
**Title 40 CFR Part 191
Subparts B and C
Compliance Recertification Application-2019
for the
Waste Isolation Pilot Plant
Models and Computer Codes
(40 CFR 194.23)**



**United States Department of Energy
Waste Isolation Pilot Plant**

Carlsbad Field Office
Carlsbad, New Mexico

Compliance Recertification Application 2019
Models and Computer Codes
(40 CFR 194.23)

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Acronyms and Abbreviations

CRA	Compliance Recertification Application
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
PA	performance assessment

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23.0 Models and Computer Codes (40 CFR 194.23)

23.1 Requirements

§ 194.23 Models and Computer Codes

(a) Any compliance application shall include:

- (1) A description of the conceptual models and scenario construction used to support any compliance application.
- (2) A description of plausible, alternative conceptual model(s) seriously considered but not used to support such application, and an explanation of the reason(s) why such model(s) was not deemed to accurately portray performance of the disposal system.
- (3) Documentation that:
 - (i) Conceptual models and scenarios reasonably represent possible future states of the disposal system.
 - (ii) Mathematical models incorporate equations and boundary conditions which reasonably represent the mathematical formulation of the conceptual models.
 - (iii) Numerical models provide numerical schemes which enable the mathematical models to obtain stable solutions.
 - (iv) Computer models accurately implement the numerical models; i.e., computer codes are free of coding errors and produce stable solutions.
 - (v) Conceptual models have undergone peer review according to §194.27.

(b) Computer codes used to support any compliance application shall be documented in a manner that complies with the requirements of ASME NQA-2a-1990 addenda, part 2.7, to ASME NQA-2-1989 edition.

(c) Documentation of all models and computer codes included as part of a compliance application performance assessment calculation shall be provided. Such documentation shall include, but shall not be limited to:

- (1) Descriptions of the theoretical backgrounds of each model and the method of analysis or assessment.
- (2) General descriptions of the models; discussions of the limits of applicability of each model; detailed instructions for executing the computer codes, including hardware and software requirements, input and output formats with explanations of each input and output variable and parameter (e.g., parameter name and units); listing of input and output files from a sample computer run; and reports on code verification, bench marking, validation, and quality assurance procedures.
- (3) Detailed descriptions of the structure of the computer codes and complete listings of the source codes.
- (4) Detailed descriptions of data collection procedures, data reduction and analysis, and code input parameter development.
- (5) Any necessary licenses;
- (6) An explanation of the manner in which models and computer codes incorporate the effects of parameter correlation.

(d) The Administrator or the Administrator's authorized representative may verify the results of computer simulations used to support any compliance application by performing independent simulations. Data files, source codes, executable versions of computer software for each model, other material or information needed to permit the Administrator or the

Administrator's authorized representative to perform independent simulations, and to access necessary hardware to perform such simulations, shall be provided within 30 calendar days of a request by the Administrator or the Administrator's authorized representative.

23.2 Background

Title 40 CFR 194.23 ([U.S. EPA 1996](#)) presents the requirements for all models and computer codes used in the performance assessment (PA) that the U.S. Department of Energy (DOE) must use to demonstrate compliance with the containment requirements at 40 CFR 191.13 ([U.S. EPA 1993](#)). The DOE has deferred submittal of the CRA-2019 PA until after submission of the CRA-2019 (see Executive Summary 2019, Section 1.3). As such, the CRA-2014 PA continues to be the baseline for the models and computer codes for the CRA-2019. As directed in 40 CFR 194.15(b), where information remains valid and has been submitted in previous recertification applications, such information may be summarized and referenced.

Information and data from previous compliance certification and recertification applications that form the basis of past DOE compliance positions and past U.S. Environmental Protection Agency (EPA) decision documents ([U.S. EPA 2017](#)) are found in the CRA-2014, Section 23 ([U.S. DOE 2014](#)). The results of the deferred PA will be described in a second submission that will also include revisions, when appropriate, to the information submitted in March, 2019.

23.3 Changes or New Information Since the CRA-2014

No changes were made to the information in the CRA-2014 that was used to demonstrate compliance with 40 CFR 194.23 requirements. The information in CRA-2014, Section 23 continues to demonstrate compliance with the requirements of 40 CFR 194.23.

23.4 References

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

U.S. Department of Energy (DOE). 2014. Title 40 CFR Part 191 Subparts B and C. Compliance Recertification Application for the Waste Isolation Pilot Plant. Carlsbad, NM: Carlsbad Field Office. DOE/WIPP 2014-3503.*

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. Environmental Protection Agency (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. Environmental Protection Agency (EPA). 2017. 40 CFR Part 194: Criteria for the Certification and Recertification of the Waste Isolation Pilot Plant's Compliance with the

Disposal Regulations: Recertification Decision; Final Rule. Washington, DC: Office of Radiation and Indoor Air. Department of Energy, Carlsbad Field Office. (July 19, 2017): EPA Docket FDMS Docket ID No. EPA-HQ-OAR-2014-0609-0081.*

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