2009 Compliance Recertification Application (2009 CRA)
Compliance Application Review Document (CARD) No. 54

Scope of Compliance Assessments

54.0 BACKGROUND

The Compliance Criteria include two general categories of quantitative requirements on the performance of the Waste Isolation Pilot Plant (WIPP) that are intended to ensure its safety. The first category consists of the containment requirements at Section 194.34, which implement the general containment requirements of the radioactive waste disposal regulations, Section 191.13. The second category of quantitative requirements consists of the individual and ground water protection requirements (§194.54), which implement Section 191.15. The individual and ground water protection requirements place limitations on both the potential radiation exposure of individuals and the possible levels of radioactive contamination of ground water due to disposal of waste in the WIPP. The individual protection requirement focuses on the annual radiation dose of a maximally exposed hypothetical person living on the surface just outside the boundary to the accessible environment.

The containment requirements and individual and ground water protection requirements are fundamentally different. The containment requirements apply to cumulative releases to the accessible environment over the 10,000-year regulatory period. To demonstrate compliance with the containment standards, U.S. Department of Energy (DOE or Department) is required to consider human intrusion, such as deep drilling, shallow drilling, and mining. In contrast, the individual and ground water protection requirements apply to the doses received by an individual over a human lifespan. Moreover, compliance assessments utilized to demonstrate compliance with the individual and ground water protection requirements consider performance of the repository in the "undisturbed" scenario.

As with performance assessments, compliance assessments must consider features, events, and processes (FEPs) and the uncertainties associated with those FEPs. Compliance assessments may be regarded as a "subset" of performance assessments, in as much as the latter incorporates FEPs related to undisturbed conditions that are necessary for the compliance assessment. The results of the performance assessment are used as input values to the compliance assessments. Section 194.54 of the Compliance Criteria, Scope of Compliance Assessments, contains the procedures that must be followed in assessments of the WIPP's compliance with the individual dose and ground water protection requirements.

54.1 REQUIREMENTS

(a) "Any compliance application shall contain compliance assessments required pursuant to this part. Compliance assessments shall include information which:

(1) Identifies potential processes, events, or sequences of processes and events that may occur over the regulatory time frame.
(2) Identifies the processes, events, or sequences of processes and events included in compliance assessment results provided in any compliance application.
(3) Documents why any processes, events, or sequences of processes and events identified pursuant to paragraph (a)(1) of this section were not included in compliance assessment results provided in any compliance application."

(b) "Compliance assessments of undisturbed performance shall include the effects on the disposal system of:

(1) Existing boreholes in the vicinity of the disposal system, with attention to the pathways they provide for migration of radionuclides from the site.
(2) Any activities that occur in the vicinity of the disposal system prior to or soon after disposal. Such activities shall include, but shall not be limited to: existing boreholes and the development of any existing leases that can be reasonably expected to be developed in the near future, including boreholes and leases that may be used for fluid injection activities."

54.2 1998 CERTIFICATION DECISION

54.2.1 194.54(a)

The U.S. Environmental Protection Agency (EPA or Agency) expected the Compliance Certification Application (CCA) to contain a comprehensive FEPs list. EPA also expected DOE to adequately reference FEPs source information. EPA reviewed DOE's initial FEP list to determine whether it was comprehensive in the original compliance certification application (CCA). EPA examined information sources used by DOE to compile FEP lists for accuracy of technical information. EPA also examined FEP listings to determine whether DOE's rationale for reducing FEP listings was appropriately documented and technically sufficient. EPA concluded that DOE adequately identified and considered any natural processes/events that may occur within the regulatory time frame in the WIPP area in the CCA.

54.2.2 194.54(b)

EPA's detailed review of the CCA indicated that DOE appropriately screened the FEPs, although the limited justification of some FEPs required additional evaluation. EPA ultimately concluded that DOE appropriately identified and screened FEPs pertaining to undisturbed performance. Criteria for screening FEPs were adequately described and implemented. DOE appropriately identified and discussed the effects of the sequences and combination of FEPs that resulted in modeled scenarios.

EPA reviewed CCA Appendix SCR, numerous references, and FEP screening record packages in the Sandia National Laboratories Records Center. EPA reviewed DOE's arguments concerning natural flow through abandoned boreholes within the LWA area, including natural fluid head conditions, abandonment techniques, and number and location of abandoned boreholes. EPA concluded that DOE's screening arguments and documentation were reasonable.

In the CCA DOE screened out the possibility that oil and gas extraction would affect the WIPP based upon low consequence. EPA concurred with DOE's decision and concluded that the FEP screening appropriately considered the possibility of both subsidence and pressure gradients in a system due to oil and gas extraction. EPA concluded that DOE considered the appropriate issues, and that the technical conclusions reached by DOE regarding current and near future screening of oil and gas extraction activities were valid. See EPA Technical Support Document for Section 194.32: Fluid Injection Analysis (EPA 1998b) for detailed results of EPA's analysis. See CCA CARD 32—Scope of Performance Assessments for a discussion of EPA's analysis of fluid injection.

In the CCA DOE screened out induced system changes due to hydrocarbon storage operations that have occurred thus far in the area based on low consequence. EPA concluded that this screening was appropriate. Although DOE did not specify oil and gas field life in detail for each field near WIPP in CCA Appendix DEL, EPA found that it was possible to derive the expected active lifetimes of oil and gas fields from information presented in that Appendix. EPA agreed that the lease life estimation values presented in the CCA were reasonable, although EPA asked DOE to consider the effects of longer injection periods (Docket A-93-02, Item II-I-17).

A complete description of EPA's 1998 Certification Decision for Section 194.54 can be obtained from EPA Air Docket, A-93-02, Items V-A-1 and V-B-2.

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

The 2004 Compliance Recertification Application (2004 CRA) did not report significant changes related to the Section 194.54 requirements. In the original CCA DOE selected 67 undisturbed performance FEPs. DOE added three FEPs as a result of its 2004 CRA FEPs reevaluation (See 2004 CRA Appendix PA, Attachment SCR). DOE added organic complexation (W68), organic ligands (W69), and surface disruptions (H41). W68 and W69 were added because new information since the CCA indicated that organic ligands may increase actinide solubilities and should be included in assessments at WIPP (See 2004 CRA Appendix PA, Attachment SCR 6.5.6.1.3). H41 was added because surface activities may impact infiltration requiring its inclusion in assessments (See 2004 CRA Appendix PA, Attachment SCR 5.3.1.2.3). All other undisturbed performance FEPs were unchanged in the CRA 2004, therefore except for W68, W69 and H41 DOE did not change their process, screening arguments, or final decisions related to 67 FEPs in the CCA.

The 2004 CRA Chapter 8, Section 8.1.1 documents that DOE considered existing boreholes and potential boreholes as required by 40 CFR 194.52(b)(1) and (b)(2). In the 2004 CRA, DOE confirmed that the most plausible undisturbed transport pathway is through the anhydrite marker beds as assumed in the CCA. Therefore, DOE's approach has not changed since the original CCA.

In the 2004 CRA, DOE did not change its dose calculation methodology. DOE still assumes an existing borehole (2004 CRA 8.1.2.1) and still uses a bounding analysis (2004 CRA 8.1.2.2) if needed. DOE determined that the maximum release concentrations predicted for undisturbed performance is lower than the CCA predictions, therefore the new bounding dose calculations were not needed for the 2004 CRA. DOE reconsidered some parameters, such as average water usage and its water quality determination, based on new information since the CCA (2004 CRA 8.2.1 and 8.2.2). These parameter changes did not change DOE's analysis.

In the 2004 CRA, DOE reevaluated 40 CFR 194.54 requirements for the compliance assessment. DOE reviewed FEPs development to determine any changes since the original CCA. DOE added three new undisturbed FEPs as part of its 2004 CRA review used in the compliance assessment. DOE also continued to consider existing and potential boreholes in the 2004 CRA. EPA found DOE's FEP development process to be the same as the CCA and any changes to be adequately documented and justified.

54.3.1 Evaluation of Compliance for 2004 Recertification

EPA reviewed DOE compliance with the Section 194.54 requirements. EPA verified that DOE's FEP development process had not changed since the CCA. DOE reevaluated CCA FEPs in the 2004 CRA, and EPA found the 2004 CRA process to be reasonable and adequately documented. EPA found that DOE adequately identified FEPs that may occur over the regulatory time frame (2004 CRA Chapter 6.3.1), identified FEPs included in the compliance assessment (2004 CRA Chapter 6.3.1), and adequately documented why FEPs were not selected (2004 CRA Appendix PA Attachment SCR). EPA also found that DOE adequately considered existing wells and activities that may occur in the vicinity of the WIPP (2004 CRA Chapter 8.1.1).

EPA did not receive any public comments on DOE's continued compliance with the scope of compliance assessments requirements of Section 194.54.

54.3.2 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 Section 194.54.

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

The 2009 Compliance Recertification Application (2009 CRA) did not report significant changes related to the Section 194.54 requirements. In the 2009 CRA DOE did not change screening decisions for undisturbed performance FEPs, but the justification for some screening decisions have changed (2009 CRA, Appendix SCR-2009).

The reassessment of FEPs (Kirkes 2008) results in a new FEPs baseline for the 2009 CRA. Out of 235 WIPP FEPs 189 remain unchanged since the 2004 CRA. However, 35 FEPs required updates to their FEP descriptions and/or screening arguments, 10 FEPs have been split into 20 similar but more descriptive FEPs, and 1 FEP has had its screening decision changed. The single screening decision change does not result in a new FEP incorporated into PA calculations; the FEP continues to be screened out of PA. Thus the 2009 CRA evaluates 245 WIPP FEPs.

DOE continued to considered existing boreholes and potential boreholes as required by 40 CFR 194.52(b)(1) and (b)(2) for 2009 CRA (2009 CRA, Appendix IGP-2009, Section IGP-2.1). DOE confirmed that the most plausible undisturbed transport pathway is through the anhydrite marker beds as assumed in the CCA and 2004 CRA (2009 CRA, Appendix IGP-2009, Section IGP-2.2.1). Therefore, DOE's approach has not changed since the original CCA.

DOE did not change its dose calculation methodology in 2009 CRA. DOE still assumes an existing borehole (2009 CRA, Appendix IGP-2009, Section IGP-2.2.1) and still uses a bounding analysis (2009 CRA, Appendix IGP-2009, Section IGP-2.2.2) if needed. As in 2004 CRA DOE determined that the maximum release concentrations predicted for undisturbed performance is lower than the CCA predictions and that the new bounding dose calculations were not needed for the 2009 CRA (2009 CRA, Appendix IGP-2009, Section IGP-2.3). In 2009 CRA, DOE reconsidered some parameters, such as average water usage and its water quality determination, based on new information since the CCA and 2004 CRA (2009 CRA, Appendix IGP-2009, Sections IGP-3.1 and 3.2). These parameter changes did not change DOE's analysis.

In 2009 CRA, DOE reevaluated 40 CFR 194.54 requirements for the compliance assessment. DOE reviewed FEPs development to determine any changes since the original CCA. DOE did not change or add to undisturbed FEPs as part of its 2009 CRA review used in the compliance assessment. DOE also continued to consider existing and potential boreholes in the 2009 CRA. EPA found DOE's FEP development process to be the same as the CCA and any changes to be adequately documented and justified.

54.4.1 EVALUATION OF COMPLIANCE FOR 2009 RECERTIFICATION

EPA reviewed DOE compliance with the Section 194.54 requirements. EPA verified that DOE's FEP development process has not changed since the CCA and 2004 CRA. DOE reevaluated CCA and 2004 CRA FEPs in the 2009 CRA, and EPA found the 2009 CRA process to be reasonable and adequately documented. EPA found that DOE adequately identified FEPs that may occur over the regulatory time frame (2009 CRA, Appendix IGP-2009, Section IGP-2.1), identified FEPs included in the compliance assessment (2009 CRA, Appendix IGP-2009, Section IGP-2.1), and adequately documented why FEPs were not selected (2009 CRA, Appendix SCR-2009, Section SCR-2.3). EPA also found that DOE adequately considered existing wells and activities that may occur in the vicinity of the WIPP (2009 CRA, Appendix SCR-2009).

EPA did not receive any public comments on DOE's continued compliance with the scope of compliance assessments requirements of Section 194.54.

54.4.2 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-2004-0025, Air Docket A-98-49), EPA determines that DOE continues to comply with the requirements for Section 194.54.