

## ArevaEPRDCPEm Resource

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**From:** RYAN Tom (AREVA) [Tom.Ryan@areva.com]  
**Sent:** Thursday, September 13, 2012 3:34 PM  
**To:** Tesfaye, Getachew  
**Cc:** Miernicki, Michael; Gleaves, Bill; GUCWA Len (EXTERNAL AREVA); BALLARD Bob (AREVA); BENNETT Kathy (AREVA); DELANO Karen (AREVA); LEIGHLITER John (AREVA); ROMINE Judy (AREVA); TOLLEY Tracey (AREVA); VANCE Brian (AREVA); WELLS Russell (AREVA); WILLIFORD Dennis (AREVA)  
**Subject:** DRAFT Response to U.S. EPR Design Certification Application RAI No. 552 (6512, 6526), FSAR Ch. 6, Questions 06.02.02-134  
**Attachments:** RAI 552 Response US EPR DC - DRAFT.pdf

Getachew,

Attached is a second draft response for RAI 552, Question 06.02.02-134 in advance of the final response date of September 27, 2012 shown below. This draft incorporates NRC feedback that was provided on September 6, 2012. To keep our commitment to send a final response to this question by September 27th, we need to receive all NRC staff feedback and comments no later than **September 20th**.

Please let me know if the staff has questions or if this response can be sent as final.

Sincerely,

*Tom Ryan for  
Dennis Williford, P.E.  
U.S. EPR Design Certification Licensing Manager  
AREVA NP Inc.*

7207 IBM Drive, Mail Code CLT 2B  
Charlotte, NC 28262  
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**From:** WILLIFORD Dennis (RS/NB)  
**Sent:** Wednesday, September 05, 2012 5:06 PM  
**To:** [Getachew.Tesfaye@nrc.gov](mailto:Getachew.Tesfaye@nrc.gov)  
**Cc:** BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); LEIGHLITER John (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); KOWALSKI David (RS/NB); GUCWA Len (External RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 552 (6512, 6526), FSAR Ch. 6, Supplement 1  
**Importance:** High

Getachew,

AREVA NP Inc. provided a schedule for a technically correct and complete response to the two questions in RAI No. 552 on July 6, 2012.

The attached file, "RAI 552 Supplement 1 Response US EPR DC.pdf" provides a technically correct and complete final response to one (Question 06.02.02-135) of the two questions.

The following table indicates the respective pages in the response document, "RAI 552 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 552 — 06.02.02-135	2	4

The schedule for a technically correct and complete response to the remaining question remains unchanged as provided below.

Question #	Response Date
RAI 552 — 06.02.02-134	September 27, 2012

Sincerely,

***Dennis Williford, P.E.***  
***U.S. EPR Design Certification Licensing Manager***  
***AREVA NP Inc.***

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**From:** WILLIFORD Dennis (RS/NB)  
**Sent:** Friday, July 06, 2012 9:47 AM  
**To:** [Getachew.Tesfaye@nrc.gov](mailto:Getachew.Tesfaye@nrc.gov)  
**Cc:** BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); GUCWA Len (External RS/NB); [bill.gleaves@nrc.gov](mailto:bill.gleaves@nrc.gov)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 552 (6512, 6526), FSAR Ch. 6

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 552 Response US EPR DC.pdf," provides a schedule since a technically correct and complete response to the two questions cannot be provided at this time.

The following table indicates the respective pages in the response document, "RAI 552 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 552 — 06.02.02-134	2	2
RAI 552 — 06.02.02-135	3	3

The schedule for a technically correct and complete response to these 2 questions is provided below.

Question #	Response Date
RAI 552 — 06.02.02-134	<b>September 27, 2012</b>
RAI 552 — 06.02.02-135	<b>September 27, 2012</b>

Sincerely,

***Dennis Williford, P.E.***  
***U.S. EPR Design Certification Licensing Manager***  
***AREVA NP Inc.***

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**To:** ZZ-DL-A-USEPR-DL  
**Cc:** Ashley, Clinton; McKirgan, John; Strnisha, James; Terao, David; Gleaves, Bill; Segala, John; ArevaEPRDCPEm Resource  
**Subject:** U.S. EPR Design Certification Application RAI No. 552 (6512, 6526), FSAR Ch. 6

Attached please find the subject request for additional information (RAI). A draft of the RAI was provided to you on May 31, 2012, and on June 7, 2012, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,  
Getachew Tesfaye  
Sr. Project Manager  
NRO/DNRL/LB1  
(301) 415-3361

**Hearing Identifier:** AREVA\_EPR\_DC\_RAIs  
**Email Number:** 4040

**Mail Envelope Properties** (68A588D0DDE96547855C97AF83A8CAFDB1A75B)

**Subject:** DRAFT Response to U.S. EPR Design Certification Application RAI No. 552  
(6512, 6526), FSAR Ch. 6, Questions 06.02.02-134  
**Sent Date:** 9/13/2012 3:34:17 PM  
**Received Date:** 9/13/2012 3:34:25 PM  
**From:** RYAN Tom (AREVA)

**Created By:** Tom.Ryan@areva.com

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<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
MESSAGE	5113	9/13/2012 3:34:25 PM
RAI 552 Response US EPR DC - DRAFT.pdf		585096

**Options**

**Priority:** Standard  
**Return Notification:** No  
**Reply Requested:** No  
**Sensitivity:** Normal  
**Expiration Date:**  
**Recipients Received:**



**Response to**

**Request for Additional Information No. 552 (6512, 6526), Revision 0**

**6/07/2012**

**U. S. EPR Standard Design Certification**

**AREVA NP Inc.**

**Docket No. 52-020**

**SRP Section: 06.02.02 - Containment Heat Removal Systems**

**Application Section: 6.2**

**QUESTIONS for Containment & Ventilation Branch (SCVB)**

**QUESTIONS for Component Integrity Branch (CIB)**

**DRAFT**

**Question 06.02.02-134:**

RG 1.206 (June 2007) Regulatory Position, Part IV: Miscellaneous Topics, describes the following:

The creation of, and restrictions on, changing Tier 2\* information resulted from the development of Tier 1 information for the advanced BWR design certification (Appendix A to 10 CFR Part 52) and the Asea Brown Boveri-Combustion Engineering System 80+ reactor design certification (Appendix B, "Design Certification Rule for the System 80+ Design," to 10 CFR Part 52). During this development process, these applicants requested that the agency minimize the amount of information in Tier 1 to allow additional flexibility for an applicant or licensee who references these appendices. Tier 2 also specified many codes, standards, and design processes that Tier 1 does not specify but that are acceptable for meeting ITAAC. As a result, certain significant information only exists in Tier 2, and the Commission does not want this significant information to be changed without prior NRC approval. The generic DCD identifies this Tier 2\* information with italicized text and brackets.

NUREG-1792 "Final Safety Evaluation Report Related to Certification of the AP1000 Standard Plant Design", describes the following:

The ACRS review for the AP1000 highlighted the significance of certain assumptions about debris in containment to the adequacy of long-term core cooling, and a concern that the values not be revised without substantial additional testing and analysis. As a means of emphasizing this, the applicant proposed to designate the key information as Tier 2\*, to require prior NRC approval, in a letter dated February 23, 2011. This change is included in Revision 19. The NRC agrees that this is a prudent change and will modify the final rule language to reflect this addition, as a Tier 2\* item without expiration at fuel load.

In the most recent amendment (December 2011) to Appendix D to Part 52 "Design Certification Rule for the AP1000 Design" this change was put into effect.

Given ANP-10293 Appendix F "Downstream Effects Evaluation for the U.S. EPR," containment debris limits discussed in response to RAI 511 Question 06.02.02-124 and RAI 488 Question 06.02.02-91 and associated DCD Section 6.3 markup, it appears that the US EPR is similar to the AP1000 regarding assumptions about debris in containment to the adequacy of long term core cooling, specifically the debris limits for core inlet blockage evaluations. Therefore, the NRC staff request that AREVA evaluate the appropriateness of applying Tier 2\* designation to items associated with long term core cooling or the appropriateness of establishing a technical specification. If information related to long term core cooling is designated as Tier 2\*, the staff request AREVA identify this information in the DCD to ensure that the appropriate change process and limits are followed.

**Response to Question 06.02.02-134:**

AREVA is proposing a Tier 2\* item for containment debris in lieu of establishing a Technical Specification (TS) requirement. This action is based on regulatory precedence and NRC's requirements related to the content of TS set forth in 10 CFR 50.36.

## Technical Specifications

Current NRC and industry guidance on the content of TS are incorporated into standard technical specifications (STS) which are published as a NUREG-series publication. STS were developed based on the criteria in the Final Commission Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, dated July 22, 1993 (58 FR 39132). This policy statement was subsequently codified by changes to 10 CFR 50.36. These improved STS were the result of extensive technical meetings and discussions among the NRC staff, industry owners groups, vendors, and other stakeholders regarding the appropriateness of including specific requirements in TS. The TS in U.S. EPR FSAR Tier 2 Chapter 16 are the result of the experience gained in the development of the improved STS.

The rule change that followed the issuance of NRC's policy statement on TS improvements provided the basis for many nuclear power plant licensees to relocate a number of existing TS requirements which do not fall within or satisfy the criteria 10 CFR 50.36 to other licensee-controlled documents. The NRC staff concluded that these "relocated" provisions were not related to dominant contributors to plant risk. Some of the relocated requirements were associated with containment cleanliness/foreign material exclusion requirements. NRC-approved STS do not include specific containment debris limits.

AREVA has evaluated the appropriateness of including debris limits in Technical Specifications and concludes that debris limits do not meet any of the four criteria for establishing Technical Specification limiting conditions for operation as provided under 10 CFR 50.36(c)(2)(ii). This position is consistent with that taken by the AP1000 design center and NRC staff comments made during the December 15, 2010 ACRS subcommittee meeting regarding AP1000 design certification.

According to 10 CFR 50.36(c)(2)(ii), a technical specification limiting condition for operation must meet one or more of the following criteria:

*Criterion 1.* Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.

*Criterion 2.* A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

*Criterion 3.* A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

*Criterion 4.* A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.



Criterion 1 relates to installed instrumentation, which debris obviously is not.

Criterion 2 applies to certain process variables, design features and operating restrictions that are initial conditions of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. Debris is neither a process variable nor a design feature. However, a debris limit could be considered an operating restriction, but it is not an explicit item identified in the design basis accident or transient analyses described in the FSAR Chapter 15 safety analysis, which has been industry practice for consideration of inclusion into TS.

Criterion 3 and Criterion 4 involve structures, systems and components, and debris is not any of those.

### Tier 2\*

AREVA NP has reviewed NRC's Tier 2\* designations of other Part 52 design certifications regarding GSI-191 long-term cooling. In particular, the ACRS review of the AP1000 design underscored the significance of certain assumptions regarding debris in containment and its potential effect on adequacy of long-term cooling under postulated scenarios.

The responses to RAI 488, Question 6.2.2-91 and RAI 511, Question 6.2.2-124 provide debris limits that are similar to debris parameters provided for the AP1000 design, although the values are greater for the U.S. EPR design. U.S. EPR FSAR Tier 2, Section 6.3.2.2.2 will be revised to apply Tier 2\* designation to these debris limits. In addition, U.S. EPR FSAR Introduction, Table I-1 will be revised to provide a locator for this Tier 2\* information. The debris limit will be specified as Tier 2\* without expiration at fuel load. Although these limits are subject to change, any such change will require prior NRC approval in accordance with the change process specified in the U.S. EPR design certification rule and 10 CFR 52.63(a)(5).

AREVA NP has reviewed other GSI-191 design/debris inputs and assumptions for consideration as Tier 2\* information; however, their relative importance does not rise to the high level for Tier 2\* designation. This review included the results from a series of flow tests conducted by AREVA NP that demonstrate the effects and sensitivity of various debris loadings. In some cases, increasing the amount/ratio of certain debris resulted in less flow blockage. In addition, testing with surrogate chemical precipitates showed a "saturation plateau" where the addition of more chemicals did not appreciably increase flow blockage.

### Conclusion

AREVA concludes that debris limits do not meet any of the four criteria for establishing Technical Specification limiting conditions for operation as provided under 10 CFR 50.36(c)(2)(ii). Exclusion of debris limits from TS is consistent with the Commission Policy Statement on TS improvements. Inclusion of debris limits in the U.S. EPR FSAR as Tier 2\* information provides for consistency across all referencing plants with respect to debris control and NRC control of any future relaxation of the limits.

The placement of the debris limits in TS would provide unnecessary duplication of the controls on changes to these limits established through Tier 2\* designation and the requirements of the U.S. EPR design certification rule and 10 CFR 52.63(a)(5).

**FSAR Impact:**

U.S. EPR FSAR Introduction, Table I-1 and U.S. EPR FSAR Tier 2, Section 6.3.2.2.2 will be revised as described in the response and indicated on the enclosed markup.

DRAFT

# U.S. EPR Final Safety Analysis Report Markups

DRAFT

Table I-1—Summary of Tier 2\* Information

Location	Description of Tier 2* Information	Expiration
<u>6.3.2.2.2</u>	<u>Latent Debris Inside Containment</u> (LATER)	<u>No</u>



Question 6.2.2-134

DRAFT

- Controls for foreign material exclusion to limit the introduction of foreign material and debris sources into containment.
- Controls to assess and manage maintenance activities, including associated temporary changes, to confirm that ECCS function is not reduced by associated changes in analytical inputs or assumptions, or other activities that could introduce debris or potential debris sources into containment.
- Controls on the introduction of coating materials into containment and to address deficiencies of coating materials used in containment.

Question 6.2.2-134

- [Latent debris will be limited to 150 pounds (10.2 lbs of fiber and 139.8 lbs of particulate) and 100 ft<sup>2</sup>.]\* These latent debris limits derive from U.S. EPR sump strainer and fuel assembly testing that demonstrates adequate long term core cooling under debris-laden coolant conditions.

Coolant pH adjustment baskets containing granulated trisodium phosphate dodecahydrate (TSP-C) are strategically placed in the inlet flow path to the IRWST within the boundary perimeter of the weirs at the four heavy floor openings of the RB. Flow through the baskets dissolves the TSP-C into the coolant that returns to the IRWST to passively neutralize entrained acids and maintain the alkalinity of the coolant. The pH of the recirculated coolant is maintained above 7.0. The control of pH in the recirculated coolant reduces the potential for stress-corrosion cracking of the austenitic stainless steel components, limits the generation of hydrogen attributable to corrosion of containment metals, and minimizes the re-evolution of iodine in post-LOCA containment solution, maintaining the radioiodine in solution to reduce radioactive releases to the environment. The minimum amount of granulated TSP-C for this pH control is 12,200 lb<sub>m</sub>. Section 15.0.3.12 provides an evaluation of post-accident water chemistry control.

The IRWST is connected to the molten core spreading area by pipes that are closed during normal operation and accident conditions. If a severe accident occurs and molten material reaches the spreading area, an actuation device melts, flooding valves open, and IRWST water flows into the spreading area to support the operation of the SAHRS. The IRWST is located at a higher elevation than the core spreading area to provide gravity flooding of the spreading area with the IRWST water inventory. The core spreading area and the SAHRS are described in Section 19.2.3.3.

The debris interceptor components, including trash racks, retention baskets and ECCS strainers, are designed and analyzed per the provisions of ANSI/AISC N690-1994, “Specification for the Design, Fabrication and Erection of Steel Safety-Related Structures for Nuclear Facilities,” including Supplement 2 (S2). The structural qualification of the debris interceptors includes an evaluation of the structural integrity of the supports and anchorages as it relates to the abilities of the trash rack, retention baskets and ECCS strainers to perform their intended function.