



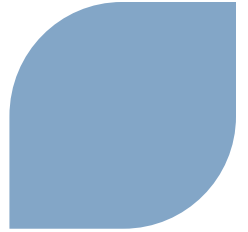
U.S. EPR – FSAR Group C Chapter Closure Plans

December 17, 2013

U.S. EPR Design Certification

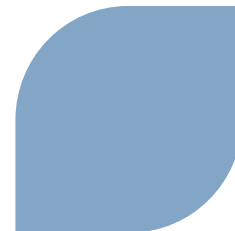


Meeting Purpose



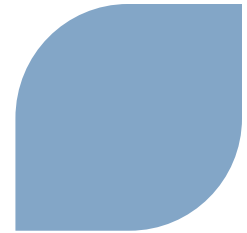
- ▶ **Continuation of closure plan discussions for the U.S. EPR design certification application**
- ▶ **Identify AREVA and NRC activities required for closure of the first set of Group C FSAR chapters (11, 12, 19, Fukushima)**
- ▶ **Agreement on activities from this meeting will be documented in closure plan letters**

Meeting Agenda



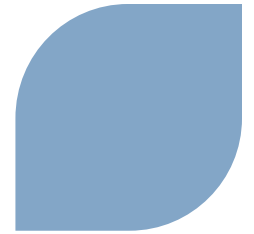
- ▶ **Introductory Remarks**
- ▶ **Project planning status**
- ▶ **Group C chapter closure activities**
 - ◆ **Chapter 11 – Radioactive Waste Management**
 - ◆ **Chapter 12 – Radiation Protection**
 - ◆ **Chapter 19 – Probabilistic Risk Assessment and Severe Accident Evaluation**
 - Today's discussion: PRA and severe accident evaluation
 - Seismic margins analysis to be addressed with Ch. 3 seismic
 - Aircraft impact assessment addressed with Group A chapters
 - ◆ **Fukushima Response**
- ▶ **Next Steps**
- ▶ **Meeting Summary**

Project Planning Status



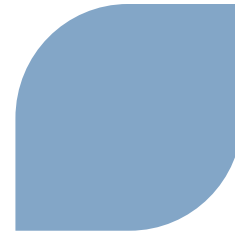
- ▶ **Closure plan meetings will establish a common agreement on remaining activities to close FSAR chapters. Results of these meetings and subsequent schedule discussions will be documented in closure plan letters that will govern project execution.**
- ▶ **Grouping supports safe closure of FSAR chapters beginning in early 2014.**
- ▶ **Group A chapters**
 - ◆ Meeting on remaining activities Oct 24, 2013 (C)
 - ◆ Meeting on schedule Nov 15, 2013 (C)
 - ◆ Closure plan letter Dec 2013
- ▶ **Group B chapters**
 - ◆ Meeting on remaining activities Nov 21, 2013 (C)
 - ◆ Meeting on schedule Jan 2014
- ▶ **Group C chapters**
 - ◆ 1st meeting on remaining activities Dec 17, 2013
 - ◆ 2nd meeting on remaining activities Jan 2014

Chapter Groupings



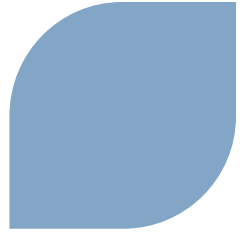
Group A	Group B	Group C
Chapter 2	Chapter 4	Chapter 1
Chapter 5	Chapter 6	Chapter 3
Chapter 8	Chapter 9	Chapter 7
Chapter 10	Chapter 15	Chapter 11
Chapter 13	Chapter 18	Chapter 12
Chapter 17 (exc. 17.4)		Chapter 14
AIA		Chapter 16
		Chapter 19 (and 17.4)
		Fukushima

Group C FSAR Chapters



- ▶ **Group C includes chapters expected to be the last chapters to close due to technical challenges or dependencies on other Group C chapters**
- ▶ **This meeting will identify remaining RAIs, open technical issues, audits, and significant pending FSAR changes**
- ▶ **Less significant pending FSAR changes and future FSAR changes will be managed through periodic meetings on closure plan progress and dedicated meetings on non-RAI FSAR changes. As Group C chapters advance toward closure, focus will increase on all potential FSAR changes.**
- ▶ **Material incorporated by reference (e.g., technical reports) will be revised and submitted as necessary prior to Group C chapter closure**

Chapter 11 – Radioactive Waste Management



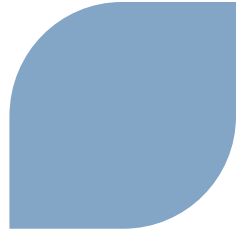
► Radiological challenges

- ◆ RAI responses provided by AREVA in mid-2013 contained inconsistencies related to process and effluent radiation monitors
- ◆ A public meeting for AREVA to present its recovery plan was postponed
- ◆ AREVA plans to systematically correct inconsistencies through a detailed review of radiation monitor design bases, correct inconsistencies in all affected FSAR chapters, and revise RAI responses

► Chapter 11 RAIs

- ◆ **RAI 528 Question 11.05-28 - Issues related to radiation monitors**
 - Advanced Response did not resolve radiation monitor inconsistencies (i.e., descriptions, safety classifications, automatic control functions, test program abstracts)
 - Inconsistencies with other FSAR chapters (Chapters 3, 6, 9, 11, 12, 14)
 - AREVA to revise RAI response following systematic review of radiation monitor design bases
 - Resolution of RAI 528 will address issues originally raised in **RAI 273** (Question 11.05-5 In Evaluation, Question 11.05-02 Confirmatory Action)

Chapter 11 – Radioactive Waste Management



▶ Chapter 11 RAIs (continued)

◆ RAI 554 Question 11.02-27 – Design commitments associated with RG1.143

- NRC status: In evaluation.

◆ RAI 301 Question 11.02-17(5) – Liquid waste tank rupture

- AREVA will update liquid containing tank rupture evaluation in Section 11.2.3.7 based on updated source terms outside containment from RAI 539 Question 12.3-12.4-29

▶ Other chapter RAIs

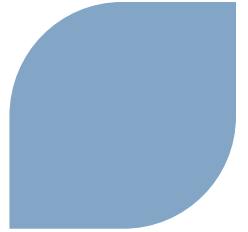
◆ RAI 578 Question 09.04.03-7 – Ventilation system design changes

- AREVA is currently addressing comments received on the Advanced Response, some related to radiation monitors and impacting the scope of Chapter 11 review
- At November 21, 2013 Group B meeting, NRC indicated the possibility for additional comments from Health Physics

◆ RAI 527 Questions 14.02-163 and 14.03.07-38 and RAI 557 Question 14.03.07-39

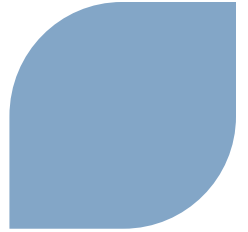
- ITAAC questions related to Tier 2 Chapter 11
- AREVA plans to address comments and revise RAI responses after design basis review is performed and Tier 2 inconsistencies are corrected

Chapter 11 – Radioactive Waste Management



- ▶ **Significant pending FSAR changes**
 - ◆ None, beyond those related to outstanding RAls
- ▶ **Audits, inspections, or public meetings required for Phase 4**
 - ◆ AREVA requests a public meeting in early 2014 to present an action plan for resolution of radiation monitor inconsistencies and quality issues identified in Chapter 11 review
- ▶ **2014 plan**
 - ◆ Public meeting on Chapter 11 resolution plan in 1st quarter 2014
 - ◆ Work will proceed on Chapter 11 in 2014 but will not complete in 2014 based on current work plans

Chapter 12 – Radiation Protection



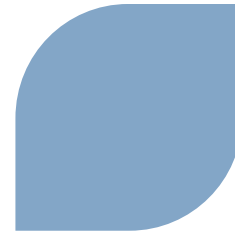
► Radiological challenges

- ◆ RAI responses provided by AREVA in mid-2013 introduced substantial new information related to source terms and shielding, and suffered from inconsistencies between information presented
- ◆ A public meeting for AREVA to present its recovery plan was postponed
- ◆ AREVA plans to review design inputs in source term and shielding calculations and update calculations as necessary to reflect the plant design, correct inconsistencies in affected FSAR chapters, and revise RAI responses

► Chapter 12 RAIs

- ◆ **RAI 539 Question 12.03-12.04-29 – Source terms outside containment and shielding**
 - AREVA will address comments on the Advanced Response. Inconsistencies between design inputs used in radiological documents (i.e., source terms and shielding), design basis documents, and design values listed in the FSAR will be addressed. Records will be updated as necessary and the RAI response will be supplemented.
- ◆ **RAI 529 Question 12.03-12.04-28 – Airborne and area radiation monitors**
 - AREVA will address comments on the Advanced Response. Resolution of issues related to radiation monitors will be addressed as part of the Chapter 11 resolution plan.
- ◆ **RAI 593 Question 12.03-12.04-33 – Dose rates from AVS filters**
 - Follow-up question to RAI 521 concerning unbuffered pools of water and iodine re-evolution
 - AREVA will provide an Advanced Response to the requests in RAI 593

Chapter 12 – Radiation Protection



► Chapter 12 RAIs (continued)

◆ RAI 599 Question 12.03-34 – Radiation zones in FSAR Rev. 5

- U.S. EPR FSAR Rev. 5 provides revised post-accident radiation zone figures for the Safeguards Buildings. The RAI requests the basis for the zoning changes and confirmation that shielding thicknesses are sufficient. The RAI also requests radiation zone figures for all vital areas and access routes to vital areas.
- AREVA will review the bases for the zoning changes, confirm a complete set of radiation zone figures, and provide a response to RAI 599 that updates the FSAR accordingly.
- Radiation zone changes may require AREVA to revise responses to **RAI 525 Question 09.01.04-23** and **RAI 398 Question 09.01.03** related radiation zones around the spent fuel cask transfer facility

◆ RAI 616 Question 12.03-35 – Radwaste bldg ventilation system change in FSAR Rev. 5

- AREVA will confirm that the ventilation system design is presented accurately and consistently in the FSAR and will submit an Advanced Response to RAI 616 with appropriate FSAR markups.

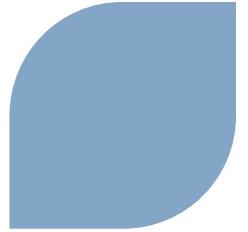
◆ RAI 548 Question 12.03-12.04-31 – Radiation doors

- The final response to Question 12.03-12.04-31 defers part of the question to the response to RAI 539 Question 12.03-12.04-29. The RAI is statused as “In Evaluation.” AREVA requests confirmation that the only outstanding issue with RAI 548 Question 12.03-12.04-31 is the outstanding link to RAI 539 Question 12.03-12.04-29.

◆ RAI 570 Question 12.03-12.04-32 – Radiation doors

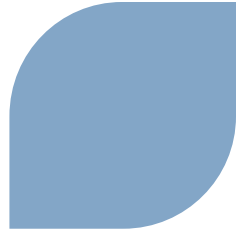
- AREVA requests confirmation that this RAI is closed

Chapter 12 – Radiation Protection



- ▶ **Significant pending FSAR changes**
 - ◆ **FSAR Chapter 12 will be revised as necessary to resolve inconsistencies and answer outstanding RAIs. No additional significant pending changes are identified.**
- ▶ **Audits, inspections, or public meetings required for Phase 4**
 - ◆ **Public meeting to address resolution plan for Chapter 12 (with Chapter 11)**
 - ◆ **AREVA will provide to NRC for audit documents supporting the revised response to RAI 539**
 - ◆ **AREVA will provide a walk-through of source terms outside containment as requested by NRC**
- ▶ **2014 plan**
 - ◆ **Public meeting on Chapter 11/12 resolution plan in 1st quarter 2014**
 - ◆ **Based on current plans, work on Chapter 12 in 2014 will likely be limited to what is necessary to support closure of Group A chapters**

Chapter 19 – PRA and Severe Accident Evaluation



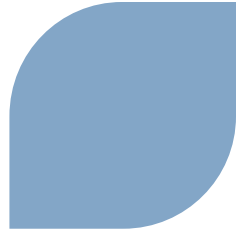
► Key Technical Issues

- ◆ PRA
- ◆ Severe Accidents
- ◆ Seismic margins analysis (addressed with Ch. 3 civil/structural)

► Chapter 19 RAIs

- ◆ **RAI 227 Q19-284, 287, 292, 293, 294, 295 – Software common cause failure**
 - Advanced response submitted; NRC review on hold pending I&C path forward
- ◆ **RAI 289 Q19-328, 329 - Software common cause failure, PRA update**
 - Advanced responses submitted and PRA audit conducted; audit actions remain to be closed by AREVA and NRC
- ◆ **RAI 495 Q19-351 - Containment pressure fragility**
 - Advanced response submitted; expecting additional NRC comments
- ◆ **RAI 532 Q19-352 - MAAP input model**
 - Response will be supplemented to address PRA audit action items
- ◆ **RAI 532 Q353, 354, 355 – Severe accidents**
 - Final responses submitted; Request confirmation of RAI closure status
- ◆ **RAI 572 Q19-364 - Containment isolation**
 - Final response submitted; confirmatory action for incorporation into FSAR Rev. 6
- ◆ **RAI 572 Q19-365 - PARs during shutdown**
 - Advanced response submitted; final response will address PRA audit action item
- ◆ **RAI 579 Q19-366, 367 - MHSI bypass, PRA uncertainties**
 - Advanced responses submitted; final response requires resolution of audit action items

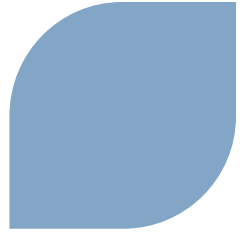
Chapter 19 – PRA and Severe Accident Evaluation



► Chapter 19 RAIs (continued)

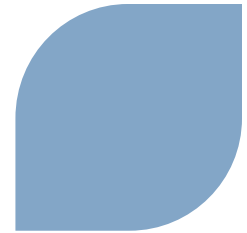
- ◆ **RAI 581 Q19-368 – PRA ASME capability category**
 - Final response submitted; Request confirmation of RAI closure status
- ◆ **RAI 581 Q19-369 – RAI reconciliation**
 - AREVA to perform RAI reconciliation and submit response
- ◆ **RAI 591 Q19-370 – FSAR Section 19.2 update**
 - Final response submitted 7/15/2013, including commitment to update FSAR Section 19.2 in Revision 6
 - Environmental Report (ANP-10290) will also be updated
- ◆ **RAI 561 Q19.01-48, 49, 50 – External events**
 - Final response submitted; FSAR markups incorporated into FSAR Rev. 5
 - Request confirmation that confirmatory items are closed
- ◆ **RAI 349 Q19-334, 335 – Steam explosion, SGTR**
 - Final responses submitted 1/23/2013; NRC status – In Evaluation
 - Request confirmation of RAI closure status
- ◆ **RAI 460 Q19-350 – SAHRS**
 - Final response submitted 8/15/2013; no questions or comments on Advanced Response
 - Request confirmation of RAI closure status
- ◆ **Equipment survivability RAIs (RAI 473, RAI 597) addressed in Chapter 6**

Chapter 19 – PRA and Severe Accident Evaluation



- ▶ **Other pending FSAR changes**
 - ◆ None
- ▶ **Audits, inspections, or public meetings required for Phase 4**
 - ◆ Action items are being tracked from PRA / Severe Accident audit
- ▶ **2014 plan**
 - ◆ Severe accident-related audit actions and RAIs are being worked in the near-term to close the severe accident portion of the review
 - ◆ Progress on PRA-related audit actions and RAIs will be limited in 2014 due to chapter prioritization
 - ◆ PRA maintenance, including design change review, impact assessment on RAP

Fukushima Response



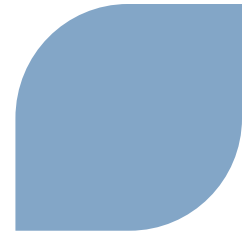
► Remaining technical issues

- ◆ Containment venting and containment heat removal
- ◆ Primary coolant injection pump developed head and discharge check valve design conditions
- ◆ Reasonable protection requirements (e.g., seismic classification of Fire Protection Building and Fire Protection tanks)
- ◆ Regulatory treatment of shutdown states
 - Alignment between new plants and operating fleet

► Fukushima-related RAIs

- ◆ RAI 549 Question 13.03-8 – Recommendation 9.3 – Emergency Preparedness
 - Status: Closed
- ◆ RAI 550 Question 09.01.03-16 – Recommendation 7.1 – Spent Fuel Pool Instrumentation
 - Status: Closed

Fukushima Response



► Fukushima-related RAIs (continued)

◆ RAI 563 Question 19-356 – Recommendation 4.2 – Mitigating Strategies

- AREVA/NRC public meeting on June 25, 2013 to discuss Advanced Response and planned resolution
- AREVA will address NRC comments on Advanced Response subject to June 25, 2013 meeting clarifications
- Response will result in revision to ANP-10329

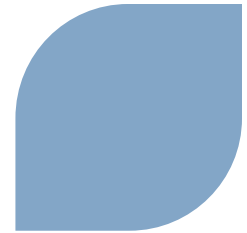
◆ RAI 598 Question 06.02.01-106 – Follow-up to RAI 563 regarding containment integrity

- AREVA will address NRC questions on containment venting and containment heat removal
- AREVA remains engaged with industry developments on ELAP mitigating strategies that may impact U.S. EPR approach
- Response will result in revision to ANP-10329

◆ New RAIs

- NRC has indicated that new RAIs related to Fukushima design modifications are to be expected (e.g., MHSI failure modes)
- Receipt of all known RAIs will help AREVA to develop a technical plan for closure

Fukushima Response



► FSAR impacts

- ◆ ELAP mitigating strategies addressed primarily in Section 19.2.8 and ANP-10329
- ◆ Containment venting / heat removal – Tier 2 Chapters 3, 9, 14, 19; Tier 1 Figure 2.6.8-1
- ◆ Primary coolant injection pump / valve characteristics – Tier 2 Chapters 6, 14, 19; Tier 1 Figure 2.2.3-1
- ◆ Reasonable protection – Tier 2 Chapters 3 and 9

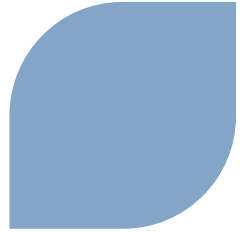
► Audits and public meetings

- ◆ Audit of Fukushima containment analysis using GOTHIC – complete
- ◆ Audit of DC load shedding analysis – request status
- ◆ ELAP S-RELAP5 analysis – deferred
- ◆ Spent fuel pool time-to-boil and makeup analysis – draft audit plan
- ◆ A public meeting or telecon may be warranted prior to submittal of ANP-10329 Revision 1 to present changes from Revision 0

► 2014 plan

- ◆ AREVA plans to work Fukushima issues and RAIs in 2014

Next Steps



- ▶ **AREVA and NRC to meet in January 2014 to discuss remainder of Group C chapters**
- ▶ **AREVA and NRC to discuss Group B chapter schedules in January 2014**
- ▶ **AREVA to submit closure plan letters for Groups A, B, and C to re-establish review schedule**

Meeting Summary

