## CCNPP3COLA PEmails

**From:** Carneal, Jason
**Sent:** Thursday, May 20, 2010 7:34 AM
**To:** Arora, Surinder
**Cc:** Phan, Hanh; Patterson, Malcolm; CCNPP3COL Resource
**Subject:** Final slide package
**Attachments:** CALVERT ACRS Ch 19 slides FINAL.pdf

All:

Attached is the final slide package for tomorrow for Calvert Chapter 19.

Thanks,

Jason

**Hearing Identifier:** CalvertCliffs_Unit3Cola_Public_EX
**Email Number:** 1349

**Mail Envelope Properties** (77BCCD26C6050B42A72FE3939CF492ED1E2ABC332D)

**Subject:** Final slide package
**Sent Date:** 5/20/2010 7:33:31 AM
**Received Date:** 5/20/2010 7:34:09 AM
**From:** Carneal, Jason

**Created By:** Jason.Carneal@nrc.gov

**Recipients:**
"Phan, Hanh" <Hanh.Phan@nrc.gov>
Tracking Status: None
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| MESSAGE | 114 | 5/20/2010 7:34:09 AM |
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United States Nuclear Regulatory Commission

*Protecting People and the Environment*

# Presentation to the ACRS Subcommittee

## Calvert Cliffs Nuclear Power Plant Unit 3 Combined License Application Review

## Safety Evaluation Report with Open Items

### General Presentation

May 21, 2010

# Review Schedule
## (Public Milestones)

| Phase - Activity | Target Date |
|---|---|
| **Phase 1** - Preliminary Safety Evaluation Report (SER) and Request for Additional Information (RAI) | April 12, 2010 |
| **Phase 2** - SER with Open Items | April 27, 2011 |
| **Phase 3** – Advisory Committee on Reactor Safeguards (ACRS) Review of SER with Open Items | July 27, 2011 |
| **Phase 4** - Advanced SER with No Open Items | January 31, 2012 |
| **Phase 5** - ACRS Review of Advanced SER with No Open Items | May 17, 2012 |
| **Phase 6** – Final SER with No Open Items | July 17, 2012 |

# ACRS Phase 3 Review Plan

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## FSAR CHAPTERS GROUPED BY COMPLETION DATES

| Group | Chapter(s) | Issue Date | ACRS Meeting |
|---|---|---|---|
| 3A-1 | 8 | 1/6/2010 | 2/18/2010 |
| 3B-1 | 4<br>5<br>12<br>17 | 3/20/2010<br>3/22/2010<br>3/12/2010<br>3/19/2010 | 4/20/2010 |
| 3B-2 | 19 | 4/20/2010 | 5/21/2010 |
| 3B3, 3B4, 3B5 | Remaining 13 Chapters | | Meeting Dates not yet finalized |

# Information Incorporated by Reference

Several chapters of the COLA FSAR incorporate by reference the U.S. EPR Design Certification application, which is currently being reviewed under Docket No. 52-020.

The staff's review of the COL FSAR for the chapters or sections, which incorporate US EPR FSAR by reference, ensures that the combination of the information incorporated by reference from the U.S. EPR FSAR and the information included in the COL FSAR represents the complete scope of information relating to a specific review topic. A generic RAI 222, Question 01-5, has been issued for tracking the open item pertinent to the concurrent review of the US EPR FSAR.

**Generic Open Item:**

RAI 222, Question 01-5 tracks the ongoing review of the U.S EPR FSAR as an open item for all COLA chapters. This OI will be closed after the design certification is complete.

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# Presentation to the ACRS Subcommittee

## Calvert Cliffs Nuclear Power Plant Unit 3 Combined License Application Review

### Safety Evaluation Report with Open Items

### Chapter 19: PROBABILISTIC RISK ASSESSMENT & SEVERE ACCIDENT EVALUATION

May 21, 2010

# Staff Review Team

- **Technical Staff**

  **PRA and Severe Accidents Branch**
  - **Hanh Phan** (Lead), Senior Reliability & Risk Engineer
  - **Edward Fuller,** Senior Reliability & Risk Engineer
  - **Malcolm Patterson,** Reliability & Risk Engineer
  - **Eric Powell,** Reliability & Risk Engineer

  **Structural Engineering Branch 2**
  - **Jim Xu,** Senior Structural Engineer

- **Project Managers**
  - **Surinder Arora**
  - **Jason Carneal**
  - **Prosanta Chowdhury**

# Presentation Outline

## Section 19.1 - Probabilistic Risk Assessment

- COL Information Items
  1) Open Items
  2) Technical Topics of Interest

## Section 19.2 - Severe Accident Evaluation

- COL Information Item
  1) Open Item
  2) Technical Topics of Interest

# Overview of Calvert Cliffs Combined License Application

| Chapter 19 – Probabilistic Risk Assessment and Severe Accident Mitigation | | |
|---|---|---|
| **SE Section (Application Section)** | **Subject** | **Number of SE Open Items** |
| 19.1 | Probabilistic Risk Assessment | 6 |
| 19.2 | Severe Accident Evaluation | 1 |
| | **Totals** | **7** |
| **Total Number of RAIs = 6; Number of Questions = 25** | | |

# Description of SE Open Items

- **RAI 160, Question 19-19 (Seismic Accident Sequences):** requests the COL applicant provide an update to the system model developed in the U.S. EPR FSAR for the PRA-based seismic margin assessment
- **RAI 198, Questions 19-20 (External Events):** requests the COL applicant reassess external events and show in applicable cases that the resulting CDF and LRF would be significantly lower than the total baseline U.S. EPR CDF and LRF
- **RAI 198, Question 19-21 (Airplane Crash Events):** requests the COL applicant provide analysis which demonstrates that more realistic CDF and LRF resulting from the airplane crash events are significantly lower than the baseline U.S. EPR CDF and LRF
- **RAI 198, Question 19-22 (Toxic Chemical Release):** requests the COL applicant reassess the toxic chemical release accidents according to RG 1.200 screening criteria

# Description of SE Open Items

- **RAI 198, Question 19-23 (Tornado Strike Frequency):** requests the COL applicant describe the basis for CCNPP Unit 3 site-specific tornado strike frequency in sufficient detail to allow the staff to confirm the conclusion drawn in the COL FSAR
- **RAI 198, Question 19-24 (Hurricanes):** requests the COL applicant describe the frequencies and potential consequences of hurricanes at the CCNPP Unit 3 site
- **RAI 241, Question 19-25 (Severe Accident Management Guidelines):** requests that the COL applicant add COL Information Item 19.2-1 to the application and to provide a schedule for implementing the severe accident management guidelines prior to fuel loading

# Review Approach (General)

- Discussed plant-specific information with other technical branches
- Discussed technical issues with other NRC offices (e.g., RES and NRR)
- Ensured consistency with other COL applications
- Ensured consistency with the analyses documented in COL FSAR (e.g., Chapter 2, “Site Characteristics” and Chapter 3, “Design of Structures, Components, Equipment, and Systems”)

# Review Approach (Screening)

- For the deterministic screening assessment, confirmed that:
  - The potential hazard associated with the postulated external event does not adversely affect the plant
  - The plant/site is designed to accommodate the “maximum size” of the postulated external event
- For the probabilistic screening assessment, confirmed conformance with RG 1.200 quantitative screening criteria, specifically:

  Can be shown using a demonstrably conservative analysis that the CDF and LRF is reasonably lower than the baseline risk values

# COL Information Item 19.0-1

- This item directs the COL applicant to either confirm that the PRA in the DC bounds the site-specific design information and any design changes or departures, or update the PRA to reflect this information.
- The COL FSAR states that the U.S. EPR design-specific PRA bounds CCNPP Unit 3.
- The staff's conclusion on COL Information Item 19.0-1 depends on the evaluation of other areas:
  - Supplemental information provided by the COL applicant to address site-specific design information
  - Site-specific effects of seismic hazards (**open item**)
  - Site-specific external events (**open item**)

# COL Information Item 19.1-1

- This item directs the COL applicant to describe the uses of PRA in support of licensee programs and to identify and describe risk-informed applications being implemented during the **COL application phase.**
- The COL FSAR states that during the COL application phase, no risk-informed applications are proposed. The uses of PRA during the COL application phase include:
  - Identifying risk-informed safety insights
  - Providing PRA importance measures
  - Gaining risk insights
  - Providing input to the procedure development process

# COL Information Item 19.1-2

- This item directs the COL applicant to describe the uses of PRA in support of licensee programs and to identify and describe risk-informed applications being implemented during the **construction phase.**
- The COL FSAR states that during the construction phase, no specific PRA uses are anticipated and no risk-informed applications are proposed.

# COL Information Item 19.1-3

- This item directs the COL applicant to describe the uses of the PRA in support of licensee programs and to identify and describe risk-informed applications being implemented during the **operational phase**.
- The COL FSAR states that during the operational phase, no risk-informed applications are proposed.
- The PRA will be used during this phase to support typical licensee programs such as SDP, MSPI, and the maintenance rule program.

# COL Information Item 19.1-4

- This item directs the COL applicant to conduct a peer review of the PRA relative to the ASME PRA standard prior to use of the PRA to support risk-informed applications or before fuel load.
- The following statement is included as a proposed **license condition** in Part 10, Section 2 of the CCNPP Unit 3 COL application:

  A peer review of the PRA relative to the American Society of Mechanical Engineers (ASME) PRA Standard shall be performed prior to use of the PRA to support risk-informed applications or before initial fuel load.

# COL Information Item 19.1-5

- This item directs the COL applicant to describe the COL applicant's PRA maintenance and upgrade program.
- The following statement is included as a proposed **license condition** in Part 10, Section 2 of the CCNPP Unit 3 COL application:

  The CCNPP Unit 3 PRA shall be treated as a living document. A PRA Configuration Control Program shall be put in place to maintain (update) or upgrade the PRA, as defined in ASME Standard RA-Sc-2007 and as clarified by RG 1.200.

# COL Information Item 19.1-6

- This item directs the COL applicant to confirm that the U.S. EPR design-specific PRA-based seismic margins assessment is bounding for their specific site.
- RAI 160, Question 19-19, requested that the COLA provide an update to the system model developed in the U.S. EPR FSAR to identify and incorporate as applicable any site-specific capacity reductions due to site-specific effects (soil liquefaction, slope failure) and site-specific structures (site-specific intake structure, intake tunnel heat sink). In addition, the COLA should demonstrate the plant seismic margin (in terms of the sequence-level HCLPF capacity) to be 1.67 times the site SSE.
- The staff is currently reviewing the response. **Question 19-19 is being tracked as an open item.**

# COL Information Item 19.1-7

- This item directs the COL applicant to perform site-specific screening analysis and site-specific risk analysis for applicable external events.
- The applicant addressed all external events listed in Appendix A of the ANSI/ANS 58.21-2003, "External Events in PRA Methodology," and followed the guidance in that standard as well as guidance in NUREG-1407, "Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities."

# COL Information Item 19.1-7 (Continued)

- RG 1.200, Section C.1.2.5, states

  It is recognized that for those new reactor designs with substantially lower risk profiles (e.g., internal events CDF below 1E-6/year), the quantitative screening value should be adjusted according to the relative baseline risk value.

- RAI 93, Question 19-13 and follow-up RAI 198, Question 19-20, requested that the COL applicant reassess the external events using an appropriate PRA screening value, or quantitatively justify that when all conservatisms are removed from the analysis, the resulting CDF and LRF would be significantly lower than the total baseline U.S. EPR CDF and LRF.

- **Question 19-20 is being tracked as an open item.**

# COL Information Item 19.1-8

- This item directs the COL applicant to describe the uses of PRA in support of site-specific design programs and processes during the design phase.
- The COL FSAR states that during the design phase, no additional PRA-related design activities are anticipated for CCNPP Unit 3.

# Review Approach (Internal Events)

- Confirmation that site-specific and plant-specific features are consistent with assumptions of the EPR PRA at design certification
  - Loss of offsite power (LOOP)
    - Frequency
    - Recovery
  - Balance-of-plant systems (e.g., circulating water)
- Confirmation that PRA insights and assumptions are preserved.

# COL Information Item 19.1-9

- This item directs the COL ***applicant*** to review as-designed and as-built information and conduct walk-downs as necessary to confirm that the assumptions used in the PRA (including PRA inputs to RAP and SAMDA) remain valid. However, this activity cannot be completed prior to licensing and construction.
- The following statement is part of a proposed **license condition** in Part 10, Section 2 of the CCNPP Unit 3 COL application:
  - As-designed and as-built information shall be reviewed, and walk-downs shall be performed, as necessary, to confirm that the assumptions used in the Probabilistic Risk Assessment (PRA)… remain valid….

# COL Information Item 19.2-1

- A COL applicant that references the U.S. EPR design certification will develop and implement severe accident management guidelines prior to fuel loading using the operating strategies for severe accidents (OSSA) methodology described in U.S. EPR FSAR Tier 2, Section 19.2.5.
- The staff is currently reviewing the response. **Question 19-25 is being tracked as an open item.**

# ACRONYMS

- **ASME -** American Society of Mechanical Engineers
- **CDF -** core damage frequency
- **CFR -** Code of Federal Regulations
- **COL -** combined construction permit and operating license
- **DC -** design certification
- **EPRI -** Electric Power Research Institute
- **HCLPF -** high-confidence-and-low-probability-of-failure
- **LOOP -** loss of offsite power
- **LRF -** large release frequency
- **OSSA -** operational strategies for severe accidents
- **PRA -** probabilistic risk assessment
- **RAI -** request for additional information
- **SAMDA -** severe accident mitigation design alternatives
- **SE -** safety evaluation
- **SMA -** seismic margin assessment