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2

Boric Acid Tank Failure Analysis

RESRAD-OFFSITE Model



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Overview

- ☐ **Conceptual Model**
- ☐ **Source Term**
- ☐ **Parameter Selection**
- ☐ **Conservatism**
- ☐ **Sensitivity Analysis**



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Conceptual Model

- ☐ **RESRAD-OFFSITE Version 2.6**
- ☐ **Horizontal Pathway (TXUT-001-FSAR-2.4.12-CALC-039)**
 - **Shortest**
 - **Fastest**
- ☐ **Vertical pathway (TXUT-001-FSAR-2.4.12-CALC-035)**
- ☐ **Evaluates radionuclide concentration in hypothetical well (groundwater) prior to SCR**
- ☐ **Compares against 10CFR20 Appendix B Table 2 Column 2 Effluent Concentration Limits**



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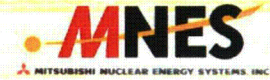


Source Term

- ☐ **Boric Acid Tank is the limiting tank as it has the largest radionuclide inventory**
- ☐ **80 percent of tank volume for horizontal (66,000/52,800 gal)**
- ☐ **0.02 percent of 80 percent of tank volume for vertical (105.6 gal)**



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Source Term (Cont.)

- ☐ **Applicable nuclides adjusted for 0.12 percent fuel failure rate**
- ☐ **Conversion from microCi/ml to pCi/g to determine total radionuclide inventory in soil**
 - **Adjusted for effective porosity (0.17) and for soil density (1.52 g/cm³)**
- ☐ **Radionuclides with half-life <1 day are excluded**



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Parameter Selection Preference

- ☐ **Site-specific (e.g. Kd values)**
- ☐ **Published materials (e.g. evapotranspiration coefficient)**
- ☐ **RESRAD-OFFSITE default (e.g. B parameter)**



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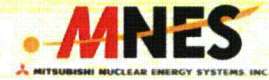


Conservatism

- ☐ **Assumes an immediate, non-mechanistic rupture of the tank and transport of the source term directly into groundwater (no retention for liquid in building)**
- ☐ **Lowest available Kd including subtraction of uncertainty**
- ☐ **Uses the shortest/fastest groundwater pathway**
- ☐ **Evaluates concentrations in groundwater prior to reaching the SCR (shortest path with no dilution in SCR)**



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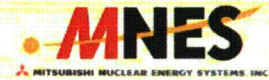


Sensitivity Analysis

- ☐ **Assures conservative values for sensitive parameters**
- ☐ **Greater than 10% change in SOF is defined as sensitive**
- ☐ **Performed on H-3 concentration**
 - **H-3 accounts for effectively 100% of activity in hypothetical well**



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Sensitivity Analysis (Cont.)

- ☐ **Sensitivity Evaluated for:**
 - **Saturated zone thickness**
 - **Pump intake depth**
 - **Saturated zone total porosity**
 - **Saturated zone effective porosity**
 - **Clean cover thickness**
 - **Hydraulic gradient**
 - **Distribution Coefficients**



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Conclusions

- ☐ **No individual source term or progeny radionuclides exceed 10CFR20 Appendix B Table 2 Column 2 limits**
- ☐ **Sum of the Fractions less than 1**



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Recent Comments from NRC

2. An overview of the modeling approach, assumptions and results for the vertical and horizontal accidental release scenarios. Discussed in presentation.

- A. What were the assumptions used for distributing contaminants into a release volume that is used in RESRAD? Discussed in presentation.
- B. For horizontal release scenario why is nothing allowed to reach the SCR? Is that a conservative assumption for the exposure point? Discussed in presentation.