State-of-the-Art Reactor Consequence Analyses (SOAR CA)

Briefing for Commissioner's Technical Assistants
December 20, 2006

Office of Nuclear Reactor Regulation

Office of Nuclear Regulatory Research

Office of Nuclear Security and Incident Response

Agenda

- Overview
- Status
- Communication
- Industry Feedback
- Accomplishments

Overview

OBJECTIVE

- Realistic evaluation of severe accident progression, radiological releases and offsite consequences

- Develop a faster-than-real-time tool to assist in decision-making in the event of off normal events

Overview - Continued

Background

- NUREG/CR-2239 (1982 Sandia Siting Study)
- Improvements Since 1982
  - Modeling (PRA, MELCOR, MACCS)
  - Plant Performance
  - Plant Modifications
  - Severe Accident Research
  - Additional Mitigating Measures
  - Emergency Preparedness Improvements

Overview - Continued

Approach

Use detailed integral modeling of plant systems, radionuclide transport and deposition, and release pathways (i.e., PRA, MELCOR, MACCS)

- Select scenarios using existing PRA information
- Estimate accident progression and fission product release to environment using MELCOR
- Estimate offsite radiological consequences using MACCS

Overview - continued

Approach – Continued

- Account for plant improvements
- Account for recent developed mitigation strategies
- Use risk communication techniques

Overview - Continued

Potential Uses

- Safety-Related Decision Making
- New Reactor Licensing at New Sites
- Emergency Preparedness and Emergency Response
- Regulatory analysis for backfitting decisions
- Generic safety issues
- Communication with the public
- Insight for future regulatory and research activities

Overview - Continued

Schedule

- Three-year project
  - 1st year: Westinghouse 4-loop, large dry containment, GE Mark I, and GE Mark III plants
  - 2nd year: GE Mark II, Ice Condenser, and other Westinghouse plants
  - 3rd year: B&W and CE plants
- Six plants selected as lead plants
  - Provide Mixture of Population Densities
  - Westinghouse 4-loop, large dry containment
    - Diablo Canyon, Salem, Seabrook
  - GE Mark I
    - Duane Arnold, Fermi, Peach Bottom

All plant results will be released at the completion of project

Status

- Codes Improvements
- Accident Scenario Selection for Plant
- Request for Plant Information
- Communication Plan

Communication Plan

- **Communication Package**
  - **Communication Plan**
  - **WEB Page**
  - **Fact Sheet**
  - **Press Release**
  - **Links**
    - **Contact Us**
    - **Frequently Asked Questions and Answers**
    - **Meetings Notices**
    - **Meeting Summaries**
    - **Presentations**
    - **Probabilistic Risk Analysis and Severe Accident Modeling**
    - **Related Information**

Communications

- ACRS briefing - September 2006
- Public meeting - September 2006
- Announce 6 lead plants – September 2006
- Drop-in visits/calls with lead plant staff – October 2006
- Public meeting with NEI and lead plant staff - October 2006
- Communication plan – December 2006
- ACRS briefing – December 2006
- Commissioner Assistant briefing – December 2006

Industry Feedback

- Support the project in concept
- Questioned the degree to which the analyses are plant-specific
- Concerned about the presentation of results
- Concerned with aggressive schedule
- Agreed with the concept of lead plants
- Concerned with the selection of the six lead plants
- NEI letter dated Nov. 29, 2006

Accomplishments

- Identification of Code Improvements
- Communication Plan
- Plant Groupings
- Scenario Selection Process
- Public Meetings
- Lead Plants Selection

Other Items

- Treatment of dose and dose effects
- Use of sheltering as a protective action
- Use of the B.5.b Initiative mitigation strategies
- Terminology - Consequence Analyses versus Risk Analysis
- Information collection from licensees
  - OMB requirements
  - Through industry participation
- Industry participation i.e., peer reviews
- Communication of assessment results

August 15 2006 Briefing

- Path to elevate land contamination to Commission
- Discussion of EP and B.5.b information
- Pierson, NMSS on conservatism used in recent fuel cycle facility event analysis – to avoid same mistake
- Basis for not evaluating seismic scenario involving destruction of roads and bridges