



Overview of NRC Monitoring Activities at the Saltstone Disposal Facility at the Savannah River Site

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Outline

- NDAA Monitoring
 - Background
 - Recent Activities
- NRC Review Results
- Activities Since Completing Review
- Path Forward



NDAA Monitoring

Background

- Section 3116 of the National Defense Authorization Act for Fiscal Year 2005
- 2005 Draft Saltstone Waste Determination
- 2006 Final Saltstone Waste Determination
- 2005 NRC Technical Evaluation Report
- 2007 NRC Monitoring Plan
- Monitoring Activities since 2007



NDAA Monitoring

Recent Activities

- 2009 Saltstone Performance Assessment
- 2 Rounds of Questions and 11 Public Meetings
- 2012 Technical Evaluation Report
- NRC Type IV Letter of Concern
- Current Status of Project



NRC Review Results

Performance Objectives for Low-Level Waste Disposal

- 10 CFR 61.41 – Protection of the general population from releases of radioactivity
- 10 CFR 61.42 – Protection of individuals from inadvertent intrusion
- 10 CFR 61.43 – Protection of individuals during operations
- 10 CFR 61.44 – Stability of the disposal site after closure



NRC Review Results

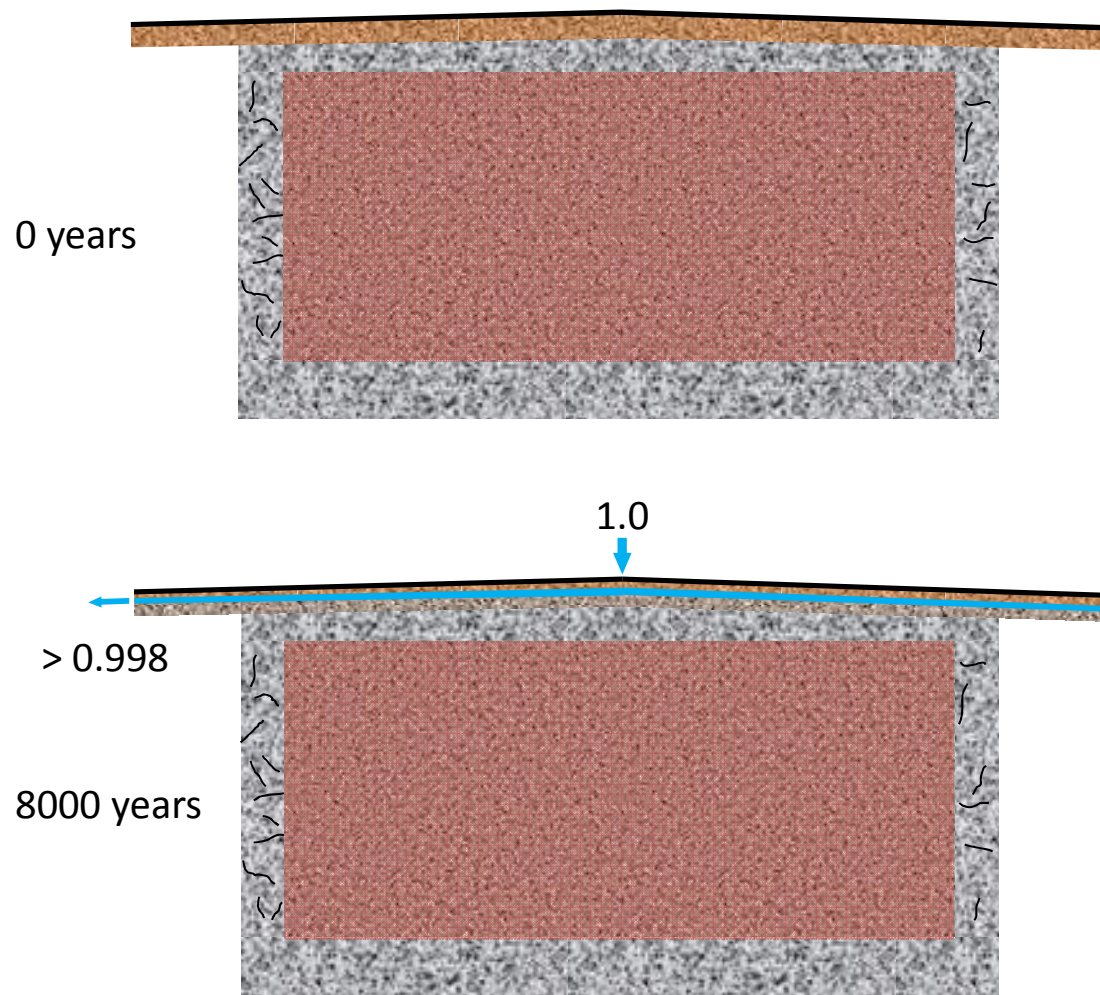
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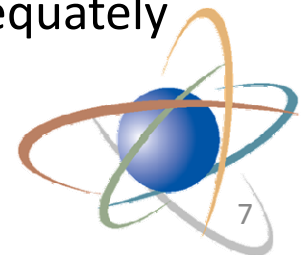


NRC Review Results

DOE Base Case for the SDF

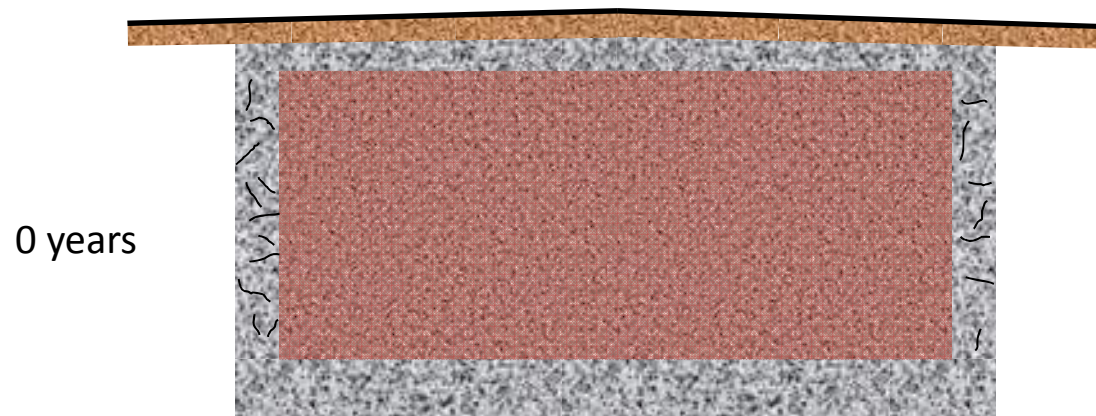


- No saltstone fracturing within 20,000 years (inconsistent with current conditions)
- Almost all water shed around the vault for the entire performance period (intermediate result not adequately supported)
- Minimal saltstone oxidation (intermediate result not adequately supported)

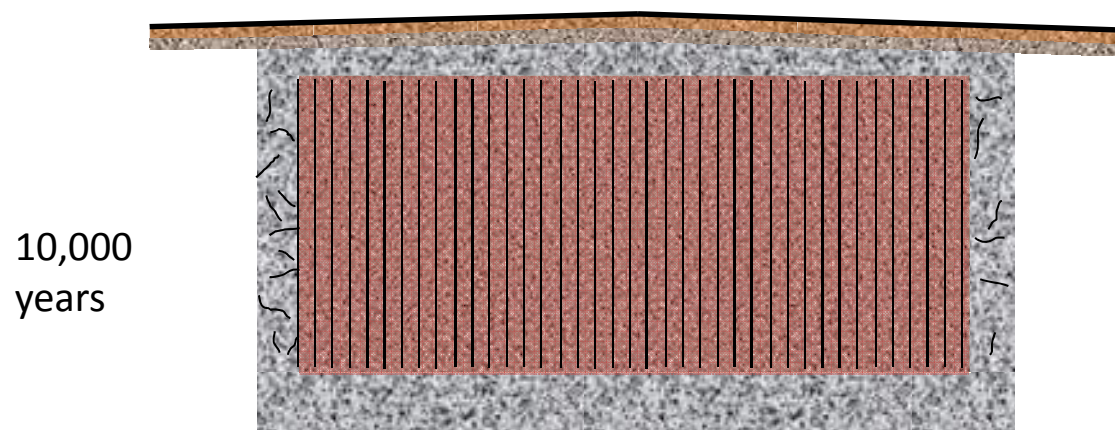


NRC Review Results

Alternate Conceptual Model for the SDF (Case K)



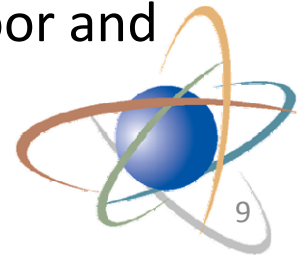
- Through-going fractures form every 10 cm in 10,000 years
- Oxidation proceeds from fracture faces and monolith edges
- Additional differences from Case A



NRC Review Results

DOE Case K

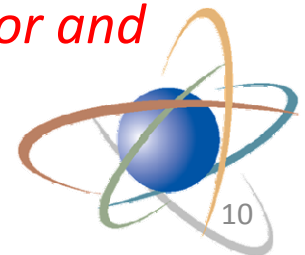
- Three closely related cases K, K1, K2
- DOE characterized these cases as pessimistic sensitivity analyses
- NRC staff disagrees case is overly pessimistic
 - Ra-226, Th-230 and U-234 inventories
 - Hydraulic conductivity of saltstone
 - Assumptions about Tc sorption coefficients in saltstone
 - Assumptions about fracture timing
 - Assumptions about Tc retention in disposal unit floor and walls



NRC Review Results

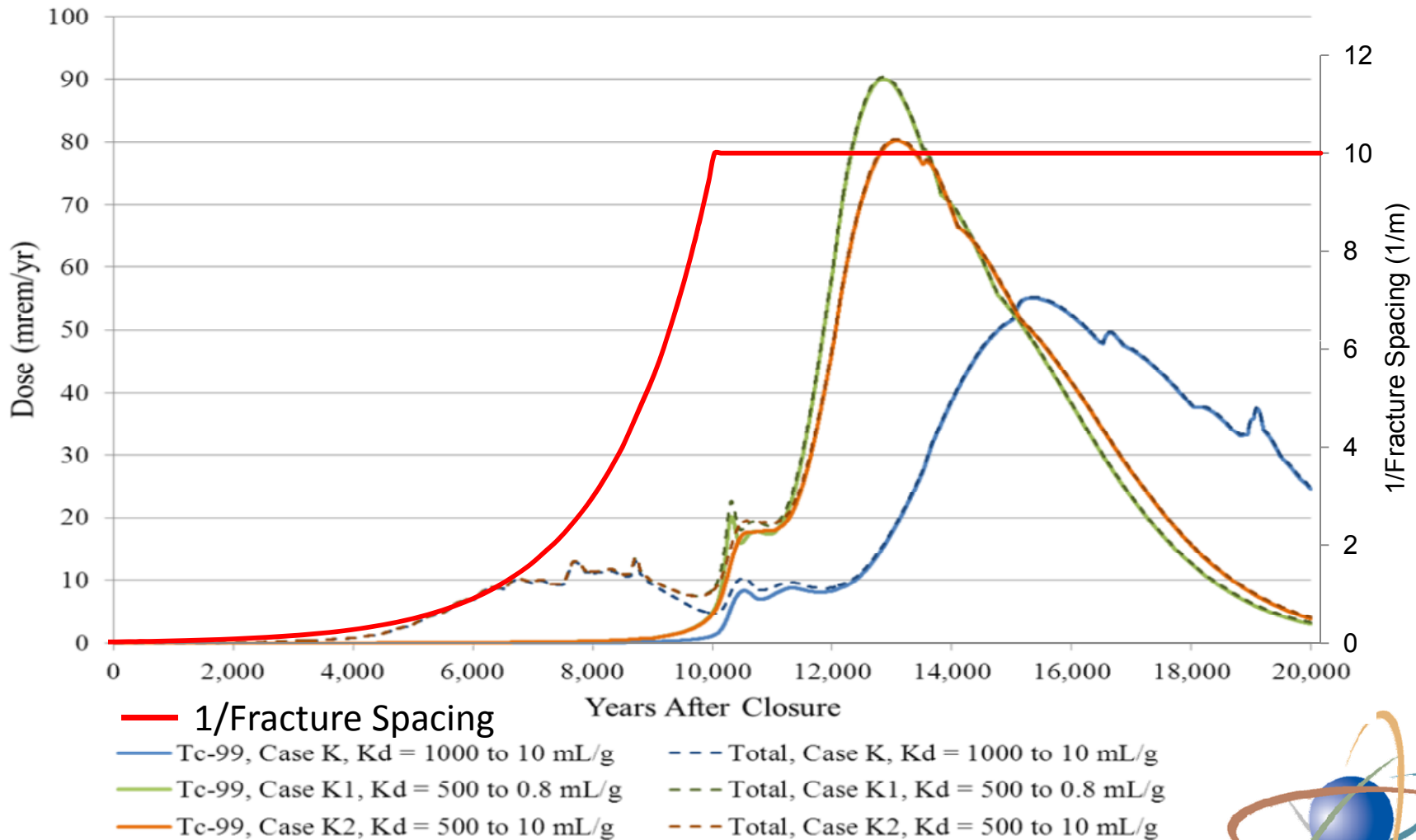
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 - *Assumptions about fracture timing*
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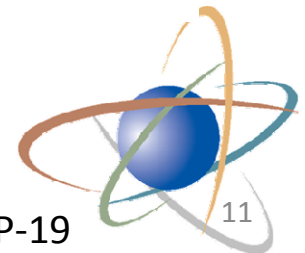


NRC Review Results

SDF Time of Peak Dose Sensitivity to Fracturing

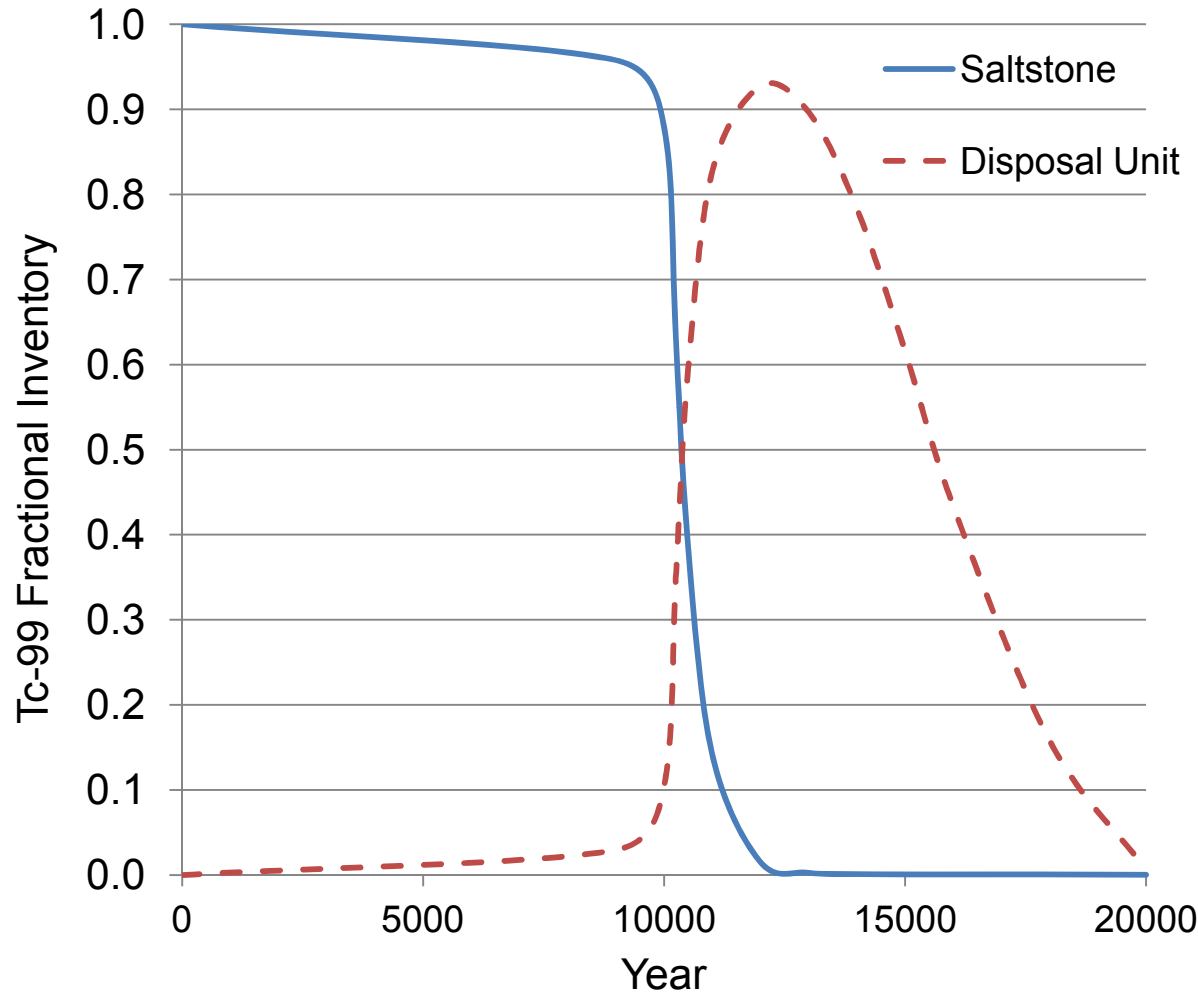


Adapted from DOE Response to NRC's Second Request for Additional Information, Fig. SP-19

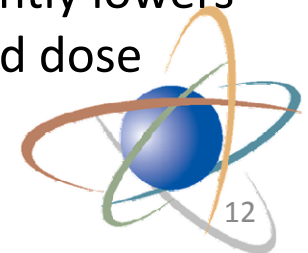


NRC Review Results

Case K: DOE Intermediate Results



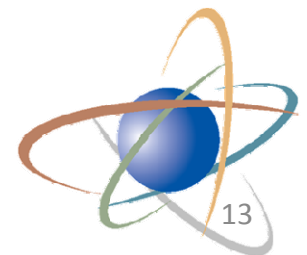
- Tc leaving saltstone nearly all retained in disposal unit concrete
- Reflects a 13X greater Tc concentration in disposal unit floor and walls than in original saltstone
- Unrealistic given material properties
- Significantly lowers predicted dose



NRC Review Results

DOE Results & NRC Sensitivity Analyses

- DOE Case K, K1, and K2 peak doses greater than 25 mrem/yr after 10,000 years
- Peak timing sensitive to assumed fracturing
- Unexpected intermediate model results
- NRC sensitivity analyses used to evaluate implications of alternate assumptions related to unexpected intermediate results



NRC Review Results

Conclusion for 10 CFR 61.41

- NRC staff expects peak dose at 100 m from SDF to be approximately 25 to 100 mrem/yr
- Uncertainty in timing important to TER conclusions
- Conclusion based on DOE “Case K1” results
- Conclusion supported by NRC independent sensitivity analyses



NRC Review Results

TER Conclusions: Monitoring Areas

- Inventory
- Infiltration and Erosion Control
- Waste Form Hydraulic Performance
- Waste Form Physical Degradation
- Waste Form Chemical Performance
- Disposal Unit Performance
- Subsurface Transport
- Environmental Monitoring
- Radiation Protection Program
- Site Stability



NRC Review Results

TER Conclusions: Monitoring Areas

- Inventory
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Activities Since Completing Review

April 2012 - Present

- Public meetings in April and May 2012
- DOE provided
 - Research results in June
 - A partial response to NRC concerns in early July
 - Revised Tc inventory in FDCs 2A/2B, 3A/3B, 5A/5B
 - Revised sensitivity and uncertainty analysis
 - The rest of their response which explains how DOE plans to address NRC's concerns
 - NRC is still reviewing this response

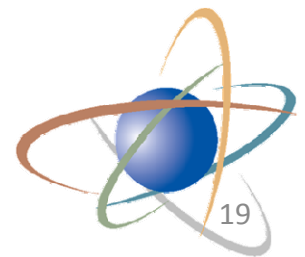


Path Forward

- Complete review of DOE response
- Continue NRC monitoring activities
- Continue discussions with SC DHEC and DOE regarding NRC concerns and DOE disposal actions
- Conduct public meeting to discuss draft monitoring plan with SC DHEC and DOE
- Complete revised monitoring plan



Backup Slides



NRC Review Results

NRC Modification of DOE Case K1

	Reduced Saltstone K_d (mL/g)	Oxidized Saltstone K_d (mL/g)	Disposal Unit K_d (mL/g)	Fracturing Scheme	Final Fracture Spacing (m)	Time of Peak Release Rate (yr)	Dose Estimate* (mrem/yr)
DOE Case K1	500	0.8	500 to 217	Log	0.1	12,800	90
Test 1	500	0.8	500 to 217	Quadratic	0.1	12,100	86
Test 2	500	0.8	0.8	Quadratic	0.1	8730	680 [†]
Test 3	500	0.8	0.8	Log	0.1	10,300	930 [†]
Test 4	500	0.8	0.8	Quadratic	1	19,100	25
Test 5	139	0.8	0.8	Quadratic	1	10,100	35

* Dose estimated based on the annual fraction Tc inventory released from the near-field domain in each case scaled by the ratio of the peak annual fractional Tc inventory released from the near-field domain in DOE's Case K1 to peak dose in Case K1

[†] NRC staff believes these doses are significant overestimates attributable to an artifact of DOE's "single-porosity" average- K_d model that primarily affects cases with rapid oxidation

