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## 6.3 SOURCE DATA, LISTED BY DATA TRACKING NUMBER

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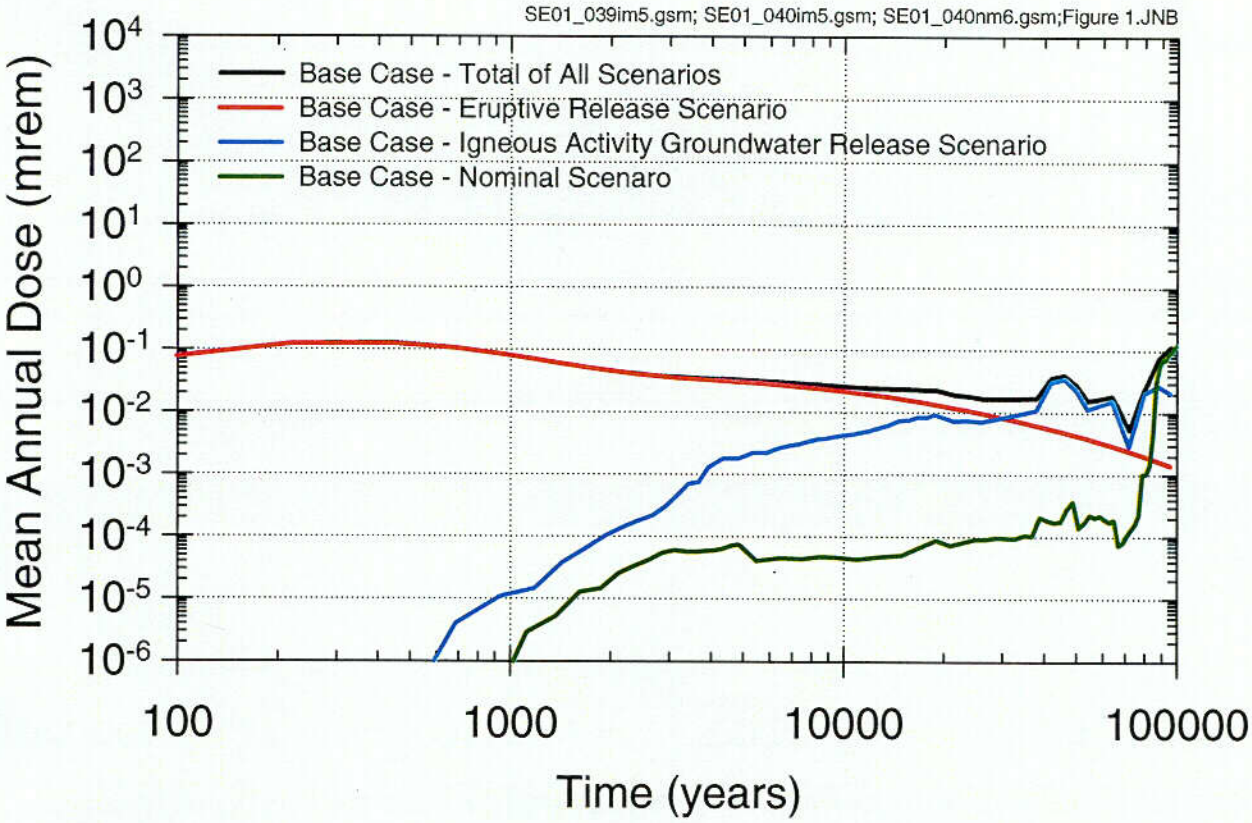
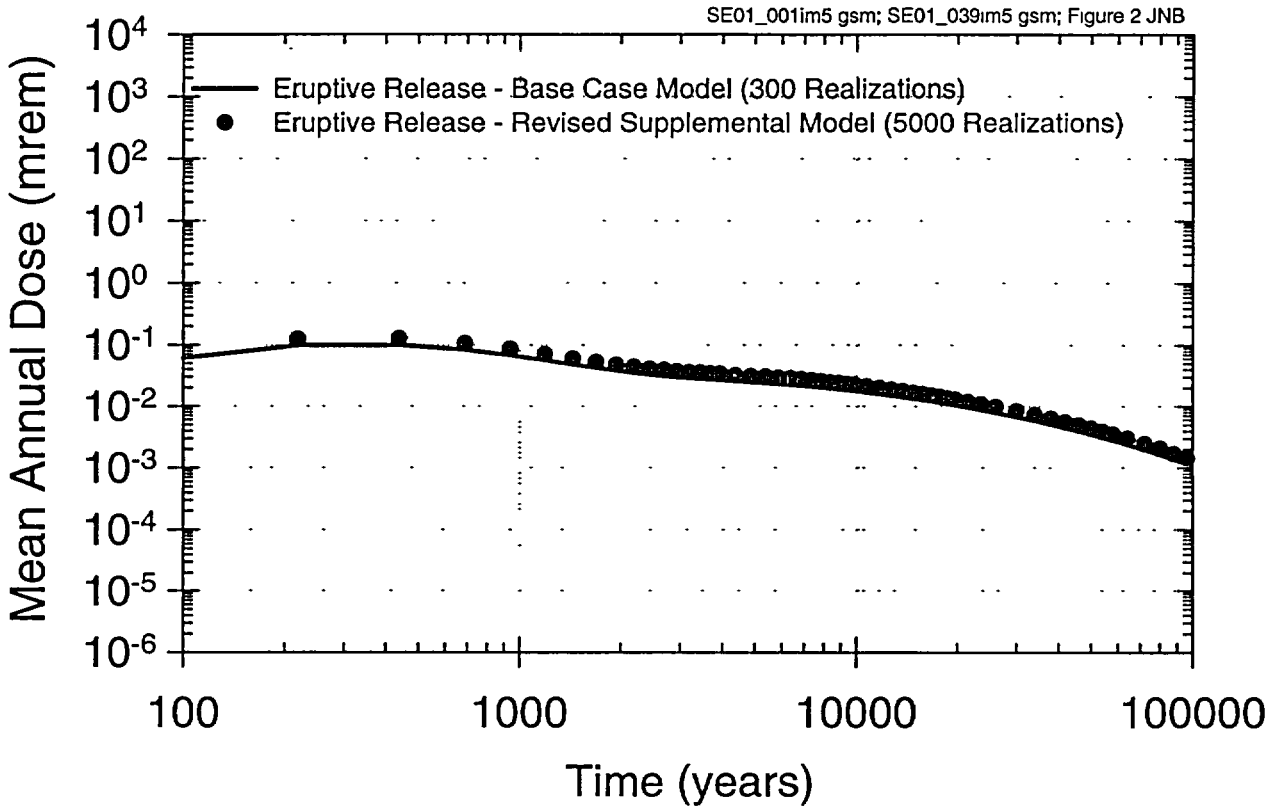


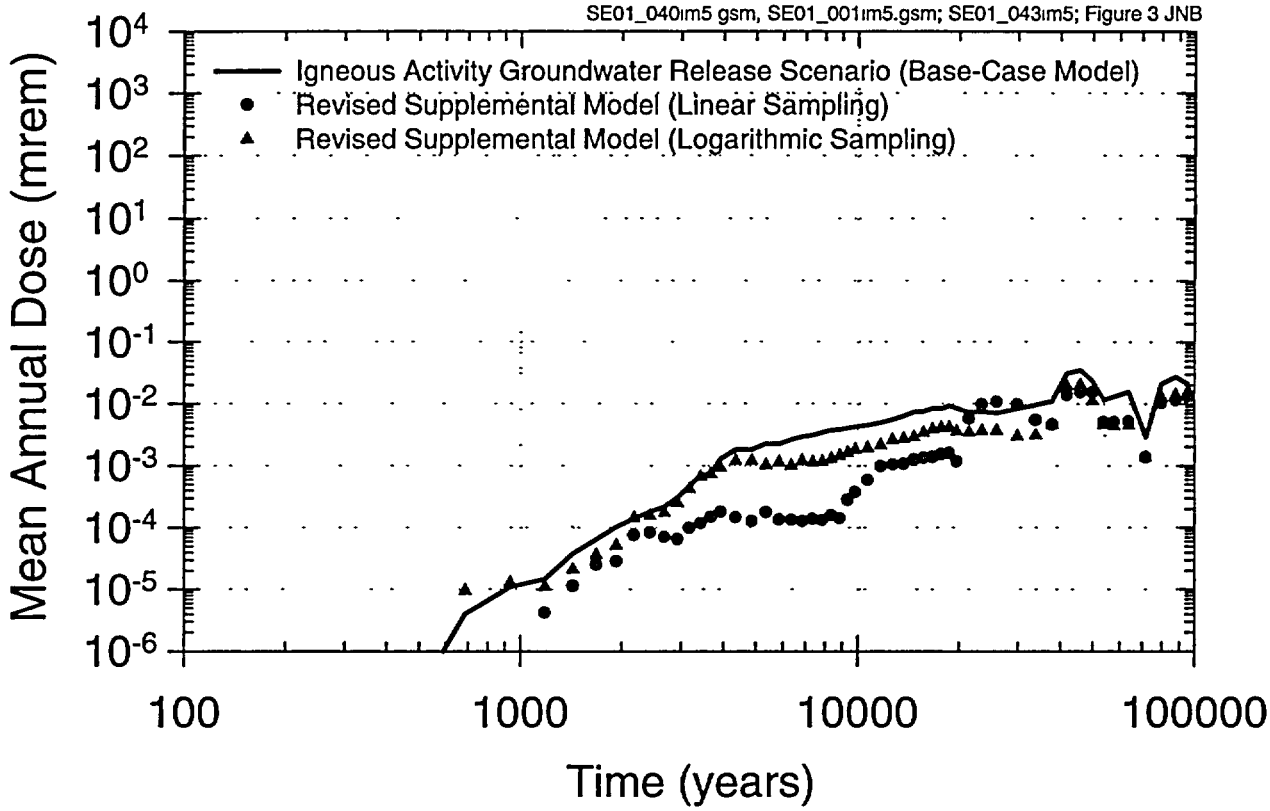

NOTE: Each mean annual dose curve is a probability-weighted average.

Figure 1. Base-Case Results for the Sensitivity Studies



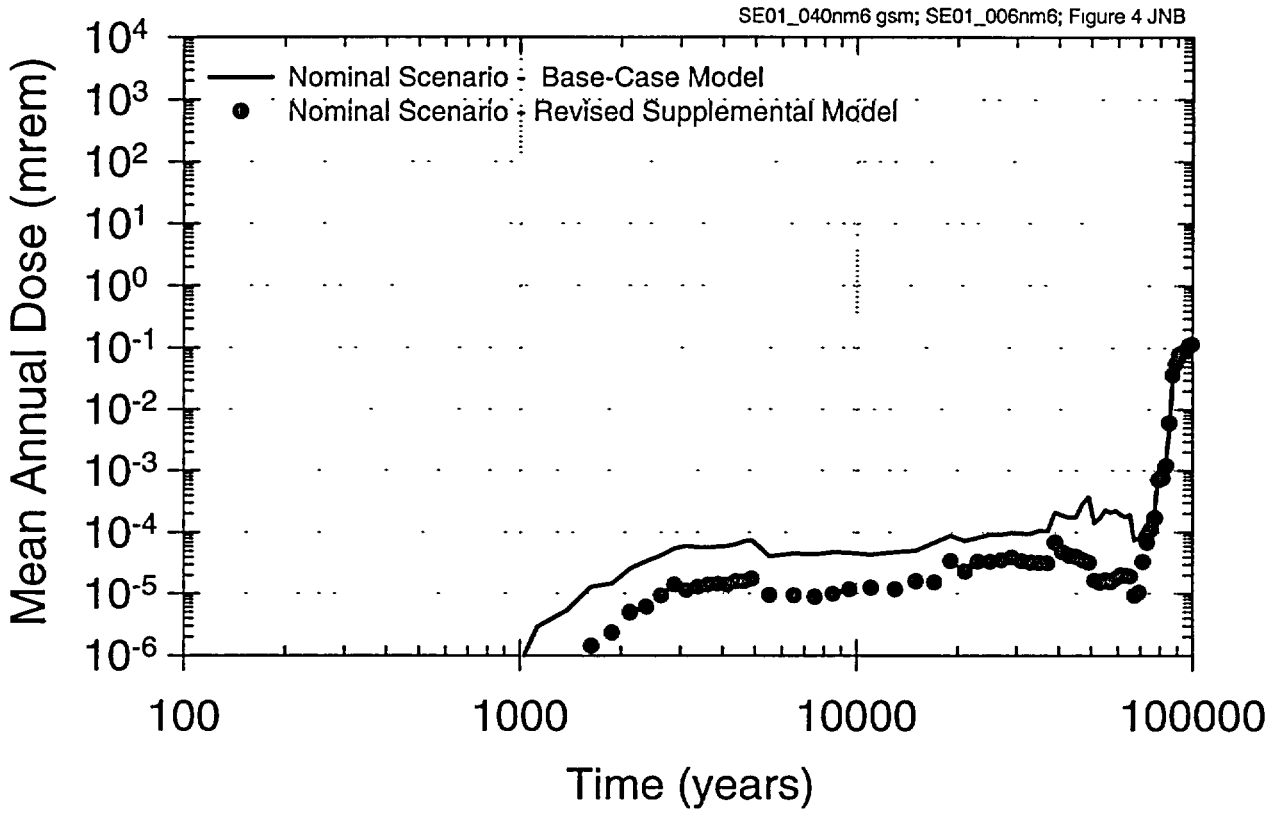

NOTE: The mean annual dose curve is a probability-weighted average.

Figure 2. Comparison of Base-Case TSPA Model with Revised Supplementary Model for Igneous Activity Eruptive Release Scenario




NOTE: Each mean annual dose curve is a probability-weighted average.

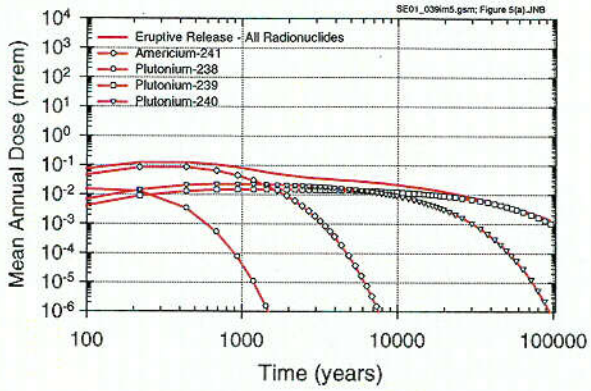
Figure 3. Comparison of Base-Case TSPA Model with Revised Supplementary Model for Igneous Activity Groundwater Release Scenario



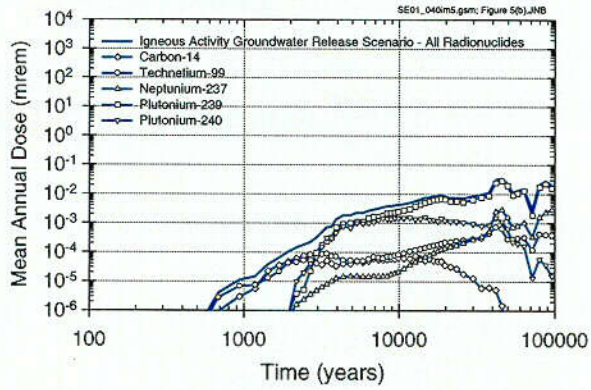

NOTE: Each mean annual dose curve is a probability-weighted average.

Figure 4. Comparison of Base-Case TSPA Model with Revised Supplementary Model for Nominal Scenario

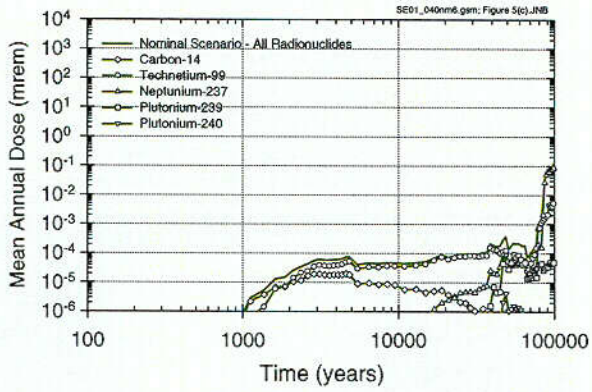
**(a) Igneous Activity Eruptive Release Scenario**




**(b) Igneous Activity Groundwater Release Scenario**



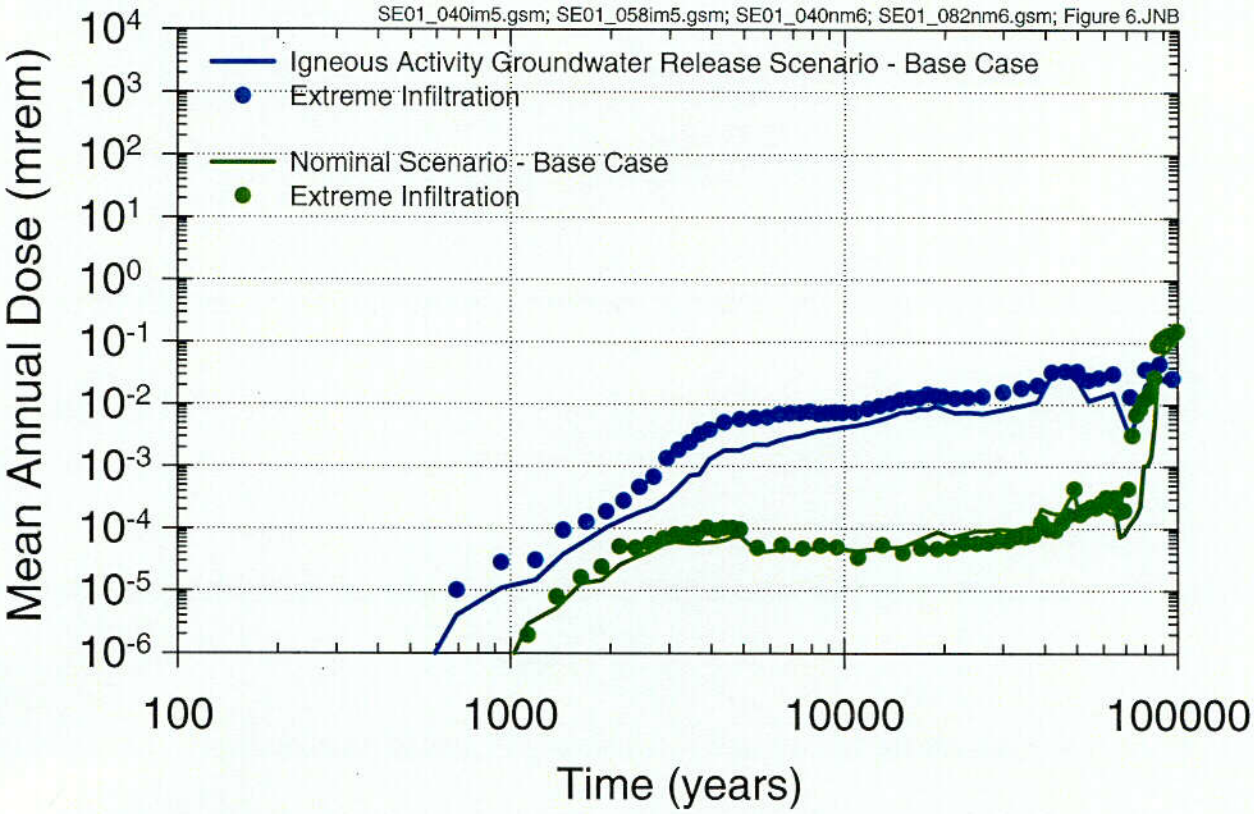

**(c) Nominal Scenario**




NOTE: Each mean annual dose curve is a probability-weighted average.

Figure 5. Dominant Radionuclide Contributors to Mean Annual Dose

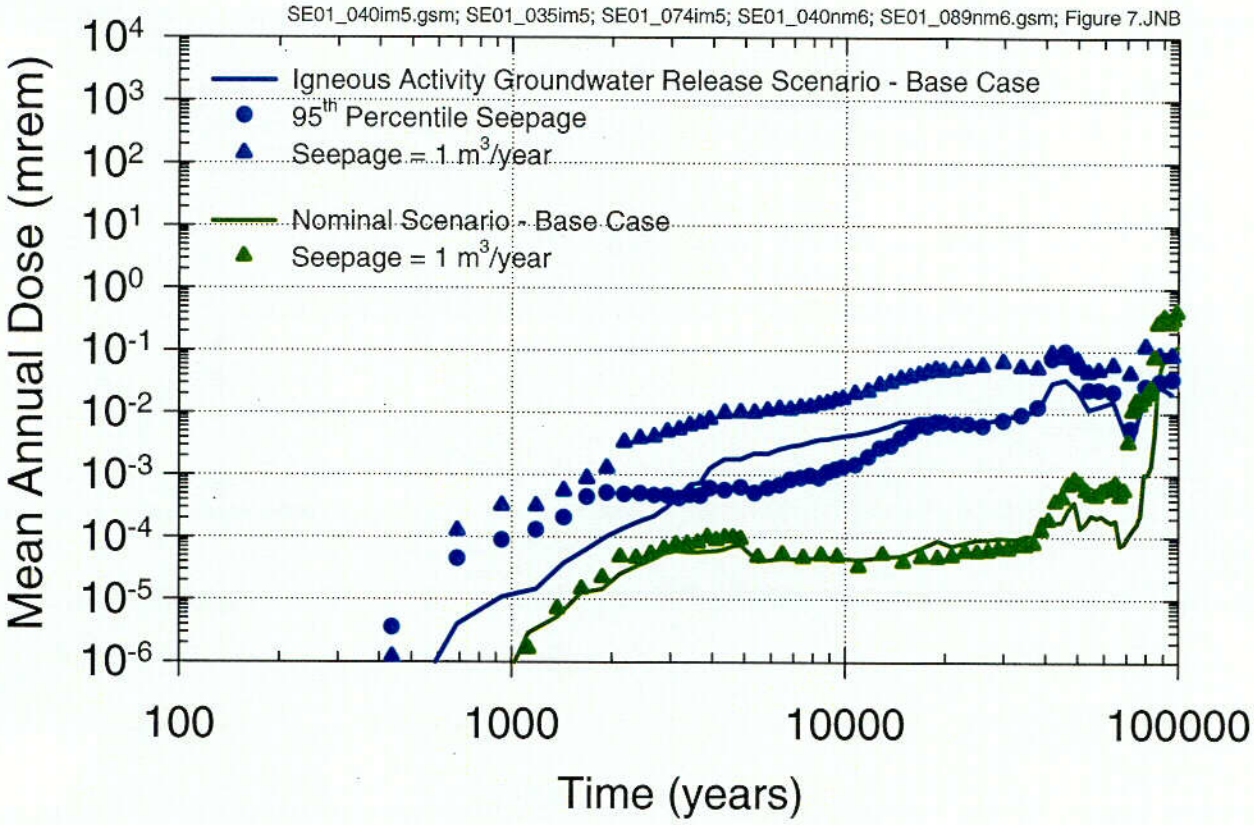
C02




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 6. Sensitivity of Mean Annual Dose to the Climate and Net Infiltration TSPA Model Component

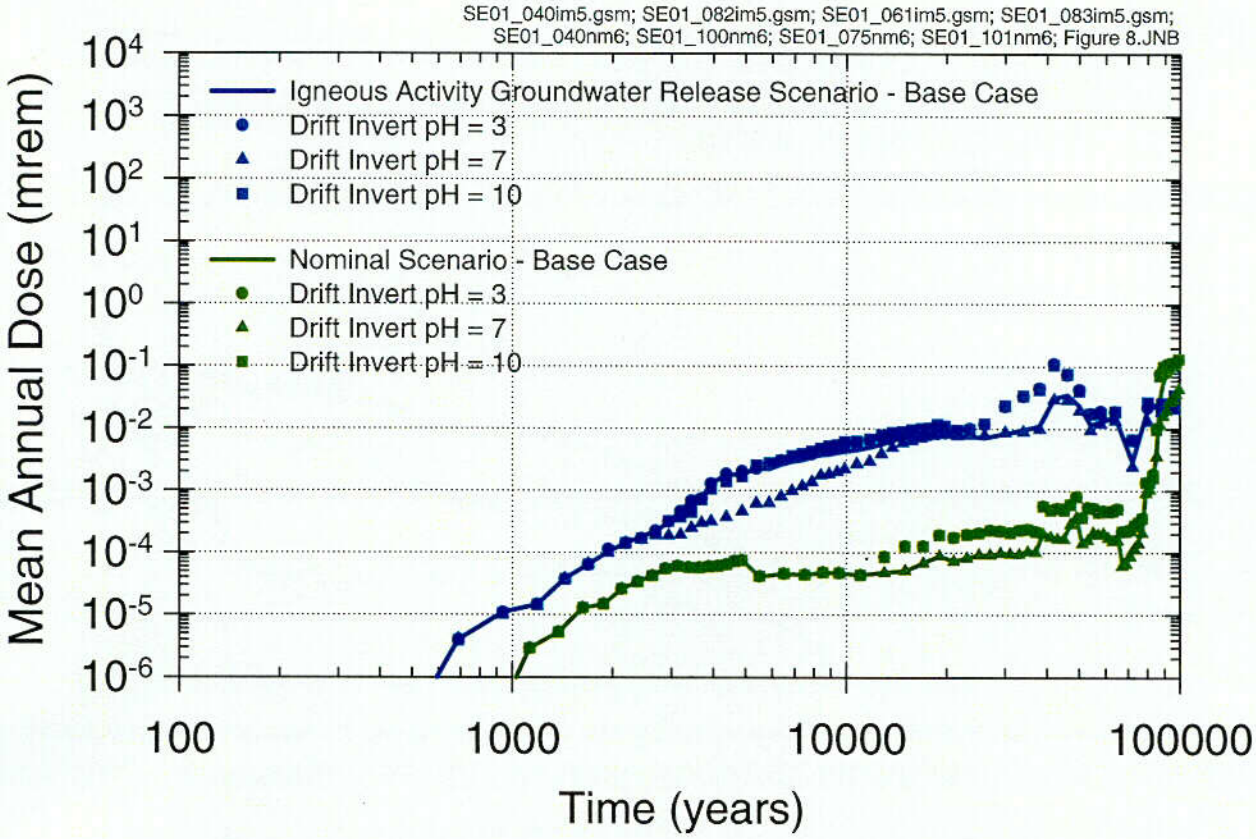
C03




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 7. Sensitivity of Mean Annual Dose to the Seepage TSPA Model Component

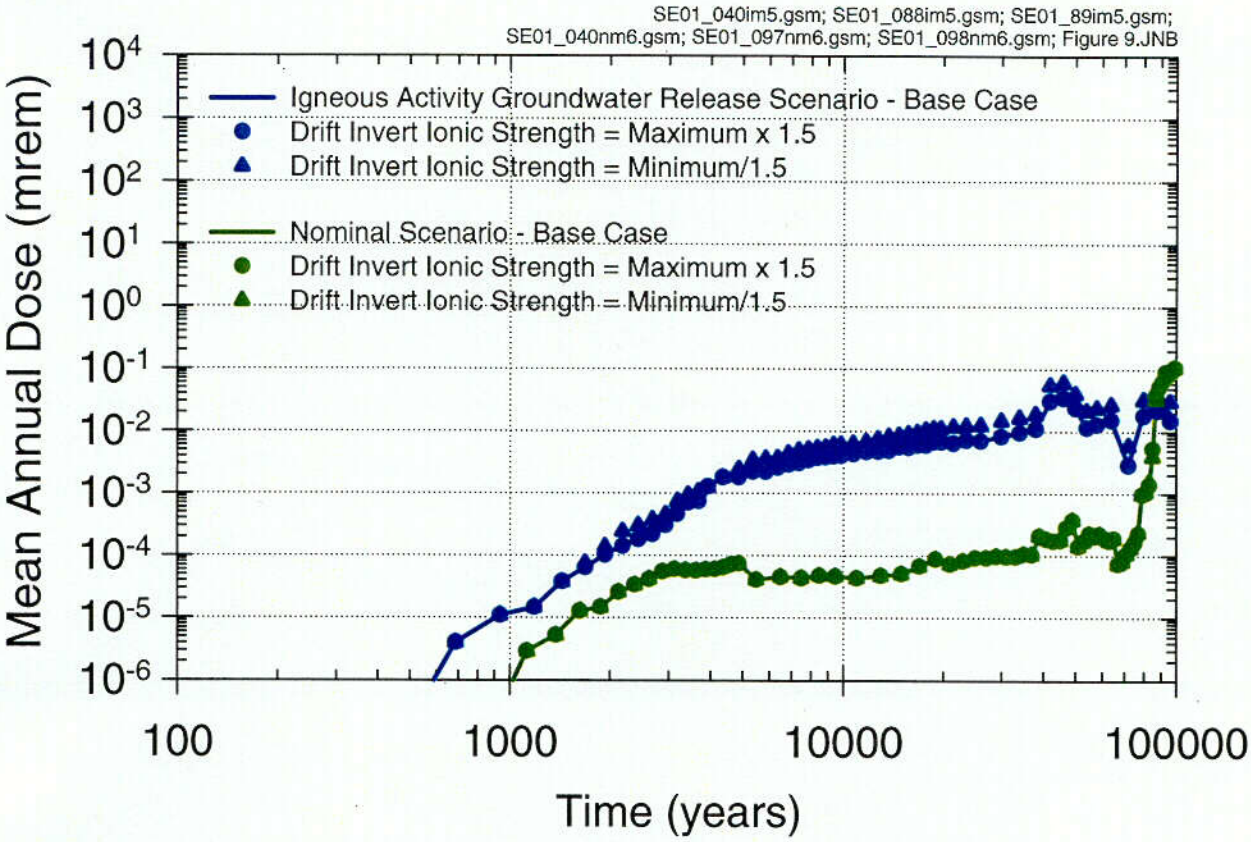
C04




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 8. Sensitivity of Mean Annual Dose to Drift Invert pH

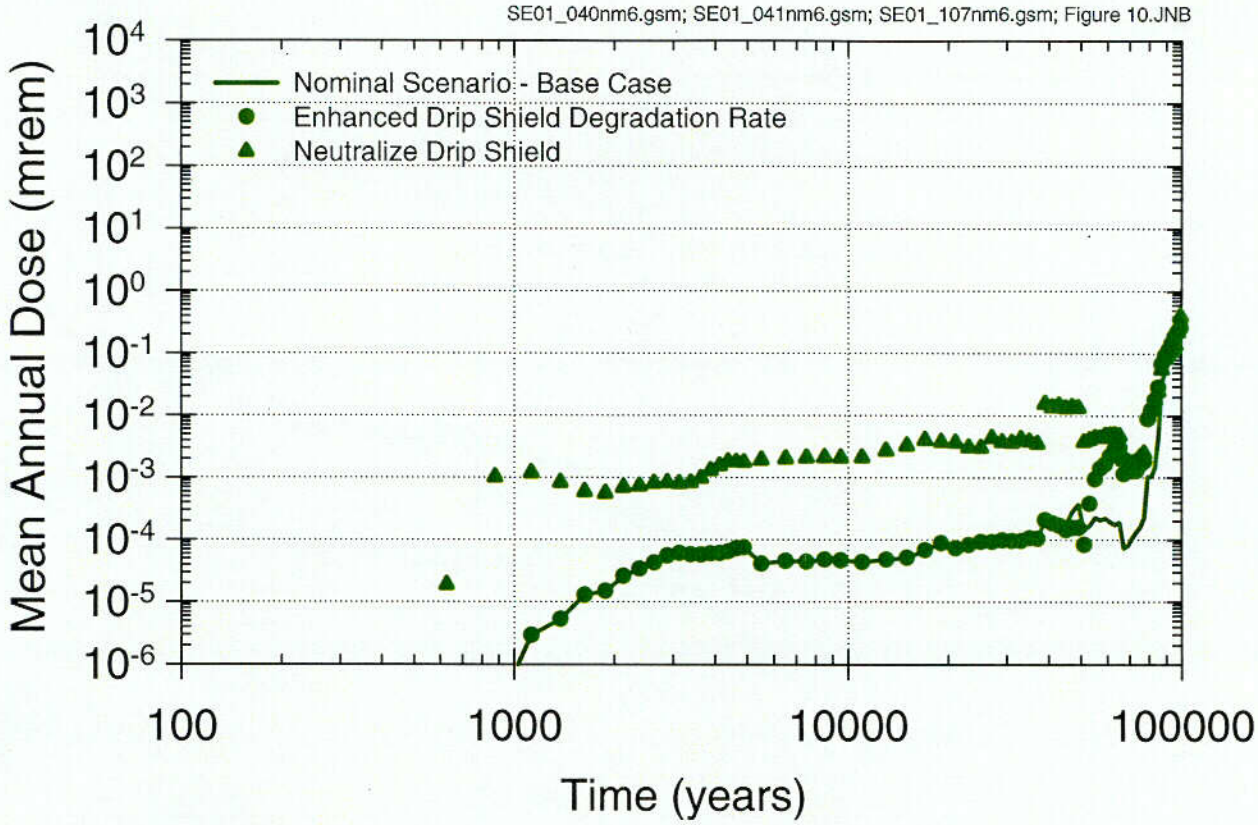
C05




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 9. Sensitivity of Mean Annual Dose to Drift Invert Ionic Strength

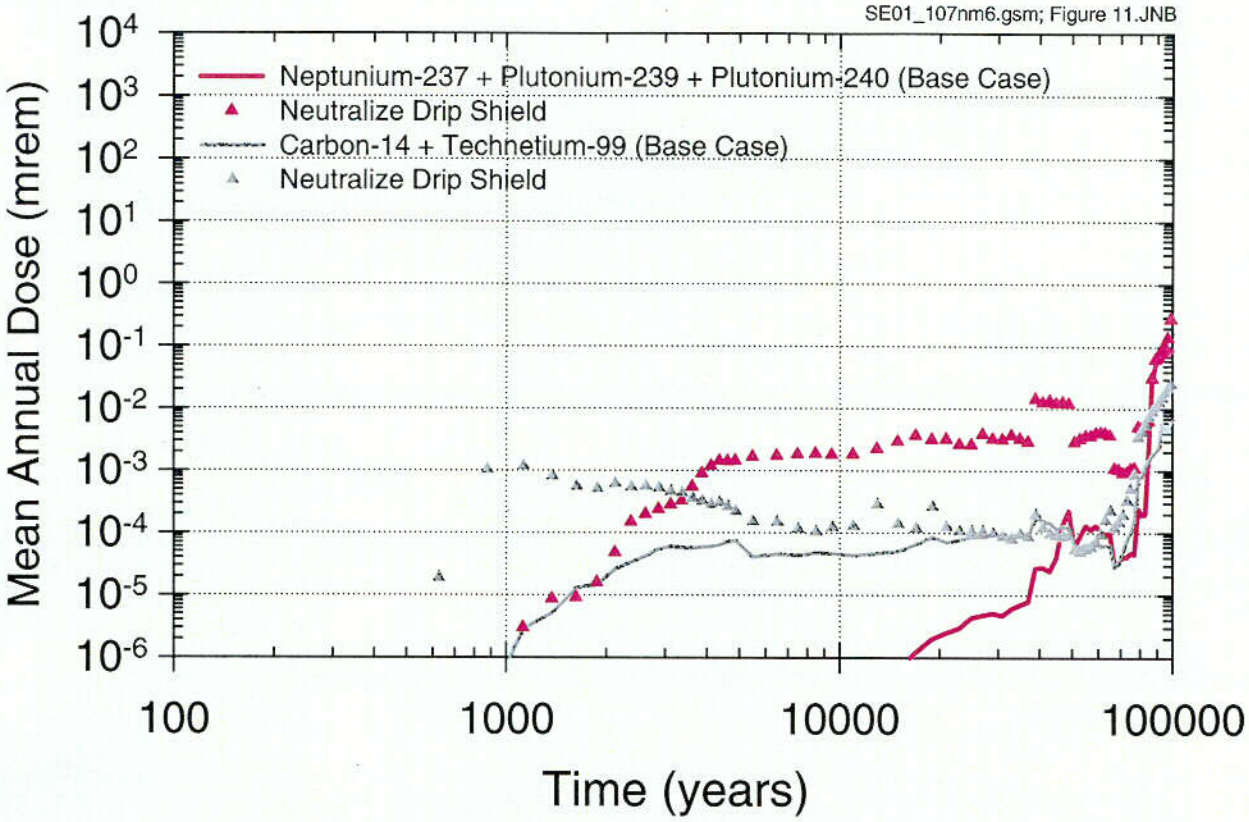
C06




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 10. Sensitivity of Mean Annual Dose to the Drip Shield Performance TSPA Model Component

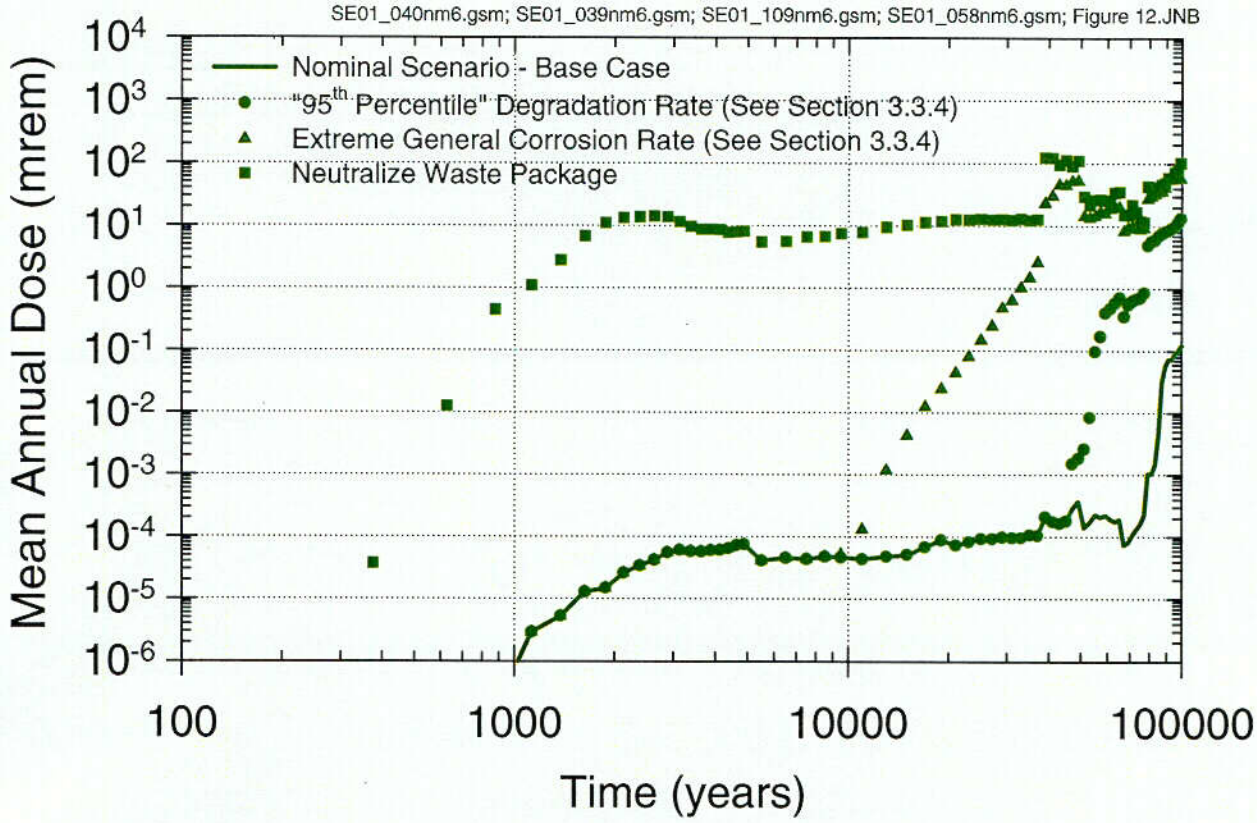
C07




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 11. Contribution of Radionuclides for the Base Case and the Case with the Drip Shield Neutralized

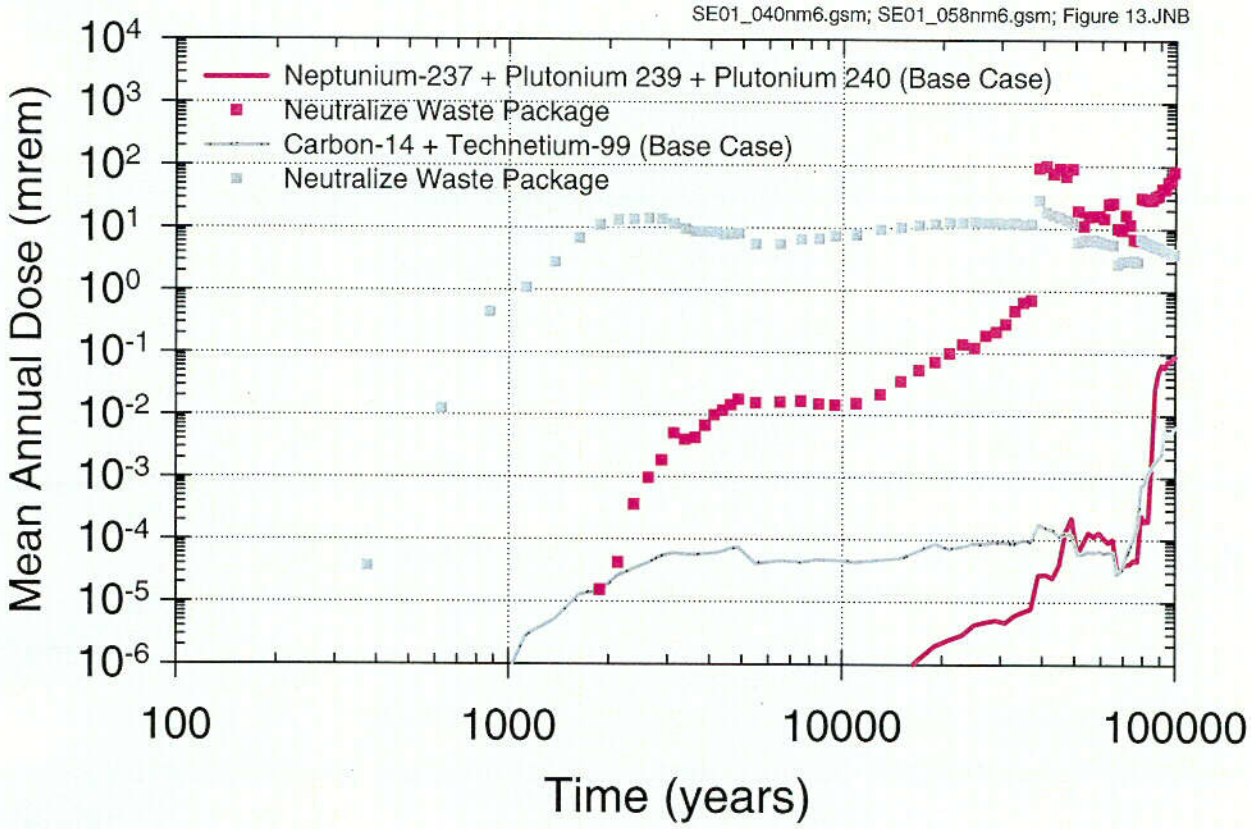
C08




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 12. Sensitivity of Mean Annual Dose to the Waste Package Performance TSPA Model Component

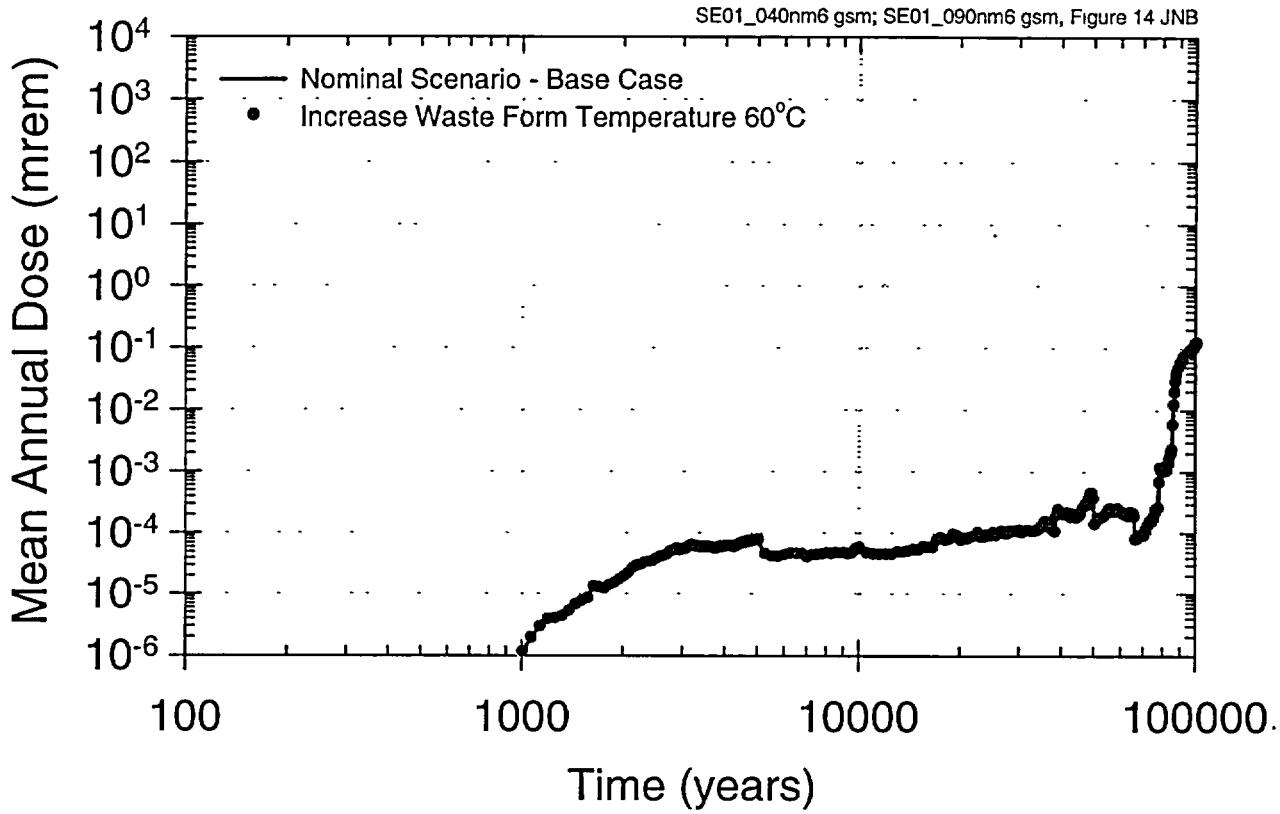
C09




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

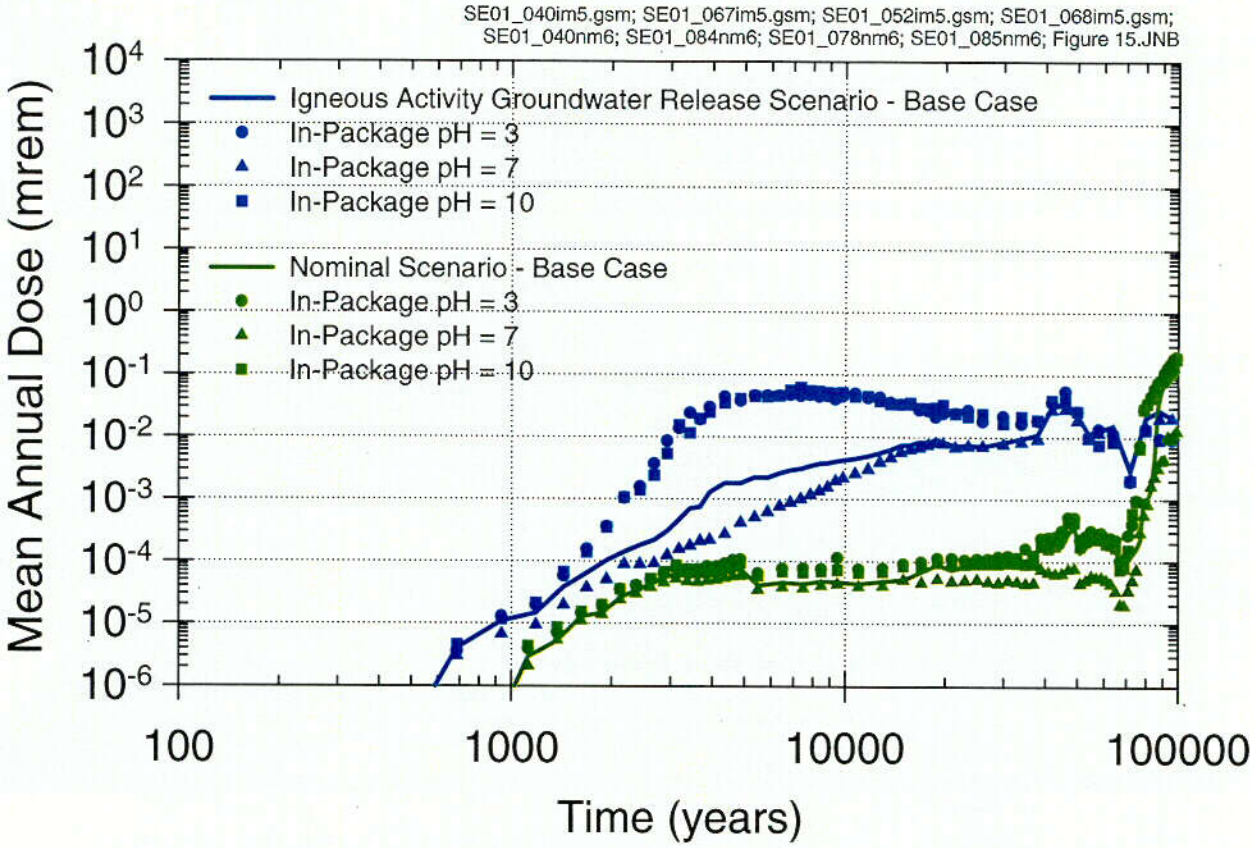
Figure 13. Contribution of Radionuclides for the Base Case and the Case with the Waste Package Neutralized

C10




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

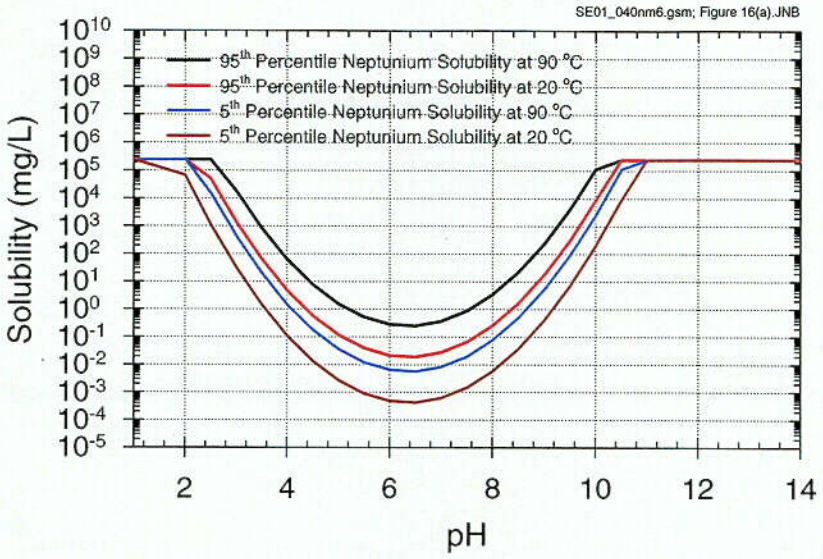
Figure 14. Sensitivity of Mean Annual Dose to In-Package Temperature




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 15. Sensitivity of Mean Annual Dose to In-Package pH

**(a) Dependence of Neptunium Solubility**




**(b) Dependence of Plutonium Solubility**

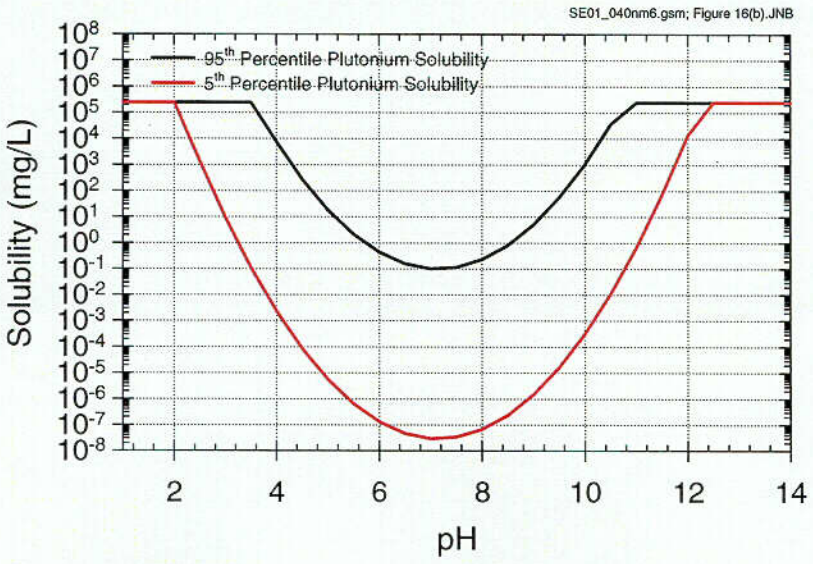
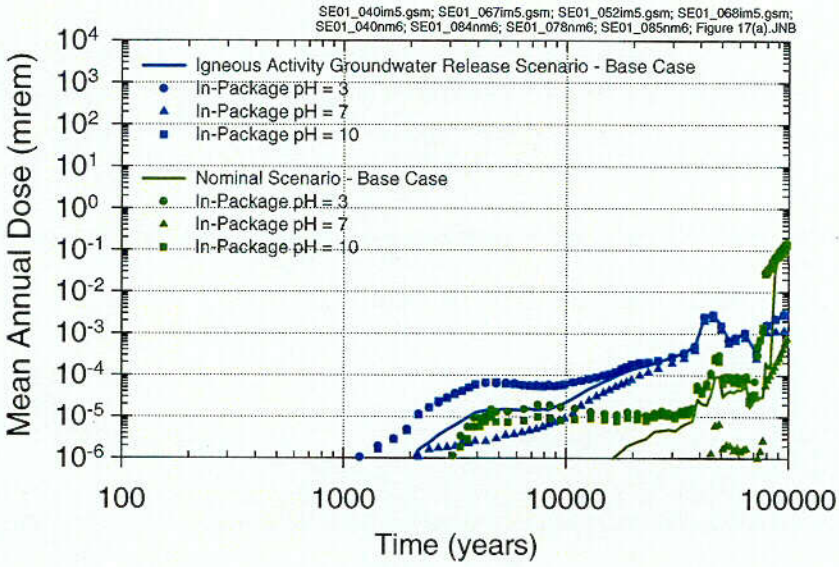
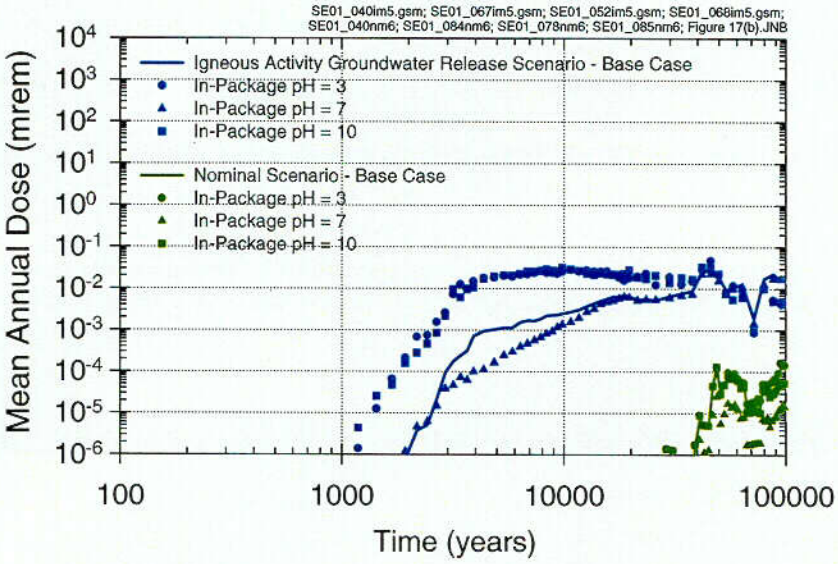



Figure 16. Dependence of Neptunium and Plutonium Solubility on pH

**(a) Contribution of Neptunium-237**



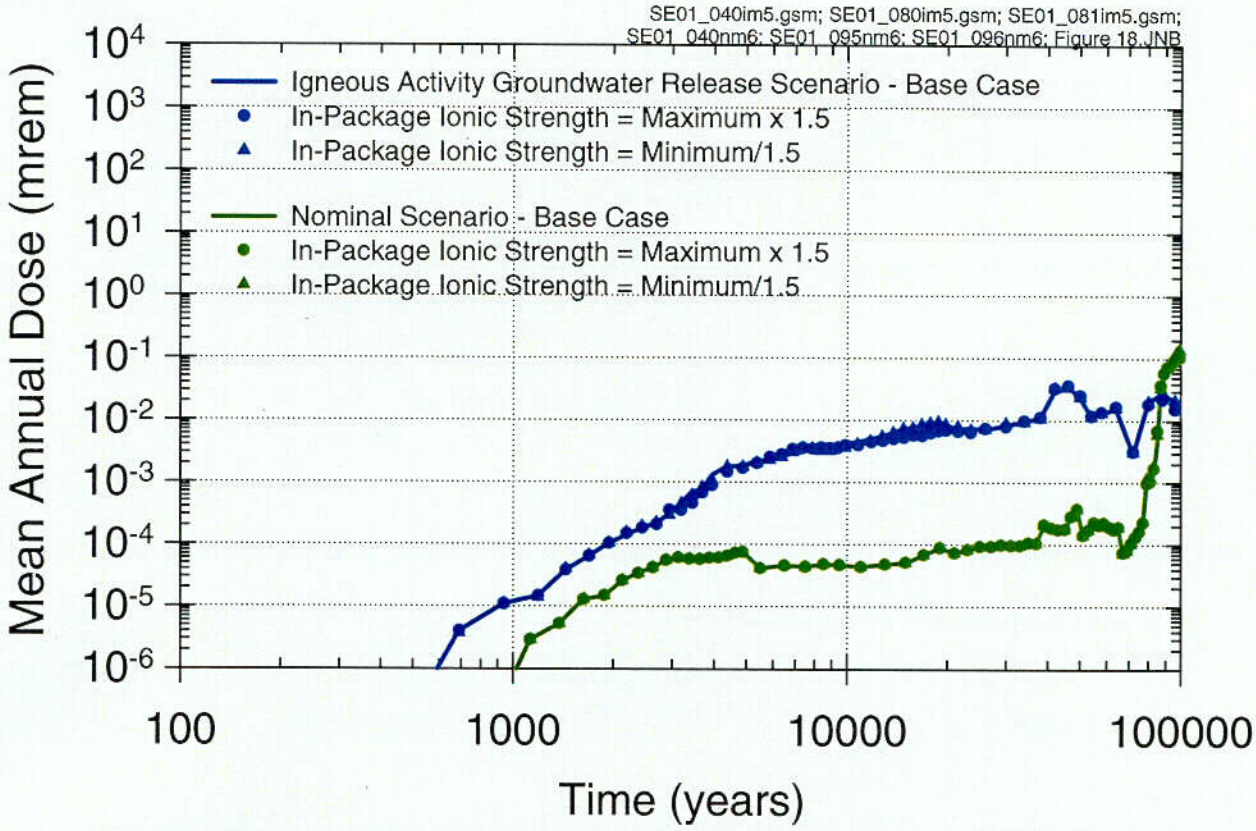

**(b) Contribution of Plutonium-239**




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 17. Contribution of Neptunium-237 and Plutonium-239 to Mean Annual Dose for Different pH Models

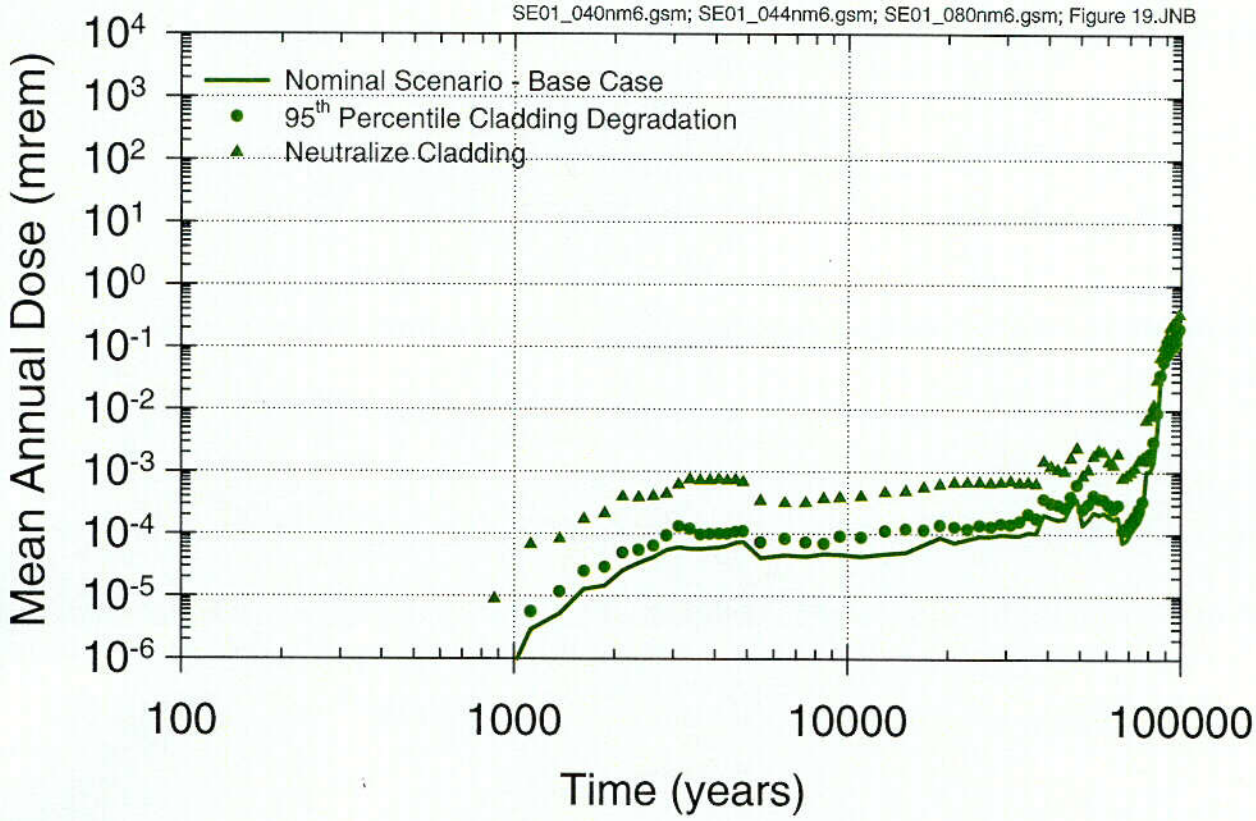
C13




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 18. Sensitivity of Mean Annual Dose to In-Package Ionic Strength

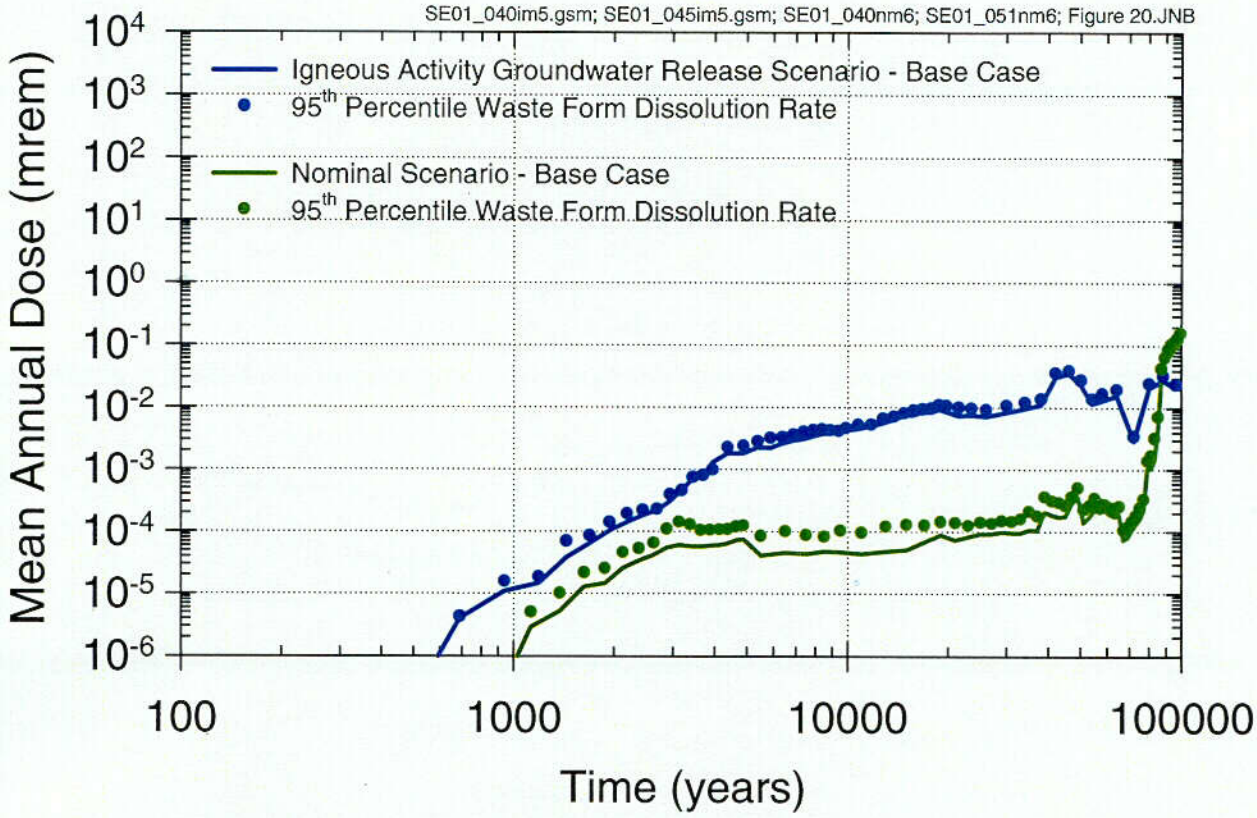
C14




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 19. Sensitivity of Mean Annual Dose to the CSNF Cladding Degradation Rate

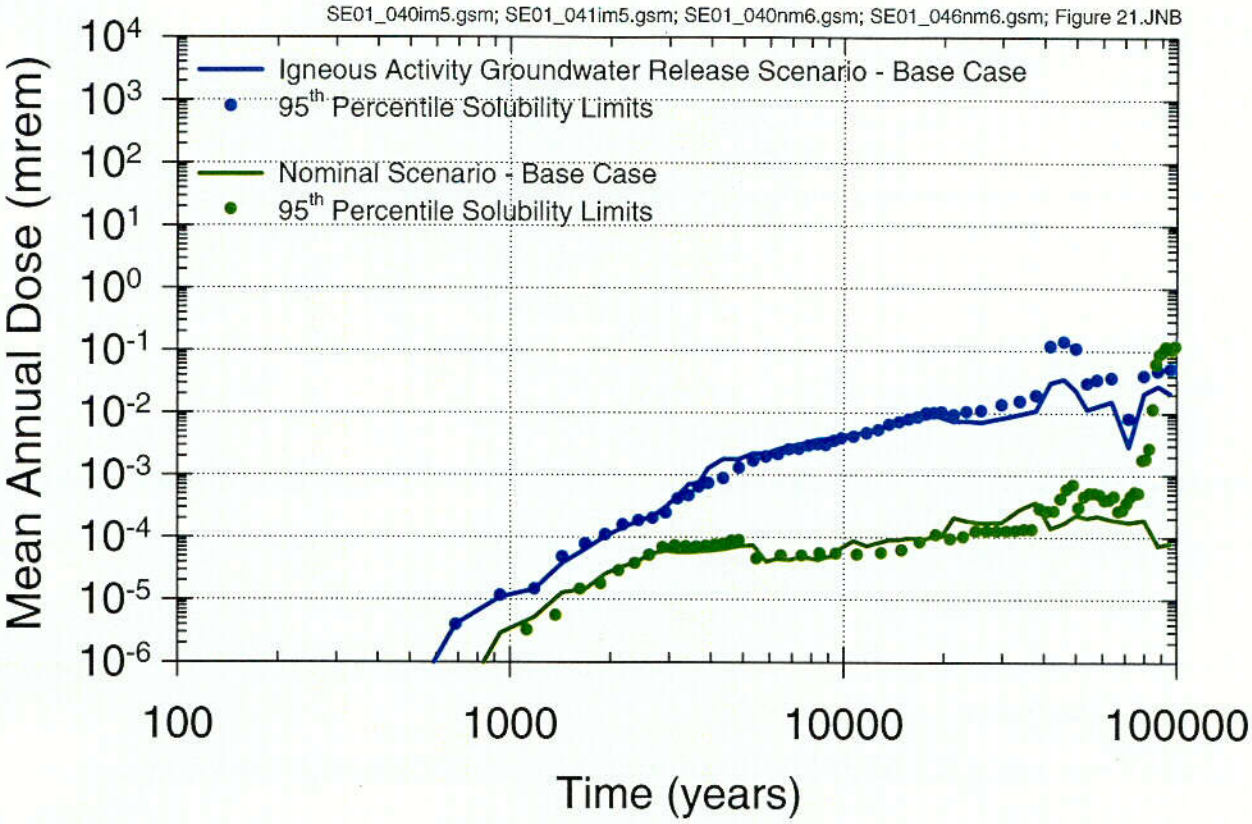
C15




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 20. Sensitivity of Mean Annual Dose to the Waste Form Dissolution Rate

C16

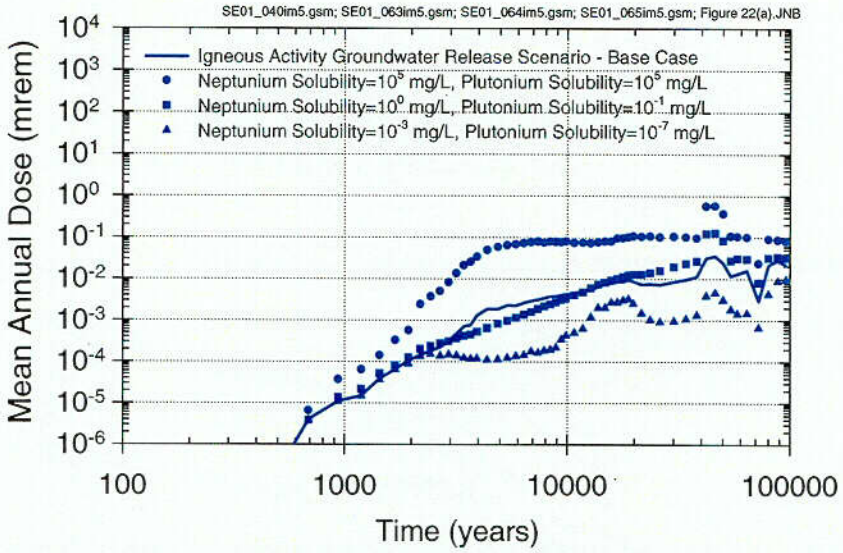



NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

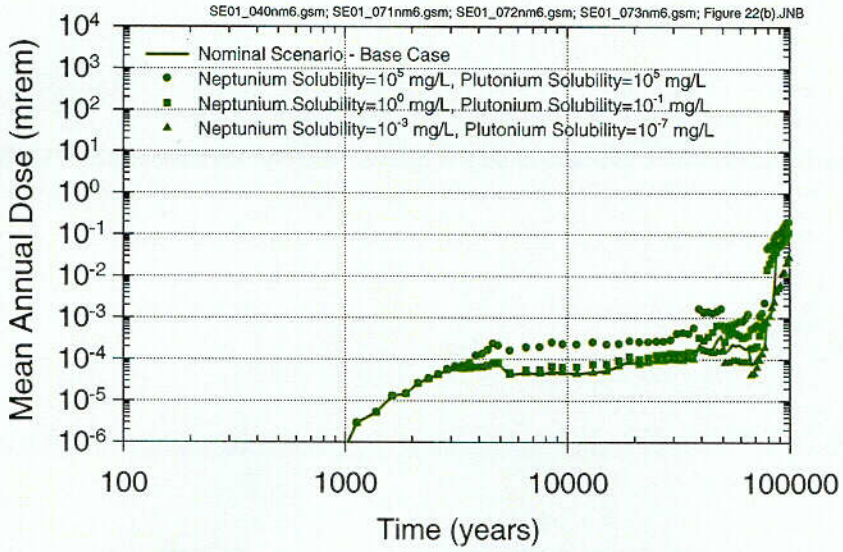
Figure 21. Sensitivity of Mean Annual Dose to Radionuclide Concentration Limits

C17

**(a) Igneous Activity Groundwater Release Scenario**



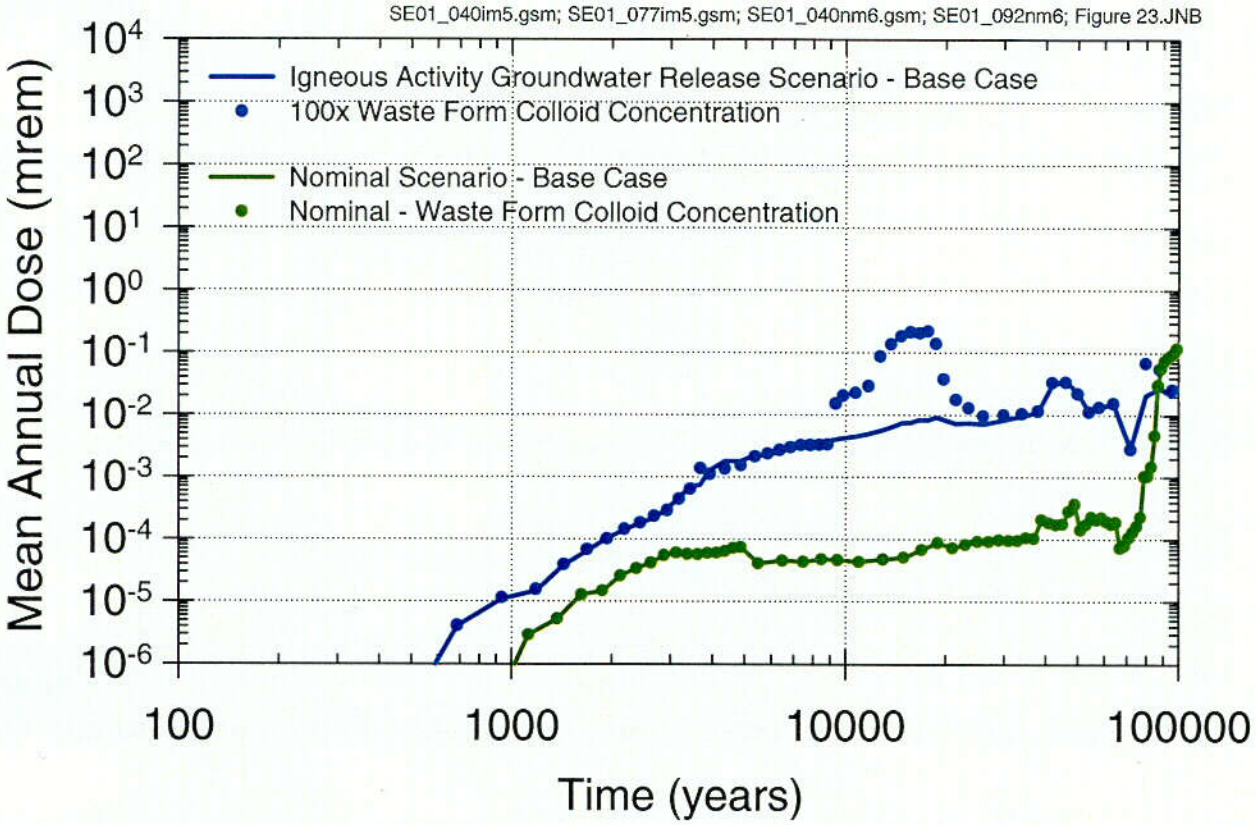

**(b) Nominal Scenario**




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 22. Sensitivity of Mean Annual Dose to Concentration Limits for Neptunium and Plutonium

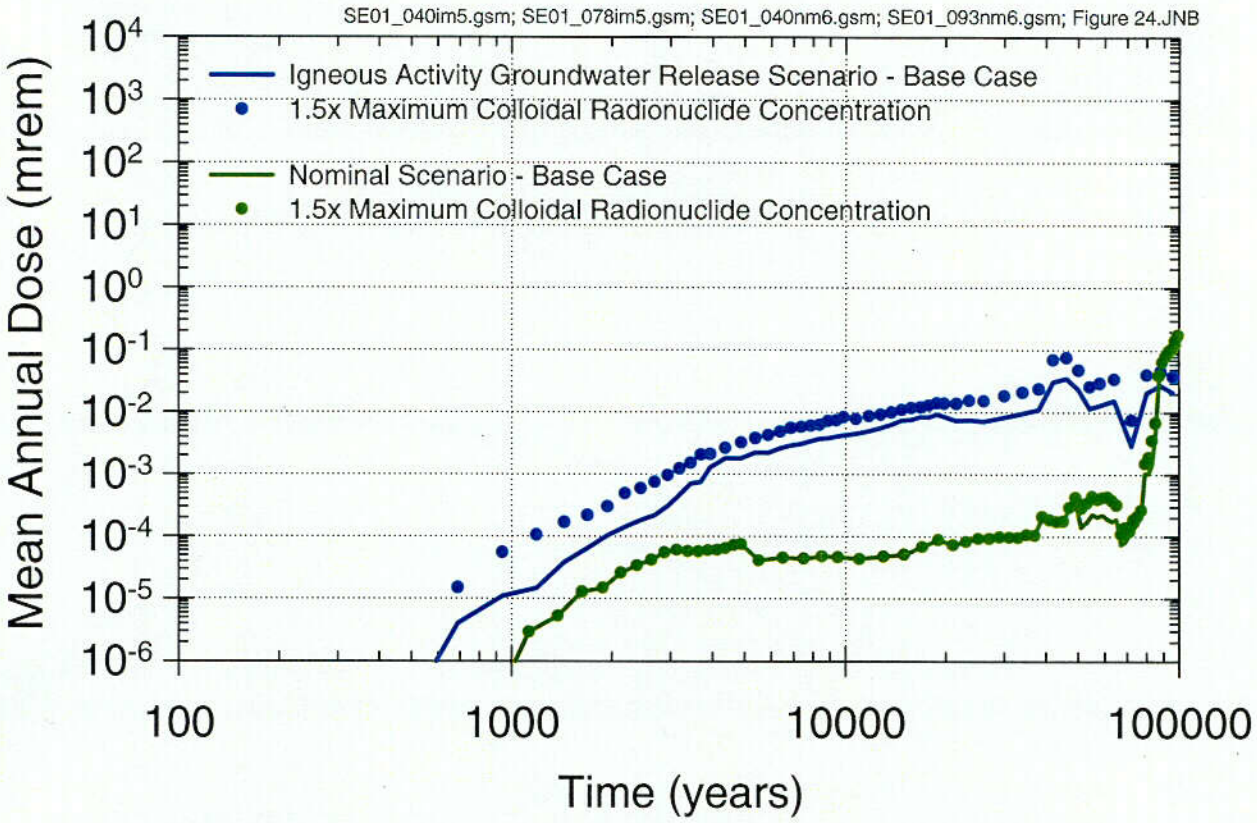
C18




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 23. Sensitivity of Mean Annual Dose to Concentration of Waste Form Colloids

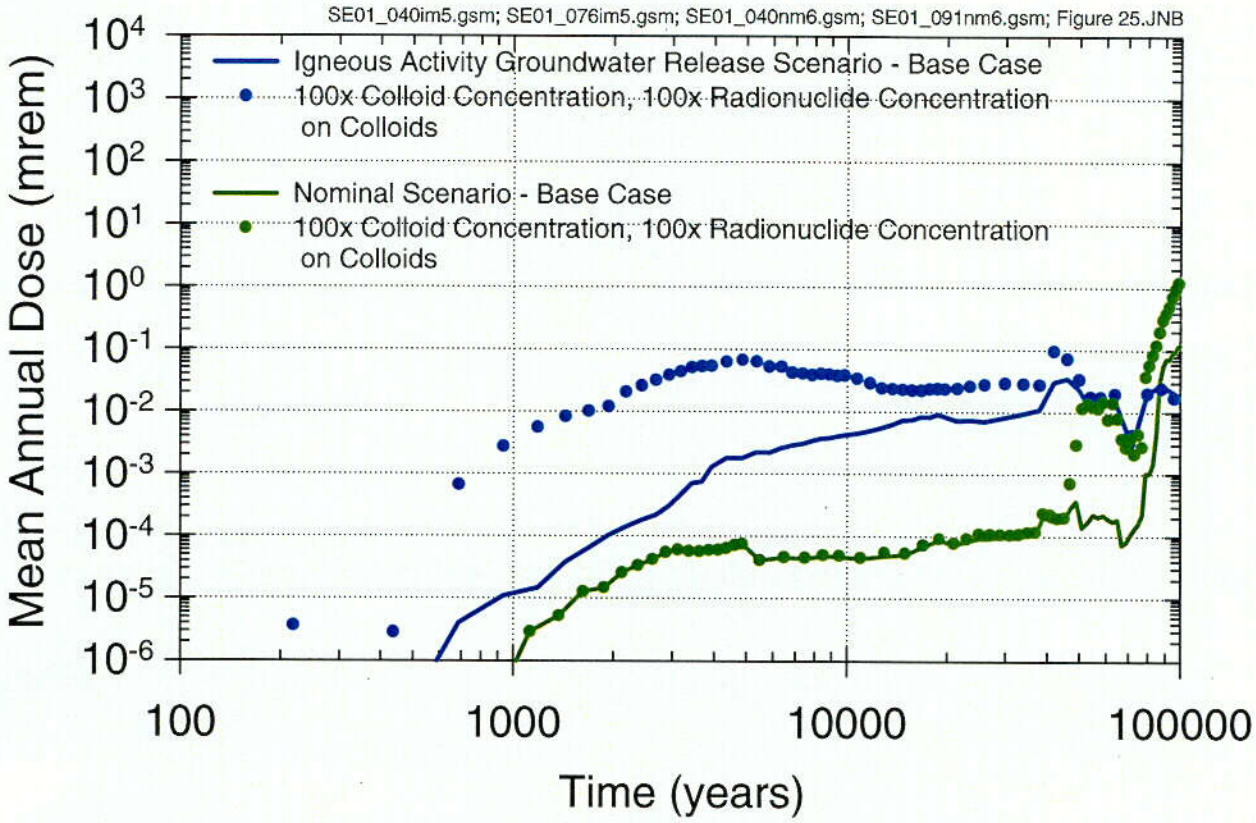
C19




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 24. Sensitivity of Mean Annual Dose to Concentration of Plutonium and Americium Irreversibly Sorbed to Waste Form Colloids

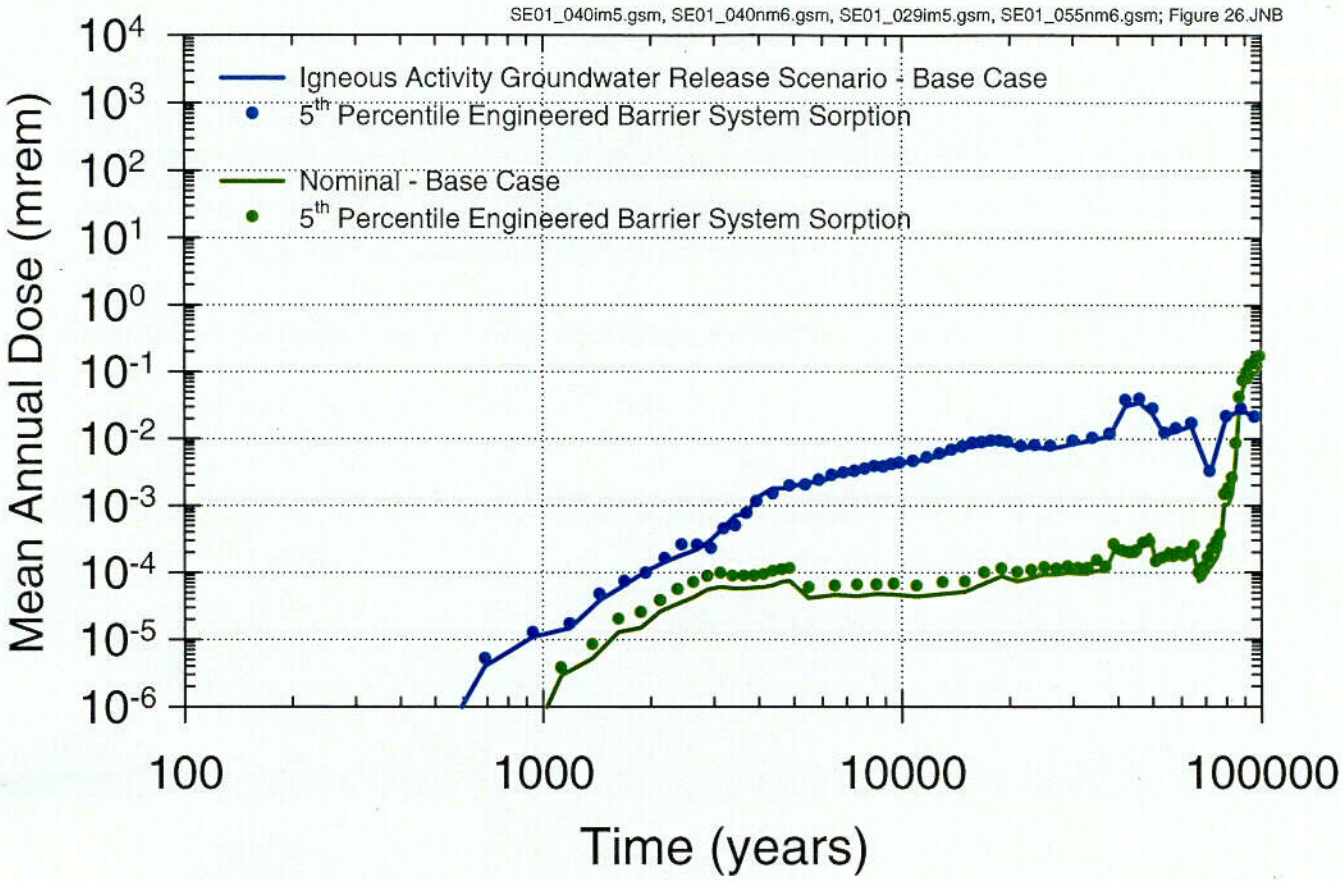
C20




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 25. Sensitivity of Mean Annual Dose to Concentration Limits for Plutonium and Americium Irreversibly Sorbed to Waste Form Colloids

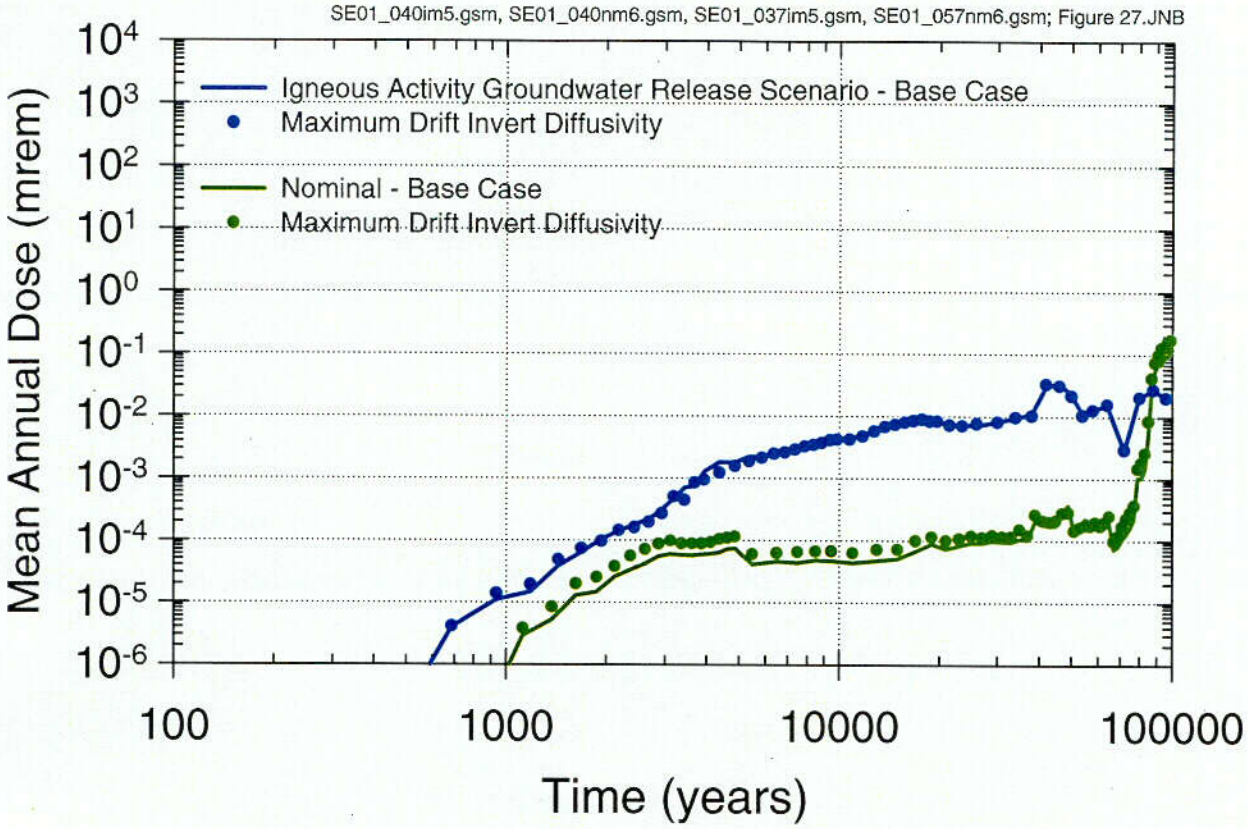
C21




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 26. Sensitivity of Mean Annual Dose to Radionuclide Sorption in the Drift Invert

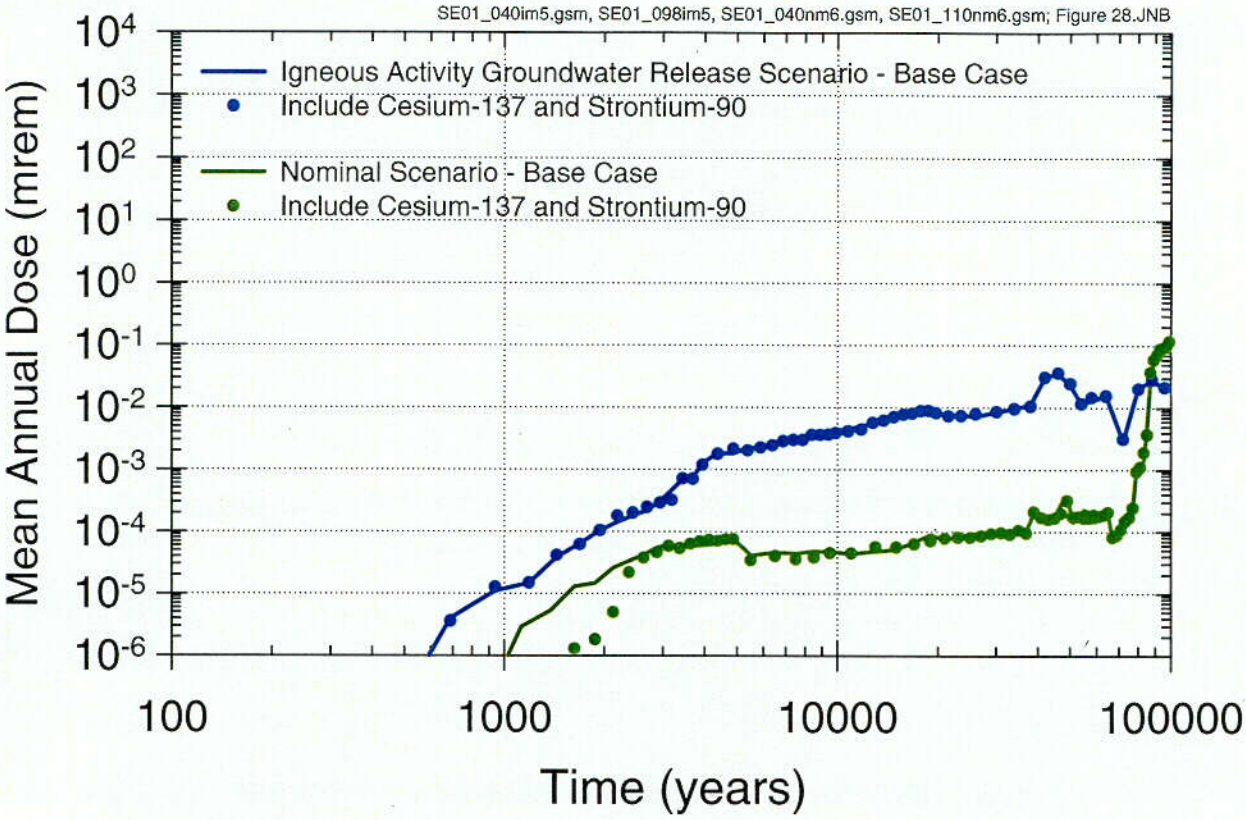
C22




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 27. Sensitivity of Mean Annual Dose to Radionuclide Diffusivity of the Drift Invert

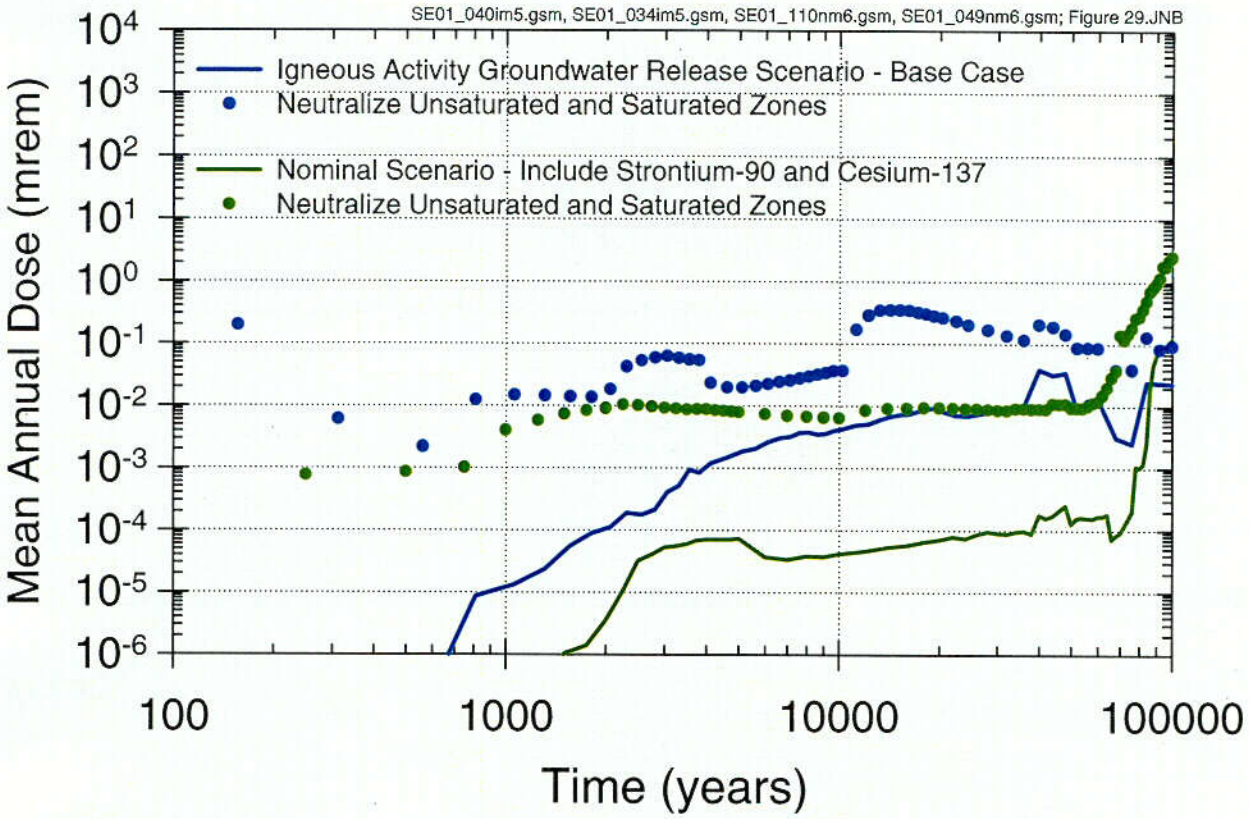
C23




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 28. Sensitivity of Mean Annual Dose to Treatment of Strontium-90 and Cesium-137 in the Unsaturated Zone Radionuclide Transport Component of the TSPA Model

C24

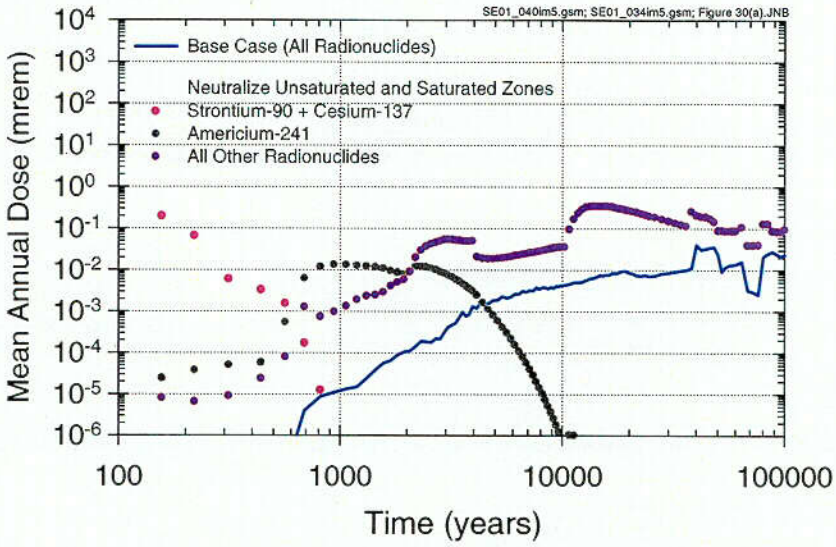



NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

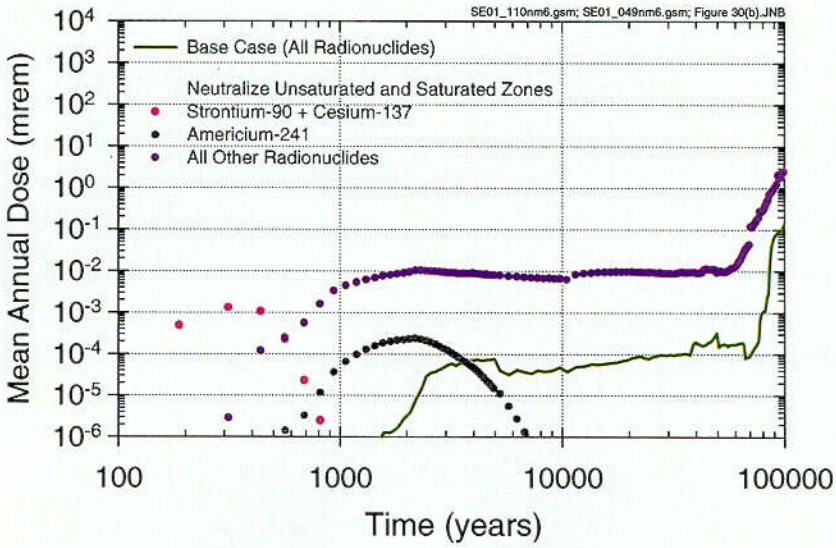
Figure 29. Effect of Neutralizing Both the Unsaturated Zone and Saturated Zone Radionuclide Transport Barriers on Mean Annual Dose

C25

**(a) Igneous Activity Groundwater Release Scenario**




**(b) Nominal Scenario**

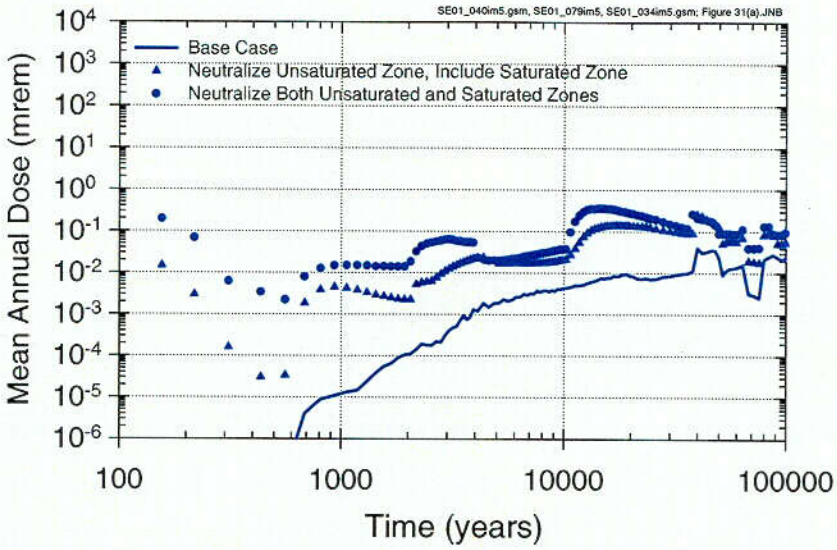



NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

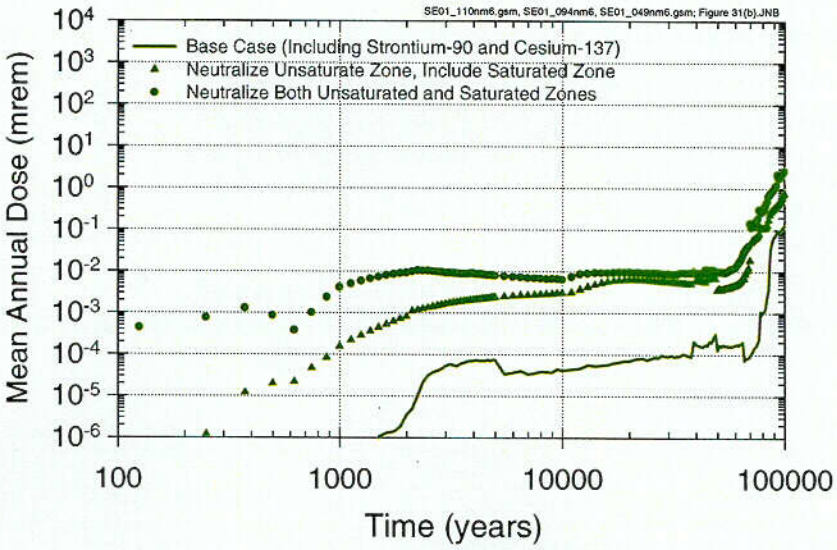
Figure 30. Contribution of Individual Radionuclides When Both the Unsaturated Zone and Saturated Zone Radionuclide Transport Barriers Are Neutralized

C26

**(a) Igneous Activity Groundwater Release Scenario**




**(b) Nominal Scenario**

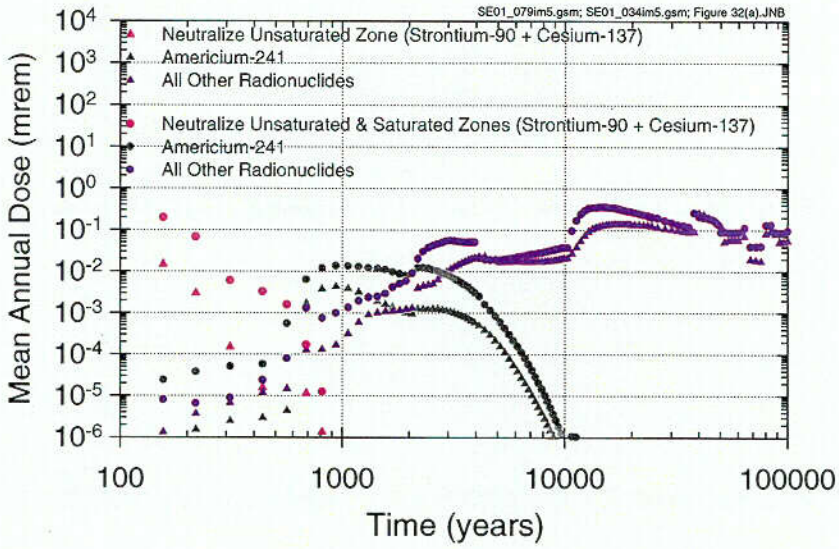



NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

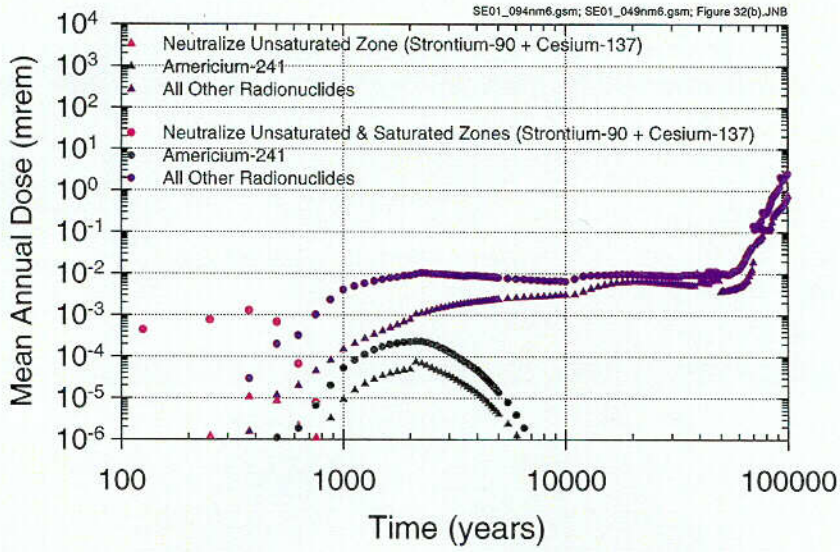
Figure 31. Effect of Saturated Zone Radionuclide Transport Barrier on Mean Annual Dose

C27

**(a) Igneous Activity Groundwater Release Scenario**




**(b) Nominal Scenario**

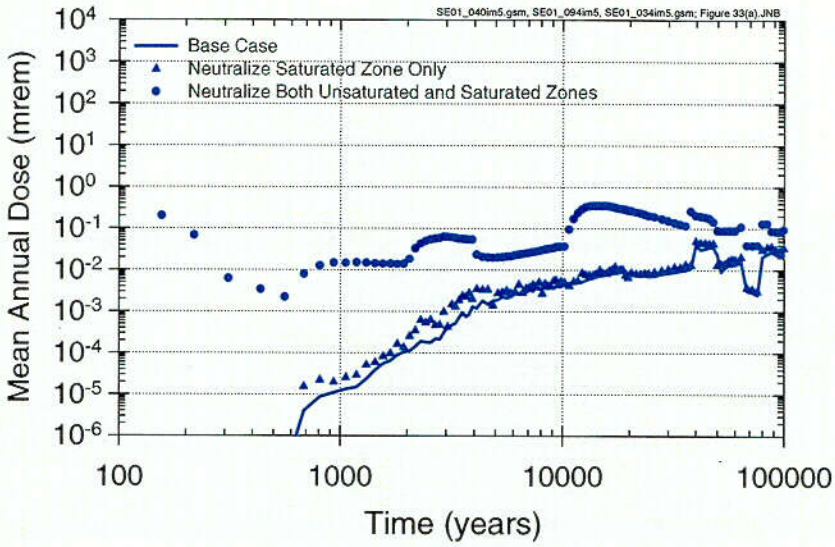



NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

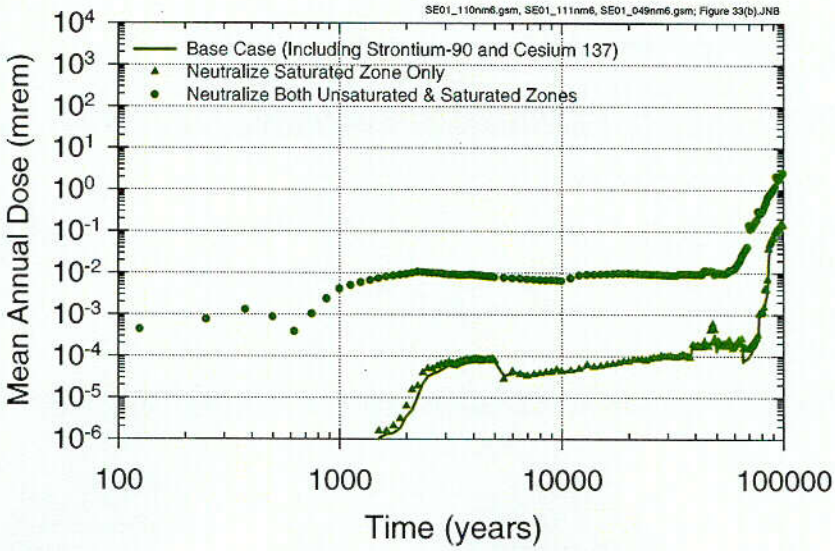
Figure 32. Contribution of Individual Radionuclides When the Saturated Zone Radionuclide Transport Barrier Is Included

C28

**(a) Igneous Activity Groundwater Release Scenario**




**(b) Nominal Scenario**

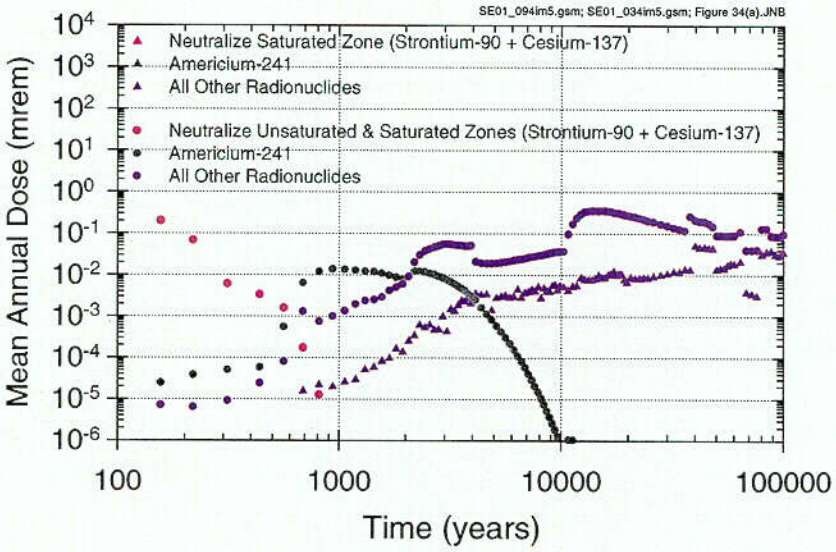



NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

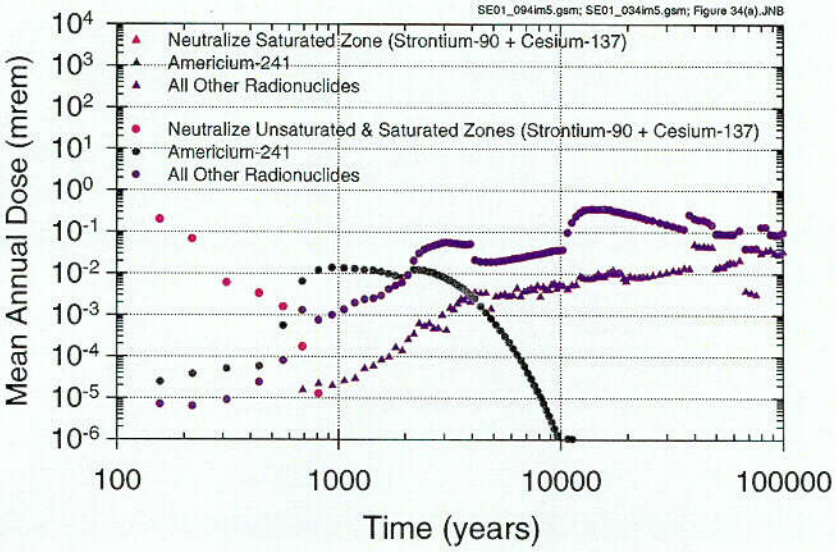
Figure 33. Effect of Unsaturated Zone Radionuclide Transport on Mean Annual Dose

C29

**(a) Igneous Activity Groundwater Release Scenario**




**(a) Igneous Activity Groundwater Release Scenario**

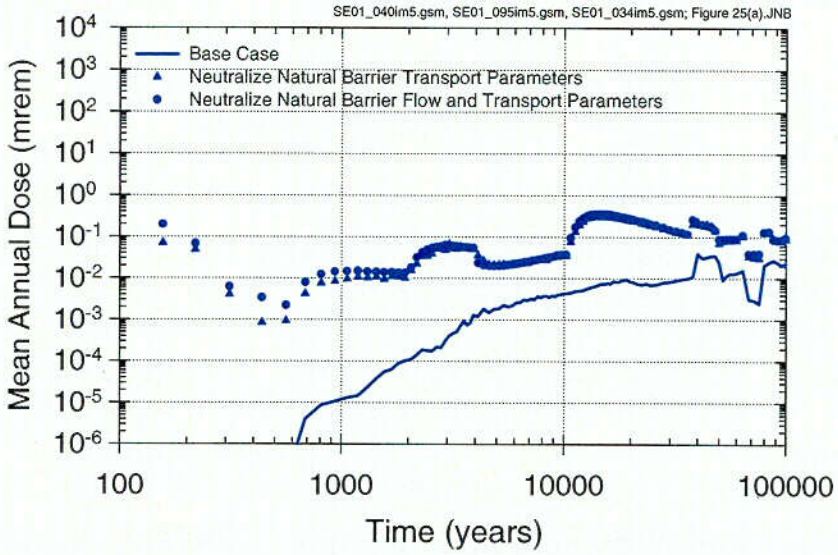



NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

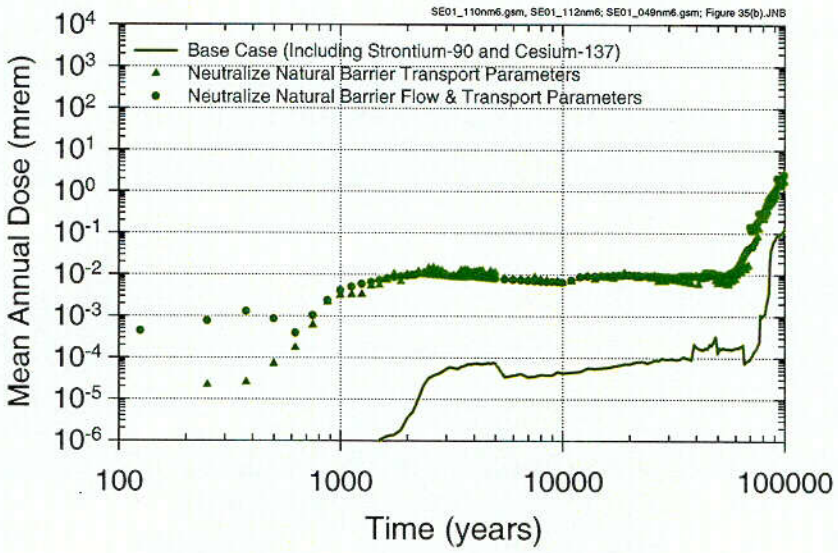
Figure 34. Contribution of Individual Radionuclides When the Unsaturated Zone Radionuclide Transport Barrier Is Included

C30

**(a) Igneous Activity Groundwater Release Scenario**




**(b) Nominal Scenario**

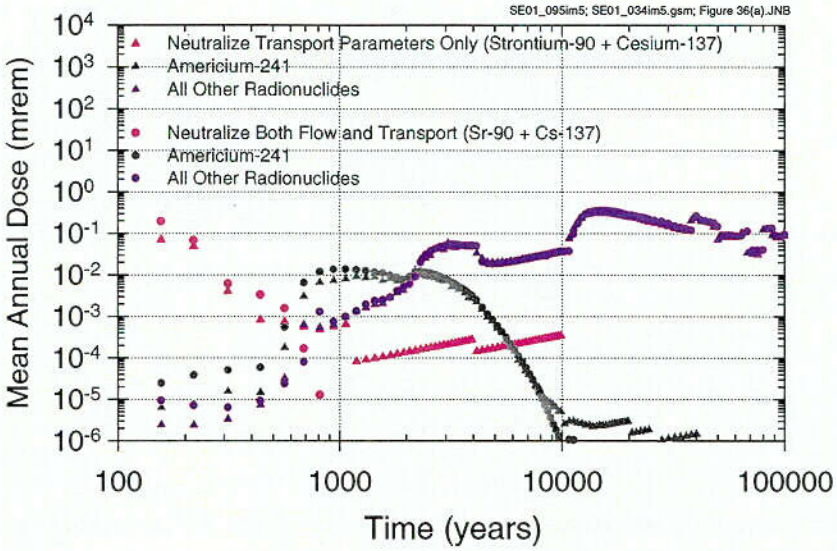



NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

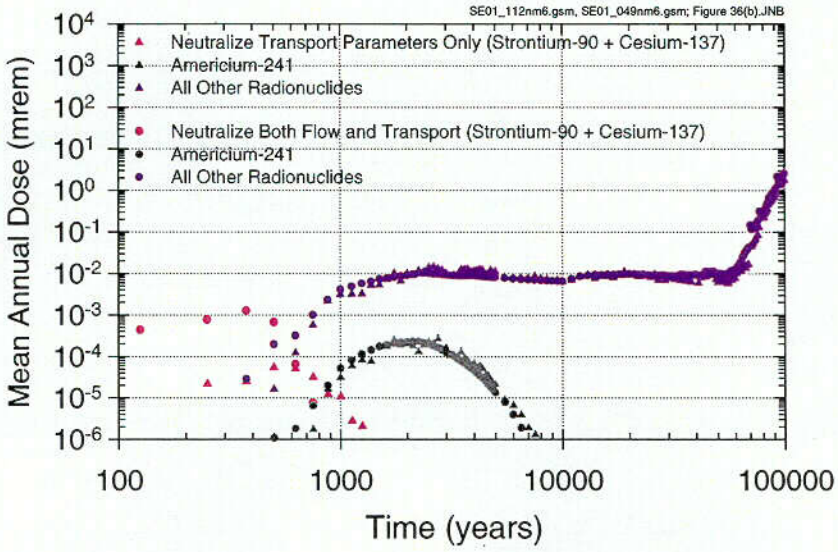
Figure 35. Sensitivity of Mean Annual Dose to Sorption, Matrix Diffusion, and Colloid Filtration in the Unsaturated Zone and Saturated Zone Radionuclide Transport Components of the TSPA Model

C31

**(a) Igneous Activity Groundwater Release Scenario**



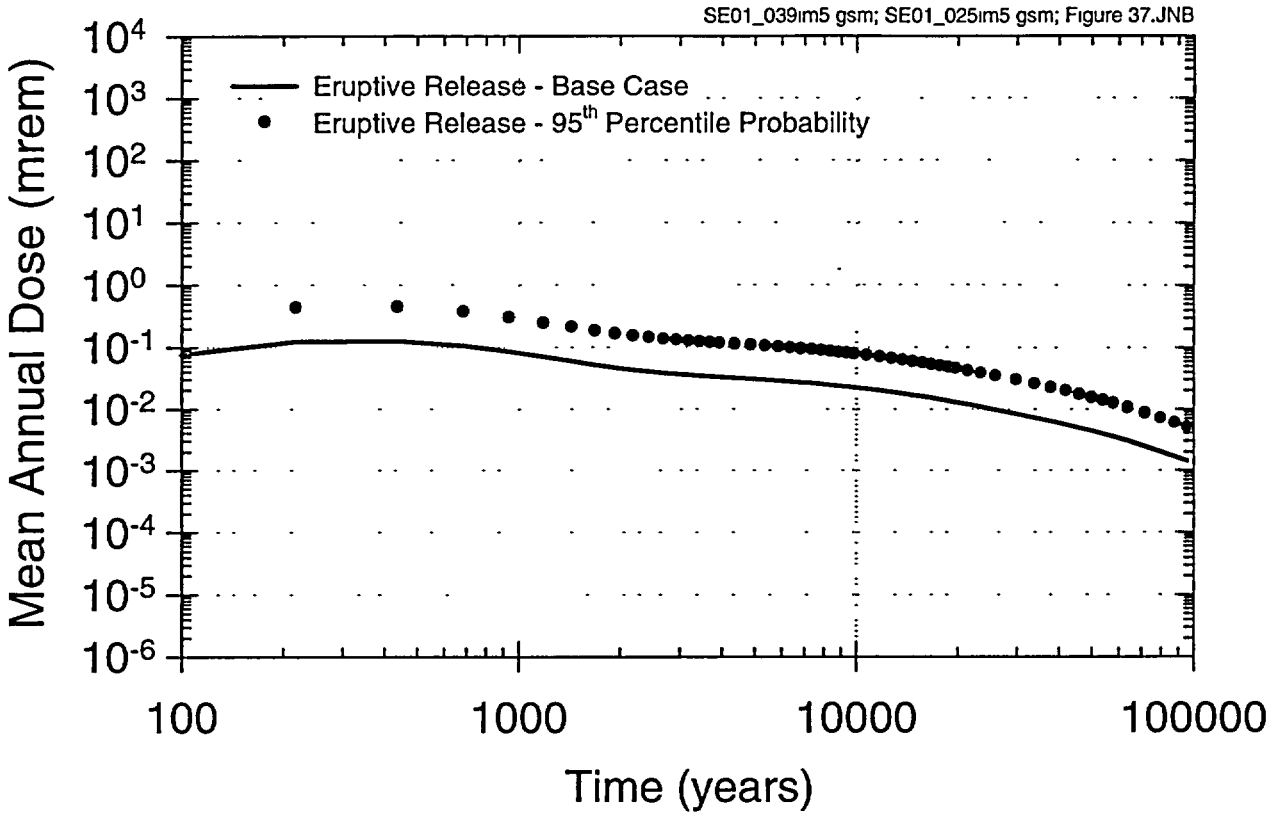

**(b) Nominal Scenario**




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

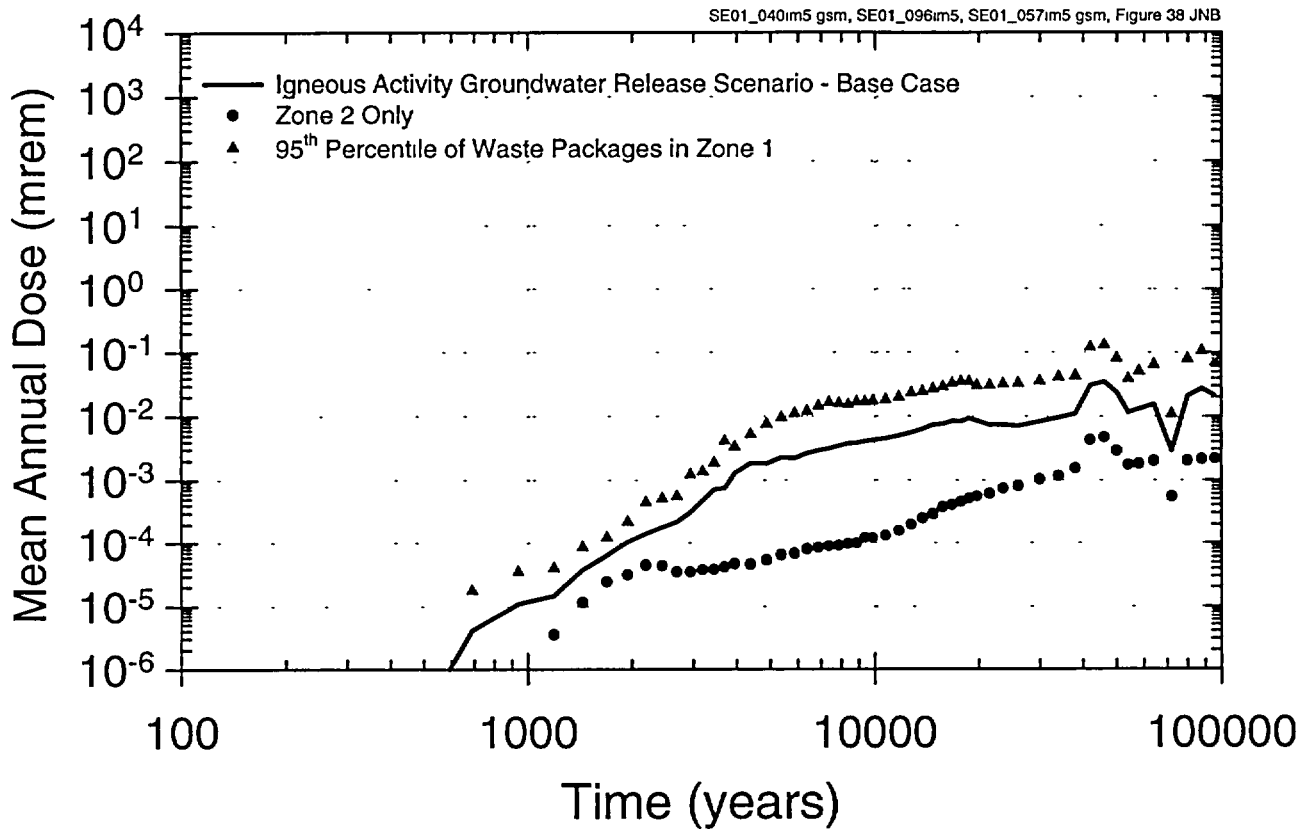
Figure 36. Role of Sorption, Matrix Diffusion, and Colloid Filtration in the Unsaturated Zone and Saturated Zone Radionuclide Transport Components of the TSPA Model for Different Radionuclides

C32



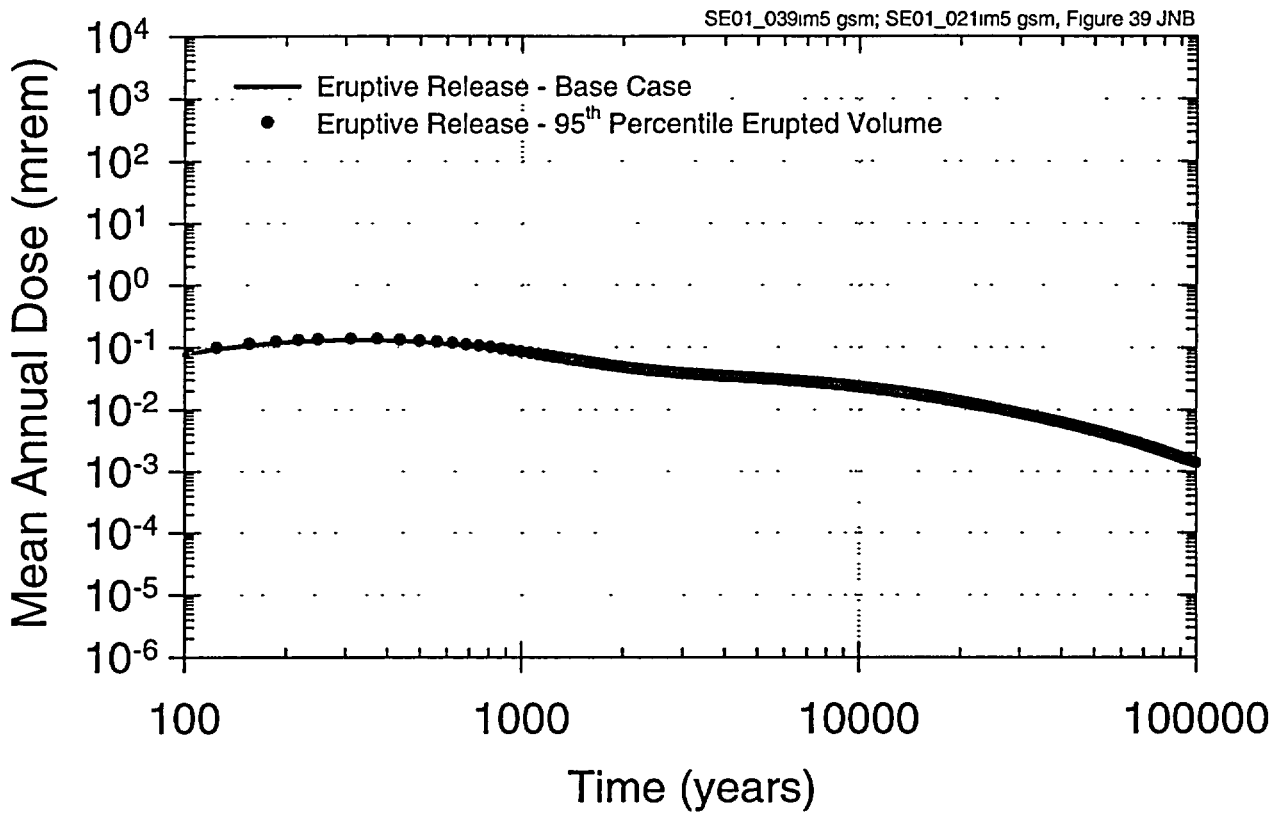

NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 37. Sensitivity of Mean Annual Dose to the Igneous Activity Probability TSPA Model Component



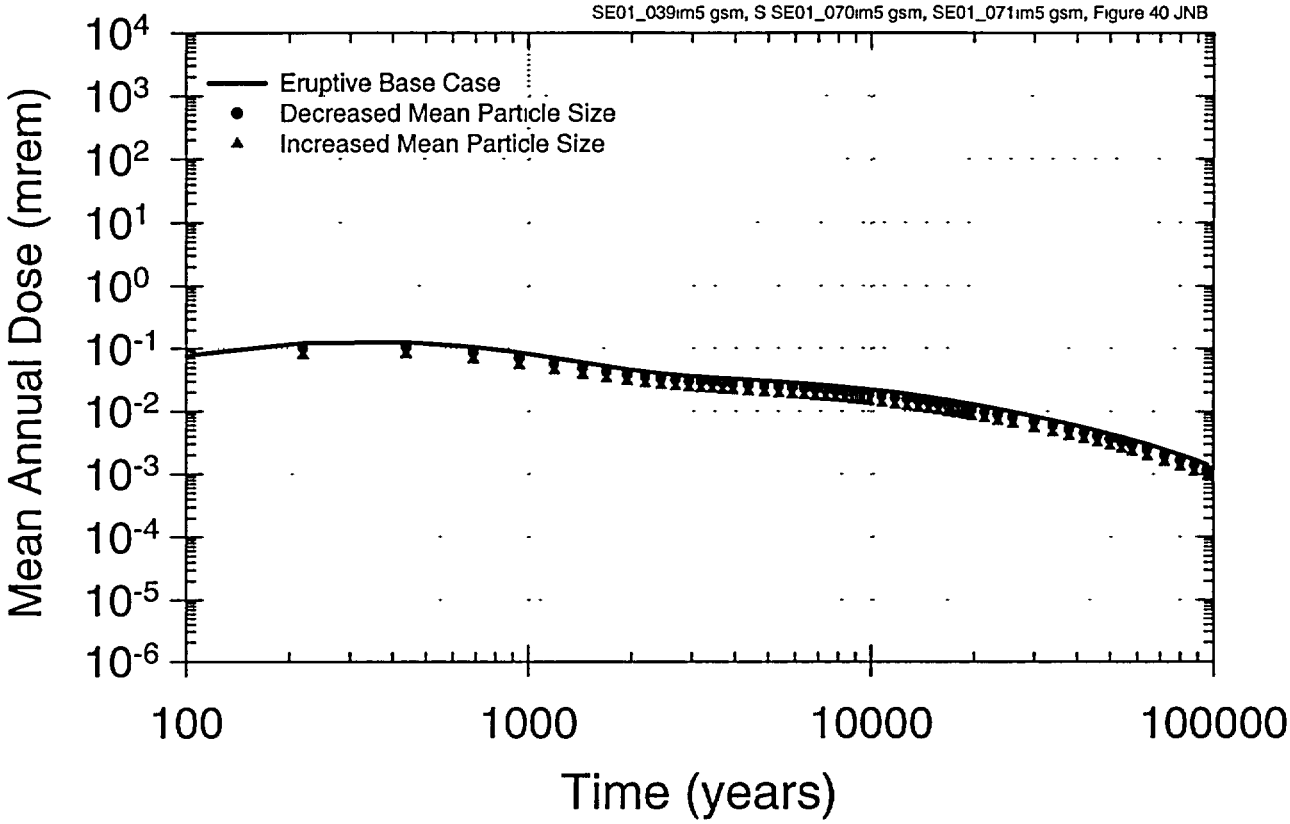

NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 38. Sensitivity of Mean Annual Dose to the Number of Waste Packages Disrupted by Igneous Intrusion



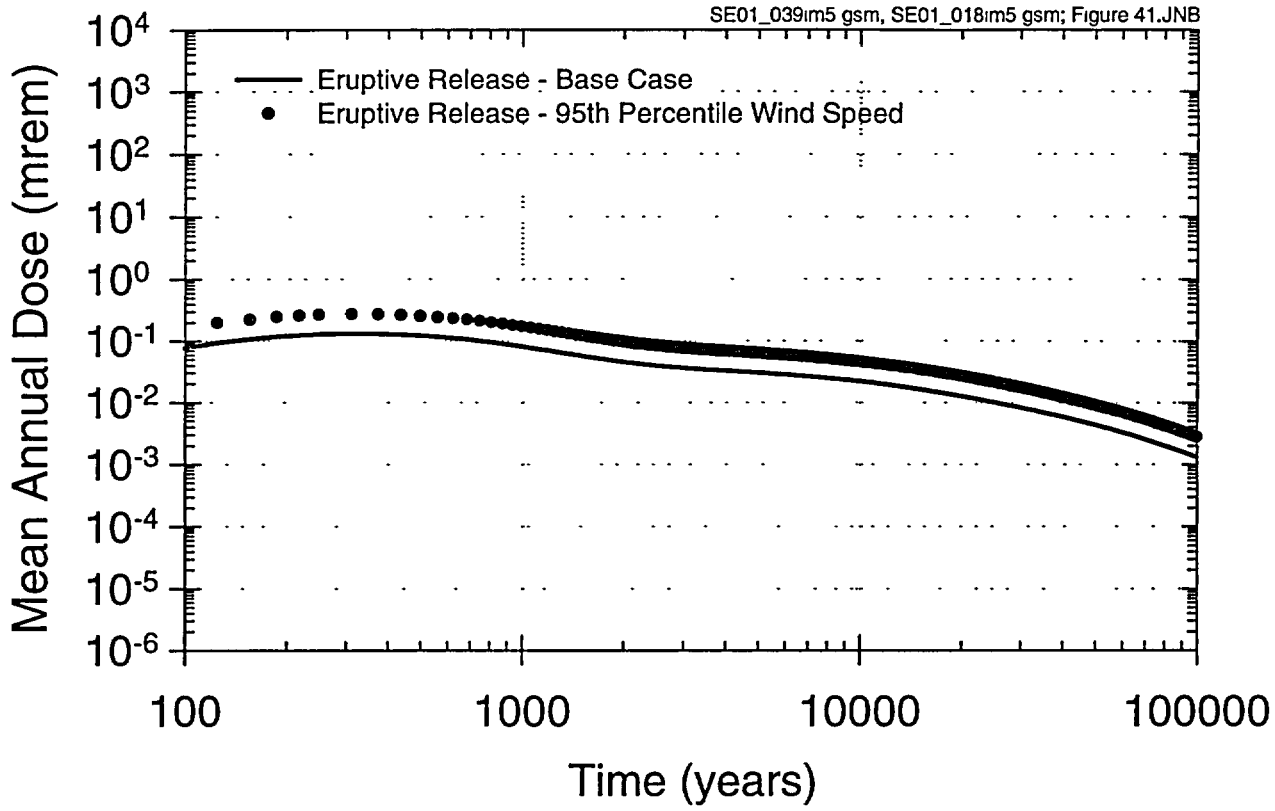

NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 39. Sensitivity of Mean Annual Dose to the Volume of Erupted Material



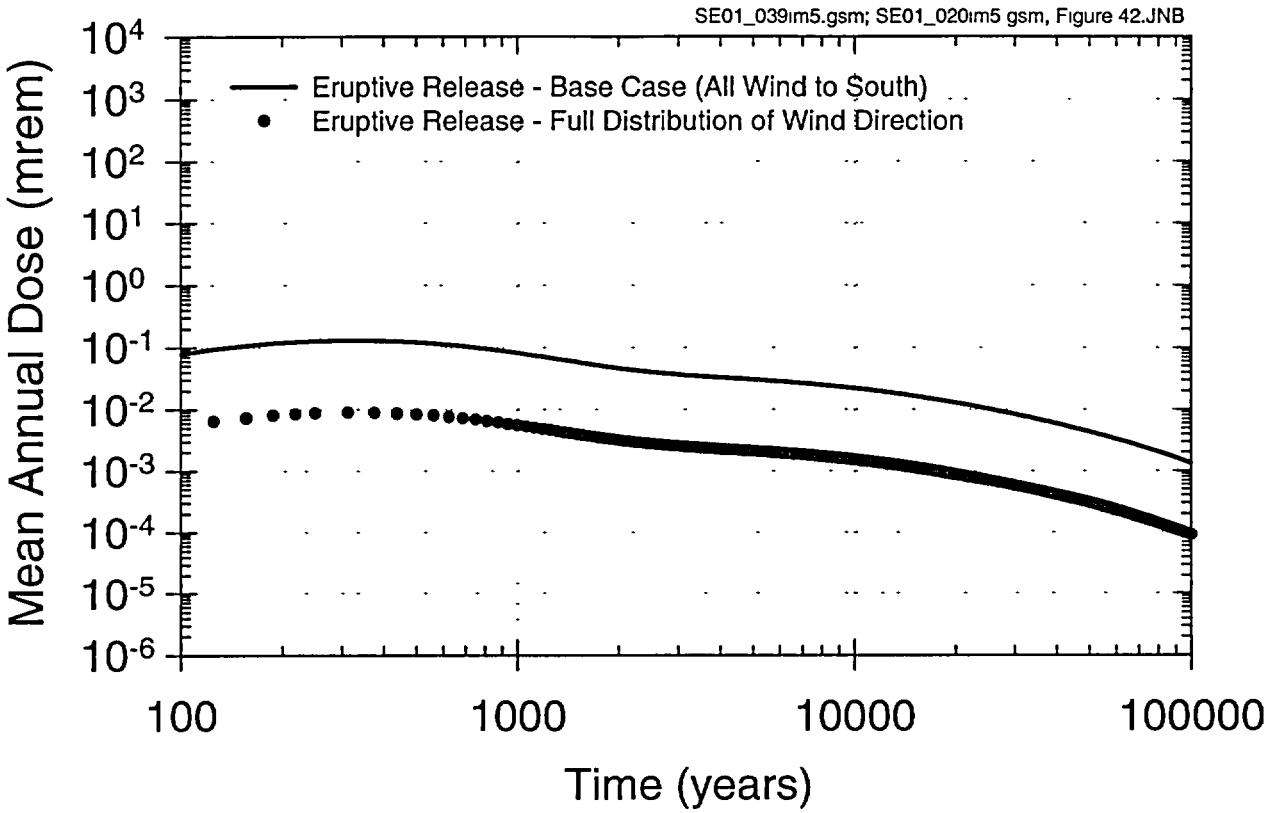

NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 40. Sensitivity of Mean Annual Dose to Particle Size



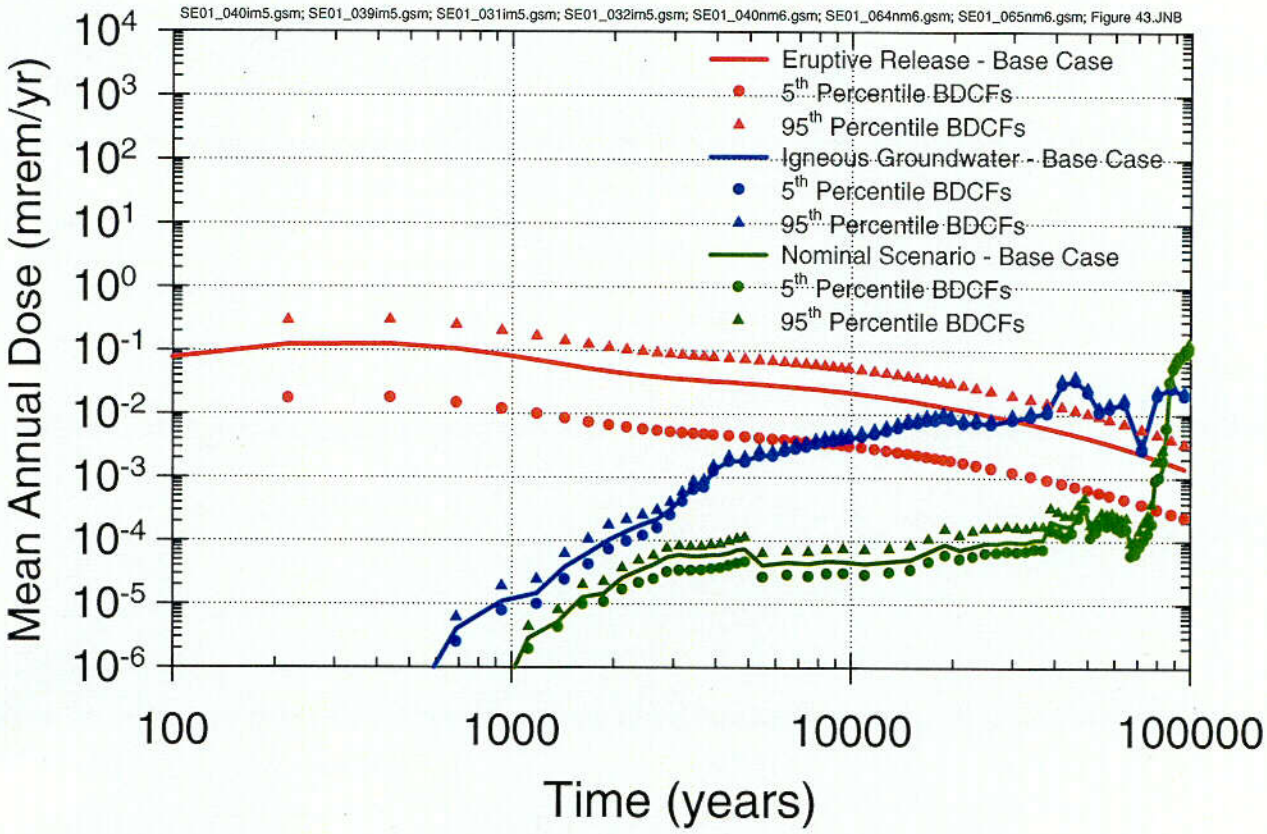

NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 41. Sensitivity of Mean Annual Dose to Wind Speed




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

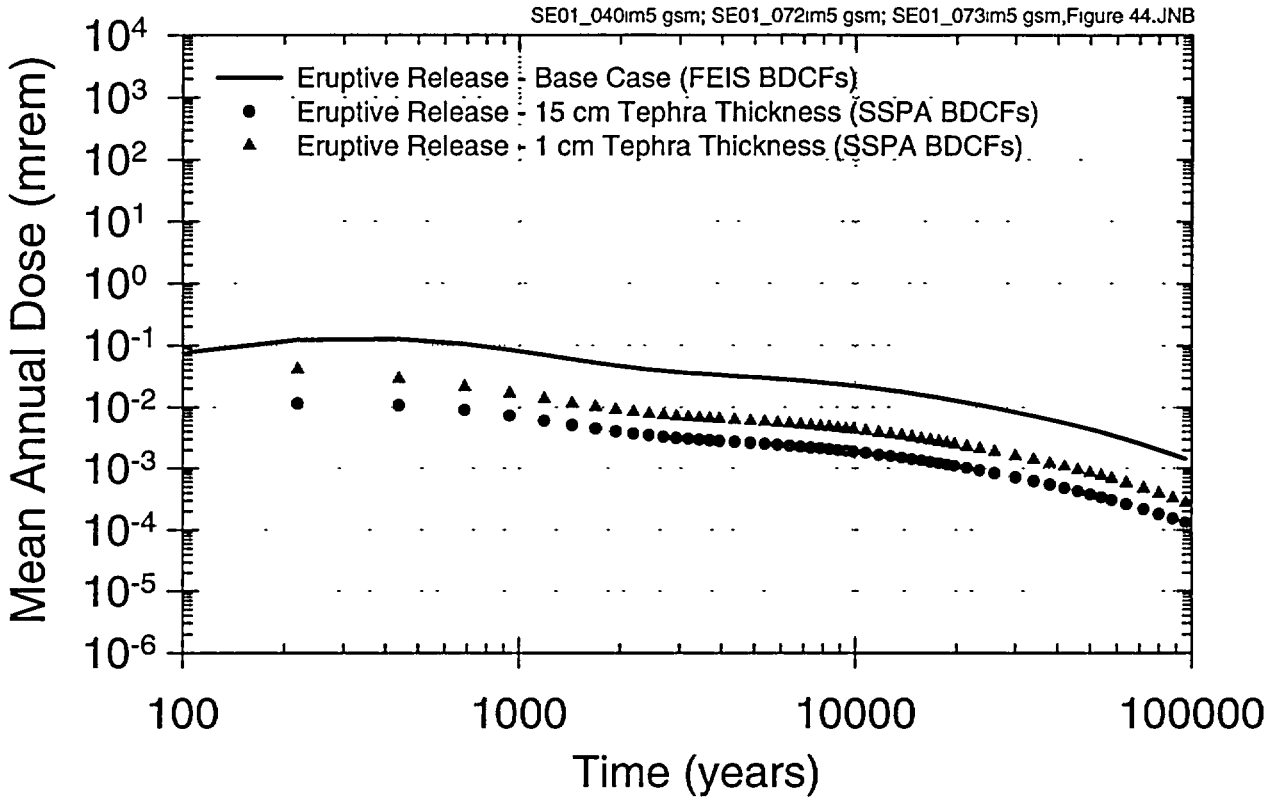
Figure 42. Sensitivity of Mean Annual Dose to Wind Direction




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

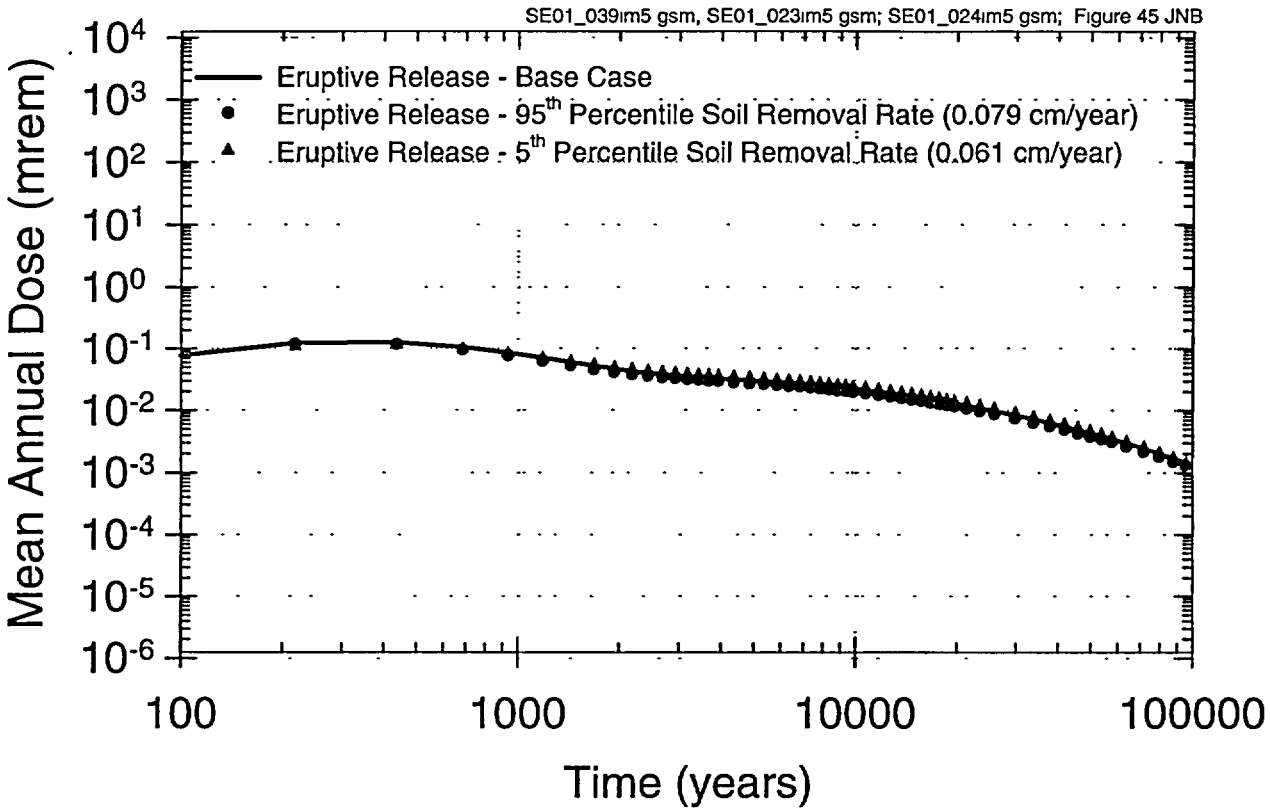
Figure 43. Sensitivity of Mean Annual Dose to the Biosphere TSPA Model Component

C33




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

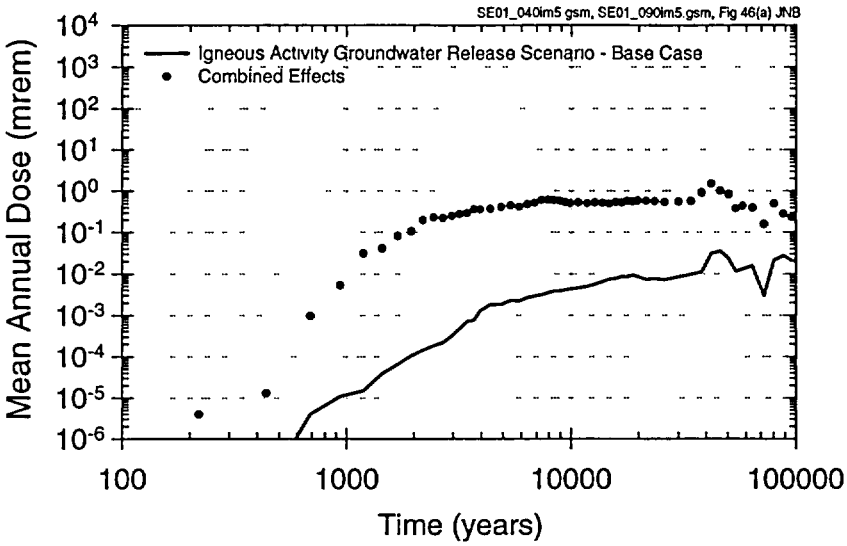
Figure 44. Sensitivity of Igneous Activity Eruptive Release Mean Annual Dose to Tephra Deposit Thickness



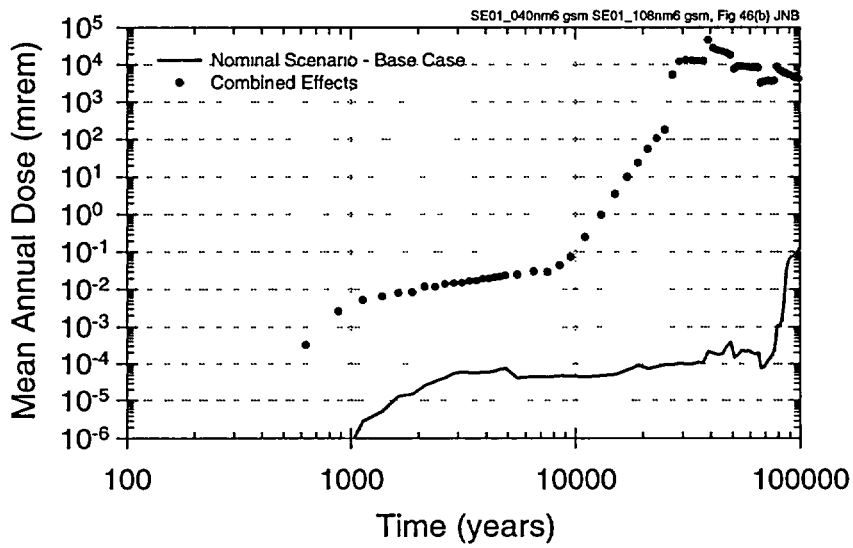

NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 45. Sensitivity of Igneous Activity Eruptive Release Mean Annual Dose to Soil Removal Rate

**(a) Igneous Activity Groundwater Release Scenario**



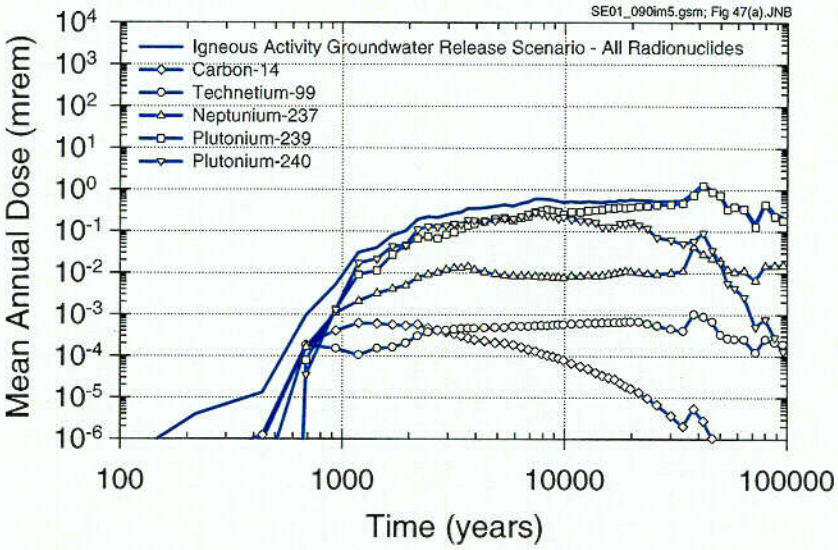

**(b) Nominal Scenario**



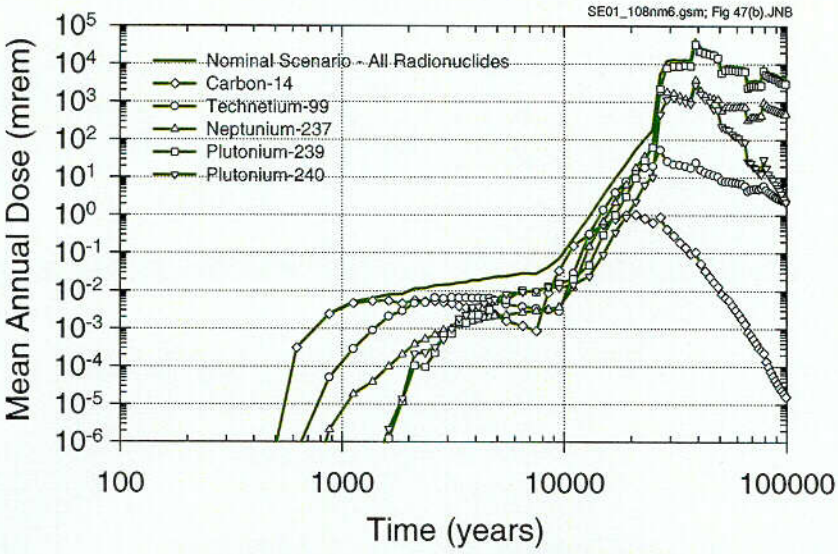

NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 46. Effect of Combinations of Variations in TSPA Model Components

**(a) Igneous Activity Groundwater Release Scenario**




**(b) Nominal Scenario**




NOTE: Each mean annual dose curve is a probability-weighted average. However, the results of the sensitivity studies do not correspond to expected risk (see introduction to Section 3).

Figure 47. Contributions of Individual Radionuclides in the Study of Effect of Combinations of Variations in TSPA Model Components

C34

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## Table 1. TSPA Model Areas and Components

| TSPA Model Area | TSPA Model Component | Study Section |
|---|---|---|
| Unsaturated Zone Flow and Seepage | Climate and Net Infiltration | 3.3.1 |
| | Unsaturated Zone Flow | 3.3.1, 3.3.10 |
| | Seepage into Emplacement Drifts | 3.3.2 |
| | Coupled Thermal, Chemical, and Mechanical Effects on Unsaturated Zone Flow and Seepage | (3.3.1, 3.3.2) |
| In-Drift Moisture and Chemistry | Chemistry of Water on Drip Shield | (3.3.4) |
| | Chemistry of Water on Waste Package | (3.3 4) |
| | Drift Invert Moisture Conditions | (3 3.2) |
| | Drift Invert Water Chemistry | 3.3.3 |
| Waste Package and Drip Shield Degradation | Drip Shield Early Failure | 3.3.4 |
| | Drip Shield General and Local Corrosion | 3.3.4 |
| | Drip Shield Stress Corrosion Cracking | 3.3.4 |
| | Waste Package Early Failure | 3.3.4 |
| | Waste Package General and Local Corrosion | 3.3.4 |
| | Waste Package Stress Corrosion Cracking | 3.3.4 |
| Mechanical Disruption of Engineered Barriers | Mechanical Disruption of Waste Packages, Drip Shields, and Cladding from Seismic Activity and Rockfall | (3.3.4, 3 3.6) |
| Quantity and Chemistry of Water Contacting Waste Forms | In-Package Temperature, Moisture, and Chemistry | 3 3.5, (3.3.2) |
| Radionuclide Release Rates and Concentrations | Radionuclide Inventory | 3.3.15 |
| | CSNF Cladding Degradation | 3.3.6 |
| | Dissolution of Uranium Oxide and High-Level Waste Glass | 3.3.6 |
| | Dissolved Radionuclide Concentrations | 3 3.7 |
| | Colloid-Associated Radionuclide Concentrations | 3.3.8 |
| | Radionuclide Transport from the Engineered Barrier System | 3.3.9 |

NOTE: Study section numbers without parentheses indicate sensitivity studies that bear directly on the TSPA model area or component. Section numbers in parentheses indicate those sections that bear on the model area or component indirectly.

**Table 1. TSPA Model Areas and Components (Continued)**

| TSPA Model Area | TSPA Model Component | Study Section |
|---|---|---|
| Unsaturated Zone Radionuclide Transport | Drift Scale Radionuclide Transport in the Unsaturated Zone | 3.3.10 |
| | Mountain Scale Radionuclide Transport in the Unsaturated Zone | 3.3.10 |
| | Coupled Thermal, Chemical, and Mechanical Effects on Unsaturated Zone Radionuclide Transport | (3 3.10) |
| Saturated Zone Flow and Radionuclide Transport | Saturated Zone Flow | 3.3.10 |
| | Saturated Zone Radionuclide Transport | 3.3.10 |
| Disruption of Engineered Barriers by Igneous Activity | Igneous Activity Groundwater Release Probability | 3.3.11 |
| | Igneous Activity Eruptive Release Probability | 3.3.11 |
| | Damage to Waste Packages, Drip Shields, and Cladding by Igneous Intrusion | 3.3.12 |
| | Damage to Waste Packages, Drip Shields, and Cladding by Igneous Eruption | 3.3.12 |
| Atmospheric Transport of Erupted Radionuclides | Volume of Erupted Material | 3 3.13 |
| | Particle Size and Density | 3 3.13 |
| | Wind Speed and Direction | 3.3.13 |
| Biosphere Characteristics | Biosphere Dose Conversion Factors | 3.3.14 |
| | Tephra Deposit Thickness | 3.3.14 |
| | Tephra Redistribution | 3.3.14 |
| Postclosure Criticality | Postclosure Criticality Probability and Effects | None |

NOTE: Study section numbers without parentheses indicate sensitivity studies that bear directly on the TSPA model area or component. Section numbers in parentheses indicate those sections that bear on the model area or component indirectly.

## Table 2. Prioritization of TSPA Model Components

| Importance to Expected Risk | Importance to Eruptive Release Mean Annual Dose | Importance to Igneous Activity Groundwater Release Mean Annual Dose[a] | Importance to Nominal Scenario Mean Annual Dose |
|---|---|---|---|
| Potentially Significant | • Probability of Igneous Eruption in Repository<br>• Amount of Waste Erupted<br>• BDCFs for Eruptive Release Scenario | None | Waste Package Early Failure and Degradation |
| Possibly Significant in Combination with Other Components | • Mean Wind Speed and Direction<br>• Soil Redistribution | • Probability of Igneous Intrusion into Repository<br>• Damage to Engineered Barriers in Intrusion<br>• Dissolved Pu-239 and Pu-240 Concentrations<br>• UZ Transport of Sr-90 and Cs-137<br>• SZ Transport of Sr-90 and Cs-137 | None |
| Not Significant | • Soil Thickness and Removal<br>• Eruptive Volume<br>• Particle Size and Density | • Climate and Net Infiltration<br>• Seepage into Emplacement Drifts<br>• In-Drift Temperature, Moisture, Chemistry<br>• In-Package Temperature, Moisture, Chemistry<br>• Waste Form (Including Cladding) Degradation<br>• Dissolved Concentrations of Rns other than Pu-239 and Pu-240<br>• Colloid-Associated Rn Concentrations<br>• EBS Radionuclide Transport<br>• UZ and SZ Flow<br>• UZ and SZ Transport of Rns other than Sr-90 & Cs-137<br>• BDCFs for Groundwater Release Scenarios | • Climate and Net Infiltration<br>• Seepage into Emplacement Drifts<br>• In-Drift Temperature, Moisture, Chemistry[b]<br>• Drip Shield Degradation<br>• In-Package Temperature, Moisture, Chemistry<br>• Waste Form (Including Cladding) Degradation<br>• Dissolved Rn Concentrations<br>• Colloid-Associated Rn Concentrations<br>• EBS Radionuclide Transport<br>• UZ and SZ Flow<br>• UZ and SZ Radionuclide Transport<br>• BDCFs for Groundwater Release Scenarios |

NOTES:

[a]Analogous conclusions may also apply to seismic activity groundwater release scenario.

[b]In-drift temperature, moisture, and chemistry could be more important in the nominal scenario if localized corrosion is determined to be initiated under expected conditions.

BDCF = Biosphere dose conversion factor

UZ, SZ = Unsaturated zone, saturated zone

EBS = Engineered barrier system

Rn = Radionuclide

Pu, Sr, Cs = Plutonium, strontium, cesium

**Table 3. Correlation of TSPA Model Areas and Components with Model Validation Areas**

| TSPA Model Area | TSPA Model Component | Study Section | Model Validation Area |
|---|---|---|---|
| Unsaturated Zone Flow and Seepage | Climate and Net Infiltration | 3 3.1 | Climate and Net Infiltration |
| | Unsaturated Zone Flow, Coupled Thermal, Chemical, and Mechanical Effects on Unsaturated Zone Flow | 3.3.1, 3.3.12 | Unsaturated Zone Flow |
| | Seepage into Emplacement Drifts, Coupled Thermal, Chemical, and Mechanical Effects on Seepage | 3.3.2 | Seepage into Emplacement Drifts |
| In-Drift Moisture and Chemistry | Chemistry of Water on Drip Shield | (3.3.4) | In-Drift Moisture and Chemistry |
| | Chemistry of Water on Waste Package | (3.3.4) | |
| | Drift Invert Moisture Conditions | (3.3.2) | |
| | Drift Invert Water Chemistry | 3 3.3 | |
| Waste Package and Drip Shield Degradation | Drip Shield Early Failure | 3.3.4 | Waste Package and Drip Shield Degradation |
| | Drip Shield General and Local Corrosion | 3.3.4 | |
| | Drip Shield Stress Corrosion Cracking | 3.3.4 | |
| | Waste Package Early Failure | 3 3.4 | |
| | Waste Package General and Local Corrosion | 3.3.4 | |
| | Waste Package Stress Corrosion Cracking | 3.3.4 | |
| Quantity and Chemistry of Water Contacting Waste Forms | In-Package Temperature, Moisture, and Chemistry | 3.3 5, (3.3.2) | Radionuclide Release Rates and Concentrations |
| Radionuclide Release Rates and Concentrations | Radionuclide Inventory | 3.3.15 | |
| | CSNF Cladding Degradation | 3.3.6 | |
| | Dissolution of Uranium Oxide and High-Level Waste Glass | 3.3 6 | |
| | Dissolved Radionuclide Concentrations | 3.3.7 | |
| | Colloid-Associated Radionuclide Concentrations | 3 3 8 | |
| | Radionuclide Transport from the Engineered Barrier System | 3.3.9 | |

NOTE: Study section numbers without parentheses indicate sensitivity studies that bear directly on the TSPA model area or component. Section numbers in parentheses indicate those sections that bear on the model area or component indirectly.

**Table 3. Correlation of TSPA Model Areas and Components with Model Validation Areas (Continued)**

| TSPA Model Area | TSPA Model Component | Study Section | Model Validation Areas |
|---|---|---|---|
| Unsaturated Zone Radionuclide Transport | Drift Scale Radionuclide Transport in the Unsaturated Zone | 3.3.10 | Unsaturated Zone Radionuclide Transport |
| | Mountain Scale Radionuclide Transport in the Unsaturated Zone | 3.3.10 | |
| | Coupled Thermal, Chemical, and Mechanical Effects on Unsaturated Zone Radionuclide Transport | (3 3.10) | |
| Saturated Zone Flow and Radionuclide Transport | Saturated Zone Flow | 3.3.10 | Saturated Zone Flow and Radionuclide Transport |
| | Saturated Zone Radionuclide Transport | 3.3.10 | |
| Disruption of Engineered Barriers by Igneous Activity | Igneous Activity Groundwater Release Probability | 3.3.11 | Probability of Igneous Activity |
| | Igneous Activity Eruptive Release Probability | 3.3.11 | |
| | Damage to Waste Packages, Drip Shields, and Cladding by Igneous Intrusion | 3.3.12 | Damage to Engineered Barriers by Igneous Activity |
| | Damage to Waste Packages, Drip Shields, and Cladding by Igneous Eruption | 3.3.12 | |
| Atmospheric Transport of Erupted Radionuclides | Volume of Erupted Material | 3.3.13 | Atmospheric Transport of Erupted Radionuclides |
| | Particle Size and Density | 3.3.13 | |
| | Wind Speed and Direction | 3.3 13 | |
| Biosphere Characteristics | Biosphere Dose Conversion Factors | 3.3.14 | Biosphere Characteristics |
| | Tephra Deposit Thickness | 3.3.14 | |
| | Tephra Redistribution | 3.3.14 | |

NOTE: Study section numbers without parentheses indicate sensitivity studies that bear directly on the TSPA model area or component. Section numbers in parentheses indicate those sections that bear on the model area or component indirectly.

**Table 4. Correlation of TSPA Model Areas and Components with KTI Agreements**

| TSPA Model Area | TSPA Model Component | Study Section | Related KTI Agreements |
|---|---|---|---|
| Unsaturated Zone Flow and Seepage | Climate and Net Infiltration | 3.3.1 | ENFE 1.03, 1.05, 1.07, 2.16, 4.02<br>RDTME 3 20, 3 21<br>RT 1.01, 3.02, 3.05, 3.06<br>SDS 3.01, 3.02, 3.03, 3.04<br>TEF 2.01, 2.04, 2.05, 2.08, 2.09, 2.10, 2.11, 2.12, 2.13<br>TSPAI 3.07, 3.11, 3.18, 3.19, 3.20, 3.21, 3 22, 3 23, 3 24, 3.25, 3.26, 3.27<br>USFIC 3.01, 3.02, 4.01, 4.02, 4.03, 4.04, 4.05, 4.06, 6.02, 6.03 |
| | Unsaturated Zone Flow | 3.3.1, 3.3.12 | |
| | Seepage into Emplacement Drifts | 3.3.2 | |
| | Coupled Thermal, Chemical, and Mechanical Effects on Unsaturated Zone Flow and Seepage | (3.3.1, 3.3.2) | |
| In-Drift Moisture and Chemistry | Chemistry of Water on Drip Shield | (3 3.4) | CLST 5.04<br>ENFE 1.04, 2.04, 2.05, 2.06, 2.07, 2.08, 2.09, 2.10, 2.11, 2.12, 2.13, 2.14, 2.15, 2.16, 2.17, 4.02, 4.07<br>RDTME 3.01, 3.14<br>RT 4.03<br>TEF 2.04, 2.05, 2.10<br>TSPAI 3 07, 3 09, 3.10, 3.15 |
| | Chemistry of Water on Waste Package | (3.3.4) | |
| | Drift Invert Moisture Conditions | (3.3.2) | |
| | Drift Invert Water Chemistry | 3.3.3 | |
| Waste Package and Drip Shield Degradation | Drip Shield Early Failure | 3.3 4 | CLST 1.01, 1.02, 1.03, 1.04, 1.05, 1.06, 1.07, 1.08, 1.09, 1.10, 1.11, 1.12, 1.13, 1.15, 1.16, 1.17, 2.04, 2.05, 2.06, 2.07, 2.08, 6.01, 6.02, 6.03, 6.04<br>ENFE 2.04, 2.05, 2.06, 2.07, 2.08, 2.09, 2.10, 2.11, 2.13, 2.14, 2.17, 2.18<br>RDTME 3.18<br>TSPAI 2.04, 3.01, 3.02, 3.03, 3.04, 3.05, 3.12, 3.13 |
| | Drip Shield General and Local Corrosion | 3.3.4 | |
| | Drip Shield Stress Corrosion Cracking | 3.3.4 | |
| | Waste Package Early Failure | 3.3.4 | |
| | Waste Package General and Local Corrosion | 3.3.4 | |
| | Waste Package Stress Corrosion Cracking | 3.3.4 | |

NOTES: Study section numbers without parentheses indicate sensitivity studies that bear directly on the TSPA model area or component. Section numbers in parentheses indicate sensitivity studies not designed to address the TSPA model area or component directly, but whose results can be used to support prioritization of the model area or component.
CLST: = Container life and source term
ENFE = Evolution of near-field environment
RDTME = Repository design and thermal-mechanical effects
RT = Radionuclide transport
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**Table 4. Correlation of TSPA Model Areas and Components with KTI Agreements (Continued)**

| TSPA Model Area | TSPA Model Component | Study Section | Related KTI Agreements |
|---|---|---|---|
| Mechanical Disruption of Engineered Barriers | Mechanical Disruption of Waste Packages, Drip Shields, and Cladding from Seismic Activity and Rockfall | (3.3.4, 3.3 6) | CLST 1.14, 2.01, 2.02, 2.03, 2.08, 2.09, 3.10, 4.10<br>IA 2.19<br>RDTME 3.02, 3.03, 3.04, 3.05, 3.06, 3 07, 3.08, 3.09, 3.10, 3.11, 3.12, 3.13, 3.15, 3.16, 3.17, 3.18, 3.19<br>SDS 1.02, 2.01, 2.02, 2 03, 2.04<br>TSPAI 3.06 |
| Quantity and Chemistry of Water Contacting Waste Forms | In-Package Temperature, Moisture, and Chemistry | 3.3.5, (3.3 2) | CLST 3.01, 3.02, 3.03, 3.04, 3.05, 4.01, 4.02, 4.03, 4.04, 4.05<br>ENFE 3.03, 3 04<br>TSPAI 3.08, 3.14 |
| Radionuclide Release Rates and Concentrations | Radionuclide Inventory | 3.3.15 | CLST 3 06, 3.07, 3 08, 3.09, 4.06, 4.07, 4.08, 4.09, 4 11<br>ENFE 3.05, 4.04, 4.05<br>RT 1.03<br>TSPAI 3.16, 3.17, 3.30, 3.42 |
| | CSNF Cladding Degradation | 3.3.6 | |
| | Dissolution of Uranium Oxide and High-Level Waste Glass | 3.3 6 | |
| | Dissolved Radionuclide Concentrations | 3.3.7 | |
| | Colloid-Associated Radionuclide Concentrations | 3.3.8 | |
| | Radionuclide Transport from the Engineered Barrier System | 3.3.9 | |
| Unsaturated Zone Radionuclide Transport | Drift Scale Radionuclide Transport in the Unsaturated Zone | 3.3.10 | ENFE 1.06, 1.07, 4.03, 4.06<br>RT 1.02, 1.04, 1.05, 2.11, 3.01, 3.04, 3.05, 3.07, 3.10<br>TSPAI 3.23, 3.28, 3.29, 3.30, 3 42, 4.02 |
| | Mountain Scale Radionuclide Transport in the Unsaturated Zone | 3.3.10 | |
| | Coupled Thermal, Chemical, and Mechanical Effects on Unsaturated Zone Radionuclide Transport | (3.3.10) | |

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ENFE = Evolution of near-field environment
IA = Igneous activity
RDTME = Repository design and thermal-mechanical effects
RT = Radionuclide transport
SDS = Structural deformation and seismicity
TSPAI = Total system performance assessment and integration

**Table 4. Correlation of TSPA Model Areas and Components with KTI Agreements (Continued)**

| TSPA Model Area | TSPA Model Component | Study Section | Related Agreements |
|---|---|---|---|
| Saturated Zone Flow and Radionuclide Transport | Saturated Zone Flow | 3.3.10 | RT 1.04, 1.05, 2.01, 2 02, 2.03, 2.04, 2.05, 2.06, 2.07, 2.08, 2.09, 2.10, 2.11, 3 01, 3.03, 3 04, 3.07, 3.08, 3.09<br>TSPAI 3 30, 3.31, 3 32, 3.42, 4 02<br>USFIC 5.01, 5.02, 5.03, 5.04, 5.05, 5.06, 5.07, 5.08, 5.09, 5.10, 5.11, 5.12, 5.14, 6 01, 6.04 |
| | Saturated Zone Radionuclide Transport | 3.3.10 | |
| Disruption of Engineered Barriers by Igneous Activity | Igneous Activity Groundwater Release Probability | 3.3.11 | IA 1.01, 1.02, 2 05, 2.10, 2.18, 2.19, 2.20 |
| | Igneous Activity Eruptive Release Probability | 3.3.11 | |
| | Damage to Waste Packages, Drip Shields, and Cladding by Igneous Intrusion | 3.3.12 | |
| | Damage to Waste Packages, Drip Shields, and Cladding by Igneous Eruption | 3.3.12 | |
| Atmospheric Transport of Erupted Radionuclides | Volume of Erupted Material | 3.3.13 | IA 1.01, 2.01, 2.02, 2.03, 2.04, 2 06, 2.09 |
| | Particle Size and Density | 3.3.13 | |
| | Wind Speed and Direction | 3.3.13 | |
| Biosphere Characteristics | Biosphere Dose Conversion Factors | 3.3.14 | IA 2.07, 2.08, 2.11, 2.12, 2.13, 2.14, 2.15, 2.16, 2.17<br>TSPAI 3.33, 3.34, 3.35, 3 36, 3.37 |
| | Tephra Deposit Thickness | 3.3.14 | |
| | Tephra Redistribution | 3.3.14 | |

NOTES: Study section numbers without parentheses indicate sensitivity studies that bear directly on the TSPA model area or component. Section numbers in parentheses indicate sensitivity studies not designed to address the TSPA model area or component directly, but whose results can be used to support prioritization of the model area or component.
IA = Igneous activity
RT = Radionuclide transport
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**Table 4. Correlation of TSPA Model Areas and Components with KTI Agreements (Continued)**

| TSPA Model Area | TSPA Model Component | Study Section | Related Agreements |
|---|---|---|---|
| Postclosure Criticality | Postclosure Criticality Probability and Effects | None | CLST 5.03, 5.05, 5.06, 5.07<br>ENFE 5.03<br>RT 4.03 |
| NA | NA | None | CLST 5.01, 5.02<br>ENFE 1.01, 1.02, 2.02, 2.03, 3.01, 3 02, 4.01, 4.08, 5.01, 5.02<br>PRE 3.01, 3.02, 6.01, 6.02, 7.01, 7.02, 7.03, 7.04, 7.05<br>RDTME 2.01, 2.02, 3 01<br>RT 4.01, 4.02<br>SDS 1.01<br>TEF 1.01, 1.02, 2.02, 2.03, 2.06, 2.07<br>TSPAI 1.01, 1.02, 2.01, 2.02, 2.03, 2.05, 2.06, 2.07, 3.38, 3.39, 3.40, 3.41, 4.01, 4.03, 4.04, 4.05, 4.06, 4.07<br>USFIC 4.05, 4.07, 5.13 |

NOTES: Study section numbers without parentheses indicate sensitivity studies that bear directly on the TSPA model area or component. Section numbers in parentheses indicate sensitivity studies not designed to address the TSPA model area or component directly, but whose results can be used to support prioritization of the model area or component.
CLST: = Container life and source term
ENFE = Evolution of near-field environment
NA = Not applicable
PRE = Preclosure safety
RDTME = Repository design and thermal-mechanical effects
RT = Radionuclide transport
SDS = Structural deformation and seismicity
TEF = Thermal effects on flow
TSPAI = Total system performance assessment and integration
USFIC = Unsaturated and saturated flow under isothermal conditions

## Table 5. Example KTI Agreements

| TSPA Model Component | Sensitivity Study Section | KTI Agreement |
|---|---|---|
| Drip Shield Stress Corrosion Cracking | 3.3.4 | **TSPAI 3.03**—DOE will provide the technical basis for crack arrest and plugging of crack openings (including the impact of oxide wedging and stress redistribution) in assessing the stress corrosion cracking of the drip shield and waste package in an update to the Stress Corrosion Cracking of the Drip Shield, Waste Package Outer Barrier, and the Stainless Steel Structural Material AMR (ANL-EBS-MD-000005) in accordance with the scope and schedule for existing agreement item CLST 1.12 (Reamer and Gil 2001). |
| Climate and Net Infiltration | 3.3.1 | **TSPAI 3.19**--DOE will provide justification for the use of the evapotranspiration model, and justify the use of the analog site temperature data. The justification will be documented in an update to the Simulation of Net Infiltration for Modern and Potential Future Climates AMR (ANL-NBS-HS-000032) and the Future Climate Analysis AMR (ANL-NBS-GS-000008). The AMRs are expected to be available to NRC in FY 2003 (Reamer and Gil 2001). |
| | | **USFIC 3.01**—Provide the documentation sources and schedule for the Monte Carlo method for analyzing infiltration. DOE will provide the schedule and identify documents expected to contain the results of the Monte Carlo analyses in February 2002 (Reamer and Williams 2000b). |
| | | **USFIC 3.02**—Provide justification for the parameters in Table 4-1 of the Analysis of Infiltration Uncertainty AMR (for example, bedrock permeability in the infiltration model needs to be reconciled with Alcove 1 results/observations). Also, provide documentation (source, locations, tests, test results) for the Alcove 1 and Pagany Wash tests. DOE will provide justification and documentation in a Monte Carlo analysis document. The information will be available in February 2002 (Reamer and Williams 2000b). |
| Unsaturated Zone Flow | 3.3.1, 3.3.10 | **TSPAI 3.22**—DOE will provide an assessment or discussion of the uncertainty involved with using a hydrologic property set obtained by calibrating a model on current climate conditions and using that model to forecast flow for future climate conditions. This assessment will be documented in the UZ Flow Models and Submodels AMR (MDL-NBS-HS-000006) expected to be available to NRC in FY 2003 (Reamer and Gil 2001). |