Saltstone Disposal Facility
Performance Assessment Overview

Presentation to the Savannah River Site
Citizens Advisory Board
Waste Management Committee

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What is a PA?

• PA = Performance Assessment
• Performance Assessment = a key risk assessment tool used to inform closure and disposal decisions
  – Models fate and transport of materials over long periods of time to determine potential consequences
  – Utilizes informed assumptions
  – Provides most likely consequences of planned actions
• PA provides best estimation of what the dose consequences will be, both chemical and radiological, over time
  − Focused on determining “peak dose” - worst one-year period – or “peak concentration”
  − Reflects potential variation in parameters and identifies key parameters for which the model has the greatest sensitivity (importance)
Existing Disposal Units

Vault 1
Six 100’x100’ cells
Approximately 25’ high

Vault 4
Twelve 100’x100’ cells
Approximately 26’ high

Vault 2–Future Disposal Cells

11/20/2008
Site Prep

5/15/2009
Wall Panels

7/23/2009
Roof Form

10/14/2009
Cell Interior
SDF PA Development

• SRS initiated a PA revision in October 2007 per DOE O 435.1 to support disposal operations
• Revised PA accounts for a new disposal cell design, new research data since 2005 and incorporates new information related to the eight factors from the NRC Technical Evaluation Report (ML053010225) issued in December 2005
• Revision A was submitted for review by a DOE Savannah River Operations Office appointed team in March 2009
• Revision B was submitted for review by a DOE Low Level Waste Federal Review Group (LFRG) appointed team in June 2009
• The LFRG on-site review was conducted August 10-14, 2009 and NRC staff were observers
  - NRC issued observation report (ML092710477)
• Revision 0 was submitted to NRC and SCDHEC in November 2009

• Eleven Chapters and twelve appendices
  • Including disposal facility characteristics, performance analysis, analysis results, inadvertent intruder analysis, and results interpretation

• More than 290 figures and 170 tables of information in the main body of PA

• Volume 1 of the Revised PA (663 pages) and the appendices comprise over 2000 total pages
Hybrid Modeling Approach

- Modeling is a hybrid approach with the deterministic (PORFLOW) results as the baseline and the sensitivity/uncertainty analyses performed with a probabilistic code (GoldSim) to evaluate all parameters at once
- PORFLOW also used for one-off sensitivity analyses

Conceptual Model
Model Example: Closure Cap

Far-Field Flow Pathlines

Traces reach Gordon Aquifer which has a NW flow
• The PA development process is regulated by DOE Order 435.1
• Disposal requirements are based on:
  − DOE Order 435.1

**Conclusions**

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>Limit</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOE O 435.1-1 All-Pathways Dose</td>
<td>25 mrem/yr</td>
<td>1.4 mrem/yr</td>
</tr>
<tr>
<td>DOE O 435.1-1 Intruder Dose</td>
<td>500 mrem acute</td>
<td>N/A – acute</td>
</tr>
<tr>
<td></td>
<td>100 mrem/yr chronic</td>
<td>1.9 mrem/yr – chronic</td>
</tr>
<tr>
<td>DOE O 435.1-1 Air Pathways Dose</td>
<td>10 mrem/yr</td>
<td>&lt;4E-09 mrem/yr</td>
</tr>
<tr>
<td>DOE O 435.1-1 Radon Flux</td>
<td>20 pCi/m²/s At ground surface</td>
<td>2.0E-13 pCi/m²/s</td>
</tr>
<tr>
<td>DOE O 435.1-1 And Safe Drinking Water Act</td>
<td>Groundwater Protection - Maximum Contaminant Levels</td>
<td>Total β/γ 4 mrem/yr Total α 15 pCi/L Total U 30 mg/L Total Ra 5 pCi/L 1.16 mrem/yr 1.9 pCi/L 8.0E-9 mg/L 1.9 pCi/L</td>
</tr>
<tr>
<td>10 CFR 61.41 All-Pathways Dose</td>
<td>25 mrem/yr</td>
<td>1.4 mrem/yr</td>
</tr>
<tr>
<td>10 CFR 61.42 Intruder Dose</td>
<td>500 mrem/yr</td>
<td>1.9 mrem/yr</td>
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</tbody>
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Summary

- SDF PA has been completed and is currently undergoing external review

- Planned SDF disposal activities result in peak year doses / concentrations well below regulatory requirements