007–2083	2009–closure	2019–closure
Develop final design of markers	2083–2090	2033 (anticipated)	2033 (anticipated)
Finalize messages	n/a	2033 (anticipated)	2033 (anticipated)

[a] Source: Reyes 2008.

In this application the DOE is not proposing any changes to the PICs program for the WIPP. Information pertaining to the program as provided for the CCA and the CRA-2004 remains unchanged, with the exception of the PICs testing schedule. The DOE believes it has demonstrated continued compliance with the provisions of section 194.43.

43.7 References

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