United States Nuclear Regulatory Commission

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Overview of NRC's Dose Modeling Expectations

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DOE and NRC Scoping Meeting on
West Valley Demonstration Project, Phase 1
Decommissioning Plan Dose Modeling Approach
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Overview

- Phased decommissioning approach
- Assumptions
- General considerations for DCGL development
- Model abstractions
- Erosion considerations
- Consideration of uncertainty
- Conclusions

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Phased Approach

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General Assumptions

- DOE will take a phased approach to decommissioning
- During Phase 1, process building and lagoons will be removed and back-filled
- Phase 1 source areas cleaned to unrestricted release levels
  - No actual release of land will occur
- All decommissioning options will be preserved
- Additional data collected and analyses conducted to support Phase 2 decisions

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DCGL Development for DP

- Derived Concentration Guideline Level or DCGL
- NRC is reviewing DOE's development of DCGLs or radionuclide-specific concentrations in media below which DOE is expected to be in compliance with release criteria
- DOE is cleaning Phase 1 sources to unrestricted release levels (i.e., 25 mrem/yr dose standard)

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General Considerations for Phase 1 DCGL development

- Consider reasonably foreseeable land use and develop appropriate exposure scenarios
- Provide justification for scenarios selected
- Evaluate less likely, but plausible scenarios
- Consider site-specific features, events, and processes

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General Considerations (cont)

- Collect and analyze data
- Develop site conceptual model
- Select computer code appropriate for the site conceptual model
- Discuss characterization efforts and iterative approach to data collection and modeling

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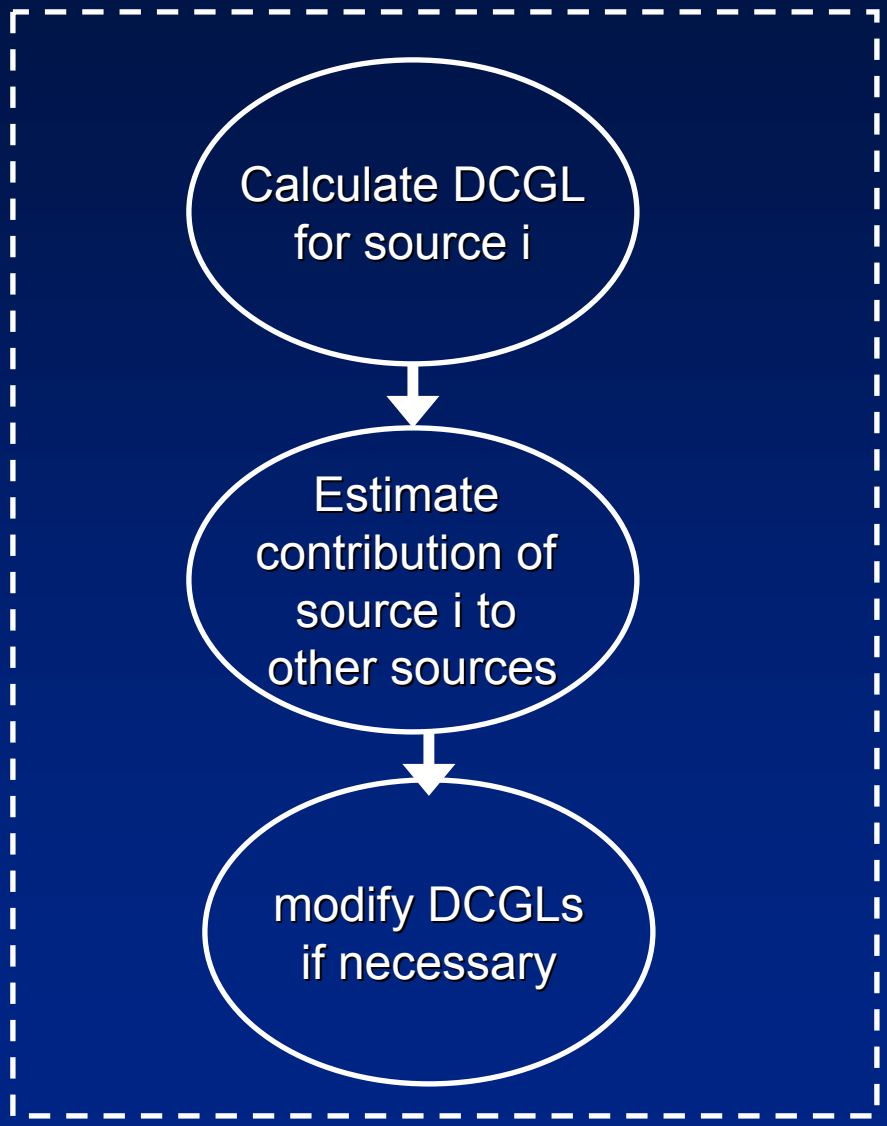
General Considerations (cont)

- Demonstrate understanding of how source areas can overlap in space and time

  Note: DOE can demonstrate that the residual risk associated with Phase 1 sources is very low compared to unrestricted release criteria to lessen burden of evaluating cumulative impacts from both Phase 1 and 2 sources

Suggested Approach



Note: To help ensure that additional remediation of Phase 1 sources will not be needed at the end of Phase 2* if for example, unrestricted release of the site is pursued, DOE can show that Phase 2 sources do not overlap with Phase 1 sources or that Phase 1 residual risk is a small fraction of the unrestricted dose limits.

risk phase 1 sources << 25 mrem/yr

*DOE cannot totally preclude the potential need for additional clean-up of Phase 1 sources. For example, recontamination of Phase 1 source areas may occur or additional information may be collected during the ongoing assessment period that shows the residual risk is higher than expected.

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Use of monitoring data and calibrated model results

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Erosion Considerations

NRC expects DOE to consider erosion for Phase 1 sources for the entire compliance period

Assumptions and additional expectations:

- No actual release of land will occur during Phase 1; offsite erosion impacts are expected to be significantly lower than onsite impacts
- Source areas are expected to be almost completely removed with little residual radioactivity remaining at depth
- NRC expects that DOE will collect additional data and conduct additional analyses during the ongoing assessment period to refine erosion predictions to support Phase 2
- NRC expects DOE to provide information on erosion controls to ensure public health and safety is protected during Phase 1 decommissioning activities including the ongoing assessment period

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Uncertainty

- Evaluate sensitivity of model results to various parameters and conceptual models
- Manage uncertainty with conservative assumptions per guidance in NUREG-1757, Volume 2 or
- Conduct probabilistic analysis

Note: Identify sensitivity of model results to both *timing* and magnitude of peak dose

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Conclusions

- Adequate characterization is needed to develop site conceptual model
- Appropriate exposure scenarios should be developed and evaluated
- Consideration of cumulative impacts of multiple source areas should be considered
- Model abstractions will be reviewed carefully
- Uncertainties should be evaluated and appropriately managed