40 CFR Part 191
Subparts B and C
Compliance Recertification Application 2026
for the
Waste Isolation Pilot Plant
Scope of Performance Assessment
(40 CFR 194.32)

United States Department of Energy
Waste Isolation Pilot Plant

Carlsbad Field Office
Carlsbad, New Mexico

Compliance Recertification Application 2026
Scope of Performance Assessment
(40 CFR 194.32)

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ACRONYMS AND ABBREVIATIONS

CCA	Compliance Certification Application
CFR	Code of Federal Regulations
CRA	Compliance Recertification Application
DOE	U.S. Department of Energy
DP	disturbed performance
EP	event and process
EPA	U.S. Environmental Protection Agency
FEP	feature, event, and process
HCN	historic, current, and near-future
IB	inside boundary
OB	outside boundary
PA	performance assessment
SO-C	screened out-consequence
SO-P	screened out-probability
SO-R	screened out-regulation
UP	undisturbed performance
WIPP	Waste Isolation Pilot Plant

32.0 SCOPE OF PERFORMANCE ASSESSMENT (40 CFR 194.32)

32.1 Requirements

§ 194.32 Scope of Performance Assessment

(a) Performance assessments shall consider natural processes and events, mining, deep drilling, and shallow drilling that may affect the disposal system during the regulatory time frame.

(b) Assessments of mining effects may be limited to changes in the hydraulic conductivity of the hydrogeologic units of the disposal system from excavation mining for natural resources. Mining shall be assumed to occur with a one in 100 probability in each century of the regulatory time frame. Performance assessments shall assume that mineral deposits of those resources, similar in quality and type to those resources currently extracted from the Delaware Basin, will be completely removed from the controlled area during the century in which such mining is randomly calculated to occur. Complete removal of such mineral resources shall be assumed to occur only once during the regulatory time frame.

(c) Performance assessments shall include an analysis of the effects on the disposal system of any activities that occur in the vicinity of the disposal system prior to disposal and are expected to occur in the vicinity of the disposal system 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.

(d) Performance assessments need not consider processes and events that have less than one chance in 10,000 of occurring over 10,000 years.

(e) Any compliance application(s) shall include information which:

(1) Identifies all potential processes, events or sequences and combinations of processes and events that may occur during the regulatory time frame and may affect the disposal system;

(2) Identifies the processes, events or sequences and combinations of processes and events included in performance assessments; and

(3) Documents why any processes, events or sequences and combinations of processes and events identified pursuant to paragraph (e)(1) of this section were not included in performance assessment results provided in any compliance application.

32.2 Background

Performance assessment (PA) is a process that assesses the likelihood that the Waste Isolation Pilot Plant (WIPP) disposal system will meet the release limits specified by 40 Code of Federal Regulations (CFR) 191.13 for 10,000 years after waste disposal. Performance assessments must consider both natural and human-initiated processes and events that affect the WIPP disposal system.

Title 40 CFR 194.32 requires that PAs consider the effects of excavation mining, drilling fluid injection, and future development of leases. In addition, the PA must consider the effects of current activities such as secondary oil recovery methods (waterflooding), disposal of natural brine, and solution mining to extract brine in the vicinity of the repository. Title 40 CFR 194.32 requires identification of all features, events, and processes (FEPs), or sequences or

combinations of processes and events that could occur during the regulatory time frame that may affect the repository, and documentation of why certain events or groups of events are not included, if so warranted.

Therefore, the PA methodology for the WIPP includes a process that compiles a comprehensive list of FEPs that are relevant to disposal system performance. Those FEPs determined by screening analysis as having the potential to affect performance are incorporated into scenario development and quantitative analyses. These analyses employ a system of linked computer models to characterize the interaction between the repository and the natural system in undisturbed and disturbed conditions. This process originated with the Compliance Certification Application (CCA) (U.S. DOE 1996), in which the U.S. Department of Energy (DOE) first compiled a comprehensive list of FEPs. This list was subsequently screened resulting in a set of relevant FEPs used in the PA to demonstrate compliance with the long-term disposal standards. The final set of FEPs used in the CCA became the WIPP FEPs baseline.

The screening criteria shown below are used to determine whether a specific FEP should be included in conceptual models and PA scenarios:

- Screened Out-Regulation (SO-R): For example, future human-initiated events and processes (EPs) may be excluded from consideration for regulatory reasons (e.g., deliberate drilling intrusions). 40 CFR 194.25(a) requires 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 (see also Section 25 of this Compliance Recertification Application [CRA]-2026).

- Screened Out-Probability (SO-P): 40 CFR 194.32(d) states that PA need not consider processes and events that have less than a 1 in 10,000 chance of occurring over 10,000 years.

- Screened Out-Consequence (SO-C): The DOE eliminated some FEPs based on their consequences according to the following two criteria:

  - Insignificant Consequences. The DOE eliminated FEPs where there was a reasonable expectation that such omissions would not significantly change the remaining probability of cumulative releases. These FEPs are designated SO-C.

  - Beneficial FEPs. Those FEPs that could benefit the disposal system or subsystem performance were eliminated to simplify the analysis. This argument may be used when there is uncertainty about how the FEP should be incorporated into PA calculations, or when such incorporation would incur unreasonable difficulties. Omitting the effect of beneficial FEPs is considered a conservative decision. These FEPS are designated SO-C Beneficial (e.g., the accumulation of radioactive contaminants in soils).

The FEPs retained in PA are accounted for under calculations of either the undisturbed performance (UP) scenario or disturbed performance (DP) scenarios (see the CCA, Chapter 6.0, Sections 6.2.2.2 and 6.2.2.3).

- The UP scenario evaluates the behavior of the disposal system, assuming it is not disrupted by human intrusion or unlikely natural events.

- The DP scenarios evaluate the behavior of the disposal system, assuming disruption by human intrusion or other actions, including future drilling and mining activities.

With each recertification application, new information relevant to the FEPs' baseline is reviewed and incorporated as appropriate, ensuring that the FEPs' basis remains current for each recertification cycle. This FEPs basis has historically been maintained with each update to Appendix SCR (i.e., Appendix SCR-2004, Appendix SCR-2009, …) (U.S. DOE 2004, U.S. DOE 2009, U.S. DOE 2014, and U.S. DOE 2019).

32.3 Changes or New Information Since the CRA-2019

Since the CRA-2019, there has been a reassessment of FEPs (Kirkes and McCormick 2023) in response to U.S. Environmental Protection Agency (EPA) comments (U.S. EPA 2022). Additionally, FEPs have been updated in support of the Replacement Panels Planned Change Request (U.S. DOE 2024) and due to normal updates to PA input parameters such as waste inventory, deep drilling activities, and other monitoring activities. As a result, 151 of the 245 WIPP FEPs have been updated in some way. Of these, five have had screening decisions changed. A summary of these five changes follows:

The FEP N71 "Microbes" was changed to remove the reference to "UP-for colloidal effects and gas generation". The screening decision for N71 has been changed to focus only on naturally occurring microbes, which is SO-C. Colloidal effects and gas generation due to microbial degradation are no longer mentioned in FEP N71 and are discussed solely in FEP W44, Degradation of Organic Material.

The FEP W8 "Shaft Seal Chemical Composition" was changed from "SO-C Beneficial" to "SO-C" (losing the "beneficial" indication) due to the lack of a clear and defensible beneficial consequence. The limited movement of brine in contact with the lower shaft seal components and the resulting minimal impact on pH are not expected to provide any benefit.

The FEP W59 "Precipitation of Secondary Minerals" was also changed from "SO-C Beneficial" to "SO-C." The FEP W59 is not impactful to the concentrations of radionuclides and does not provide a clear beneficial consequence to the performance of the disposal system.

The FEP W82 "Suspension of Particles" was changed from DP to screened-out due to SO-C. The change in this classification eliminates inconsistencies within the FEPs baseline. This reclassification is consistent with the CCA (U.S. DOE 1996), and properly emphasizes dissolved and colloidal actinides as currently implemented in PA.

The FEP W111 “Panel Closure Chemical Composition” was changed from “SO-C Beneficial” to “SO-C.” FEP W111 does not provide a clear beneficial consequence to the performance of the disposal system.

Details regarding screening classifications and related screening arguments are presented in Appendix SCR. Table 32-1 below lists the CRA-2026 FEPs and their screening classifications. Note that those FEPs not separated by gridlines in the first column of Table 32-1 have been addressed by group because of close similarity with other FEPs within that group. This grouping process was formerly used in the CCA and by the EPA in its Technical Support Document for section 194.32 (U.S. EPA 1998). This grouping has been used in each subsequent recertification application.

32.3.1 40 CFR 194.32(a)

The WIPP FEPs baseline comprises three primary categories: Natural FEPs, human-initiated FEPs, and waste- and repository-induced FEPs. It is through these three categories that “…natural processes and events [Natural FEPs], mining, deep drilling, and shallow drilling [human-initiated FEPs] that may affect the disposal system [waste- and repository-induced FEPs] during the regulatory time frame” are accounted for in PA. Those FEPs with screening classifications listed as UP and DP in Table 32-1 are implemented in PA models to directly address the criteria in 40 CFR 194.32(a). As mentioned above, a detailed presentation of FEPs screening is provided in Appendix SCR.

Table 32-1. FEPs Summary for CRA-2026

EPA FEP I.D.[a,b,c, d, e]	FEP Name	Screening Argument Update?	Screening Decision Changed?	Screening Classification
N1	Stratigraphy	New references to stratigraphic data obtained during drilling of Shaft 5	No	UP
N2	Brine Reservoirs	Updated with new references	No	DP
N3	Changes in Regional Stress	Updated with new references and information	No	SO-C
N4	Regional Tectonics	Updated with new references and information	No	SO-C
N5	Regional Uplift and Subsidence	Updated with new references and information	No	SO-C
N6	Salt Deformation	Updated with new references	No	SO-P

EPA FEP I.D.[a,b,c, d, e]	FEP Name	Screening Argument Update?	Screening Decision Changed?	Screening Classification
N7	Diapirism	Updated with new references	No	SO-P
N8	Formation of Fractures	Updated with new references	No	SO-P (Far-field) UP (Repository)
N9	Changes in Fracture Properties	Updated with new references	No	SO-C UP (Near Repository)
N10	Formation of New Faults	Updated with new references	No	SO-P
N11	Fault Movement	Updated with new references	No	SO-P
N12	Seismic Activity	Updated with new references	No	UP
N13	Volcanic Activity	No change	No	SO-P
N14	Magmatic Activity	No change	No	SO-C
N15	Metamorphic Activity	No change	No	SO-P
N16	Shallow Dissolution	Updated with new references and information	No	UP
N18	Deep Dissolution	Updated with new references	No	SO-P
N20	Breccia Pipes	Updated with new references	No	SO-P
N21	Collapse Breccias	Updated with new references	No	SO-P
N22	Fracture Infills	Updated with new references	No	SO-C - Beneficial
N23	Saturated Groundwater Flow	No change	No	UP
N24	Unsaturated Groundwater Flow	No change	No	UP
N25	Fracture Flow	No change	No	UP
N27	Effects of Preferential Pathways	No change	No	UP
N26	Density Effects on Groundwater Flow	Updated to discuss new geometry	No	SO-C – Beneficial
N28	Thermal Effects on Groundwater Flow	Updated with new references	No	SO-C
N29	Saline Intrusion (Hydrogeological Effects)	No change	No	SO-P
N30	Freshwater Intrusion (Hydrogeological Effects)	Updated with new references	No	SO-P

EPA FEP I.D.[a,b,c, d, e]	FEP Name	Screening Argument Update?	Screening Decision Changed?	Screening Classification
N31	Hydrological Response to Earthquakes	Updated with new references and information	No	SO-C
N32	Natural Gas Intrusion	Updated with new references and information	No	SO-P
N33	Groundwater Geochemistry	Updated with new references	No	UP
N34	Saline Intrusion (Geochemical Effects)	Updated with new references	No	SO-C
N38	Effects of Dissolution	Updated with new references	No	SO-C
N35	Freshwater Intrusion (Geochemical Effects)	FEP text updated with new information	No	SO-C
N36	Changes in Groundwater Eh	FEP text updated with new information	No	SO-C
N37	Changes in Groundwater pH	FEP text updated with new information	No	SO-C
N39	Physiography	No change	No	UP
N40	Impact of a Large Meteorite	No change	No	SO-P
N41	Mechanical Weathering	No change	No	SO-C
N42	Chemical Weathering	No change	No	SO-C
N43	Aeolian Erosion	FEP text updated with new information	No	SO-C
N44	Fluvial Erosion	FEP text updated with new information	No	SO-C
N45	Mass Wasting (Erosion)	FEP text updated with new information	No	SO-C
N46	Aeolian Deposition	No change	No	SO-C
N47	Fluvial Deposition	No change	No	SO-C
N48	Lacustrine Deposition	No change	No	SO-C
N49	Mass Wasting (Deposition)	No change	No	SO-C
N50	Soil Development	Updated with new references	No	SO-C
N51	Stream and River Flow	No change	No	SO-C

EPA FEP I.D.[a,b,c, d, e]	FEP Name	Screening Argument Update?	Screening Decision Changed?	Screening Classification
N52	Surface Water Bodies	No change	No	SO-C
N53	Groundwater Discharge	Updated with new information	No	UP
N54	Groundwater Recharge	Updated with new information	No	UP
N55	Infiltration	Updated with new information	No	UP
N56	Changes in Groundwater Recharge and Discharge	Updated with new references and information	No	UP
N57	Lake Formation	No change	No	SO-C
N58	River Flooding	No change	No	SO-C
N59	Precipitation (e.g., Rainfall)	Updated with new references and climate data	No	UP
N60	Temperature	Updated with new references and climate data	No	UP
N61	Climate Change	No change	No	UP
N62	Glaciation	No change	No	SO-P
N63	Permafrost	No change	No	SO-P
N64	Seas and Oceans	No change	No	SO-C
N65	Estuaries	No change	No	SO-C
N66	Coastal Erosion	No change	No	SO-C
N67	Marine Sediment Transport and Deposition	No change	No	SO-C
N68	Sea Level Changes	No change	No	SO-C
N69	Plants	No change	No	SO-C
N70	Animals	No change	No	SO-C
N71	Microbes	FEP text updated with new information that states this FEP only applies to naturally-occurring microbes	Yes	SO-C
N72	Natural Ecological Development	No change	No	SO-C
H1	Oil and Gas Exploration	Updated with new drilling rate and references	No	SO-C (HCN) DP (Future)

EPA FEP I.D.[a,b,c, d, e]	FEP Name	Screening Argument Update?	Screening Decision Changed?	Screening Classification
H2	Potash Exploration	FEP text updated with new information	No	SO-C (HCN) DP (Future)
H4	Oil and Gas Exploitation	Updated with new drilling rate and references	No	SO-C (HCN) DP (Future)
H8	Other Resources	FEP text updated with new information	No	SO-C (HCN) DP (Future)
H9	Enhanced Oil and Gas Recovery	FEP text updated with new information	No	SO-C (HCN) DP (Future)
H3	Water Resources Exploration	Updated with most recent monitoring information	No	SO-C (HCN) SO-C (Future)
H5	Groundwater Exploitation	Updated with most recent monitoring information	No	SO-C (HCN) SO-C (Future)
H6	Archaeological Investigations	No change	No	SO-R (HCN) SO-R (Future)
H7	Geothermal Energy Production	No change	No	SO-R (HCN) SO-R (Future)
H10	Liquid Waste Disposal	No change	No	SO-R (HCN) SO-R (Future)
H11	Hydrocarbon Storage	No change	No	SO-R (HCN) SO-R (Future)
H12	Deliberate Drilling Intrusion	No change	No	SO-R (HCN) SO-R (Future)
H13	Conventional Underground Potash Mining	No change	No	UP (HCN) DP (Future)
H14	Other Resources (Mining For)	No change	No	SO-C (HCN) SO-R (Future)
H15	Tunneling	No change	No	SO-R (HCN) SO-R (Future)
H16	Construction of Underground Facilities (For Example Storage, Disposal, Accommodation)	No change	No	SO-R (HCN) SO-R (Future)
H17	Archaeological Excavations	No change	No	SO-C (HCN) SO-R (Future)
H18	Deliberate Mining Intrusion	No change	No	SO-R (HCN) SO-R (Future)

EPA FEP I.D.[a,b,c, d, e]	FEP Name	Screening Argument Update?	Screening Decision Changed?	Screening Classification
H19	Explosions for Resource Recovery	No change	No	SO-C (HCN) SO-R (Future)
H20	Underground Nuclear Device Testing	Updated for clarity. No new information.	No	SO-C (HCN) SO-R (Future)
H21	Drilling Fluid Flow	Updated to screen H21, H22, and H23 together	No	SO-C (HCN) DP (Future)
H22	Drilling Fluid Loss	Updated to screen H21, H22, and H23 together	No	SO-C (HCN) DP (Future)
H23	Blowouts	Updated to screen H21, H22, and H23 together	No	SO-C (HCN) DP (Future)
H24	Drilling-Induced Geochemical Changes	Updated for clarity	No	UP (HCN) DP (Future)
H25	Oil and Gas Extraction	FEP text updated with new information	No	SO-C (HCN) SO-R (Future)
H26	Groundwater Extraction	Updated with new references	No	SO-C (HCN) SO-R (Future)
H27	Liquid Waste Disposal–Outside Boundary (OB)	Updated with new references	No	SO-C (HCN) SO-C (Future)
H28	Enhanced Oil and Gas Production–OB	Updated with new references	No	SO-C (HCN) SO-C (Future)
H29	Hydrocarbon Storage–OB	No change	No	SO-C (HCN) SO-C (Future)
H60	Liquid Waste Disposal–Inside Boundary (IB)	No change	No	SO-R (HCN) SO-R (Future)
H61	Enhanced Oil and Gas Production–IB	No change	No	SO-R (HCN) SO-R (Future)
H62	Hydrocarbon Storage–IB	No change	No	SO-R (HCN) SO-R (Future)
H30	Fluid-Injection Induced Geochemical Changes	No change	No	UP (HCN) SO-R (Future)
H31	Natural Borehole Fluid Flow	Updated to reflect new plugging probabilities	No	SO-C (HCN) SO-C (Future, holes not penetrating waste panels) DP (Future, holes penetrating panels)

EPA FEP I.D.[a,b,c, d, e]	FEP Name	Screening Argument Update?	Screening Decision Changed?	Screening Classification
H32	Waste-Induced Borehole Flow	Updated to reflect new plugging probabilities	No	SO-R (HCN) DP (Future)
H34	Borehole-Induced Solution and Subsidence	Updated with new references and information	No	SO-C (HCN) SO-C (Future)
H35	Borehole-Induced Mineralization	Updated with new references and information	No	SO-C (HCN) SO-C (Future)
H36	Borehole-Induced Geochemical Changes	Updated to reflect new plugging probabilities	No	UP (HCN) DP (Future) SO-C – Beneficial (for units other than the Culebra)
H37	Changes in Groundwater Flow Due to Mining	Updated with new references and mining leases	No	UP (HCN) DP (Future)
H38	Changes in Geochemistry Due to Mining	Argument edited for clarity	No	SO-C (HCN) SO-R (Future)
H39	Changes in Groundwater Flow Due to Explosions	No change	No	SO-C (HCN) SO-R (Future)
H40	Land Use Changes	FEP text updated with new information	No	SO-R (HCN) SO-R (Future)
H41	Surface Disruptions	FEP text updated with new information	No	UP (HCN) SO-C (Future)
H42	Damming of Streams and Rivers	No change	No	SO-C (HCN) SO-R (Future)
H43	Reservoirs	No change	No	SO-C (HCN) SO-R (Future)
H44	Irrigation	No change	No	SO-C (HCN) SO-R (Future)
H45	Lake Usage	No change	No	SO-R (HCN) SO-R (Future)
H46	Altered Soil or Surface Water Chemistry by Human Activities	No change	No	SO-C (HCN) SO-R (Future)
H47	Greenhouse Gas Effects	No change	No	SO-R (HCN) SO-R (Future)
H48	Acid Rain	No change	No	SO-R (HCN) SO-R (Future)
H49	Damage to the Ozone Layer	No change	No	SO-R (HCN) SO-R (Future)

EPA FEP I.D.[a,b,c, d, e]	FEP Name	Screening Argument Update?	Screening Decision Changed?	Screening Classification
H50	Coastal Water Use	No change	No	SO-R (HCN) SO-R (Future)
H51	Sea Water Use	No change	No	SO-R (HCN) SO-R (Future)
H52	Estuarine Water Use	No change	No	SO-R (HCN) SO-R (Future)
H53	Arable Farming	No change	No	SO-C (HCN) SO-R (Future)
H54	Ranching	No change	No	SO-C (HCN) SO-R (Future)
H55	Fish Farming	No change	No	SO-R (HCN) SO-R (Future)
H56	Demographic Change and Urban Development	No change	No	SO-R (HCN) SO-R (Future)
H57	Loss of Records	No change	No	NA (HCN) DP (Future)
H58	Solution Mining for Potash	No change	No	SO-R (HCN) SO-R (Future)
H59	Solution Mining for Other Resources	Updated with new information regarding brine wells in the region	No	SO-C (HCN) SO-C (Future)
W1	Disposal Geometry	Updated with additional and replacement panel information.	No	UP
W2	Waste Inventory	Updated with new inventory data	No	UP
W3	Heterogeneity of Waste Forms	Updated with new inventory data	No	DP
W4	Container Form	Updated with new container material masses	No	SO-C – Beneficial
W34	Container Integrity	Updated to screen W4 and W34 together	No	SO-C – Beneficial
W5	Container Material Inventory	Updated to reflect new inventory data and container variants.	No	UP
W6	Shaft Seal Geometry	FEP text updated with new information	No	UP

EPA FEP I.D.[a,b,c, d, e]	FEP Name	Screening Argument Update?	Screening Decision Changed?	Screening Classification
W7	Shaft Seal Physical Properties	FEP text updated with new information	No	UP
W109	Panel Closure Geometry	FEP text updated with new information	No	UP
W110	Panel Closure Physical Properties	FEP text updated with new information	No	UP
W8	Shaft Seal Chemical Composition	Screened separately from W111	Yes	SO-C
W9	Backfill Physical Properties	FEP text updated with new information	No	SO-C
W10	Backfill Chemical Composition	No change	No	UP
W11	Post-Closure Monitoring	No change	No	SO-C
W12	Radionuclide Decay and In-Growth	No change	No	UP
W13	Heat from Radioactive Decay	FEP text updated with new information	No	SO-C
W14	Nuclear Criticality: Heat	FEP text updated with new information.	No	SO-P
W15	Radiological Effects on Waste	Updated to reflect new radionuclide inventory	No	SO-C
W16	Radiological Effects on Containers	Updated to reflect new radionuclide inventory	No	SO-C
W17	Radiological Effects on Shaft Seals	Updated to reflect new radionuclide inventory	No	SO-C
W112	Radiological Effects on Panel Closures	Updated to reflect new radionuclide inventory	No	SO-C
W18	Disturbed Rock Zone	Updated with information on new panels	No	UP
W19	Excavation-Induced Changes in Stress	Updated with information on new panels	No	UP

EPA FEP I.D.[a,b,c, d, e]	FEP Name	Screening Argument Update?	Screening Decision Changed?	Screening Classification
W20	Salt Creep	Updated with new references	No	UP
W21	Changes in the Stress Field	Updated with new references	No	UP
W22	Roof Falls	Updated with information about new panels	No	UP
W23	Subsidence	Updated with new references and information	No	SO-C
W24	Large Scale Rock Fracturing	Updated with new references and information	No	SO-P
W25	Disruption Due to Gas Effects	Updated with information on mechanical effects of gas generation	No	UP
W26	Pressurization	Updated with information on mechanical effects of gas generation	No	UP
W27	Gas Explosions	FEP text updated with new information	No	UP
W28	Nuclear Explosions	Updated with new references and information	No	SO-P
W29	Thermal Effects on Material Properties	Updated to reflect new inventory information	No	SO-C
W30	Thermally-Induced Stress Changes	Updated to reflect new inventory information	No	SO-C
W31	Differing Thermal Expansion of Repository Components	Updated to reflect new inventory information	No	SO-C
W72	Exothermic Reactions	Updated to reflect new inventory information	No	SO-C
W73	Concrete Hydration	Updated to reflect new inventory information	No	SO-C

EPA FEP I.D.[a,b,c, d, e]	FEP Name	Screening Argument Update?	Screening Decision Changed?	Screening Classification
W32	Consolidation of Waste	Updated disposal room porosity surface	No	UP
W36	Consolidation of Shaft Seals	No change	No	UP
W37	Mechanical Degradation of Shaft Seals	No change	No	UP
W39	Underground Boreholes	No change	No	UP
W113	Consolidation of Panel Closures	No change	No	UP
W114	Mechanical Degradation of Panel Closures	No change	No	SO-P
W33	Movement of Containers	Updated with new references	No	SO-C
W35	Mechanical Effects of Backfill	Updated with new information and references	No	SO-C
W40	Brine Inflow	Updated with new formulas and references	No	UP
W41	Wicking	Updated with new formulas and references	No	UP
W42	Fluid Flow Due to Gas Production	Updated with new references	No	UP
W43	Convection	Updated with new estimates of heat produced from inventory data	No	SO-C
W44	Degradation of Organic Material	Updated with new information and screened separately from W45 and W48	No	UP
W45	Effects of Temperature on Microbial Gas Generation	Updated with new thermal increase calculations and screened separately from W44	No	UP
W48	Effects of Biofilms on Microbial Gas Generation	Updated with new thermal increase calculations and screened separately from W44	No	UP

EPA FEP I.D.[a,b,c, d, e]	FEP Name	Screening Argument Update?	Screening Decision Changed?	Screening Classification
W46	Effects of Pressure on Microbial Gas Generation	Updated with new references and information. Modified to more directly discuss the effects of pressure on gas generation	No	SO-C
W47	Effects of Radiation on Microbial Gas Generation	Updated with new information	No	SO-C
W49	Gases from Metal Corrosion	Updated to reflect new inventory information and address EPA comments	No	UP
W51	Chemical Effects of Corrosion	Updated to reflect new inventory information and address EPA comments	No	UP
W50	Galvanic Coupling (Within the Repository)	Updated with information on lead inventory	No	SO-C
W52	Radiolysis of Brine	Updated with new references	No	UP
W53	Radiolysis of Cellulose	Updated with new information and references	No	SO-C
W54	Helium Gas Production	Updated to reflect new inventory	No	SO-C
W55	Radioactive Gases	Updated to reflect new inventory	No	SO-C
W56	Speciation	Updated with new information and references	No	UP in disposal rooms and Culebra. SO-C elsewhere, and SO-C Beneficial in shaft seals
W57	Kinetics of Speciation	No change	No	SO-C
W58	Dissolution of Waste	No change	No	UP
W59	Precipitation of Secondary Minerals	No change	Yes	SO-C
W60	Kinetics of Precipitation and Dissolution	No change	No	SO-C

EPA FEP I.D.[a,b,c, d, e]	FEP Name	Screening Argument Update?	Screening Decision Changed?	Screening Classification
W61	Actinide Sorption	Updated with new references	No	UP in the Culebra and Dewey Lake; SO-C—Beneficial in the disposal room, shaft seals, panel closures, and other geologic units.
W62	Kinetics of Sorption	Updated with new references	No	UP in the Culebra and Dewey Lake; SO-C—Beneficial in the disposal room, shaft seals, panel closures, and other geologic units.
W63	Changes in Sorptive Surfaces	Updated with new references	No	UP
W64	Effects of Metal Corrosion	No change	No	UP
W66	Reduction-Oxidation Kinetics	No change	No	UP
W65	Reduction-Oxidation Fronts	No change	No	SO-P
W67	Localized Reducing Zones	No change	No	SO-C
W68	Organic Complexation	Updated with new references	No	UP
W69	Organic Ligands	Updated with new references	No	UP
W71	Kinetics of Organic Complexation	Updated with new references	No	SO-C
W70	Humic and Fulvic Acids	No change	No	UP
W74	Chemical Degradation of Shaft Seals	No change to argument. FEP W115 removed from screening.	No	UP
W76	Microbial Growth on Concrete	No change to argument. FEP W115 removed from screening.	No	UP
W75	Chemical Degradation of Backfill	No change	No	SO-C
W77	Solute Transport	Updated for clarity	No	UP
W78	Colloid Transport	Updated with new references	No	UP
W79	Colloid Formation and Stability	Updated with new references	No	UP

EPA FEP I.D.[a,b,c, d, e]	FEP Name	Screening Argument Update?	Screening Decision Changed?	Screening Classification
W80	Colloid Filtration	Updated with new references	No	UP
W81	Colloid Sorption	Updated with new references	No	UP
W82	Suspension of Particles	Updated with arguments for screening out this FEP	Yes	SO-C
W83	Rinse	No change	No	SO-C
W84	Cuttings	No change	No	DP
W85	Cavings	No change	No	DP
W86	Spallings	No change	No	DP
W87	Microbial Transport	Updated with new references	No	UP
W88	Biofilms	Updated with new references and information	No	SO-C – Beneficial
W89	Transport of Radioactive Gases	Updated with new references and information	No	SO-C
W90	Advection	Updated with new references and information	No	UP
W91	Diffusion	Updated with new information	No	UP
W92	Matrix Diffusion	Updated with new information	No	UP
W93	Soret Effect	Updated with new references and information	No	SO-C
W94	Electrochemical Effects	No change	No	SO-C
W95	Galvanic Coupling (Outside the Repository)	No change	No	SO-P
W96	Electrophoresis	No change	No	SO-C
W97	Chemical Gradients	Updated with new references and information	No	SO-C
W98	Osmotic Processes	No change	No	SO-C
W99	Alpha Recoil	No change	No	SO-C
W100	Enhanced Diffusion	No change	No	SO-C

EPA FEP I.D.[a,b,c, d, e]	FEP Name	Screening Argument Update?	Screening Decision Changed?	Screening Classification
W101	Plant Uptake	Updated with new references and information	No	SO-R (for section 191.13) SO-C (for section 191.15)
W102	Animal Uptake	Updated with new references and information	No	SO-R (for section 191.13) SO-C (for section 191.15)
W103	Accumulation in Soils	Updated with new references and information	No	SO-C Beneficial (for section 191.13) SO-C (for section 191.15)
W104	Ingestion	Updated with new references and information	No	SO-R SO-C (for section 191.15)
W105	Inhalation	Updated with new references and information	No	SO-R SO-C (for section 191.15)
W106	Irradiation	Updated with new references and information	No	SO-R SO-C (for section 191.15)
W107	Dermal Sorption	Updated with new references and information	No	SO-R SO-C (for section 191.15)
W108	Injection	Updated with new references and information	No	SO-R SO-C (for section 191.15)
W111	Panel Closure Chemical Composition	Screened separately from W8	Yes	SO-C
W115	Chemical Degradation of Panel Closures	Screened separately from W74 and W76	No	SO-P

a N = Natural FEP

b H = Human-induced event and process (EP)

c W = Waste- and Repository-induced FEP

d FEPs in this column that are not separated by rows represent FEPs that are similar in nature and are discussed and screened as a common group.

e Screening classifications are described in Section 32.2. Two time periods are used when evaluating human-induced EPs, including historical, current, and near-future (HCN) human activities and future human activities (Future).

32.3.2 40 CFR 194.32(b)

The requirements of 40 CFR 194.32(b) specify assumptions regarding the implementation of mining in PA calculations. The PA modeling system used for the mining scenario is similar to that developed for the undisturbed repository scenario but with a modified Culebra transmissivity field in the controlled area to account for the mining effects. Implementation of the mining scenario has not changed since the CRA-2019. Details regarding how mining processes are represented in PA models are presented in Appendices PA-2.2.2.2.5, PA-3.3, and PA-8.2, and MASS-13.4.

32.3.3 40 CFR 194.32(c)

Title 40 CFR 194.32(c) provides specific timeframes for the evaluating activities that may affect the disposal system. This requirement focuses on activities that have occurred, are occurring, or are expected to occur in the near future. The DOE classifies this time frame as HCN. Because 40 CFR 194.32(e)(1) requires the evaluation of human-induced FEPs during the regulatory period, the DOE also evaluates human-induced FEPs for the period from repository closure to 10,000 years into the future (Future) (see human-initiated FEPs in Table 32-1). Human-initiated EPs are described and considered for both the HCN and Future time frames in Appendix SCR-5.0. The time frames considered in this CRA have not changed from previous applications. Therefore, the DOE complies with the requirements of 40 CFR 194.32(c).

32.3.4 40 CFR 194.32(d)

Low-probability events can be excluded on the basis of the criterion provided in 40 CFR 194.32(d), which states, “performance assessments need not consider processes and events that have less than 1 chance in 10,000 of occurring over 10,000 years.” In practice, for most FEPs screened out on the basis of low probability of occurrence, it has not been possible to estimate a meaningful quantitative probability. In the absence of quantitative probability estimates, a qualitative argument must be used. Therefore, 23 FEPs were screened out using the SO-P criterion for the CRA-2026. The FEPs screened out because of low probability of occurrence are listed in Table 32-2.

Table 32-2. FEPs Classified SO-P for the CRA-2026

FEP I.D.	FEP Name
N6	Salt Deformation
N7	Diapirism
N8	Formation of Fractures
N10	Formation of New Faults
N11	Fault Movement
N13	Volcanic Activity
N15	Metamorphic Activity
N18	Deep Dissolution

FEP I.D.	FEP Name
N20	Breccia Pipes
N21	Collapse Breccias
N29	Saline Intrusion (Hydrogeological Effects)
N30	Freshwater Intrusion (Hydrogeological Effects)
N32	Natural Gas Intrusion
N40	Impact of a Large Meteorite
N62	Glaciation
N63	Permafrost
W14	Nuclear Criticality: Heat
W24	Large Scale Rock Fracturing
W28	Nuclear Explosions
W65	Reduction-Oxidation Fronts
W95	Galvanic Coupling (Outside the Repository)
W114	Mechanical Degradation of Panel Closures
W115	Chemical Degradation of Panel Closures

32.3.5 40 CFR 194.32(e)

The requirements in 40 CFR 194.32(e) are met by the identification and screening steps as documented in Appendix SCR.

Title 40 CFR 194.32, “Scope of Performance Assessment,” requires the identification, selection, screening, and incorporation of all significant processes and events into PA. The DOE has taken a comprehensive approach in meeting the requirements of the section as documented here and in Appendix SCR. The process used is consistent with evaluations of WIPP FEPs in past compliance applications.

In summary, based on the information summarized here, and in detail in Appendix SCR, the DOE continues to comply with the requirements in 40 CFR 194.32 for the CRA.

32.4 References

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

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U.S. Department of Energy (DOE). 1996. Title 40 CFR Part 191 Compliance Certification Application for the Waste Isolation Pilot Plant (October). 21 vols. Carlsbad, NM: Carlsbad Area Office. DOE/CAO 1996-2184.

U.S. DOE. 2004. Title 40 CFR Part 191 Compliance Recertification Application for the Waste Isolation Pilot Plant (March). 10 vols. Carlsbad, NM: Carlsbad Field Office. DOE/WIPP 2004-3231.

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U.S. DOE. 2024. Planned Change Request for the use of Replacement Panels 11 and 12. Letter from Mark Bollinger (DOE) to Lee Veal (EPA). March 12, 2024. CBFO:ERCD:MG:SV:24-0168. Carlsbad, NM: Carlsbad Field Office.*

U.S. EPA. 1998. Technical Support Document for Section 193.32: Scope of Performance Assessments (May). Washington, DC: Office of Radiation and Indoor Air.

U.S. EPA. 2022. Technical Support Document (TSD) for Section 194.23, 194.32, and 194.54 Review of Changes to WIPP Performance Assessment Features Events, and Processes in the CRA-2019. April 2022. Washington, DC: Office of Radiation and Indoor Air. EPA Docket FDMS Docket ID No. EPA-HQ-OAR-2019-0534.*