

Severe Accident Codes and Models for Radiological Release

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Role of Uncertainties in Risk-Informed Decisionmaking

Mark I and Mark II Filtered
Containment Venting Systems

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August 8, 2012

Pending Commission Decision

Fukushima Lessons Learned

- Whether or not to require filtered containment venting systems (FCVS) for Mark I and Mark II containments?
 - Regulatory analysis: Probabilistic cost/benefit and qualitative considerations, including uncertainties
 - Adequate protection: Defense-in-depth
 - Deterministic technical judgment to offset uncertainties

Scope

- Core cooling and containment heat removal casualty causing severe core damage
 - Example: Fukushima
- All sequences using venting to control containment pressure, before or after core damage (EOPs + SAMGs + EDMGs)
 - Include BWROG early venting proposal
- Sensitivity analyses: FCVS + (1) water below the reactor vessel pedestal before vessel rupture;(2) recovered core spray;(3) recovered dry well spray

Importance of Uncertainties

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- “In implementing risk-informed decisionmaking, the U.S. Nuclear Regulatory Commission expects that appropriate consideration of uncertainty will be given in the analyses used to support the decision and in the interpretation of the findings of those analyses.”

Sources of Uncertainty

- Severe accident progression and containment performance uncertainty
 - RV bottom head failure
 - Hydrogen generation
 - Liner melt through
 - Limited number of deterministic sequences
 - Pressure and temperature effects on penetrations
- Source term analysis uncertainty
 - Complex DF models inside primary containment
 - Range of wet well conditions, DF
 - Casualty core spray recovery, DF
 - Casualty dry well spray recovery, DF

Important Information for Assessing Uncertainty

- Integrated testing of wet well pool DF?
- Integrated testing of dry well spray DF?
- Integrated testing of venturi scrubber/mist filter DF?