Sandia National Laboratories
Waste Isolation Pilot Plant

Features, Events and Processes Assessment for the Compliance Recertification Application – 2026, Revision 0

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LIST OF ACRONYMS

AP	Analysis Plan
CARD	Compliance Application Review Document
CCA	Compliance Certification Application
CFR	Code of Federal Regulation
CRA	Compliance Recertification Application
DBMAR	Delaware Basin Monitoring Annual Report
DOE	Department of Energy
DP	disturbed performance
EP	events and processes
EPA	Environmental Protection Agency
FEP	feature, event, or process
HCN	historic, current, or near-future
LWA	Land Withdrawal Act
PA	performance assessment
PAIR	Performance Assessment Inventory Report
SNL	Sandia National Laboratories
SO-C	screened-out, consequence
SO-P	screened-out, probability
SO-R	screened-out, regulatory
SP	Specific Procedure
TRU	transuranic
TSD	Technical Support Document
UP	undisturbed performance
WIPP	Waste Isolation Pilot Plant

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1. INTRODUCTION

The United States Department of Energy (DOE) has developed the Waste Isolation Pilot Plant (WIPP) in southeastern New Mexico for the disposal of transuranic (TRU) wastes generated by defense programs. In May of 1998, the Environmental Protection Agency (EPA) certified that the WIPP would meet the disposal standards (EPA 1998) established in Title 40 Code of Federal Regulations (CFR) Part 191, Subparts B and C (EPA 1993), thereby allowing the WIPP to begin waste disposal operations. This certification was based on performance assessment (PA) calculations that were included in the DOE's Compliance Certification Application (CCA) (DOE 1996). These calculations demonstrated that the predicted releases of radionuclides to the accessible environment would not exceed those allowed by the EPA standard, given the assumptions and understanding of the disposal system at that time.

The WIPP Land Withdrawal Act (LWA) (U.S. Congress 1996) requires that the WIPP's compliance with the EPA's disposal standards be recertified every five years. This recertification process allows the most recent and up-to-date information to be incorporated into the PA. As such, the DOE has submitted Compliance Recertification Applications (CRAs) that demonstrate continued compliance with EPA's requirements for radioactive waste disposal in March 2004, 2009, 2014, and 2019. As part of their review of each CRA, the EPA evaluates the basis of features, events, and processes (FEPs) as presented by the DOE and documents their review in their Compliance Application Review Documents (CARDs) and Technical Support Documents (TSDs). The EPA's most recent review of the WIPP FEPs baseline was for CRA-2019 (DOE 2019) and is presented in their CARD for Section 194.32 (EPA 2022a) and related TSD (EPA 2022b).

In its role as the scientific advisor for the WIPP, Sandia National Laboratories (SNL) conducts periodic PAs to evaluate the performance of WIPP. With each PA, it is incumbent upon SNL to confirm that the FEPs basis is adequate and appropriate to account for any new or proposed changes to the repository design and/or the PA system. Such changes are evaluated incrementally according to SNL Specific Procedure (SP) SP 9-4, "Performing FEPs Baseline Impact Assessments for Planned and Unplanned Changes," (Kirkes 2024). Through this procedure, the FEPs baseline is managed and updated systematically over time. The method provided in SP 9-4 provides for constant maintenance of the baseline in that the FEPs baseline is evaluated each time a new performance assessment is conducted. This method provides assurance that PA analyses done in the interim between recertification applications are based on a valid and appropriate FEPs basis.

In their TSD on FEPs (EPA 2022b), the EPA stated that many FEPs within the baseline remained largely unchanged since the CCA, and that while their descriptions and screening bases were not invalid, many could benefit from updated information, even if the new information does not alter the screening argument nor its decision. To that end, Sandia Analysis Plan (AP)-199 (Kirkes 2022) laid forth a process to systematically evaluate every FEP within the FEPs baseline and update as necessary. This comprehensive process updated and brought current the FEPs baseline as presented in the analysis report that documents the AP-199 activity (Kirkes and McCormick 2023).

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Therefore, this document presents the roll-up of the FEPs assessments that have been conducted since the AP-199 Reassessment (Kirkes and McCormick 2023), as well as any new information that has not been reviewed within the SP 9-4 FEPs assessments. The results of this analysis will thereby identify potential and/or likely changes to the FEPs basis for the CRA-2026. The entire FEPs baseline, including those changed as a result of this assessment and those that were unchanged will be documented in Appendix SCR-2026, and included in the CRA-2026 submittal to the EPA.

1.1 COMPLIANCE RECERTIFICAITON APPLICATION - 2024 SUBMITTAL DELAYED

The U.S. DOE submitted a letter to U.S. EPA requesting EPA concurrence in updating the WIPP CRA schedule so that submission can occur five years after the most recent completeness determination, as published in the *Federal Register* (DOE 2023). The EPA agreed with the proposed change and adjusted the expected submittal date (EPA 2023). Under the revised schedule, the CRA submittal was moved from March 2024 (five years after submittal of the CRA-2019), such that the next CRA is expected to be submitted by DOE on or before November 26, 2026. This additional time will provide for a more robust and complete certification application by allowing pending regulatory actions (i.e., planned change notices or requests) to be completed and included into the next CRA, in this case the CRA-2026.

2. FEPS IMPACT ASSESSMENT APPROACH

As noted in the introduction, the purpose of this document is to determine if the current FEPs baseline remains appropriate for PA calculations conducted in support of the CRA-2026. The current FEPs baseline is represented by: (1) FEPs updated as part of AP-199 (Kirkes 2022, and Kirkes and McCormick 2023); (2) FEPs assessment results and other information in Sandia Records Package 549146 (the records package for SP 9-4 reports) that are more recent than the analysis reported in Kirkes and McCormick (2023); (3) changes planned for the conduct of the CRA-2026 PA; and (4) information relevant to the PA baseline that originates from sources outside the PA program. This analysis will evaluate the FEPs baseline and identify areas of change in three steps:

First, this analysis will evaluate changes to the PA baseline since the analysis that was completed under AP-199 by reviewing all FEPs assessments that have been conducted under SP 9-4 since that time. This information consists of the contents of Records Package 574936 and will assure that all changes that have been actively pursued by the DOE will be addressed in this assessment. The Replacement Panels Planned Change Request included a FEPs assessment (Kirkes 2023) that will be included as part of this analysis.

Second, this analysis will consider changes described in AP-214 (Hansen et al. 2025) and identify FEPs for evaluation resulting from the changes described for CRA-2026 PA.

Third, this analysis will evaluate new information from outside the WIPP PA program. This information may come from DOE monitoring programs or other outside sources of information

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that may be relevant to the WIPP's certification basis. Information relating to human activities in the WIPP vicinity will be of primary interest because this information has the greatest potential for changes that could impact the FEPs basis. For example, the natural system is well defined and changes occur very slowly if at all; however, technological advancements that relate to resource extraction may occur in a very short period of time. Note that some data that originates outside the WIPP program will be addressed as part of the changes identified by AP-214 above (step 2).

This report continues to use the same screening classifications used since the WIPP CCA: "UP" is the screening classification that represents those FEPs incorporated in undisturbed performance scenarios. The "DP" screening classification represents FEPs incorporated in disturbed performance scenarios. "SO-C" represents those FEPs the have been excluded or screened out of any scenario due to either low-, no-, or beneficial consequence. "SO-R" represents those FEPs that have been screened out due to regulatory provision, and "SO-P" represents those FEPs that have been screened out due to low probability of occurrence. Additionally, there are two timeframes within which human-induced FEPs are applied. Historic, current, and near-future (HCN) are those FEPs that have been known to have happened in the past, are currently occurring, or may happen within the near future. Future FEPs are those which have not happened but may be possible in the long-term.

2.1 REVIEW OF SP 9-4 FEPS ASSESSMENTS

Section 2.4.8 of SP 9-4 requires that the results of all FEPs assessments be placed in Sandia Records Package number 574936. Therefore, the contents of this records package must be obtained to begin this review for the CRA-2026. Records package 574936 includes only one FEPs assessment conducted since the most recent baseline update, the "Features, Events, and Processes Assessment for The Replacement Panels Planned Change Request," (RPPCR) (Kirkes 2023).

2.1.1 FEPS ANALYSIS FOR THE REPLACEMENT PANELS PLANNED CHANGE REQUEST PERFORMANCE ASSESSMENT

The FEPs analysis completed for the RPPCR reviewed changes listed in AP-204 (Hansen et al. 2023) and was conducted in accordance with SP 9-4. It was determined that there were no screening decision changes or changes to the FEPs baseline necessary to conduct the RPPCR PA. Therefore, the FEPs baseline was not modified as a result of the RPPCR.

2.2 ASSESSMENT FOR CHANGES DESCRIBED IN AP-214

Analysis Plan AP-214 (Hansen et al. 2025) describes models and parameters to be used in PA for the CRA-2026 and describes these changes relative to the RPPCR and the CRA-2019. AP-214 describes the analyses necessary to evaluate the impacts of two repository configurations:

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- An interim state repository comprising ten original and two replacement panels containing a portion of the allowable inventory volume. This interim state configuration represents the certified repository design at the time of submittal of CRA-2026.
- A final state repository comprising ten original, two replacement, and seven additional panels. The 19-panel final state repository provides sufficient volume for disposal of the full allowable waste volume as specified in the WIPP LWA (6.2 million cubic feet).

AP-214 describes the analysis necessary to evaluate the performance of a repository under these conditions and identifies the following changes to the PA conducted for CRA-2026:

The CRA-2026 Differs from the RPPCR PA as follows:

- The inventory for the final state repository will be based on the Full Repository Performance Assessment Inventory Report – 2024 (PAIR) (Van Soest 2025a). The inventory for the interim state repository is based on a scaled-down volume suitable for a 12-panel repository. This inventory is presented in Van Soest 2025b.
- The Salado flow and transport computational grid for the final state repository is adjusted primarily for consistency with repository design information. A Salado flow and transport computational grid for the interim state repository will be developed which represents a total of 12 waste panels, rather than 19 waste panels as in the RPPCR.
- Repository parameters ABERM, VREPOS, AREA_CH, and FVW are updated to be consistent with the interim and final state repositories.
- For anhydrite marker beds, the van Genuchten-Parker capillary pressure function (selected when parameter RELP_MOD=6) is modified to include a lower bound on capillary pressure (Day 2025).
- The parameter DBRMINBV for the minimum brine volume for a DBR release is updated for each repository state, since this parameter depends on repository excavated volume.
- Baseline solubilities for +III, +IV and +V actinides are updated in conjunction with the inventory for each repository state.
- Baseline solubility for +VI actinides is updated based on analysis by Los Alamos National Laboratory (LANL).
- Uncertainties for baseline solubilities are updated to account for new information since the RPPCR.
- Colloid concentration parameters are updated based on new analyses since the RPPCR.
- The location of the Culebra Release Point 2 (CRP 2) that represents Panels 11, 12 and 13 in the RPPCR is adjusted to represent only the replacement Panels 11 and 12 for the interim state repository. The same CRP 2 location is used for Panels 11, 12 and 13 in the final state repository.
- The drilling rate and frequencies of borehole plugging patterns are updated to account for new information since the RPPCR.

This FEPs assessment will consider these changes since the most recent baseline change that was established with completion of the AP-199 FEPs Reassessment.

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2.2.1 IDENTIFICATION OF RELATED FEPS

This FEPs analysis identified 29 FEPs related to activities in AP-214. These are listed below in Table 1.

Table 1: FEPs Related to Changes in AP-214

Related FEPs	Screening Classification	Relationship to Proposed Change
N2 Brine Reservoirs	DP	The location of additional panels may be underlain by sources of pressurized brine.
N8 Formation of Fractures	SO-P UP (Repository)	Formation of Fractures may occur around panels (additional).
N9 Changes in Fracture Properties	SO-C UP (Near Repository)	Changes in the stress field near panels may change fracture properties.
H1 Oil and Gas Exploration	SO-C (HCN) DP (Future)	The presence of additional panels and waste areas may increase the probability of an inadvertent human intrusion due to the increased repository footprint.
H2 Potash Exploration	SO-C (HCN) DP (Future)	Potash Mining above panels may alter groundwater flow due to the subsidence of overlying units.
H4 Oil and Gas Exploitation	SO-C (HCN) DP (Future)	The presence of additional panels and waste areas may increase the probability of an inadvertent human intrusion due to the increased repository footprint.
H8 Other Resources (drilling for)	SO-C (HCN) DP (Future)	The presence of additional panels and waste areas may increase the probability of an inadvertent human intrusion due to the increased repository footprint.
H9 Enhanced Oil and Gas Recovery (drilling for)	SO-C (HCN) DP (Future)	The presence of additional panels and waste areas may increase the probability of an inadvertent human intrusion due to the increased repository footprint.
H21 Drilling Fluid Flow	SO-C (HCN) DP (Future)	The presence of additional panels and waste areas may increase the probability of an inadvertent human intrusion due to the increased repository footprint and could result

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Related FEPs	Screening Classification	Relationship to Proposed Change
		in releases of radionuclides into the drilling fluid.
H22 Drilling Fluid Loss	SO-C (HCN) DP (Future)	The presence of additional panels and waste areas may increase the probability of an inadvertent human intrusion due to the increased repository footprint and drilling fluid could be lost to thief zones encountered during drilling.
H23 Blowouts	SO-C (HCN) DP (Future)	The presence of additional panels and waste areas may increase the probability of an inadvertent human intrusion due to the increased repository footprint. Fluid could flow from pressurized zones in the borehole to the land surface.
W1 Disposal Geometry	UP	The location of panels must be adequately represented in the BRAGFLO grid.
W2 Waste Inventory	UP	The updated inventory information may have an impact on calculated releases.
W5 Container Material Inventory	UP	The updated inventory will have updated masses of container materials.
W14 Nuclear Criticality: Heat	SO-P	New inventory information may increase fissile loading.
W18 Disturbed Rock Zone (DRZ)	UP	Panel layout may introduce a zone of increased permeability in the host-rock (salt) adjacent to the mining openings
W19 Excavation-Induced Changes in Stress	UP	Panel location may introduce changes in stress of the host-rock.
W22 Roof Falls	UP	Mining additional panels may increase the DRZ, which may lead to roof falls.
W23 Subsidence	SO-C	Additional panels may cause subsidence in overlying units.
W24 Large Scale Rock Fracturing	SO-P	Mining of additional panels could cause instability in the underground and lead to increased permeability and/or pathways.

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Related FEPs	Screening Classification	Relationship to Proposed Change
W41 Wicking	UP	The change in the capillary pressure function affects capillary rise (wicking) in the waste material, which could affect gas generation rates due to water availability. Potential releases caused by drilling intrusion are also influenced by brine saturations and therefore by wicking.
W43 Convection	SO-C	Change to inventory could cause a change in heat production estimates.
W56 Speciation	UP in disposal rooms and Culebra. SO-C elsewhere, and SO-C - Beneficial in shaft seals	New inventory information may impact waste inventory-related parameters, actinide solubilities, and related uncertainty distributions.
W68 Organic Complexation	UP	New inventory information may impact waste inventory-related parameters and solubility calculations.
W69 Organic Ligands	UP	New inventory information may impact waste inventory-related parameters and solubility calculations.
W78 Colloidal Transport	UP	New inventory information may impact waste inventory-related parameters and colloid formation and/or actinide transport.
W79 Colloidal Formation and Stability	UP	New inventory information may impact waste inventory-related parameters and colloid formation and/or actinide transport.
W80 Colloidal Filtration	UP	New inventory information may impact waste inventory-related parameters and colloid formation and/or actinide transport.
W81 Colloidal Sorption	UP	New inventory information may impact waste inventory-related parameters and colloid formation and/or actinide transport.

UP: Screened in, undisturbed performance scenario
DP: Screened in, disturbed performance scenario
SO-C: Screened out, consequence
SO-P: Screened out, probability

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2.2.2 ANALYSIS OF FEPS FOR AP-214

2.2.2.1 N2 Brine Reservoirs

The FEP N2 Brine reservoirs is currently accounted for in PA calculations in the E1 scenario which assumes an inadvertent human intrusion borehole intercepts a source of pressurized brine beneath the repository. This scenario will continue to be represented in the CRA-2026 PA. Changes to the implementation and representation of brine reservoirs is listed in AP-214. This information will not change the screening argument or its decision.

2.2.2.2 N8 Formation of Fractures and N9 Changes in Fracture Aperture

The FEPs N8 Formation of Fractures and N9 Changes in Fracture Aperture are accounted for in PA calculations through the treatment of the disturbed rock zone (DRZ). Mining additional panels will cause similar fracturing near new excavations. The screening arguments and decisions of these FEPs should not change as a result from analyses completed under AP-214. Parameters and modeling implementation of these two FEPs is beyond the scope of this analysis.

2.2.2.3 H1 Oil and Gas Exploration, H2 Potash Exploration, H4 Oil and Gas Exploitation, H8 Other Resources (drilling for), and H9 Enhanced Oil and Gas Recovery (drilling for)

The WIPP FEPs H1 Oil and Gas Exploration, H2 Potash Exploration, H4 Oil and Gas Exploitation, H8 Other Resources (drilling for), and H9 Enhanced Oil and Gas Recovery (drilling for) are currently accounted for in PA calculations in the disturbed scenario which assumes inadvertent human intrusion into the repository while drilling for resources. Drilling parameters, to include drilling rate and probability of one-, two-, and three-plug well bore plugging patterns will be updated for CRA-2026 as described in AP-214. However, the screening decision and screening argument will remain unchanged.

2.2.2.4 H21 Drilling Fluid Flow, H22 Drilling Fluid Loss, and H23 Blowouts

The FEPs H21 Drilling Fluid Flow, H22 Drilling Fluid Loss, and H23 Blowouts are currently accounted for in PA calculations in the E1 and E2 scenarios. The CRA-2026 will use the same intrusion scenarios as the RPPCR and CRA-2019. Therefore, the screening classifications and arguments for these FEPs will not change for CRA-2026.

2.2.2.5 W1 Disposal Geometry

FEP W1 Disposal Geometry is currently accounted for in PA calculations. This FEP has been identified as related to the changes described in AP-214 because changes to the modeling grid will be necessary to represent both the interim and final states of the repository. Changes made to the model geometry will provide an accurate representation of the repository and important components and is fundamental to meaningful performance predictions. Therefore, FEP W1 should remain screened into PA calculations. This FEP screening argument will be

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updated with new information about the two repository configurations, but no change is needed to the screening decision.

2.2.2.6 W2 Waste Inventory

FEP W2 Waste Inventory is accounted for in PA calculations. Releases from the repository are calculated based on available radioactivity at time of release. Other non-waste inventory components are also tracked and affect repository conditions such as pressure and actinide solubility. Inventory estimates are adjusted in CRA-2026 for both the final state and interim state repositories. This FEP will be updated to include references to the new inventories used. This information will not change the screening decision for FEP W2.

2.2.2.7 W5 Container Material Inventory

FEP W5 container Material Inventory is accounted for in PA calculations through the Gas Generation model and also has effects on the chemical conditions within the repository. FEP W5 will be updated with new inventory data for CRA-2026, but the screening decision will not change.

2.2.2.8 W14 Nuclear Criticality: Heat

FEP W14 Nuclear Criticality: Heat will be updated with new radionuclide inventory information and associated criticality calculations. This new information does not change the screening decision.

2.2.2.9 W18 Disturbed Rock Zone (DRZ) and W19 Excavation-Induced Changes in Stress

FEP W18 Disturbed Rock Zone (DRZ) and W19 Excavation-Induced Changes in Stress are accounted for in PA calculations by the representation of the DRZ around the disposal room model. Additional panels will be based on similar design as current panels. FEPs W18 and W19 will not require changes to screening arguments or decisions based on changes described in AP-214.

2.2.2.10 W22 Roof Falls

Additional excavations will induce changes in stress resulting in the formation of a DRZ around new excavations. Instability of the DRZ could lead to localized roof falls in the first few hundred years after mining. However, the resulting changes in stress, formation of a DRZ, and subsequent roof falls will be similar to those that occur in existing areas of the repository. Therefore, no changes are necessary to the screening decision or screening argument for FEP W22.

2.2.2.11 W23 Subsidence and W24 Large Scale Rock Fracturing

FEPS W23 and W24 are concerned with subsidence and the potential large-scale fracturing of the geologic regions above the repository. The rock extraction ratio for the new panels will be equal to or less than in the original repository design because the isolation pillars between the

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rooms will be greater for the new panels than in the original panel design. Thus, the subsidence over these new panels shouldn't be greater than over the original repository layout. These additional excavated panels are expected to create approximately the same deformation in the immediate vicinity of the excavations (DRZ) and similar fracture openings in the formations above the Salado as in previous repository designs. The screening arguments for these FEPs will be updated, however the screening decisions will not change; they remain excluded from PA calculations due to low consequence (W23) and low probability (W24).

2.2.2.12 W41 Wicking

Wicking is accounted for in PA brine and gas flow calculations and is impacted by changes in the capillary pressure function. The screening classification and arguments for this FEP will not change for CRA-2026.

2.2.2.13 W43 Convection

W43 Convection is updated with new waste inventory information. This new information does not change the screening decision.

2.2.2.14 W56 Speciation

Chemical speciation refers to the form in which elements occur under a particular set of chemical or environmental conditions. Conditions affecting chemical speciation include the temperature, pressure, radiolysis, redox conditions, presence/absence of complexants, degree of aggregation, and salinity (ionic strength) of the brine. The predicted chemical speciation defines the mobile actinide source term which is critical input to release scenarios that impact overall actinide mobility. The FEP W56 will be updated for CRA-2026. Waste inventory is changed for CRA-2026 and actinide solubilities will be recalculated. Colloidal contributions are also updated based on new parameter recommendations. The screening decision for this FEP remains UP in disposal rooms and Culebra.

2.2.2.15 W68 Organic Complexation and W69 Organic Ligands

Some organic ligands can increase actinide solubilities. FEP W68 and W69 will be updated with the most recent inventory information for CRA-2026. There is no change to the screening decision.

2.2.2.16 W78 Colloidal Transport, W79 Colloidal Formation and Stability, W80 Colloidal Filtration, and W81 Colloidal Sorption

The colloidal source term is updated based on updated inventory information. FEPs W78, W79, W80, and W81 will be updated based on the new waste inventory. There is no change to the screening decision; however, updates to the screening arguments should be made to reflect new information regarding the implementation of these FEPs.

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2.2.3 IDENTIFICATION OF ADDITIONAL FEPS

This step of the FEPs impact assessment determines whether there are any unidentified FEPS that are not included in the Baseline FEPs List (BFL) but are necessary to properly account for all aspects of the proposed change(s). For each of the changes identified in AP-214 the question is asked, "do the identified related FEPs account for all aspects of the changes?" In this step, the evaluator must consider each proposed change and ask if the proposed changes involve FEPs not previously identified.

The changes described in AP-214 are not a fundamental departure from existing repository design. Therefore, it can be concluded that no additional FEPs are needed to represent additional panels in the repository and no FEPs currently listed in the baseline need to be removed.

2.3 REVIEW OF NEW INFORMATION ORIGINATING OUTSIDE PERFORMANCE ASSESSMENT

This section will review information that originates outside the WIPP PA program and determine if any changes to FEPs screening decisions and arguments are warranted. Examples of this type of information include changes in technology as it relates to resource exploration, development, and exploitation. This evaluation will primarily focus on human-initiated events and process (EPs), although some natural FEPs may be affected by new data. (e.g., new seismic data may need to be incorporated). Sources of information for this review will include the Delaware Basin Monitoring Annual Report (DBMAR) for 2024 (DOE 2025), and independent contractor reports.

2.3.1 DELAWARE BASIN MONITORING ANNUAL REPORT FOR 2024

FEPs from current baseline were reviewed to determine if any required specific data and information from the DBMAR-2024 (DOE 2025). This review concluded that the following FEPs were in need of update:

2.3.1.1 N2 Brine Reservoir

Summary of New Information

Brine Reservoir (N2) is accounted for in PA and is screened DP. Since the FEPs baseline was updated with AP-199, there have been no additional Castile pressurized brine encounters during the reporting period. This does not change the screening decision, however, the information for this FEP will be updated with the latest information to the Delaware Basin Monitoring Annual Report for 2024.

2.3.1.2 N12 Seismic Activity

Summary of New Information

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Seismic Activity (N12) is accounted for in PA and is screened UP. Seismic events have occurred within the Delaware Basin since the CRA-2019. This information is reported in the DBMAR-2024 (DOE 2025). This screening decision will not change, however, new information will be added to the screening argument.

2.3.1.3 H3 Water Resources Exploration and H5 Groundwater Exploitation

Summary of New Information

Both H3 *Water Resources Exploration* and H5 *Groundwater Exploitation* are screened SO-C for the future timeframe. The Delaware Basin Monitoring Program records and tracks the development of deep and shallow wells within the vicinity of the WIPP. Updated drilling data is reported annually in the Delaware Basin Monitoring Annual Report (DOE 2025). While this information has been updated since the last recertification, it does not result in a change in the screening arguments or decisions of these FEPs.

2.3.1.4 H59 Solution Mining for Other Resources

Summary of New Information

H59 *Solution Mining for Other Resources* is screened SO-C. Since the CRA-2019, there have not been any new brine wells put into service within the Delaware Basin. There have been two previously active brine wells taken out of service and plugged and abandoned. These two decommissioned wells are both in Eddy County, New Mexico. Therefore, the total active brine well count is at 0, a reduction of 10 from the CRA-2019. These changes are illustrated below in Table 2. This new information will be incorporated in Appendix SCR-2026 into the H59 FEP screening argument, but the screening decision will not change as a result.

Table 2: Delaware Basin Brine Well Status (U.S. DOE 2025)

County	Location	API №	Well Name and Number	Operator	Status/Type
Eddy	22S-27E-17	30-015-22574	Eugenie #1	I & W Inc.	Plugged Brine Well
Eddy	22S-27E-17	30-015-23031	Eugenie #2	I & W Inc.	Plugged Brine Well
Eddy	22S-27E-23	30-015-28083	Dunaway #001	Permian Water Solutions, LLC	Plugged Brine Well
Eddy	22S-27E-23	30-015-28084	Dunaway #2	Permian Water Solutions, LLC	Plugged Brine Well

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Eddy	22S-26E-36	30-015-21842	City Of Carlsbad # 1	Key Energy Services, LLC	Plugged Brine Well
Eddy	22S-27E-03	30-015-20331	Tracy #3	Ray Westall	Plugged Brine Well

2.3.2 UPDATED INVENTORY INFORMATION

As described previously, the CRA-2026 will use updated inventory information. This information is presented in two separate PAIRs; one for the final state and one for the interim state repositories, respectively (Van Soest 2025a and 2025b). Some waste-related FEPs were identified and discussed previously as part of the AP-214 analyses. Below, other waste-related FEPs are identified that will be updated as necessary to reflect new inventory data. The FEPs that require updating to reflect the most recent inventory data are:

W3 Heterogeneity of Waste Forms

W4 Container Form

W13 Heat from Radioactive Decay

W15 Radiological Effects on Waste

W16 Radiological Effects on Containers

W17 Radiological Effects on Shaft Seals

W28 Nuclear Explosions

W29 Thermal Effects on Material Properties

W30 Thermally-induced Stress Changes

W31 Differing Thermal Expansion of Repository Components

W34 Container Integrity

W44 Degradation of Organic Material

W45 Effects of Temperature on Microbial Gas Generation

W48 Effects of Biofilms on Microbial Gas Generation

W49 Gases from Metal Corrosion

W51 Chemical Effects of Corrosion

W52 Radiolysis of Brine (gas effects)

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W54 Helium Gas Production

W55 Radioactive Gases

W72 Exothermic Reactions

W73 Concrete Hydration

W89 Transport of Radioactive Gases

W93 Soret Effect

W112 Radiological Effects on Panel Closures

3. FEPS ASSESSMENT SUMMARY

The FEPs baseline has been re-evaluated to determine if any new information affects the baseline screening descriptions, arguments, and decisions for WIPP FEPs. Results from FEPs assessments conducted under SP 9-4 since the AP-199 FEPs reassessment were reviewed to identify information that is in need of update. This consisted of a single SP 9-4 assessment completed for the RPPCR. Previous 9-4 assessments were rolled up in the AP-199 FEPs reassessment. In addition, new information that originates outside the Sandia WIPP PA system was reviewed and compared against the FEPs baseline to identify areas of change. This review concludes with 245 FEPs in the baseline for the CRA-2026. No FEPs have been added, and none deleted since the CRA-2019. This analysis has identified 64 FEPs that will be updated with new information for the CRA-2026[1]. There have been no changes to screening decisions as part of this assessment. The 64 FEPs that will be updated for the CRA-2026 are listed below in Table 3.

Table 3: FEPs Reassessment Results

EPA FEP I.D.	FEP Name	Screening Decision Changed	Change Summary	Screening Classification
N2	***Brine Reservoirs***	No	Update with new parameter PBRINE.	DP
N12	***Seismic Activity***	No	Update with new seismic data.	UP
N43	***Aeolian Erosion***	No	Update with rainfall and temperature data	SO-C

[1] Additional FEPs may be updated as part of the broader CRA-2026 review process (i.e., during the final review of Appendix SCR-2026).

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EPA FEP I.D.	FEP Name	Screening Decision Changed	Change Summary	Screening Classification
N44	***Fluvial Erosion***	No	Update with rainfall and temperature data	SO-C
N45	***Mass Wasting***	No	Update with rainfall and temperature data	SO-C
H1	***Oil and Gas Exploration***	No	Update with new drilling rate.	SO-C (HCN) DP (Future)
H3	***Water Resources Exploration***	No	Updated with most recent monitoring information.	SO-C (HCN) SO-C (Future)
H4	***Oil and Gas Exploitation***	No	Updated with new drilling rate	SO-C (HCN) DP (Future)
H5	***Groundwater Exploitation***	No	Updated with most recent monitoring information.	SO-C (HCN) SO-C (Future)
H31	***Natural Borehole Fluid Flow***	No	Update to reference new plug type probabilities.	SO C (HCN) SO-C (Future, holes not penetrating waste panels) DP (Future, holes penetrating panels)
H32	***Waste-Induced Borehole Flow***	No	Update to reference new plug type probabilities.	SO-R (HCN) DP (Future)
H35	***Borehole-Induced Mineralization***	No	Update to reference new plug type probabilities.	SO-C (HCN) SO-C (Future)
H36	***Borehole-Induced Geochemical Changes***	No	Update to reference new plug type probabilities.	UP (HCN) DP (Future) SO-C-Beneficial for units other than the Culebra
H37	***Changes in Groundwater Flow Due to Mining***	No	Update to reference new potash mining leases.	UP (HCN) DP (Future)

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EPA FEP I.D.	FEP Name	Screening Decision Changed	Change Summary	Screening Classification
H59	***Solution Mining for Other Resources***	No	Update with new information regarding brine wells in the region.	SO-C (HCN) SO-C (Future)
W1	***Disposal Geometry***	No	Update with new information regarding the interim and final state repository configurations.	UP
W2	***Waste Inventory***	No	Update to reflect the inventory data sources used for the CRA-2026.	UP
W3	***Heterogeneity of Waste Forms***	No	Update to reflect the inventory data sources used for the CRA-2026	DP
W4	***Container Form***	No	Update to reflect the inventory data sources used for the CRA-2026.	SO-C – Beneficial
W5	***Container Material Inventory***	No	Update to reflect the inventory data sources used for the CRA-2026.	UP
W9	***Backfill Physical Properties***	No	Update table with new mass of magnesium oxide in panels	SO-C
W13	***Heat from Radioactive Decay***	No	Update to reflect the inventory used for the CRA-2024.	SO-C

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EPA FEP I.D.	FEP Name	Screening Decision Changed	Change Summary	Screening Classification
W14	***Nuclear Criticality: Heat***	No	Update to reflect the inventory used for the CRA-2026 and new criticality analysis.	SO-P
W15	***Radiological Effects on Waste***	No	Update to reflect the inventory used for the CRA-2026	SO-C
W16	***Radiological Effects on Containers***	No	Update to reflect the inventory used for the CRA-2026.	SO-C
W17	***Radiological Effects on Shaft Seals***	No	Update argument to reflect the inventory used for the CRA-2026.	SO-C
W18	***Disturbed Rock Zone***	No	Update to reference changes for CRA-2026 repository models.	UP
W19	***Excavation-Induced Change in Stress***	No	Update to reference changes for CRA-2026 repository models.	UP
W20	***Salt Creep***	No	Updated with new computational grid information.	UP
W21	***Changes in the Stress Field***	No	Updated with new computational grid information.	UP
W22	***Roof Falls***	No	Update with new information around new excavation.	UP
W23	***Subsidence***	No	Update with new information around new excavation.	SO-C

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EPA FEP I.D.	FEP Name	Screening Decision Changed	Change Summary	Screening Classification
W24	***Large Scale Rock Fracturing***	No	Update with new information around new excavation.	SO-P
W28	***Nuclear Explosions***	No	Update to reflect the inventory used for the CRA-2026 and new criticality screening assessment.	SO-P
W29	***Thermal Effects on Material Properties***	No	Update to reflect the inventory used for the CRA-2026.	SO-C
W30	***Thermally-Induced Stress Changes***	No	Update to reflect the inventory used for the CRA-2026.	SO-C
W31	***Differing Thermal Expansion of Repository Components***	No	Update to reflect the inventory used for the CRA-2026.	SO-C
W34	***Container Integrity***	No	Update to reflect the inventory used for the CRA-2026.	SO-C Beneficial
W43	***Convection***	No	Update to reflect the inventory used for the CRA-2026.	SO-C
W44	***Degradation of Organic Material***	No	Update to reflect the inventory used for the CRA-2026.	UP
W45	***Effects of Temperature on Microbial Gas Generation***	No	Update to reflect the inventory used for the CRA-2026.	UP
W48	***Effects of Biofilms on Microbial Gas Generation***	No	Update to reflect the inventory used for the CRA-2026.	UP

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EPA FEP I.D.	FEP Name	Screening Decision Changed	Change Summary	Screening Classification
W49	***Gases from Metal Corrosion***	No	Update to reflect the inventory used for CRA-2026.	UP
W51	***Chemical Effects of Corrosion***	No	Update to reflect the inventory used for CRA-2026.	UP
W52	***Radiolysis of Brine (gas effects)***	No	Update to reflect the inventory used for the CRA-2026.	UP
W54	***Helium Gas Production***	No	Update to reflect new inventory used for the CRA-2026.	SO-C
W55	***Radioactive Gases***	No	Update to reflect new inventory used for the CRA-2026.	SO-C
W56	***Speciation***	No	Reference made to new solubility calculations based on new inventory components	UP in disposal rooms and Culebra. SO-C elsewhere, and SO-C Beneficial in cementitious seals.
W61	***Actinide Sorption***	No	Update with new colloid parameters.	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***	No	Update with new colloid parameters.	UP in the Culebra and Dewey Lake SO-C – Beneficial in the Disposal Room, Shaft Seals, Panel Closures, and Other Geologic Units

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EPA FEP I.D.	FEP Name	Screening Decision Changed	Change Summary	Screening Classification
W63	***Changes in Sorptive Surfaces***	No	Update with new colloid parameters.	UP
W68	***Organic Complexation***	No	Update to reflect new inventory and solubility calculations for use in the CRA-2026.	UP
W69	***Organic Ligands***	No	Update to reflect new inventory and solubility calculations for use in the CRA-2026.	UP
W72	***Exothermic Reactions***	No	Update to reflect the inventory used for the CRA-2026.	SO-C
W73	***Concrete Hydration***	No	Update to reflect the inventory used for the CRA-2026.	SO-C
W78	***Colloidal Transport***	No	Update to reflect the inventory used for the CRA-2026 and updated colloidal source term.	UP
W79	***Colloidal Formation and Stability***	No	Update to reflect the inventory used for the CRA-2026 and updated colloidal source term.	UP
W80	***Colloidal Filtration***	No	Update to reflect the inventory used for the CRA-2026 and updated colloidal source term.	UP

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EPA FEP I.D.	FEP Name	Screening Decision Changed	Change Summary	Screening Classification
W81	***Colloidal Sorption***	No	Update to reflect the inventory used for the CRA-2026 and updated colloidal source term.	UP
W87	***Microbial Transport***	No	Update with reference to new colloidal actinide source term and colloidal actinide parameters.	UP
W89	***Transport of Radioactive Gases***	No	Update to reflect the inventory used for the CRA-2026.	SO-C
W93	***Soret Effect***	No	Update to reflect the inventory used for the CRA-2026.	SO-C
W97	***Chemical Gradients***	No	Update to reference updated colloidal enhancement parameters.	SO-C
W112	***Radiological Effects on Panel Closures***	No	Update to reflect the inventory used for the CRA-2026.	SO-C

3.1 ADDITIONAL ACTIVIITES

As a result of this assessment, the following activities are required to assure that the FEPs baseline is accurately updated and documented.

1. Modify those FEPs identified above in the baseline FEPs screening document. The newly modified version of Appendix SCR will be submitted as part of the CRA-2026. The updated Attachment SCR should also be placed in records package 549146.

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