40 CFR Part 191
Subparts B and C
Compliance Recertification Application 2026
for the
Waste Isolation Pilot Plant

Consideration of Protected Individual and Exposure Pathways (40 CFR 194.51 and 194.52)

United States Department of Energy
Waste Isolation Pilot Plant

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Compliance Recertification Application 2026
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Acronyms and Abbreviations

CCA	Compliance Certification Application
CRA	Compliance Recertification Application
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
mrem	millirem
PA	performance assessment
pCi/L	picocuries per liter
USDW	underground source of drinking water
WIPP	Waste Isolation Pilot Plant

51/52. CONSIDERATION OF PROTECTED INDIVIDUAL AND EXPOSURE PATHWAYS (40 CFR 194.51 AND 194.52)

51/52.1 Requirements

§194.51 Consideration of Protected Individual

Compliance assessments that analyze compliance with §191.15 of this chapter shall assume that an individual resides at the single geographic point on the surface of the accessible environment where that individual would be expected to receive the highest dose from radionuclide releases from the disposal system.

§194.52 Consideration of Exposure Pathways

In compliance assessments that analyze compliance with §191.15 of this chapter, all potential exposure pathways from the disposal system to individuals shall be considered. Compliance assessments with part 191, subpart C and §191.15 of this chapter shall assume that individuals consume 2 liters per day of drinking water from any underground source of drinking water in the accessible environment.

51/52.2 Background

Title 40 CFR 194.51 and 194.52 (U.S. EPA 1996) of the Waste Isolation Pilot Plant (WIPP) certification criteria apply to the individual protection requirements of 40 CFR 191.15 and the groundwater protection standards of 40 CFR Part 191 Subpart C (U.S. EPA 1993). Title 40 CFR 194.51 requires the U.S. Department of Energy (DOE) to assume, in its compliance assessments, that an individual resides at the point where the dose from radionuclide releases from the WIPP would be most significant. 40 CFR 194.52 requires the DOE to consider, in its compliance assessments, all the potential exposure pathways for radioactive contaminants from the WIPP. Compliance with 40 CFR 194.51 and 194.52 is addressed in this single section because the criteria are closely related.

The likelihood that the WIPP will meet the individual dose and radionuclide concentration limits for groundwater is assessed through a compliance assessment. Compliance assessment uses methods similar to those of the performance assessment (PA) for containment requirements but is required only to address undisturbed performance of the disposal system. That is, compliance assessment does not include human intrusion scenarios (i.e., drilling or mining for resources). Compliance assessment can be considered a “subset” of PA.

The individual protection requirements of 40 CFR 191 limit annual committed effective doses of radiation to members of the public to no more than 15 millirem (mrem) (150 microsieverts). This requirement concerns human exposure to radionuclides from disposal systems over 10,000 years. These criteria address the definition of a protected individual, consideration of exposure pathways, and underground sources of drinking water (USDWs), the scope of compliance assessments, and the basis for determining compliance with the Individual Protection Standards (U.S. EPA 1996).

The U.S. Environmental Protection Agency (EPA) reviewed the DOE's 2019 Compliance Recertification Application (CRA-2019) and found that the results continue to demonstrate compliance with these requirements of 40 CFR 194.51 and 40 CFR 194.52 (U.S. EPA 2022). The EPA did not receive any public comments on the DOE's continued compliance with the requirements for considering protected individuals and exposure pathways in 40 CFR Part 194.

51/52.3 Changes or New Information Since the CRA-2019

For the CRA-2026, the DOE reviewed and updated information provided in the CRA-2019 and previous CRA sections relating to Individual and Groundwater Protection Requirements. The updated material is provided in Appendix IGP-2026. Changes or new information pertaining to the update are listed below:

1. New census and water-use data were assessed to ensure the assumption underlying the USDW determination remained appropriate. The new data did not change this determination.

2. The CRA-2026 evaluation showed that for the undisturbed performance scenario, none of the 300 modeling system realizations resulted in radionuclide concentrations greater than zero in the accessible environment through the anhydrite interbeds in the Salado Formation over the 10,000-year compliance period (Appendix PA-2026, Section PA-7.2). As with all previous CRAs, the CCA calculations bound the CRA-2026 results and are used to demonstrate continued compliance with the 40 CFR 191.15(a) individual protection standard (see Appendix IGP-1.0).

3. Because there were no realizations with radium concentrations greater than zero in the accessible environment, an updated evaluation of the maximum potential ^{226}Ra and ^{228}Ra concentrations was unnecessary and was not provided in Appendix IGP-2026. Therefore, the PA results demonstrate continued compliance with the 40 CFR 141.66(b) groundwater protection standard because they are below the 5 picocuries per liter (pCi/L) regulatory limit (see Appendix IGP-3.2.1).

4. For the CRA-2026 evaluation, the gross alpha particle activity, including ^{226}Ra and excluding radon and uranium at the boundary of the accessible environment, was zero. Continued compliance with the groundwater protection standard limit defined in 40 CFR 141.66(c) of 15 pCi/L was demonstrated (see Appendix IGP-3.2.2).

5. The bounding CCA compliance assessment assumes that an individual residing at a single geographic point on the ground surface would receive the highest radionuclide dose from the disposal system. Potential releases calculated for the CRA-2026 compliance assessment are zero and therefore less than those calculated for the CCA. As has been done for all previous CRAs, the CCA dose calculation is used as the bounding case, and a new dose calculation is unnecessary for the CRA-2026 (see Appendix IGP-4.0).

6. The bounding CCA compliance assessment evaluates all potential exposure pathways from the disposal system to individuals. The assessments also assumed that individuals consume two liters of drinking water per day from any USDW in the accessible environment (see Appendix IGP-2.0).

Based on the information provided in this section, the DOE continues to demonstrate compliance with the requirements of 40 CFR 194.51 and 194.52.

51/52.4 References

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

U.S. Environmental Protection Agency (EPA). 1993. 40 CFR Part 191: Environmental Radiation Protection Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes; Final Rule. *Federal Register*, vol. 58 (December 20, 1993): 66398–416.

U.S. EPA. 1996. 40 CFR Part 194: Criteria for the Certification and Recertification of the Waste Isolation Pilot Plant's Compliance with the 40 CFR Part 191 Disposal Regulations. Final Rule. *Federal Register*, vol. 61 (February 9, 1996): 5223–5245.

U.S. EPA. 2022. Section 51 and 52 Consideration of Protected Individual and Exposure Pathways. 2019 Compliance Recertification Application Review Document (CARD) (April) (pp. 73 through 74). Washington, DC: Office of Radiation and Indoor Air.*