



RIC 2012

Fukushima-Related Research in the Office of Nuclear Regulatory Research

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Agenda

- State-of-the-art Reactor Consequence Analyses
- Spent Fuel Pool Scoping Study
- Containment Filtered Vents Analysis
- Fukushima Accident Analysis
- Level 3 Probabilistic Risk Assessment

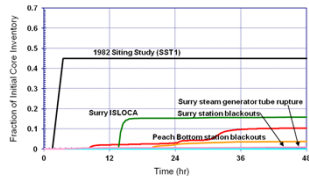
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State-of-the-Art Reactor Consequence Analysis (SOARCA)

- Draft report for public comment 1/31/12
- Incorporates decades of research and plant changes including post-9/11 security upgrades.
- With and without successful mitigation
- MELCOR analyses indicate that accidents progress more slowly and with smaller releases. Analyses show no large early releases.

SOARCA Results: Iodine Release to the Environment for Unmitigated Scenarios



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Applying SOARCA to Fukushima

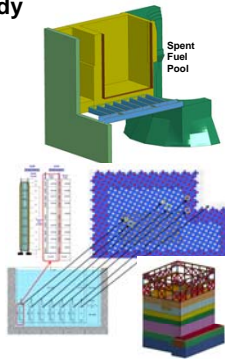
- SOARCA analyzed range of station blackout scenarios for a BWR-Mark I (Peach Bottom) and a PWR (Surry)
- MELCOR analysis provides realistic picture of accident progression and fission product release
- SOARCA results
 - Informed policy-makers regarding mitigation of station blackout scenarios at US reactors
 - Informed recommendations for protecting US citizens in Japan
 - Informing safety enhancements being considered by NRC in the wake of Fukushima

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Spent Fuel Pool (SFP) Scoping Study

- Focus: reexamination of the effects on SFP consequences of moving older fuel to dry cask storage in an expedited manner
- Two conditions to be considered
 - high-density loading
 - low-density loading
- Elements of the study include
 - Seismic and structural assessment
 - SCALE analysis (dose rates)
 - MELCOR accident progression analysis
 - Emergency planning assessment
 - MACCS2 offsite consequence analysis
 - Probabilistic considerations



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Containment Filtered Vents

- SOARCA (Peach Bottom & Surry) and Fukushima – no early releases, time for public evacuation
- For all current operating reactors, containment failure following core melt and vessel failure is a question of when, not if, given enough time and no mitigation

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Containment Filtered Vents

- Examine the benefits of filtered vents
- European experience
- Consideration of MCCI and impact on containment pressure
- Require filters? Some or all containment types?

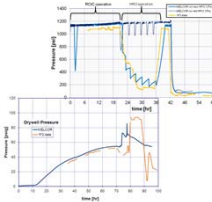
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Fukushima Accident Analysis



- Computer codes such as MELCOR are capable of predicting complex plant response under severe accidents, including operator intervention (EOP) and mitigation (SAMG)
- DOE/NRC Forensic analyses on-going
- Detailed input models for units 1/2/3



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Site Level 3 Probabilistic Risk Assessment (PRA)

- Commission directed the staff to perform a full-scope comprehensive site Level 3 PRA for an operating plant
 - Vogtle Units 1 & 2 agreed to participate in study
- Objectives:
 - reflect technical advances in PRA modeling and improvements in plant operations, safety, and security;
 - enhance PRA scope and staff capability;
 - extract new insights to enhance regulatory decisionmaking;
 - and evaluate feasibility and cost of Level 3 PRAs

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Site Level 3 PRA (cont)

- In general, based on current "state of practice"
- Scope includes main site radiological sources, all internal and external initiating events, and all modes of operation
- The study will be for a single site
- Study to be completed over a 4-year period
- Currently developing project plans, securing contractor support, gathering information on current state-of-practice