

7/03

Assessment of NPP Vulnerabilities: Accident Progression, Source Term and Consequence Estimates:

BWR and PWR Analysis and Radiological Consequences

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Consequence Estimates

Objective

- Provide decision makers with realistic estimates of consequences for terrorist-initiated scenarios



Approach

- Use MACCS code to estimate consequences for specific terrorist-initiated scenarios



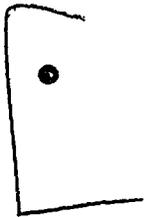
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Preliminary Consequence Evaluation

Spent fuel pool analysis

- **Performed to evaluate the effect of source term from first-of-a-kind MELCOR analysis for a spent fuel pool**
 - **Release fractions**
 - **Release timing**
 - **Plume heat content**



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- **Other assumptions same as NUREG-1738, “Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants”**

Preliminary Consequence Evaluation

Spent fuel pool source term

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Source Term	Fraction of spent fuel pool inventory released to environment								
	Xe	I	Cs	Te	Sr	Ba	Ru	La	Ce
NUREG-1738	1	.75	.75	.31	.12	.12	.75	.035	.035

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Source Terms

- **Scenario-specific source terms from MELCOR important for radiological consequence predictions**
- **Start time of release vs. start time of evacuation**
 - **Affects early and cancer fatalities**
- **Release rate vs. evacuation speed**
 - **Affects early and cancer fatalities**
- **Release magnitude**
 - **Affects land contamination and economic costs**

Weather

- **Considering effect of different weather conditions on consequences**
 - Wind direction
 - Wind speed
 - Atmospheric stability
 - Precipitation
- **MACCS capabilities include**
 - Weather sampling
 - Single weather sequence

Protective Measures

- Scenario-specific protective measures
- Evacuation start time



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- NUREG/CR-2239 siting study assumed an average delay of evacuation start of 3 hours following warning by plant

- Evacuation distance



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Cancer Predictions

- **MACCS cancer model based on linear no-threshold hypothesis**
- **MACCS estimates the total number of cancers by multiplying**
 - the organ-specific dose for an individual in a region (sector)
 - the cancer risk associated with that dose
 - the number of people in that sector

And summing the contribution from each sector

