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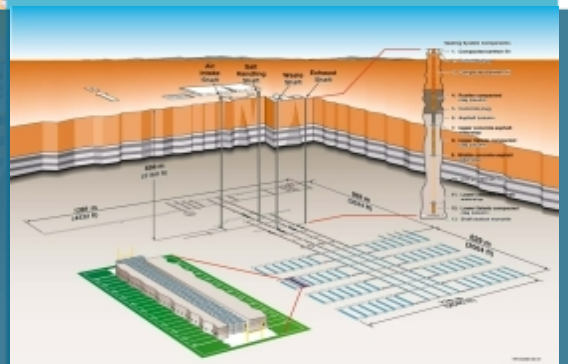
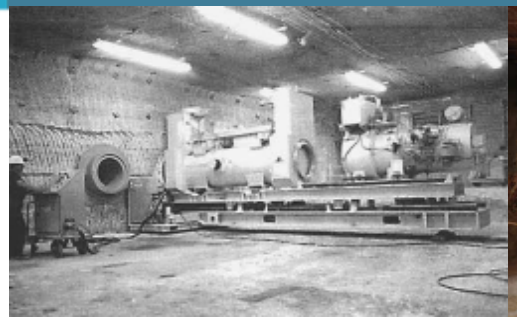
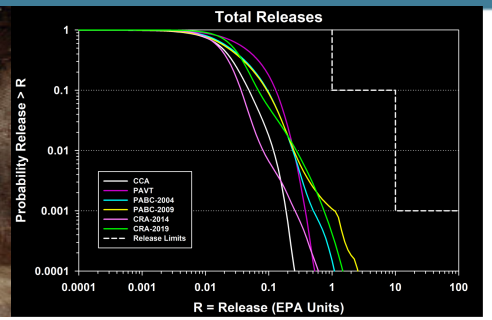
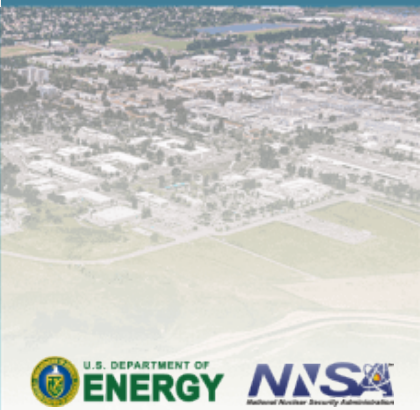
Sandia National Laboratories

Peer Review Regulatory Requirements









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Outline

- WIPP Governing Regulations
- What is Performance Assessment (PA)?
- Peer Review's Role in PA
- WIPP PA and Peer Review History
- Peer Review and the Regulatory Process
- Goal of Peer Review

WIPP Long-Term Disposal Regulations

- Environmental Protection Agency (EPA) governs radioactive waste disposal at WIPP
  - 40 CFR 191 - Radioactive Waste Disposal Standards (1985, 1993)
  - 40 CFR 194 - Criteria for Certification with 40 CFR 191 (1996)
- Radioactive Waste Disposal Standards set release limits based on emplaced inventory
- Demonstration of compliance with the release limits must include a PA (40 CFR §191.13)
- Conceptual Models used in PA must be peer reviewed (40 CFR §194.23)

Performance Assessment is Required by 40 CFR §191.13

(a) Disposal systems for spent nuclear fuel or high-level or transuranic radioactive wastes shall be designed to provide a reasonable expectation, ***based upon performance assessments***, that the cumulative releases of radionuclides to the accessible environment for 10,000 years after disposal from all significant processes and events that may affect the disposal system shall:

(1) Have a likelihood of less than one chance in 10 of exceeding the quantities calculated according to Table 1 (appendix A); and

(2) Have a likelihood of less than one chance in 1,000 of exceeding ten times the quantities calculated according to Table 1 (appendix A).

(b) ***Performance assessments need not provide complete assurance*** that the requirements of §191.13(a) will be met. Because of the long time period involved and the nature of the events and processes of interest, there will ***inevitably be substantial uncertainties*** in projecting disposal system performance. Proof of the future performance of a disposal system is not to be had in the ordinary sense of the word in situations that deal with much shorter time frames. Instead, ***what is required is a reasonable expectation***, on the basis of the record before the implementing agency, that compliance with §191.13 (a) will be achieved. (emphasis added)

Peer Review's Role in WIPP PA

- 40 CFR §194.23 states:
  - Any compliance application shall include documentation that:
    - §194.23(a)(3)(i) Conceptual models and scenarios reasonably represent possible future states of the disposal system;
    - §194.23(a)(3)(v) Conceptual models have undergone peer review according to §194.27
- 40 CFR §194.27
  - Peer Reviews must follow guidelines of NUREG 1297 "Peer Review for High-Level Nuclear Waste Repositories"
  - DOE's MP 10.5 implements these guidelines

Peer Review's Role in WIPP PA

- NUREG 1297

- "Peer reviews may be used as part of the QA actions necessary to provide adequate confidence in the work being reviewed. Because of several unique conditions inherent to the geologic repository program, expert judgement will be needed to be utilized in assessing the adequacy of work. Peer reviews are a mechanism by which these judgments may be made."

NUREG Definitions

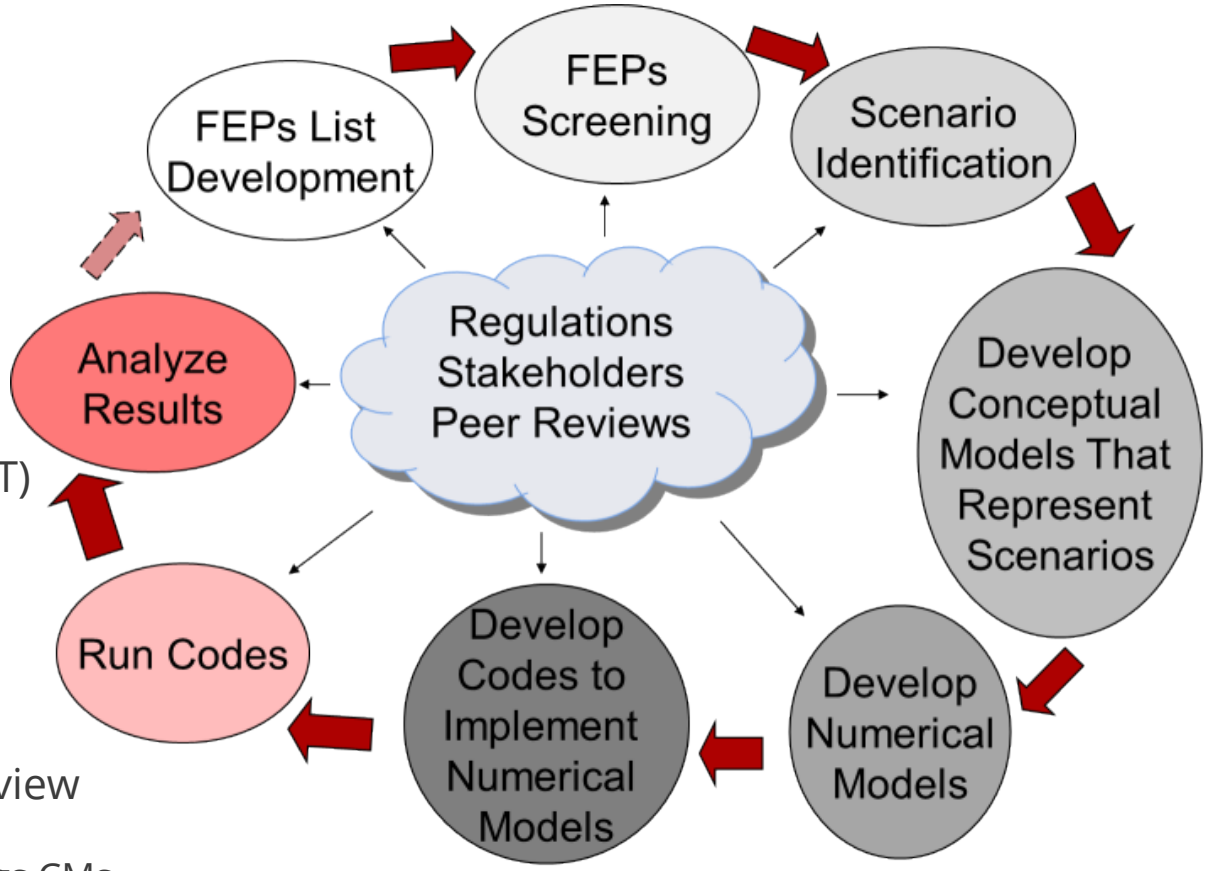
- "A *peer review* is a documented critical review performed by peers who are independent of the work being reviewed."

- "A *peer review* is an in-depth critique of assumptions, calculations, extrapolations, alternate interpretations, methodology, and acceptance criteria employed, and of conclusions drawn in the original work." (emphasis added)

WIPP PA Has Advanced via Iterative Process and Peer Review plays a role…

1992 Preliminary PA
1994 Compliance Status Report
1995 Draft Compliance Certification Application (CCA)
1996 CCA*
1997 EPA Performance Assessment Verification Test (PAVT)
2004 Compliance Recertification Application (CRA)**
2009 CRA***
2014 CRA
2019 CRA

RED text denotes PAs updated and supported by Peer Review
* All 24 WIPP CMs
** Disposal Room Geometry, Repository Fluid Flow and Spallings CMs
*** Culebra Hydrology CM



Peer Review Factors into WIPP Regulatory Process

- DOE must submit Documentation of Continued Compliance (i.e., recertification) every 5-years (WIPP Land Withdrawal Act Requirement)
  - Must incorporate changes that occur since latest certification (40 CFR §194.15 (a))
  - Peer Review of existing (and changes to) WIPP Conceptual Models is an important element of the EPA-mandated QA requirements for WIPP (40 CFR §194.27)

- DOE will include these Conceptual Model changes in a “planned change request” to be submitted to EPA.
  - EPA approval must be granted prior to implementation for compliance purposes

Peer Review Process is Transparent

- EPA may observe the Peer Review process
- EPA may audit the Peer Review records to assess compliance to the QA requirements and compliance with NUREG 1297
- EPA requires the WIPP PA to follow ASME NQA (1989 edition) QA requirements

Peer Review Goal

- Goal of Peer Review Process – Regulatory Perspective
  - Document the adequacy of conceptual models to reasonably represent repository processes in the future for use in PA
    - Focus on updates and/or changes to existing (PR approved) conceptual models; avoid re-evaluating unchanged aspects

Summary

- A Peer Review of the Conceptual Models used in the WIPP PA is required by EPA's radioactive waste disposal standards
- Peer Reviews are used to document that key aspects of the disposal system are reasonably represented by conceptual models (§194.23(a)(3)(i)).
- Conceptual model changes must be peer reviewed to NUREG 1297 in order for these changes to be acceptable to EPA
- Peer Review is a QA element. EPA may audit the Peer Review records to assess compliance with their QA requirements and NUREG 1297

Questions?