

APR1400 DESIGN CERTIFICATION REVIEW:

Probabilistic Risk Assessment Severe Accident Evaluation Reliability Assurance Program

April 13-15, 2015

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Purpose



- Provide an overview of the safety review activities and staff review expectations relevant to selected sections of DCD Chapters 17 and 19
- Discuss initial review observations related to the APR1400 DCD submittal and the associated advanced draft RAIs

Agenda

April 13, 2015:

Review Overview

Technical Issues Related to PRA

Verification/Justification Topics

April 14, 2015:

Proprietary Information (**CLOSED**)

Severe Accident Topics (**CLOSED**)

Reliability Assurance Program

PRA Completeness Topics

April 15, 2015:

Consistency Topics

Review Overview: Scope



- Chapter 19, “Probabilistic Risk Assessment and Severe Accident Evaluation” (excluding beyond design basis external events, loss of large areas, and aircraft impact assessment)
- Section 17.4, “Reliability Assurance Program”
- Section 17.6, “Maintenance Rule”
- PRA-related information provided in other chapters
 - ITAAC
 - COL information items
 - Human factors
 - Others

Review Overview: Staff Findings



- Staff determines if the application contains sufficient information to satisfy the applicable regulations and that the applicant's assumptions are technically correct (i.e., reasonable assurance of safety)
- Key examples of applicable regulations:
 - Regulation 10 CFR 50.47(a)(23): For light-water reactor designs, a **description** and analysis of design features for the prevention and mitigation of severe accidents, e.g., challenges to containment integrity caused by core-concrete interaction, steam explosion, high-pressure core melt ejection, hydrogen combustion, and containment bypass
 - Regulation 10 CFR 50.47(a)(27): A **description** of the design-specific PRA and its results

Review Overview: Staff Findings (cont.)



- Key examples of applicable regulatory documents:
 - NUREG-0800, Standard Review Plan, Chapter 19.0, “Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors,” (Draft Rev. 3, November 2014)
 - NUREG-0800, Standard Review Plan, Section 17.4, “Reliability Assurance Program (RAP)” (Rev. 1, May 2014)
 - NUREG-0800, Standard Review Plan, Section 17.6, “Maintenance Rule” (Rev. 2, July 2014)
 - Regulatory Guide 1.200, “An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities,” (Rev. 2, March 2009)
 - Generic Letters

Review Overview: Preparations



Review preparations prior to receipt of the December 2014 DCD submittal included...

- Participation in audits:
 - April 2013, PRA (Level 1 internal events and general discussion on Level 2, low power/shutdown, and other hazards)
 - June 2013, DCD (prior to September 2013 submittal)
- Participation in various public meetings:
 - July 2012 (prior to September 2013 submittal)
 - February 2014, May 2014, June 2014, August 2014 (after September 2013 submittal to discuss acceptance review results)

Review Overview: Additional Review Activities



Review activities after receipt of the December 2014 DCD submittal include...

- Development of a risk insights document for internal use:
 - Document includes key assumptions, design features, and the associated risk insights as they relate to various Standard Review Plan sections
 - Discussed risk insights with nine technical branches and have three more planned
- Involved in Multinational Design Evaluation Program with other regulators licensing the APR1400 design:
 - Severe Accident Technical Expert Subgroup

Review Overview: Review Documentation Differences



Review documentation for hydrogen combustion and the Environmental Report will be documented as follows:

- Hydrogen combustion will be evaluated and documented in the safety evaluation report as part of the Chapter 6 review, instead of the Chapter 19 review
- The Environmental Report review will be documented in the Environmental Assessment, instead of being documented in the Chapter 19 safety evaluation report

Review Overview: Licensing Activities (Handout)



- Safety review consists of six milestones
- Timely interactions and clear communication are essential to an effective and efficient review
 - Public conference calls (weekly, bi-weekly, as necessary)
 - Future public meetings (i.e., severe accident confirmatory calculations, discussion of open items?)
- Regulatory audit of non-docketed information
 - Electronic reading room availability
 - Open through October 2016

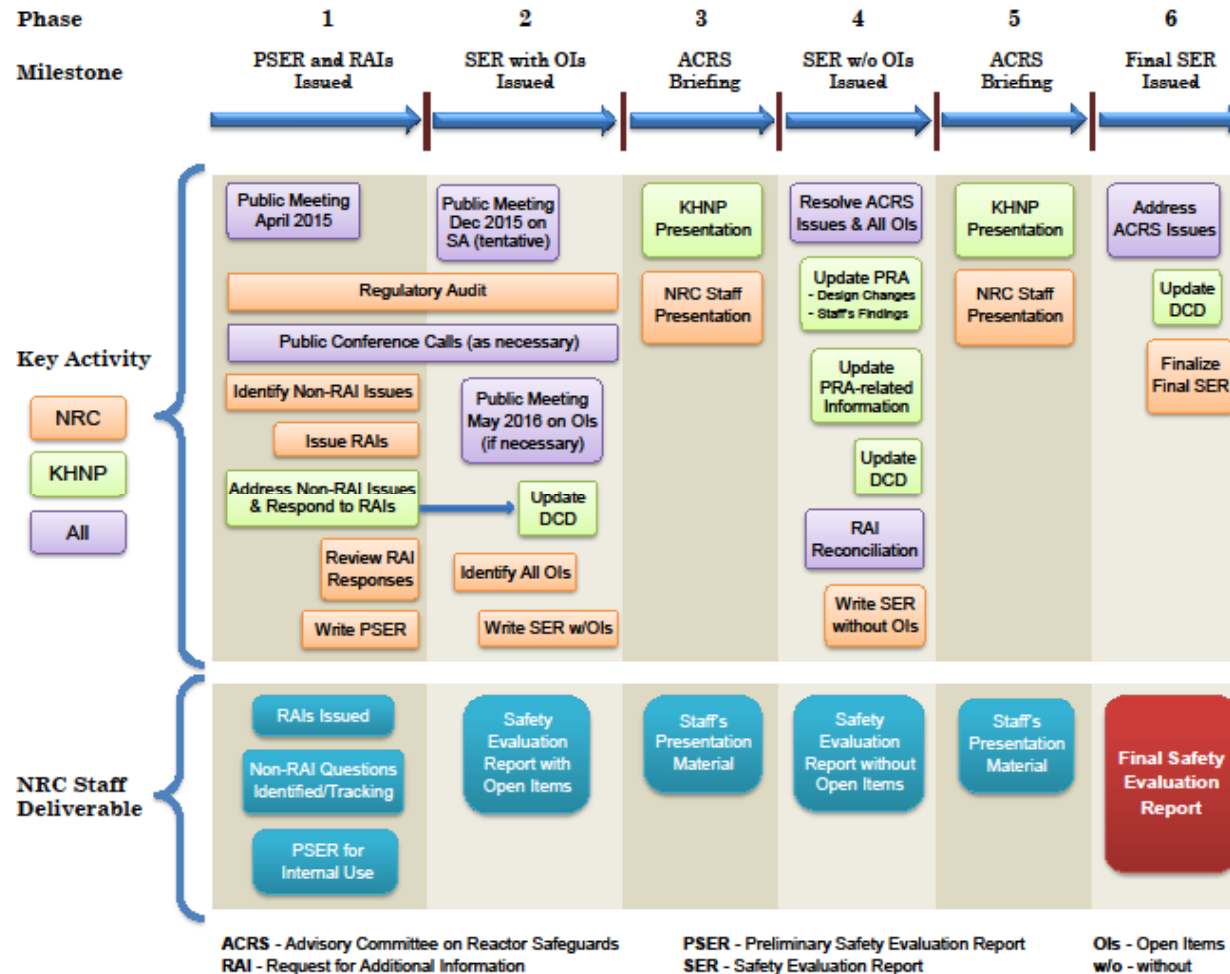
Review Overview: Licensing Activities (cont.)



- Review issue resolution:
 - RAIs
 - Non-RAI issues
- PRA update to incorporate design changes and staff's findings also requires:
 - Update to PRA-related information (e.g., changes to risk-significant human actions can impact the human factors review)
 - Review of previous submitted RAI responses for changes (i.e., reconciliation)
 - DCD update

PRA/SA/RAP Review Outline

Probabilistic Risk Assessment / Severe Accident Evaluation / Reliability Assurance Program – Safety Review Outline



(see handout)

Initial Review Observations (Handout)



- Observations gathered during acceptance review and after docketing of the DCD submittal
- Observations required for staff to reach a reasonable assurance finding will be submitted as official RAIs
- Observations not considered to be RAIs should be addressed in a future DCD update
- Observations categorized by staff as:
 - Technical issues
 - Verification/justification
 - Completeness
 - Consistency
 - Typo

Categories for Initial Review Observations



- **Technical issue**: Issue that may impact the technical contents of the submittal and staff's ability to reach a reasonable assurance finding.
- **Verification / justification**: Additional information may be necessary for the staff to evaluate conformance with the SRP or technical guidance and reach a reasonable assurance finding.
- **Completeness**: Information that may need to be provided or docketed to support a reasonable assurance finding.
- **Consistency**: Information within the submittal appears to be inconsistent and should be addressed.
- **Typo**: Potential editorial error in the submittal that should be addressed.

RAI Responses

- Information that the staff uses to reach a reasonable assurance finding must reside in the DCD or be incorporated by reference in the DCD
- RAIs should be clear about what information is requested by the staff to reach a reasonable assurance finding
- RAI responses should clearly provide the requested information and include a mark-up of any affected DCD page(s)

Next Steps

- Complete discussion action items:
 - Draft RAIs
 - Non-RAI issues
- Initiate regulatory audit
- Schedule public conference call
- Agree upon next public meeting
- Any further clarifications??

Acronym and Abbreviation List



CFR	Code of Federal Regulations
COL	combined license
DCD	design control document
FSAR	final safety analysis report
ITAAC	inspections, test, analyses, and acceptance criteria
PRA	probabilistic risk assessment
PSER	preliminary safety evaluation report
RAI	request for additional information
RAP	reliability assurance program
SA	severe accidents
SER	safety evaluation report
SRP	Standard Review Plan