



RIC 2011 SOARCA Plan for Uncertainty Analysis

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Objectives and Background

- Goal of uncertainty study is to develop insight into the overall sensitivity of the SOARCA results to uncertainty.
- One focus is on the relationship of the "best estimate" result to the mean value of the uncertainty study.
- Once complete, the study will be published as a separate NUREG report.

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Scenario Selection

- A single scenario, Peach Bottom Unmitigated Long-term Station Blackout
- Rationale includes:
 - Performance of the SRV
 - Highest risk scenario analyzed for Peach Bottom
 - Station Blackout shown to be an important scenario for other boiling water reactors too

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Treatment of Uncertainty

- Study focus on uncertainty in key parameters for selected scenario
- Study focus on uncertainty in the best estimate values
- Will evaluate the combined effects of uncertainty on best estimate consequences

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Approach

- Distributions will be defined for chosen uncertain input parameters
- Uncertainty in these parameters will be propagated in two steps using Monte Carlo sampling:
 - A set of source terms will be generated using MELCOR model
 - A distribution of consequence results will be generated using MACCS2 model

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Examples of Parameters

MELCOR:

- SRV stochastic failure to reclose
- Duration of DC power (battery life)
- Hydrogen ignition criteria
- Chemical forms of Iodine and Cesium

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Examples of Parameters (cont)

MACCS2:

- Shielding
- Dispersion
- Health effects
- Evacuation delays and speeds

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Planned Analysis of Results

- Results will include an analysis of the mapping between uncertain inputs and analysis results
- Purpose is to identify the most influential parameters for consequences
- Tools for this analysis include:
 - Partial rank correlation coefficients (PRCCs)
 - Stepwise rank regression analyses
 - Scatter plots
 - Investigation of individual runs of interest

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