
**Title 40 CFR Part 191
Subparts B and C
Compliance Recertification Application 2014
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**

Compliance Recertification Application 2014
Passive Institutional Controls
(40 CFR § 194.43)

Table of Contents

43.0 Passive Institutional Controls (40 CFR § 194.43) 43-1

 43.1 Requirements 43-1

 43.2 Background 43-1

 43.3 1998 Certification Decision 43-2

 43.4 Changes in the CRA-2004 43-2

 43.5 EPA’s Evaluation of Compliance for the 2004 Recertification 43-3

 43.6 Changes or New Information Between the CRA-2004 and the CRA-2009 (Previously:
 Changes or New Information Since the 2004 Recertification) 43-3

 43.7 EPA’s Evaluation of Compliance for the 2009 Recertification 43-4

 43.8 43.8 Changes or New Information Since the CRA-2009 43-4

 43.9 References 43-5

List of Tables

Table 43-1. Approved Schedule Changes for PICs Testing^a 43-4

This page intentionally left blank.

Acronyms and Abbreviations

CCA	Compliance Certification Application
CFR	Code of Federal Regulations
CRA	Compliance Recertification Application
DOE	U.S. Department of Energy
EPA	Environmental Protection Agency
NEA	Nuclear Energy Agency
PIC	passive institutional control
RWMC	Radioactive Waste Management Committee
RK&M	Records, Knowledge and Memory
WIPP	Waste Isolation Pilot Plant

This page intentionally left blank.

1 **43.0 Passive Institutional Controls (40 CFR § 194.43)**

2 **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.

3
4 **43.2 Background**

5 Regulations in 40 CFR Part 191 Subparts B and C (U.S. EPA 1993) state that disposal systems
6 shall be designed and built such that they provide a reasonable expectation that for 10,000 years

7 (1) the undisturbed performance of the system will not result in an annual committed effective
8 dose to any member of the public in excess of 15 millirem, (2) the levels of radioactive
9 contamination in groundwater will not exceed limits specified by the standard in 40 CFR §
10 191.24, and (3) the probability of releases from all significant processes and events acting on the
11 disposal system will not exceed the specifications in 40 CFR § 191.13(a).

12 40 CFR Part 191 Appendix C states “that inadvertent and intermittent intrusion by exploratory
13 drilling for resources can be the most severe intrusion scenario assumed by the DOE.”
14 Subsequent to Part 191 requirements, 40 CFR § 194.32 (U.S. EPA 1996) also requires that
15 performance assessments include the effects of drilling. A goal of passive institutional controls
16 (PICs) is to minimize the likelihood of inadvertent human activities that affect repository
17 performance (U.S. DOE 1996, Compliance Certification Application [CCA], Appendix PIC).

1 **43.3 1998 Certification Decision**

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

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

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

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

31 A complete description of the EPA's 1998 Certification Decision for section 194.43 can be
32 found in U.S. EPA 1998.

33 **43.4 Changes in the CRA-2004**

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

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

8 New information pertaining to the permanent markers portion of the PICs program and
9 additional amendments to the planning process were also included in the CRA-2004, Chapter
10 7.0, Section 7.3.3 (Implementation of the PICs Program), which is documented in *Permanent*
11 *Markers Testing Program Plan* (U.S. DOE 2000).

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

16 Examples of the types of files to be archived were added in the CRA-2004, Chapter 7.0, Section
17 7.3.3.1.2 (Records).

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

22 The DOE claimed no credit for the effectiveness of PICs for the 2004 Performance Assessment
23 Baseline Calculation (U.S. EPA 2006a) (Leigh et al. 2005). As indicated previously by the EPA,
24 the DOE has the right to claim such credit in future recertification applications.

25 **43.5 EPA's Evaluation of Compliance for the 2004 Recertification**

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

28 **43.6 Changes or New Information Between the CRA-2004 and the CRA-2009** 29 **(Previously: Changes or New Information Since the 2004** 30 **Recertification)**

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

1 closure dates. The EPA responded to the DOE’s schedule extension request in a letter dated
 2 March 7, 2008 (Reyes 2008). The EPA agreed to a modified schedule based on activities and
 3 current projections of the anticipated WIPP closure date. Table 43-1 is the revised list of
 4 approved schedule changes for PICs Testing.

5 **Table 43-1. Approved Schedule Changes for PICs Testing^a**

Activity	Original Time Frame	November 2002 Time Frame	New (December 2007) Time Frame
Identify 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
Construct 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.

6
 7 In the CRA-2009 (U.S. DOE 2009), the DOE did not propose any changes to the PICs program
 8 for the WIPP. Information pertaining to the program provided for the CCA and the CRA-2004
 9 remained unchanged, with the exception of the PICs testing schedule. The DOE believed it had
 10 demonstrated continued compliance with the provisions of section 194.43.

11 **43.7 EPA’s Evaluation of Compliance for the 2009 Recertification**

12 The EPA concluded that the DOE adequately described changes that had been made in the PICs
 13 program and continued to comply with the requirements of section 194.43 (Federal Document
 14 Management System Docket ID No. EPA-HQ-OAR-2009-0330, Air Docket A-98-49) (U.S.
 15 EPA 2010).

16 **43.8 Changes or New Information Since the CRA-2009**

17 In this application, the DOE is not proposing any changes to the PICs program for the WIPP.
 18 Information pertaining to the program as provided by the CCA, CRA-2004 and CRA-2009
 19 remains unchanged. The DOE has updated progress on PICs in the Annual Change Report
 20 provided to the EPA each year as requested in the Reyes 2008 letter (Reyes 2008).

21 In December 2009, the EPA requested that the DOE representatives from the WIPP become
 22 more involved with international efforts for nuclear waste disposal (December 2009 meeting in
 23 Washington, DC). As a result, the DOE became involved with the Nuclear Energy Agency

1 (NEA). The NEA's Radioactive Waste Management Committee (RWMC) issued and approved
2 the Draft Vision Document for the Long-Term Preservation of Information and Memory project.
3 This resulted in the establishment of the NEA's Records, Knowledge and Memory (RK&M)
4 group of which the DOE is a member. The function of this group is to review and evaluate all
5 current member country programs for PICs and propose a set of international guidelines for
6 member countries to follow in developing PICs for geologic repositories at nuclear waste
7 disposal sites.

8 As a result of its involvement with the RK&M, the DOE requested an extension of the EPA
9 PIC's program schedule (Moody 2010).

10 The DOE believes it has demonstrated continued compliance with the provisions of section
11 194.43.

12 **43.9 References**

13 (*Indicates a reference that has not yet been previously submitted.)

14 Leigh, C., J. Kanney, L. Brush, J. Garner, G. Kirkes, T. Lowry, M. Nemer, J. Stein, E. Vugrin, S.
15 Wagner, and T. Kirchner. 2005. *2004 Compliance Recertification Application Performance*
16 *Assessment Baseline Calculation* (Revision 0). ERMS 541521. Sandia National Laboratories,
17 Carlsbad, NM.*

18 Marcinowski, F. 2002. Letter to Dr. Inés Triay, Manager. 7 November 2002. U.S.
19 Environmental Protection Agency, Office of Air and Radiation, Washington, DC.

20 Moody, D.C. 2007. Letter to Mr. Juan Reyes (Subject: Request for Extension). 11 January
21 2007. U.S. Department of Energy, Carlsbad Field Office, Carlsbad, NM.

22 Moody, D.C. 2010. Letter to Mr. Mike Flynn (Subject: Request for Extension in the Passive
23 Institutional Controls Program Schedule). 28 July 2010. U.S. Department of Energy, Carlsbad
24 Field Office, Carlsbad, NM.*

25 Reyes, J. 2008. Letter to Dave Moody, Ph.D., Manager. 7 March 2008. U.S. Environmental
26 Protection Agency, Office of Air and Radiation, Washington, DC.

27 Triay, I.R. 2002. Letter to Mr. Frank Marcinowski. 16 May 2002. U.S. Department of Energy,
28 Carlsbad Field Office, Carlsbad, NM.

29 U.S. Department of Energy (DOE). 1996. *Title 40 CFR Part 191 Compliance Certification*
30 *Application for the Waste Isolation Pilot Plant* (October). 21 vols. DOE/CAO 1996-2184.
31 Carlsbad Area Office, Carlsbad, NM.

32 U.S. Department of Energy (DOE). 2000. *Permanent Markers Testing Program Plan*
33 (September 28). DOE/WIPP 00-3175. Carlsbad Area Office, Carlsbad, NM.

34 U.S. Department of Energy (DOE). 2004. *Title 40 CFR Part 191 Compliance Recertification*
35 *Application for the Waste Isolation Pilot Plant* (March). 10 vols. DOE/WIPP 2004-3231.
36 Carlsbad Field Office, Carlsbad, NM.

- 1 U.S. Department of Energy (DOE). 2009. *Title 40 CFR Part 191 Compliance Recertification*
2 *Application for the Waste Isolation Pilot Plant* (March). DOE/WIPP-09-3424. Carlsbad Field
3 Office, Carlsbad, NM.*
- 4 U.S. Environmental Protection Agency (EPA). 1993. “40 CFR Part 191: Environmental
5 Radiation Protection Standards for the Management and Disposal of Spent Nuclear Fuel, High-
6 Level and Transuranic Radioactive Wastes; Final Rule.” *Federal Register*, vol. 58 (December
7 20, 1993): 66398–416.
- 8 U.S. Environmental Protection Agency (EPA). 1996. “40 CFR Part 194: Criteria for the
9 Certification and Recertification of the Waste Isolation Pilot Plant’s Compliance with the 40
10 CFR Part 191 Disposal Regulations; Final Rule.” *Federal Register*, vol. 61 (February 9, 1996):
11 5223–45.
- 12 U.S. Environmental Protection Agency (EPA). 1998. “40 CFR Part 194: Criteria for the
13 Certification and Recertification of the Waste Isolation Pilot Plant’s Compliance with the
14 Disposal Regulations: Certification Decision; Final Rule.” *Federal Register*, vol. 63 (May 18,
15 1998): 27353–406.
- 16 U.S. Environmental Protection Agency (EPA). 2006a. Technical Support Document for Section
17 194.23: Review of the 2004 Compliance Recertification Performance Assessment Baseline
18 Calculation (March). Office of Radiation and Indoor Air, Washington, DC.
- 19 U.S. Environmental Protection Agency (EPA). 2006b. “40 CFR Part 194: Criteria for the
20 Certification and Recertification of the Waste Isolation Pilot Plant’s Compliance with the
21 Disposal Regulations: Recertification Decision” (Final Notice). *Federal Register*, vol. 71 (April
22 10, 2006): 18010–021.
- 23 U.S. Environmental Protection Agency (EPA). 2010. “2009 Compliance Recertification
24 Application (2009 CRA) Compliance Application Review Document (CARD) No. 43 Passive
25 Institutional Controls.” Office of Radiation and Indoor Air, Washington, DC.*