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Challenges for Department of Energy Low-Level Waste Disposal Performance Assessments

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Panel Discussion: Interagency Community of Practice on Performance and Risk Assessment
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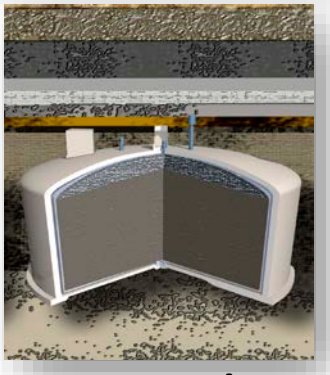
Potential Discussion Topics

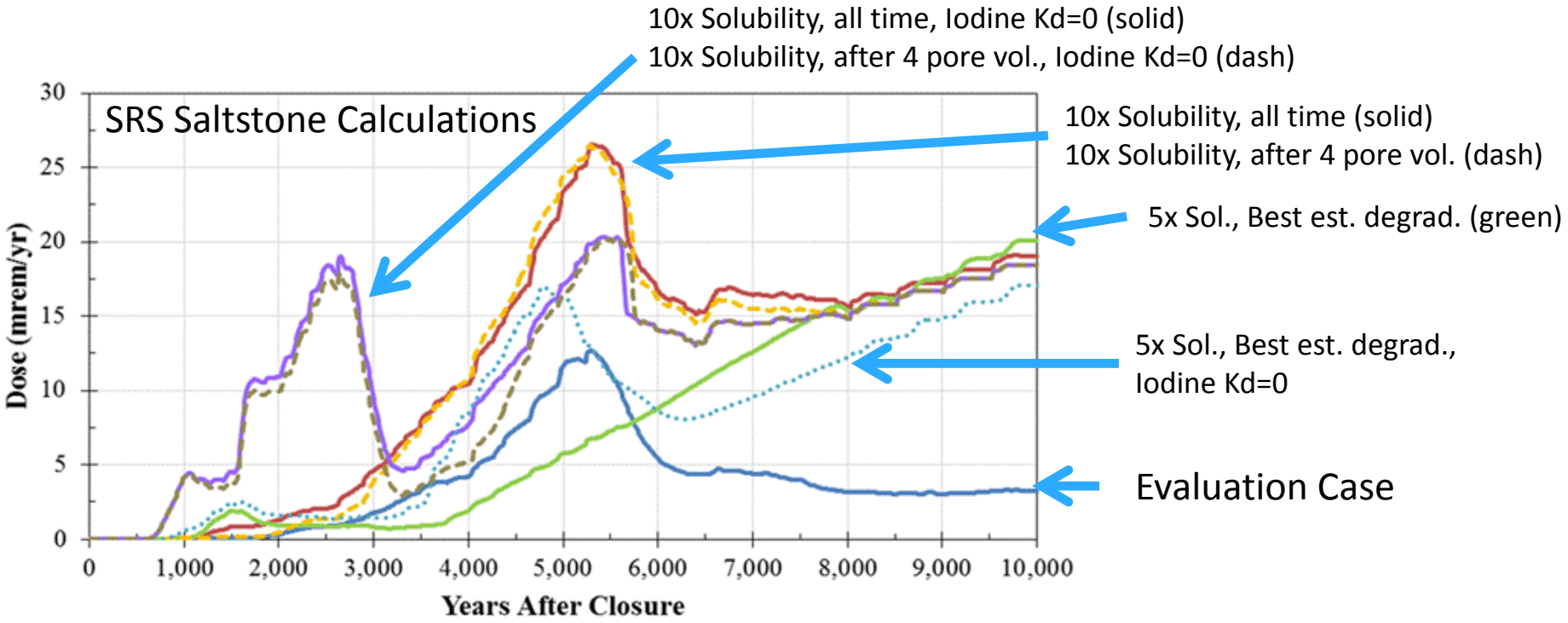
- Appropriately addressing “What-If” cases - PA as a learning tool
- Inadvertent Human Intrusion
- Use of Probabilistic Approaches (“Risk Informed”)
- Engineered barrier/waste form performance over long times
- Use of PA to prioritize R&D, characterization, monitoring, design, etc.
- Role of Monitoring – compliance, functional/performance, confidence building
- Effective communication - perspective



DOE Photos/Figures

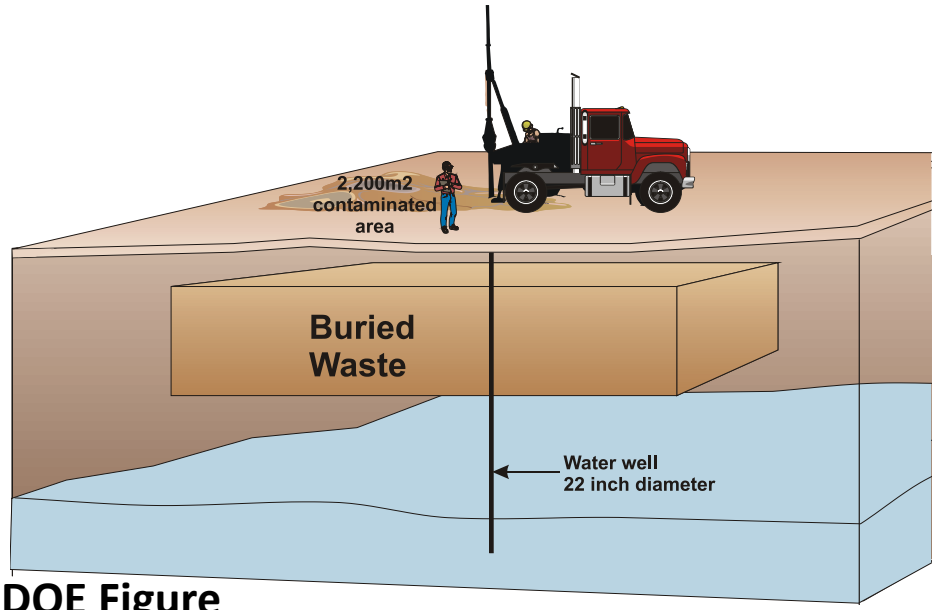
Appropriately Addressing "What-If" Cases

- Reviewers, stakeholders often request simulations with significant pessimistic bias (e.g., barrier analysis)
- Can be informative for expected effectiveness of different barriers and understanding of safety functions (sensitivity, importance)
- Interpret results relative to compliance (higher dose, lower likelihood)?



Inadvertent Human Intrusion

- Analysis unique to radioactivity (waste/residuals) to improve robustness and assess suitability of waste for near-surface disposal
- "Stylized" scenarios (e.g., excavation, drilling) – not implying ability to predict or quantify uncertainty for future human behavior
- How to address likelihood? (ICRP/IAEA specifically discourage probabilities)
- When is a scenario possible (active controls, passive controls, remoteness of facility, effectiveness of barriers, waste- or soil-like cuttings)?



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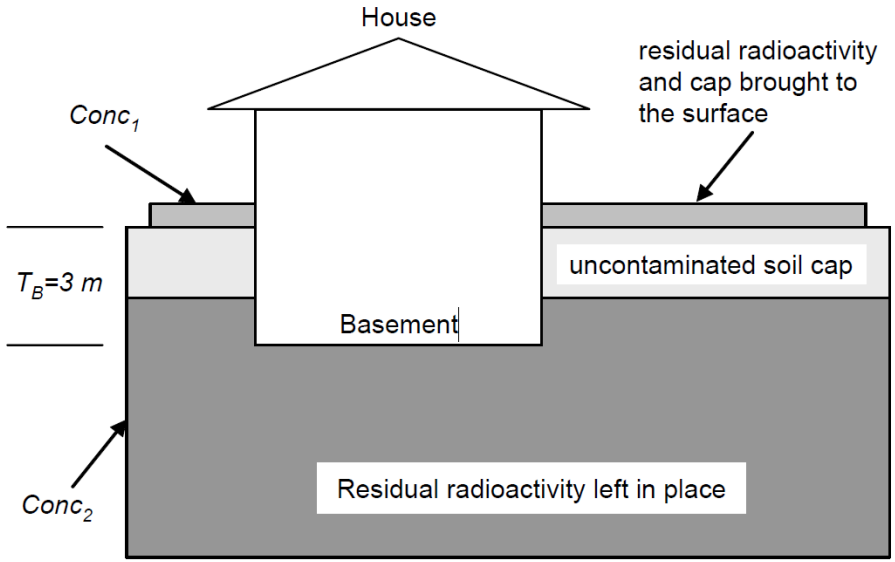
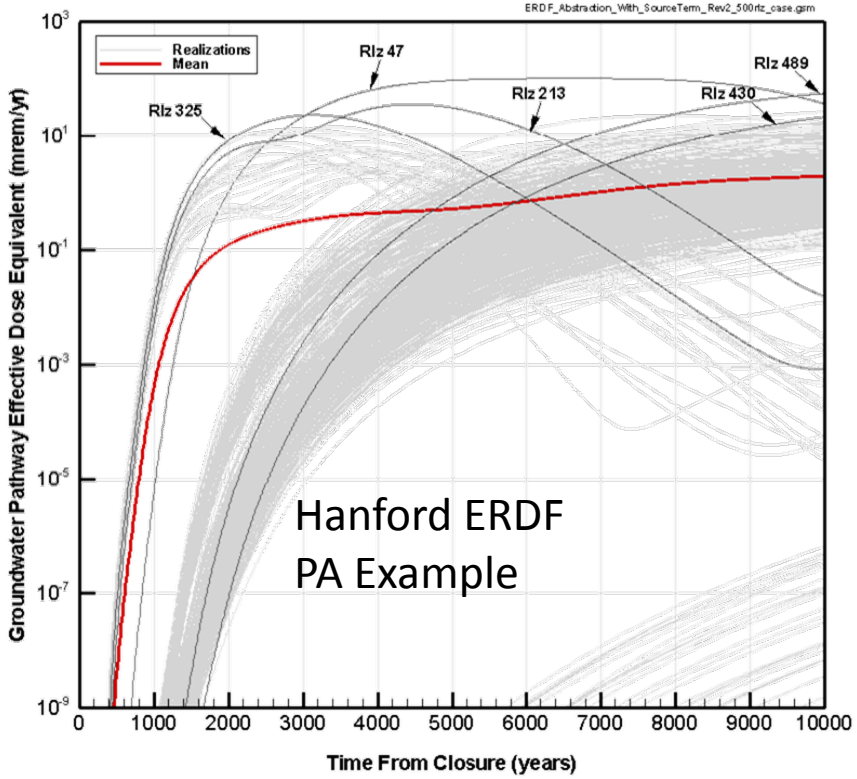
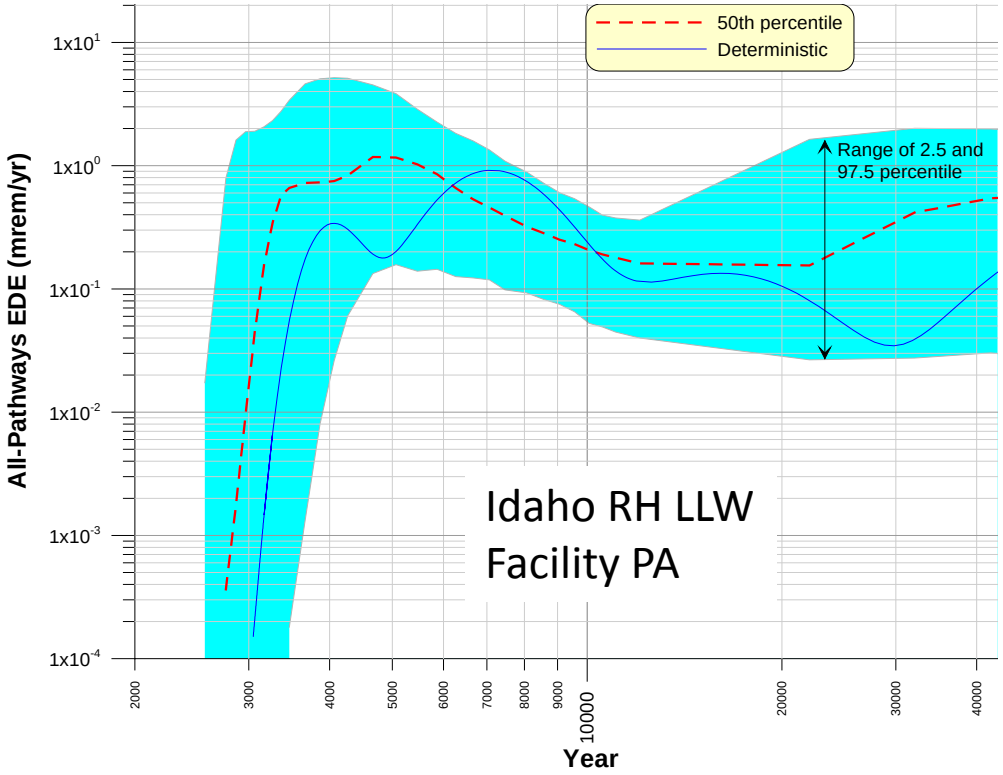


NUREG-1757, Vol. 2, Appendix I

Use of Probabilistic Approaches

- Broader perspective for behavior of engineered and natural system
- Only as accurate as inputs - need to defend distributions & probabilities
- Can be less detail in models (e.g., source release, groundwater pathway) - demonstrate that "simplified" representation is adequate
- Interpretation of results (central tendency vs. tails)





Key Points

- Role of PA to demonstrate understanding (What assumptions are important/not important? Which barriers are critical for performance? Interpreting “what-if” cases relative to compliance?)
- There is no one best method to conduct a PA - experience has shown the value of using combinations of modeling approaches
- Caution about PA becoming a mathematical exercise – Doses need to be calculated, but output only as good as input assumptions
- Realistic? – Focus on decision to be made, recognizing potential future use of results (expected or pessimistic inputs)