

RADTRAD

Design, As Built, & Updates

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Outline

- RADTRAD Design
- As Built
- Current Errors
- Modifications



RADTRAD Design

The 1994 model designed to do

- Use NUREG Spray and Natural Deposition models (Powers, Henry, or User)
- Overlying pool decontamination (Powers)
- Iodine re-evolution (ORNL)
- Filter decontamination (User)
- Transport (use but not derive flows)
- Onsite & Offsite dose analysis
- NUREG 1465 and TID 14844 source terms
- It had numerical problems



RADTRAD Design & Reg Guide 1.183 & 1.195

The 2002 release (3.03) designed to perform

- Spray and natural deposition decontamination
- Filter decontamination
- Transport
- Onsite & Offsite dose analysis
- Correct known errors
- Follow the guidance in RG 1.183 & 1.195
- Provide reliable answers



RADTRAD 3.03 As Built

The 2002 version (3.03) was not designed to perform

- Iodine re-volatilization (pool)
- Pool pH versus time analysis
- Appendix I (Equipment Qualification)
- Filter failure and re-entrainment
- Decay of deposited isotopes
- AEB 98-03 steam line deposition or release



RADTRAD 3.03 As Built

The 2002 version (3.03) was not designed to perform the guidance efficiently

- LOCA, requires multiple cases (containment release, ESF release, and multiple X/Q paths). Steam line deposition, spray decontamination limits all offline.
- FHA, CRDA, LRA acceptable
- MSLB & SGTR inventories available in Ci/cc or Ci/hr translate to Ci/MWt
- Nobles and Alkali Metals inventories 100/Ebar



RADTRAD Error Notices

- 12 Error Notices since 6/2002
- First 5 were found between the release of 3.03 by ITSC and the release by the NRC.
- The NRC version has all these modifications.



RADTRAD Error Notices

- #7: Control Room X/Q Time Intervals Ignored (7/04)
- #8: Powers' Natural Deposition Model chooses PWR (10/04)
- #9: 10 Compartments generates source term errors (10/04)
- #10: Inaccurate activities when decay of nuclides with < 2 hr half lives. (12/04)



RADTRAD Error Notices

- #11: Source term compartment without initial Iodine doesn't decay Tellurium correctly. (1/05)
- #12: Powers Natural Deposition inaccurate. (2/05)
- #13: Abrupt Flow Changes in Time causes dose inaccuracies. (3/05)



RADTRAD 3.10 Modifications

- 3.10 allows path dependent X/Q's, to allow variation with release point and/or intake
- 3.10 allows use of a multi-bin/multi-volume, homogeneous, or slug deposition model [MSIV]
- 3.10 allows spray DF limits
- 3.10 decay and daughtering of deposited nuclides



RADTRAD 3.10 Modifications

- 3.10 allows multiple inventory and release files to allow LOCA-ESF, MSLB, SGTR's to be run as single cases
- 3.10 edits activity (Ci) of airborne & deposited nuclides in both compartments and paths.
- 3.10 edits exposure (Ci-hr) and decays of airborne nuclides for shielding and pH calcs.



RADTRAD 3.10 Still Missing

- Average Beta and Gamma energies (base for pH, EQ, and 100/Ebar analysis)
- Qualified Main Steam deposition model
- Re-entrainment model
- SI units for I/O