

**2009 Compliance Recertification Application (2009 CRA)  
Compliance Application Review Document (CARD) No.25  
Future State Assumptions**

## **25.0 BACKGROUND**

Section 194.25 stipulates that performance assessments (PA) and compliance assessments “shall assume that characteristics of the future remain what they are at the time the compliance application is prepared, provided that such characteristics are not related to hydrogeologic, geologic or climatic conditions.” Section 194.25 also requires the U.S. Department of Energy (DOE or Department) to provide documentation of the effects of potential changes of hydrogeologic, geological, and climatic conditions on the disposal system over the regulatory time frame.

The purpose of the future state assumptions is to avoid unverifiable and unbounded speculation about possible future states of society, science, languages, or other characteristics of mankind. The U.S. Environmental Protection Agency (EPA or Agency) has found no acceptable methodology that could make predictions of the future state of society, science, languages, or other characteristics of mankind. However, the Agency does believe that established scientific methods can make plausible predictions regarding the future state of geologic, hydrogeologic, and climatic conditions. Therefore, §194.25 focuses the PA and compliance assessments on the more predictable significant features of disposal system performance, instead of allowing unbounded speculation on all developments over the 10,000-year regulatory time frame.

## **25.1 REQUIREMENTS**

(a) “Unless otherwise specified in this part or in the disposal regulations, performance assessments and compliance assessments conducted pursuant to the provisions of this part to demonstrate compliance with § 191.13, § 191.15 and part 191, subpart C shall assume that characteristics of the future remain what they are at the time the compliance application is prepared, provided that such characteristics are not related to hydrogeologic, geologic or climatic conditions.”

(b) “In considering future states pursuant to this section, the Department shall document in any compliance application, to the extent practicable, effects of potential future hydrogeologic, geologic and climatic conditions on the disposal system over the regulatory time frame. Such documentation shall be part of the activities undertaken pursuant to § 194.14, Content of compliance certification application; § 194.32, Scope of performance assessments; and § 194.54, Scope of compliance assessments.

(1) In considering the effects of hydrogeologic conditions on the disposal system, the Department shall document in any compliance application, to the extent practicable, the effects of potential changes to hydrogeologic conditions.

(2) In considering the effects of geologic conditions on the disposal system, the Department shall document in any compliance application, to the extent practicable, the effects of potential changes to geologic conditions, including, but not limited to: dissolution; near surface geomorphic features and processes; and related subsidence in the geologic units of the disposal system.

(3) In considering the effects of climatic conditions on the disposal system, the Department shall document in any compliance application, to the extent practicable, the effects of potential changes to future climate cycles of increased precipitation (as compared to the present conditions).”

## **25.2 1998 CERTIFICATION DECISION**

In order to comply with 40 CFR 194.25(a) EPA expected DOE to describe the future state assumptions based on present conditions, provided that such assumptions were not related to hydrogeologic, geologic, or climatic conditions. Future state assumptions that are relevant to Section 194.25(a) and may affect the containment of waste were identified by DOE in Chapter 6.2 and Appendices SCR and MASS of the Compliance Certification Application (CCA). Many of these future state assumptions were derived from the development of Features, Events and Processes (FEPs) that are potentially relevant to the performance of the waste disposal system, and can be found in CCA Appendix SCR (i.e. solution mining and anthropogenic climate changes).

EPA first determined whether all FEPs and appropriate future state assumptions were identified and developed by DOE. EPA then evaluated DOE’s criteria to eliminate (screen out) inapplicable or irrelevant FEPs and associated assumptions. EPA also analyzed whether there were potential variations in DOE’s assumed characteristics and determined whether the future state assumptions were in compliance with Section 194.25(a).

EPA’s CCA review found no potentially significant omissions in the lists of FEPs, and no major inadequacies in the CCA’s descriptions of FEPs and related future state assumptions. EPA concluded that DOE adequately described all the future state assumptions that are applicable under 194.25(a).

To comply with 40 CFR 194.25(b)(1), (b)(2), and (b)(3), EPA expected DOE to consider the effects of potential changes to hydrogeologic, geologic and climatic conditions on the disposal system. DOE identified and described the hydrogeologic FEPs and related future state assumptions retained for further evaluation and inclusion in performance assessment calculations in Chapter 6.3 of the CCA. DOE described the effects of potential changes to hydrogeologic conditions on the disposal system in Chapter 6.4.6 and 6.4.9 and Appendices SCR, TFIELD, and MASS. DOE described the effects of potential changes to geologic conditions on the disposal system in Chapters 6.2, 6.4.6, 6.5.4, and Appendices SCR and MASS of the CCA. DOE identified and described the effects of potential changes to future climate cycles of increased precipitation on the repository in Chapter 6.4.9 of the CCA.

EPA concluded that DOE adequately addressed the impacts of potential hydrogeologic, geologic and climate changes to the disposal system. The CCA included all relevant elements of the performance assessment and compliance assessments and were consistent with the requirements of Section 194.25.

A complete description of EPA’s 1998 Certification Decision for Section 194.25 can be obtained from EPA Air Docket A-93-02, Items V-A-1 and V-B-2.

### **25.3 CHANGES IN THE 2004 COMPLIANCE RECERTIFICATION APPLICATION (2004 CRA)**

DOE changed four of the FEPs by combining them, changed seven FEPs screening decisions, and added two new FEPs as summarized in Table SCR-1 of 2004 CRA, Appendix PA, and Attachment SCR. The remaining FEPs and their screening arguments have not changed since the CCA was documented. DOE eliminated sixteen FEPs (See Table 25-1 below and 2004 CRA Chapter 6 Page 6-51) using the Future States (40 CFR 194.25 (a)) assumption which assumes that these future activities will not change in the future.

**Table CARD 25-1 2004 CRA CARD 25 FEPs Eliminated Using 40 CFR 194.25(a) Justifications**

<b>EPA FEP I.D.</b>	<b>FEP Name</b>
H6	Archeological investigations
H7	Drilling associated with thermal energy production
H10	Liquid waste disposal
H11	Hydrocarbon storage
H14	Mining for other resources (not potash)
H15	Excavation activities associated with tunneling
H16	Construction of underground facilities
H40	Changes in land use
H47	Anthropogenic climate change - Greenhouse gas effects
H48	Anthropogenic climate change - Acid rain
H49	Anthropogenic climate change - Damage to the ozone layer
H53	Changes in agricultural practices - Arable farming
H54	Changes in agricultural practices – Ranching
H55	Changes in agricultural practices - Fish farming
H56	Demographic change, urban developments, and technological developments

### 25.3.1 EVALUATION OF COMPLIANCE FOR 2004 RECERTIFICATION

To evaluate compliance with our 194.25 requirements, EPA reviewed the following 2004 CRA documentation: 2004 CRA Chapters 2, 6, 7, and 9; 2004 CRA Appendix PA; 2004 CRA Appendix PA, Attachment SCR; 2004 CRA Appendix PA, Attachment TFIELD; and 2004 CRA Appendix PA, Attachment MASS. As in the 1998 Certification Decision, EPA first determined whether all FEPs and appropriate future state assumptions were identified and developed by DOE. EPA then evaluated DOE's criteria to eliminate (screen out) inapplicable or irrelevant FEPs and associated assumptions. EPA also analyzed whether there were potential variations in DOE's assumed characteristics and determined whether the future state assumptions were in compliance with Section 194.25(a). During our 2004 CRA FEPs review, EPA also reviewed any changes in FEPs, screening, or DOE process.

#### 40 CFR 194.25 (a)

EPA verified that all appropriate FEPs were included in the list provided by DOE for Section 194.25 (a) - futures remain the same. EPA reviewed any changes in FEPs including all screened-in and screened-out FEPs related to future states to verify that their selection was made correctly. The Agency's FEPs review is documented in our 2004 CRA Technical Support Documents for Sections 194.25, 193.32 and 194.33: 2004 CRA Review of FEPs (Docket A-98-49, Item II-B1-11).

#### 40 CFR 194.25 (b)(1)

EPA reexamined any hydrogeologic conditions that may have changed since our CCA review. The Agency believes that DOE's review of FEPs related to hydrogeologic condition and screen arguments is complete and conclusions drawn are appropriate. Changes in the shallow hydrology around the WIPP site, such as water level changes in monitor wells and changes in potash mining, are appropriately included in the PA modeling by updated changes in the transmissivity fields. See 2004 CRA CARD 15 for more information.

#### 40 CFR 194.25 (b) (2)

DOE reexamined DOE's characterization of future geologic conditions in the 2004 CRA documents. EPA reexamined issues we reviewed during the CCA, such as tectonics and deformation assumptions, fracture development and fault movement, ground shaking and seismic assumptions, volcanic and magmatic activity, metamorphic activity, shallow, lateral, and deep dissolution assumptions, and mineralization assumptions. We also reviewed the 2004 CRA screening arguments related to geological screening decisions. EPA determined that DOE's geologic screening arguments are reasonable and adequate.

#### 40 CFR 194.25 (b) (3)

As in the CCA our review of climatic condition changes focused on applicable FEPs. We found that new information since the CCA does not impact FEPs or screening decisions related to climate change.

Characteristics of these FEPs and criteria for screening are discussed in 2004 CRA CARD 32—Scope of Performance Assessments and EPA Technical Support Document for the Compliance Recertification Application Section 32: Scope of Performance Assessments (Docket A-93-02, Item V-B-21). The effects on the disposal system and dynamics of these processes are analyzed in 2004 CARD 23—Models and Computer Codes. EPA’s detailed review of future states related FEPs is documented in Technical Support Document for the Compliance Recertification Application Section 194.25, Section Future States.

EPA did not receive any public comments on DOE’s continued compliance with the future state assumptions requirements of Section 194.25.

#### **25.3.2 2004 RECERTIFICATION DECISION**

Based on a review and evaluation of the 2004 CRA, Chapters 2, 6, 7, and 9; 2004 CRA Appendix PA; 2004 CRA Appendix PA, Attachment SCR; 2004 CRA Appendix PA, Attachment TFIELD; 2004 CRA Appendix PA, Attachment MASS, and supplemental information (EPA Air Docket A-93-02, II-I-07, and FDMS Docket ID No. EPA-HQ-OAR-2004-0025, Air Docket A-98-49) and an assessment of changes since 1998, EPA determined that DOE continued to comply with the requirements of Section 194.25.

#### **25.4 CHANGES IN THE 2009 COMPLIANCE RECERTIFICATION APPLICATION (2009 CRA)**

Since the 2004 CRA, DOE has not changed the sixteen (16) FEPs screened out based on the Future States (Section 40 CRA 194.25(a)) assumption (which assumes that these future activities will not change in the future). These 16 FEPs are listed in Table CARD 25-1 above. Results of DOE’s 2009 Recertification FEPs screening activities are documented in DOE Appendix SCR-2009.

#### **25.4.1 EVALUATION OF COMPLIANCE FOR 2009 RECERTIFICATION**

To evaluate compliance with our 194.25 requirements, EPA reviewed the following 2009 CRA documentation: 2009 CRA Section 25, 2009 CRA Appendix PA-2009; 2009 CRA Appendix SCR-2009; 2009 CRA Appendix TFIELD-2009; and 2009 CRA Appendix MASS-2009. As in the 1998 Certification Decision and 2004 CRA, EPA first determined whether all FEPs and appropriate future state assumptions were identified and developed by DOE. EPA then evaluated DOE’s criteria to eliminate (screen out) inapplicable or irrelevant FEPs and associated assumptions. EPA also analyzed whether there were potential variations in DOE’s assumed characteristics and determined whether the future state assumptions were in compliance

with Section 194.25(a). During the Agency's 2009 CRA FEPs review, EPA also reviewed any changes in FEPs, screening, or DOE process.

40 CFR 194.25 (a)

EPA verified that all appropriate FEPs were included in the list provided by DOE for Section 194.25 (a): futures remain the same, none changed for the 2009 CRA. EPA reviewed any changes in FEPs, including all screened-in and screened-out FEPs related to future states to verify that their selection was made correctly. The Agency's FEPs review is documented in our 2009 CRA Technical Support Documents for Sections 194.25, 193.32 and 194.33: Review of Changes to the WIPP Performance Assessment Features, Events and Processes Since 2004 Recertification (EPA 2010c).

40 CFR 194.25 (b)(1)

EPA reexamined any hydrogeologic conditions that may have changed since our CCA and 2004 CRA review; none changed for the 2009 CRA. The Agency believes that DOE's review of FEPs related to hydrogeologic conditions and screening arguments is complete and conclusions drawn are appropriate. See 2009 CRA CARD 15 for more information.

40 CFR 194.25 (b)(2)

DOE reexamined DOE's characterization of future geologic conditions in the 2009 CRA documents. EPA reexamined issues reviewed during the CCA and 2004 CRA, such as tectonics and deformation assumptions, fracture development and fault movement, ground shaking and seismic assumptions, volcanic and magmatic activity, metamorphic activity, shallow, lateral, and deep dissolution assumptions, and mineralization assumptions. We also reviewed the 2009 CRA screening arguments related to geological screening decisions. These arguments have not changed since 2004 CRA. EPA verified DOE's position and determined that DOE's geologic screening arguments are reasonable and adequate.

40 CFR 194.25 (b)(3)

As in the CCA and 2004 CRA our review of climatic condition changes focused on applicable FEPs, and none changed for the 2009 CRA. We found that new information since the 2004 CRA does not impact FEPs or screening decisions related to climate change.

Characteristics of these FEPs and criteria for screening are discussed in 2009 CRA CARD 32. The effects on the disposal system and dynamics of these processes are analyzed in 2009 CRA CARD 23. EPA's detailed review of future states related FEPs is documented in Technical Support Document for the 2009 Compliance Recertification Application Sections 194.25, 193.32 and 194.33: Review of Changes to the WIPP Performance Assessment Features, Events and Processes Since 2004 Recertification (EPA 2010c).

EPA did not receive any public comments on DOE's continued compliance with the future state assumptions requirements of Section 194.25 for 2009 CRA.

#### **25.4.2 2009 RECERTIFICATION DECISION**

Based on a review and evaluation of 2009 CRA Section 25, 2009 CRA Appendix PA-2009, 2009 CRA Appendix SCR-2009, 2009 CRA Appendix TFIELD-2009, 2009 CRA Appendix MASS-2009, and supplemental information (EPA Air Docket A-93-02, II-I-XX, and FDMS Docket ID No. EPA-HQ-OAR-2009-0330, Air Docket A-98-49) and an assessment of changes since 1998 and 2004 CRA, EPA determines that DOE continues to comply with the requirements of Section 194.25 for the 2009 CRA.