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Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Closure Plan for U.S. EPR Severe Accident Related Open Items

Ref. 1: Letter, A. W. Robinson (AREVA NP Inc.) to Document Control Desk (NRC), "U.S. EPR Design Certification Schedule for Response to Open Items," NRC:12:024, May 10, 2012.

A Project Integration Meeting was held between AREVA NP Inc. (AREVA NP) and the NRC on June 20, 2012. During this meeting, a number of key areas were identified where additional interaction between AREVA NP and the NRC would be beneficial to describe Open Item Closure Plans that support the Phase 4 schedule in Reference 1. A public meeting was held in Rockville, Maryland on December 6, 2012 to discuss AREVA NP plans for resolution of severe accident-related open items.

A severe accident-related open item closure plan is enclosed with this letter based on the presentation and resulting NRC feedback received during the December 6, 2012 public meeting on the resolution of severe accident related open items. The plan provides a resolution path to closure for completing each response, NRC and AREVA NP interaction opportunities, and a schedule for submitting final responses.

AREVA NP will keep the NRC Staff informed throughout the preparation and submittal of the responses to the severe accident-related open items, including providing a draft response for discussion prior to submittal of final information. AREVA NP also proposes periodic interactions to discuss the technical information provided as part of this closure plan prior to the finalization of the information.

If you have any questions related to this information, please contact Len Gucwa by telephone at (434) 832-3466, or by e-mail at Len.Gucwa.ext@areva.com.

Sincerely,

A large, stylized handwritten signature in black ink, appearing to read 'Pedro Salas'.

Pedro Salas, Director
Regulatory Affairs
AREVA NP Inc.

Enclosures

cc: A.M. Snyder
Docket 52-020

AREVA NP INC.

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Closure Plan for U.S. EPR Severe Accident Related Open Items

1 Introduction

During the December 6, 2012 public meeting with the NRC, AREVA NP provided a resolution plan and schedule for closure of severe accident-related open items to support completion of the NRC Phase 4 review milestone. This plan documents the details of the AREVA NP Closure Plan for the U.S. EPR Severe Accident Related Open Items and provides a resolution approach for closure, interaction opportunities for the NRC Staff to provide feedback during the closure process, and the schedule for providing final responses for open items.

The following provides the planned responses for the open item RAIs, and the approach AREVA NP will take to resolve them.

2 Planned Response Approach for Each RAI Question

2.1 RAI 234, Questions 19-305 and 19-306, Containment Performance

- Provide bounding temperature and pressure information based on adiabatic isochoric complete combustion (AICC) conditions.
- Update Modular Accident Analysis Program (MAAP) model.
- Provide updated responses will be with the Response to RAI 532, Question 19-354.

2.2 RAI 396, Question 19-337, Accident Temperature Curves

- Provide bounding temperature and pressure information based on AICC conditions.
- Update MAAP model.
- Provide updated responses with the Response to RAI 532, Question 19-354.

2.3 RAI 349, Question 19-335b, Requested Revised Analyses on Multiple SGTR Tube Failures

- Revise source term accounting for initial steam generator tube rupture (SGTR) in addition to thermally induced SGTR.
- Extend calculation from 24 hours to 48 hours.
- Await NRC comments on revised draft transmitted on November 27, 2012.

2.4 RAI 532, Question 19-352, MAAP Code Differences and Modeling Enhancements

- Response will contain a summary of:
 - Enhancements to U.S. EPR MAAP Model.
 - Phenomenological modeling differences between code versions.
 - The most significant code and modeling modifications discussed with the NRC during the October 2011 MAAP audit.
 - The modeling input requested in RAI 471.

2.5 RAI 532, Question 19-353, Provide New MAAP Results for Specified Scenarios

- Response will provide results for the requested scenarios:

- Station blackout with RCP seal LOCA and containment isolation.
- Station blackout with RCP seal LOCA and failure of containment isolation.
- High pressure station blackout with dry MCCI.
- Main steam line break inside containment.
- Induced SGTR without fission product scrubbing.

2.6 RAI 532, Question 19-354, Analysis of Severe Accident Issues

- Provide hydrogen distribution for the two nodalization schemes based on the loss of offsite power with a high pressure end state (LOOP-TR) scenario.
- Provide ex-vessel conditions and timing for the relevant scenarios.
- Present discussion of the changes to the Level 2 Probabilistic Risk Analysis as part of the Response to RAI 289, Question 19-329.

2.7 RAI 532, Question 19-355, Impact of Core Exit Temperature Differences

- Provide the following information as requested:
 - The assessment of core exit temperature behavior, and the effect of the MAAP metal oxidation and candling models, including their influence on whether accumulator injection quenches the core debris.
 - The determination of the implications of different core exit temperatures on the planned Operating Strategies for Severe Accidents / Severe Accident Mitigation Guideline implementation.

2.8 RAI 524, Question 06.02.02-127, IRWST Temperature

- Include analysis of scenario for large break loss of coolant accident with a coincident loss of secondary side cooling.
- Perform sensitivity analyses of in-containment refueling water storage tank temperatures for:
 - 1 to 4 low head safety injection trains.
 - 1 to 4 medium head safety injection trains.
 - 1 to 4 accumulators.

2.9 RAI 553, Question 06.02.05-31a, Hydrogen Production

- Detail in the response the rationale to maintain an analysis that more accurately models the representative physical behaviors expected during the LOOP-TR scenario.
- Establish that RAI 471 bounds the requirements of 10 CFR 50.44.
- Establish that additional sensitivities of non-physical release rates are not warranted.

2.10 RAI 553, Question 06.02.05-31b, Hydrogen Production

- Provide clarification on the observed impact from passive autocatalytic recombiner operation and perform requested time step sensitivity study.

2.11 RAI 553, Question 06.02.05-31c, Hydrogen Production

- Provide requested scenario table (Table 6.2.1) from MAAP documentation.

2.12 RAI 553, Question 06.02.05-31d, Hydrogen Production

- Provide details of requested information on foils, dampers, and doors for the scenarios provided in RAI 471, Question 6.2.5-21.

2.13 RAI 553, Question 06.02.05-31e, Hydrogen Production

- Rewrite Section 6.2.5 to:
 - Describe the hydrogen production methodology.
 - Remove the dependency on Section 19.2.

2.14 RAI 473, Question 06.02.05-24b, Equipment Survivability (Temperature and Pressure)

- Provide temperature and pressure information based on AICC conditions.

3 Interaction Opportunities

- No interactions planned.

4 Information Submittal Dates

AREVA NP will provide draft information for discussion prior to submittal of final information. The proposed schedule for responses to the Open Item questions is provided in Table A-1.

Table A-1 — Submittal Dates for Response to RAI Open Items

RAI	Question No.	Topic/Subject	Draft to NRC	Final to NRC
349	19-335b	SGTR Source Term Calculation	11/27/12	1/31/13
532	19-352	MAAP Code Differences and Modeling Enhancements	5/30/13	7/30/13
532	19-353	Providing New MAAP Results for Specified Scenarios	5/30/13	7/30/13
532	19-354	MAAP - Hydrogen Production	5/30/13	7/30/13
532	19-355	Impact of Core Exit Temperature Differences	5/30/13	7/30/13
524	06.02.02-127	Sensitivity Study on IRWST Temperature	4/28/13	6/28/13
473	06.02.05-24	Equipment Survivability of Hydrogen Burn	4/28/13	6/28/13
553	06.02.05-31	MAAP - Hydrogen Production	4/28/13	6/28/13