

2009 Compliance Recertification Application (2009 CRA)
Compliance Application Review Documents (CARD) Nos. 51/52
Consideration of Protected Individual and Exposure Pathways

51.0 BACKGROUND

Sections 194.51 and 194.52 of the Waste Isolation Pilot Plant (WIPP) compliance criteria implement the individual protection requirements of 40 CFR 191.15 and the groundwater protection requirements of Subpart C of 40 CFR Part 191. Assessment of the likelihood that the WIPP will meet the individual dose limits and radionuclide concentration limits for ground water is conducted through a process known as compliance assessment. Compliance assessment uses methods similar to those of the performance assessment (PA-for the containment requirements) but is required to address only 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 performance assessment, since it considers only natural (undisturbed) conditions and past or near-future human activities (such as existing boreholes), but does not include the long-term future human activities that are addressed in the PA.

Section 194.51 requires the U.S. Department of Energy (DOE or Department) to assume in compliance assessments that an individual resides at the point on the surface where the dose from radionuclide releases from the WIPP would be greatest. Section 194.52 requires DOE to consider in compliance assessments all potential exposure pathways for radioactive contaminants from the WIPP). This CARD addresses both sections since they are related in that both deal with the undisturbed case using the compliance assessment approach.

The U.S. Environmental Protection Agency (EPA or Agency) incorporated requirements in 40 CFR Part 191 for the protection of individuals and ground water. The individual protection requirements of 40 CFR Part 191 limit annual committed effective doses of radiation to members of the public to no more than 15 millirem. This requirement is concerned with human exposure to radionuclides from disposal systems for 10,000 years. These criteria addresses the issues related to the definition of a protected individual, the consideration of exposure pathways, the consideration of underground sources of drinking water, the scope of compliance assessments and the basis for a determination of compliance with these requirements (EPA 1996-FR, Vol.60, No.19 January13, 1995).

51.1 REQUIREMENTS

194.51

“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.”

“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.”

51.2 1998 CERTIFICATION DECISION

For the 1998 Certification Decision, EPA expected DOE to demonstrate that there is a reasonable expectation that the undisturbed repository will result in radiation doses lower than the dose limit of 15 millirems per year, as established by Section 194.15. This demonstration had to incorporate the provisions of Section 194.51 and 194.52, which require DOE to: identify the location of maximum potential exposure for an individual on the surface; consider all potential exposure pathways; and assume that drinking water from any contaminated underground source is consumed at the rate of two liters per day.

To demonstrate a reasonable expectation that the undisturbed operation of WIPP will not exceed 15 millirem per year, DOE elected to show that even a highly improbable, conservative case will meet the regulatory requirements, thereby suggesting that any more probable case must also be in compliance. DOE referred to this approach as a bounding dose calculation because it intended to identify an upper bound to any possible exposures.

In DOE’s analysis, an individual receives the highest dose if one assumes that the individual takes drinking water directly from the Salado Formation at the subsurface boundary of the WIPP area. DOE assumed that an individual would receive the maximum estimated dose regardless of location on the surface and calculated the resultant doses accordingly. EPA found this approach to be conservative and found DOE in compliance with §194.51.

To demonstrate compliance with Section 194.52, DOE had to assume that an individual consumes two liters per day of drinking water from any underground source of drinking water from the Salado Formation outside the WIPP area. The DOE considered the following three ingestion pathways and one inhalation pathway: an individual draws drinking water directly from the Salado Formation; an individual ingests plants irrigated with contaminated water or milk and beef from cattle whose stock pond contained contaminated water from the Salado; and an individual inhales dust from soil irrigated with contaminated water from the Salado. Intended to result in the maximum dose, DOE’s assumption that water is ingested directly from the Salado actually is so conservative as to be unrealistic, since Salado water is highly saline and would have to be greatly diluted in order to function as drinking or irrigation water.

EPA determined that DOE complied with §194.52 because DOE considered all potential exposure pathways and assumed that an individual consumes two liters of Salado water a day, following dilution.

A complete description of EPA's 1998 Certification Decision for Sections 194.51 and 194.52 can be obtained from EPA Air Docket, A-93-02, Items V-A-1 and V-B-2.

51.3 CHANGES IN THE 2004 COMPLIANCE RECERTIFICATION APPLICATION (2004 CRA)

DOE did not report any significant changes to the information on which EPA based the 1998 Certification Decision of compliance or the 2004 CRA with the requirements of Section 194.51 and 194.52.

For the 2004 recertification, DOE conducted a new compliance assessment to show that the undisturbed operation of WIPP will not exceed doses greater than 15 millirems per year. The compliance assessment combines the results of the performance assessment with the dose bounding calculations for the compliance assessment in the 2004 Compliance Recertification Application (2004 CRA). Releases predicted by the 2004 CRA performance assessments are below or similar to those predicted by the CCA performance assessment results, therefore the CCA dose bounding calculations do not need to be redone for the 2004 CRA compliance assessment.

51.3.1 Evaluation OF COMPLIANCE FOR 2004 RECERTIFICATION

Based on EPA's review of the activities and conditions in and around the WIPP site, EPA did not identify any significant changes in the consideration of the protected individual and exposure pathways (See DOE 2004-2004 CRA Chapter 8). The 2004 CRA adequately describes, in detail, the location of the protected individual and the potential exposure pathways. (See EPA 2006c-2004 CRA CARD 55 for more information on the results of the compliance assessment.)

EPA did not receive any public comments on DOE's continued compliance with the Consideration of Protected Individual or Consideration of Exposure Pathways requirements of Sections 194.51 and 194.52.

51.3.2 2004 RECERTIFICATION DECISION

Based on a review and evaluation of the 2004 CRA and supplemental information provided by DOE (FDMS Docket ID No. EPA-HQ-OAR-2004-0025, Air Docket A-98-49), EPA determines that DOE continues to comply with the requirements for Sections 194.51 and 195.52.

51.4 CHANGES IN THE 2009 COMPLIANCE RECERTIFICATION APPLICATION (2009 CRA)

DOE did not report any significant changes to the information upon which EPA based the 1998 Certification and 2004 CRA decisions of compliance with the requirements of Section 194.51 and 194.52.

For the 2009 recertification, DOE conducted a new compliance assessment (2009 CRA, Appendix IGP-2009) to show that the undisturbed operation of WIPP will not exceed doses greater than 15 millirem per year. The compliance assessment continues to combine the results of the performance assessment with the dose bounding calculations for the compliance assessment in the 2009 Compliance Recertification Application (2009 CRA). Releases predicted by the 2009 CRA performance assessments are below or similar to those predicted by the CCA and 2004 CRA performance assessment results, therefore the CCA dose bounding calculations do not need to be redone for the 2009 CRA compliance assessment. In support of their assessment in the 2009 CRA, DOE has reexamined concentrations of radionuclides that could potentially reach the accessible environment under undisturbed conditions. The 2009 CRA analysis shows that the maximum concentration of radionuclides reaching the boundary is projected to be an order of magnitude less than the maximum concentration projected in the CCA. On the basis of this and additional information updated for the 2009 CRA evaluation, the Department reached to the conclusion that the WIPP continues to comply with the individual and groundwater protection provisions of Part 191 Subparts B and C.

51.4.1 Evaluation of COMPLIANCE FOR 2009 RECERTIFICATION

Based on EPA's review of the activities and conditions in and around the WIPP site, EPA did not identify any significant changes in the consideration of the protected individual and exposure pathways (See DOE 2009a-2009 CRA Section 51-52). The 2009 CRA adequately describes, in detail, the location of the protected individual and the potential exposure pathways. (See EPA 2010i-2009 CRA CARD 55 for more information on the results of the compliance assessment.)

EPA did not receive any public comments on DOE's continued compliance with the Consideration of Protected Individual or Consideration of Exposure Pathways requirements of Sections 194.51 and 194.52.

51.4.2 2009 RECERTIFICATION DECISION

Based on a review and evaluation of the 2009 CRA and supplemental information provided by DOE (FDMS Docket ID No. EPA-HQ-OAR-2009-0330, Air Docket A-98-49 Item V-B2-2), EPA determines that DOE continues to comply with the requirements for Sections 194.51 and 195.52.