Recertification CARD No. 27
Peer Review

BACKGROUND

Section 194.27 of the Waste Isolation Pilot Plant (WIPP) Compliance Criteria requires the U.S. Department of Energy (DOE or Department) to conduct peer review evaluations related to conceptual models, waste characterization analyses, and a comparative study of engineered barriers. A peer review involves an independent group of experts who are convened to determine whether technical work was performed appropriately and in keeping with the intended purpose. The required peer reviews must be performed in accordance with the Nuclear Regulatory Commission's NUREG-1297, "Peer Review for High-Level Nuclear Waste Repositories," which establishes guidelines for the conduct of a peer review exercise. Section 194.27 also requires DOE to document in the compliance application any additional peer reviews beyond those explicitly required.

REQUIREMENTS

(a) "Any compliance application shall include documentation of peer review that has been conducted, in a manner required by this section, for: (1) Conceptual models selected and developed by the Department; (2) Waste characterization analyses as required in Section 194.24(b); and (3) Engineered barrier evaluation as required in Section194.44."

(b) "Peer review processes required in paragraph (a) of this section, and conducted subsequent to the promulgation of this part, shall be conducted in a manner that is compatible with NUREG-1297, "Peer Review for High-Level Nuclear Waste Repositories," published February 1988 (Incorporation by reference as specified in Section 194.5.)"

(c) "Any compliance application shall:

(1) Include information that demonstrates that peer review processes required in paragraph (a) of this section, and conducted prior to the implementation of the promulgation of this part, were conducted in accordance with an alternate process substantially equivalent in effect to NUREG-1297 and approved by the Administrator or the Administrator's authorized representative.

(2) Document any peer review processes conducted in addition to those required pursuant to paragraph (a) of this section. Such documentation shall include formal requests, from the Department to outside review groups of individuals, to review or comment on any information used to support compliance applications, and the responses from such groups or individuals."

1998 CERTIFICATION DECISION

EPA expected DOE to adequately document any WIPP peer reviews. For the Compliance Certification Application (CCA), DOE completed the required peer reviews and

included a description of its peer review process in CCA Chapter 9 and CCA Appendix PEER (DOE 1996a). The CCA contained documentation demonstrating that DOE's procedures and plans for the required peer reviews are compatible with NUREG-1297. Peer reviews conducted after promulgation of 40 CFR 194, and intended to demonstrate compliance with Section 194.27, were subject to the requirements of the pertinent procedures and plans. To assess the peer review process during the CCA, the U.S. Environmental Protection Agency (EPA or Agency) conducted an audit of DOE's quality assurance records for peer review. The audit consisted of an extensive review of DOE's records and interviews of DOE staff and contractors responsible for management of the required peer reviews.

EPA found DOE in compliance with the requirements of Section 194.27 because EPA's independent audit established that DOE had conducted and documented the required peer reviews in a manner compatible with NUREG-1297. The Agency also proposed that DOE adequately documented additional peer reviews in the CCA.

A complete description of EPA's 1998 Certification Decision for Section 194.27 can be obtained from Docket A-93-02, Items V-A-1 and V-B-2.

CHANGES IN THE CRA

DOE performed two conceptual model peer reviews between the CCA and the 2004 Compliance Recertification Application (2004 CRA). These include the Salado Flow Conceptual Model Peer Review - March 2003 (see 2004 CRA, Chapter 9, Section 9.3.1.3.4) and the Spallings Model Peer Review - September 2003 (see 2004 CRA, Chapter 9, Section 9.3.1.3.5).

Numerous external peer reviews were also done during this same period that fall under Section 194.27 (c)(2) requirements. Reviews were done by the National Academy of Sciences (NAS), the International Atomic Energy Authority (IAEA) / Nuclear Energy Authority (NAE/OECD), Institute for Regulatory Science (RSI), and the Environmental Evaluation Group (EEG) are listed in 2004 CRA, Appendix PEER-2004, Table of Contents, pages iv and v.

EVALUATION OF COMPLIANCE FOR RECERTIFICATION

EPA reviewed each of the conceptual model peer reviews as they were performed and all documents related to each peer review. EPA's review verified that DOE's process used to perform these peer reviews was compatible with NUREG-1297 requirements.

During the original CCA, DOE developed Carlsbad Area Office (CAO) Team Procedure (TP) 10.5 Peer Review (DOE 1996b) to guide all WIPP peer reviews and to show a process that was compatible with Section 194.27 and NUREG-1297 requirements. DOE updated this procedure for the 2004 CRA calling the new version CBFO Management Procedure (MP) 10.5 (DOE 2002a). MP 10.5 provides the criteria for selecting the peer review panel, peer review process used, review plan development requirements, peer review report preparation requirements, and many other aspects of the peer review process. EPA thoroughly reviewed MP 10.5, and determined that it was adequately comparable with Section 194.27 requirements and

NUREG-1297 guidance. DOE implemented MP 10.5 to perform the Salado Flow Conceptual Model Peer Review Report and Spallings Model Peer Review. EPA completed its Salado Flow Conceptual Model Peer Review Report in June 2003 (EPA 2003a) and Spallings Model Peer Review in December 2003 (EPA 2003b).

The Salado Flow Conceptual Model Peer Review was performed from April 2002 to March 2003, publishing its final report in March 2003 (DOE 2003c). This peer review evaluated changes to three of twenty four conceptual models: Disposal System Geometry, Repository Fluid Flow, and DRZ. The three conceptual models were changed because of new information gained after the original certification or changes to conceptual model assumptions mandated by EPA in the final CCA decision, such as the Option D panel closure condition. Changes included modification of the computational grid to accommodate the new panel closure requirement, shaft simplification, changes in fluid flow paths, changing for a constant porosity for the DRZ to a range of values for the halite and anhydrite layers (DOE 2003c). EPA examined the peer review plan (DOE 2003b) and the final peer review report (DOE 2003c) for the Salado Flow Conceptual Model Peer Review. EPA also observed the actual performance of the peer review, the selection of the panel, the interaction of the panel with DOE and SNL, and the documents produced during and as a result of the peer review. EPA determined that the peer review process and the implementation of MP 10.5 met the requirements of 40 CFR 194.27 and the guidance in NUREG-1297 (EPA 2003a).

The Spallings Model Peer Review was performed from July 2003 to October 2003, publishing its final report in October of 2003 (DOE 2003e). This model was changed because the original conceptual peer review found the CCA Spallings Model to be inadequate and EPA expected DOE to develop a new Spallings Model before the first recertification in 2004. The new Spallings Model includes three major elements: consideration of multiphase flow processes in the intrusion borehole, consideration of fluidization and transport of waste particulates from the intact waste mass to the borehole, and a numerical solution for the coupled mechanical and hydrological response of the waste as a porous medium (DOE 2003e). DOE developed a new numerical code to implement the new Spallings Conceptual Model which was written to calculate the volume of WIPP solid waste that may undergo material failure and be transported to the surface as a result of a drilling intrusion. EPA examined the peer review plan (DOE 2003d) and the final peer review report (DOE 2003e) for this peer review and found them to adequately fulfill the requirements of Section 194.27 and NUREG-1297. EPA observed the actual performance of the peer review, the selection of the panel, the interaction of the panel with DOE and SNL, and the documents produced during and as a result of the peer review. EPA determined the peer review process and the implementation of MP 10.5 met the requirements of 40 CFR 194.27 and the guidance in NUREG-1297 (EPA 2003b).

EPA conducted desk-top evaluations of other reviews done since the CCA for compliance with 40 CFR 194.27(c)(2). These include those done by the NAS, IAEA, NEA/OECD, RSI, and EEG from October 1996 to September 2003. We found these reviews to be useful, reasonable,

and helpful to the WIPP project. We found these reviews to reasonably fulfill the requirements of 40 CFR 194.27(c)(2).

EPA did not receive any public comments on DOE's continued compliance with the peer review requirements of Section 194.27.

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 194.27.

REFERENCES

DOE 1996a. U.S. Department of Energy, *Department of Energy's Certification Application For the WIPP*, 1996, Docket A-93-02, II-G-1

DOE 1996b. U.S. Department of Energy, *CAO Team Procedure (TP) 10.5*, Rev. O. Carlsbad Area Office, Carlsbad, N.M., 1996

DOE 2002a. U.S. Department of Energy, *Peer Review, Management Procedure 10.5* (MP 10.5), Rev. 4, Carlsbad Field Office, Carlsbad, N.M., 2002

DOE 2002b. U.S. Department of Energy, *Salado Flow Conceptual Model Peer Review Report*, Carlsbad Field Office, Carlsbad, N.M. May 2002, Docket A-98-49, II-B1-27, Appendix PEER-2004

DOE 2003a. U.S. Department of Energy, *Peer Review, Management Procedure 10.5* (MP 10.5), Rev. 5, Carlsbad Field Office, Carlsbad, N.M., 2003, Docket A-98-49, II-B1-27, References

DOE 2003b. U.S. Department of Energy, *Salado Flow Peer Review Plan*, Revision 1, Carlsbad Field Office, Carlsbad, N.M. 2003, Docket A-98-49, II-B1-27, Appendix PEER-2004

DOE 2003c. U.S. Department of Energy, *Salado Flow Conceptual Model Peer Final Review Report*, Carlsbad Field Office, Carlsbad, N.M. March 2003, Docket A-98-49, II-B1-27, Appendix PEER-2004

DOE 2003d. U.S. Department of Energy, *Spalling Peer Review Plan*, Carlsbad Field Office, Carlsbad, N.M, June 20, 2003, Docket A-98-49, II-B1-27, Appendix PEER-2004

DOE 2003e. U.S. Department of Energy, *Spallings Conceptual Model Peer Review Report*, Carlsbad Field Office, Carlsbad, N.M, October 2003, Docket A-98-49, II-B1-27, Appendix PEER-2004

DOE 2004. U.S. Department of Energy, *Spallings Conceptual Model Peer Review Report - Errata*, Carlsbad Field Office, Carlsbad, N.M., February 20, 2004, Docket A-98-49, II-B1-27, Appendix PEER-2004

EPA 1996. U.S. Environmental Protection Agency. *Background Information Document for 40 CFR Part 194*. EPA 402-R-96-002. January 1996. (Docket A-92-56, Item V-B-1)

EPA 1997. *Audit of the Peer Review Process Conducted by the Department of Energy, Carlsbad Area Office*, Revision 0. 1997. (Docket A-93-02, Item II-A-46)

EPA 2003a. U.S. Environmental Protection Agency. *EPA Review of the U.S. Department of Energy Salado Flow Conceptual Model Peer Review*, June 2003 (Docket A-98-49, Item II-B1-13)

EPA 2003b. U.S Environmental Protection Agency. EPA Review of the U.S. Department of Energy Spallings Conceptual Model Peer Review, December 2003 (Docket A-98-49, Item II-B1-14)

NRC 1988. *Peer Review for High-Level Nuclear Waste Repositories: Generic Technical Position*. NUREG-1297. U.S. Nuclear Regulatory Commission. Washington, DC. 1988. (CCA Reference #484)