## ArevaEPRDCPEm Resource

**From:** BRYAN Martin (EXTERNAL AREVA) [Martin.Bryan.ext@areva.com]
**Sent:** Wednesday, October 06, 2010 10:54 AM
**To:** Tesfaye, Getachew
**Cc:** DELANO Karen (AREVA); ROMINE Judy (AREVA); BENNETT Kathy (AREVA); LENTZ Tony (EXTERNAL AREVA); HALLINGER Pat (EXTERNAL AREVA); WILLIFORD Dennis (AREVA); RYAN Tom (AREVA)
**Subject:** DRAFT Response to U.S. EPR Design Certification Application RAI No. 386, FSAR Ch. 14,
**Attachments:** RAI 386 Supplement 6 Response US EPR DC - DRAFT.pdf

Getachew,

Attached is a draft response for questions:

14.02-151
14.02-152
14.02-156
14.02-158
14.02-159
14.03.08-2

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

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
702 561-3528 cell
Martin.Bryan.ext@areva.com

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**From:** BRYAN Martin (External RS/NB)
**Sent:** Wednesday, September 22, 2010 12:31 PM
**To:** 'Tesfaye, Getachew'
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); LENTZ Tony (External RS/NB)
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 386, FSAR Ch. 14, Supplement 5

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the 24 questions in RAI No. 386 on June 3, 2010. Supplement 1, Supplement 2, Supplement 3, and Supplement 4 responses to RAI No. 386 were sent on July 15, 2010, August 12, 2010, August 26, 2010, and September 9, 2010, respectively, to provide a revised schedule.

To provide additional time to interact with the NRC, a revised schedule is provided in this e-mail for the response to the questions.

The schedule for technically correct and complete responses to the questions has been revised and is provided below:

| Question # | Response Date |
|---|---|
| RAI 386 — 14.02-149 | October 28, 2010 |
| RAI 386 — 14.02-150 | October 28, 2010 |
| RAI 386 — 14.02-151 | October 28, 2010 |
| RAI 386 — 14.02-152 | October 28, 2010 |
| RAI 386 — 14.02-153 | October 28, 2010 |
| RAI 386 — 14.02-154 | October 28, 2010 |
| RAI 386 — 14.02-155 | October 28, 2010 |
| RAI 386 — 14.02-156 | October 28, 2010 |
| RAI 386 — 14.02-157 | October 28, 2010 |
| RAI 386 — 14.02-158 | October 28, 2010 |
| RAI 386 — 14.02-159 | October 28, 2010 |
| RAI 386 — 14.02-160 | October 28, 2010 |
| RAI 386 — 14.03.02-44 | October 28, 2010 |
| RAI 386 — 14.03.02-45 | October 28, 2010 |
| RAI 386 — 14.03.02-46 | October 28, 2010 |
| RAI 386 — 14.03.02-47 | October 28, 2010 |
| RAI 386 — 14.03.02-48 | October 28, 2010 |
| RAI 386 — 14.03.02-49 | October 28, 2010 |
| RAI 386 — 14.03.02-50 | October 28, 2010 |
| RAI 386 — 14.03.02-51 | October 28, 2010 |
| RAI 386 — 14.03.03-37 | October 28, 2010 |
| RAI 386 — 14.03.03-46 | October 28, 2010 |
| RAI 386 — 14.03.08-2 | October 28, 2010 |
| RAI 386 — 14.03.08-3 | October 28, 2010 |

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
702 561-3528 cell
Martin.Bryan.ext@areva.com

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**From:** BRYAN Martin (External RS/NB)
**Sent:** Thursday, September 09, 2010 2:30 PM
**To:** 'Tesfaye, Getachew'
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); LENTZ Tony (External RS/NB)
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 386, FSAR Ch. 14, Supplement 4

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the 24 questions in RAI No. 386 on June 3, 2010.

AREVA NP Inc. provided technically correct and complete draft responses to 11 of the 24 questions in "RAI 386 Supplement 1 Response – DRAFT.pdf" on July 8, 2010. A revised schedule was provided in Supplement 1 on July 15, 2010, in Supplement 2 on August 12, 2010, and in Supplement 3 on August 26, 2010. To allow time for interaction between AREVA and the NRC staff, a revised schedule for submittal of final responses is provided in this e-mail.

The schedule for technically correct and complete responses to the questions has been revised and is provided below:

| Question # | Response Date |
|---|---|
| RAI 386 — 14.02-149 | October 28, 2010 |
| RAI 386 — 14.02-150 | October 28, 2010 |
| RAI 386 — 14.02-151 | October 14, 2010 |
| RAI 386 — 14.02-152 | October 14, 2010 |
| RAI 386 — 14.02-153 | October 28, 2010 |
| RAI 386 — 14.02-154 | October 28, 2010 |
| RAI 386 — 14.02-155 | October 28, 2010 |
| RAI 386 — 14.02-156 | October 14, 2010 |
| RAI 386 — 14.02-157 | October 28, 2010 |
| RAI 386 — 14.02-158 | October 14, 2010 |
| RAI 386 — 14.02-159 | October 14, 2010 |
| RAI 386 — 14.02-160 | October 28, 2010 |
| RAI 386 — 14.03.02-44 | September 23, 2010 |
| RAI 386 — 14.03.02-45 | September 23, 2010 |
| RAI 386 — 14.03.02-46 | October 28, 2010 |
| RAI 386 — 14.03.02-47 | October 28, 2010 |
| RAI 386 — 14.03.02-48 | October 28, 2010 |
| RAI 386 — 14.03.02-49 | September 23, 2010 |
| RAI 386 — 14.03.02-50 | September 23, 2010 |
| RAI 386 — 14.03.02-51 | September 23, 2010 |
| RAI 386 — 14.03.03-37 | September 23, 2010 |
| RAI 386 — 14.03.03-46 | October 28, 2010 |
| RAI 386 — 14.03.08-2 | September 23, 2010 |
| RAI 386 — 14.03.08-3 | September 23, 2010 |

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
702 561-3528 cell
Martin.Bryan.ext@areva.com

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**From:** BRYAN Martin (External RS/NB)
**Sent:** Thursday, August 26, 2010 8:27 PM
**To:** 'Tesfaye, Getachew'
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); LENTZ Tony (External RS/NB)
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 386, FSAR Ch. 14, Supplement 3

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the 24 questions in RAI No. 386 on June 3, 2010.

AREVA NP Inc. provided technically correct and complete draft responses to 11 of the 24 questions in "RAI 386 Supplement 1 Response – DRAFT.pdf" on July 8, 2010. A revised schedule was provided in Supplement 1 on July 15, 2010 and in Supplement 2 on August 12, 2010. To allow time for interaction between AREVA and the NRC staff, a revised schedule for submittal of final responses is provided in this e-mail.

The schedule for technically correct and complete responses has been revised and is provided below:

| Question # | Response Date |
|---|---|
| RAI 386 — 14.02-149 | September 9, 2010 |
| RAI 386 — 14.02-150 | September 9, 2010 |
| RAI 386 — 14.02-151 | October 14, 2010 |
| RAI 386 — 14.02-152 | October 14, 2010 |
| RAI 386 — 14.02-153 | September 9, 2010 |
| RAI 386 — 14.02-154 | September 9, 2010 |
| RAI 386 — 14.02-155 | September 9, 2010 |
| RAI 386 — 14.02-156 | October 14, 2010 |
| RAI 386 — 14.02-157 | September 9, 2010 |
| RAI 386 — 14.02-158 | October 14, 2010 |
| RAI 386 — 14.02-159 | October 14, 2010 |
| RAI 386 — 14.02-160 | September 9, 2010 |
| RAI 386 — 14.03.02-44 | September 23, 2010 |
| RAI 386 — 14.03.02-45 | September 23, 2010 |
| RAI 386 — 14.03.02-46 | September 9, 2010 |
| RAI 386 — 14.03.02-47 | September 9, 2010 |
| RAI 386 — 14.03.02-48 | September 9, 2010 |
| RAI 386 — 14.03.02-49 | September 23, 2010 |
| RAI 386 — 14.03.02-50 | September 23, 2010 |
| RAI 386 — 14.03.02-51 | September 23, 2010 |
| RAI 386 — 14.03.03-37 | September 23, 2010 |
| RAI 386 — 14.03.03-46 | September 9, 2010 |
| RAI 386 — 14.03.08-2 | September 23, 2010 |
| RAI 386 — 14.03.08-3 | September 23, 2010 |

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
702 561-3528 cell
Martin.Bryan.ext@areva.com

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**From:** BRYAN Martin (EXT)
**Sent:** Thursday, August 12, 2010 6:02 PM
**To:** 'Tesfaye, Getachew'
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); LENTZ Tony F (EXT)
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 386, FSAR Ch. 14, Supplement 2

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the 24 questions in RAI No. 386 on June 3, 2010. A revised schedule was provided in Supplement 1 on July 15, 2010.

AREVA NP Inc. provided technically correct and complete DRAFT responses to 7 of the 24 questions in "RAI 386 Supplement 1 Response – DRAFT.pdf" on July 8, 2010. To allow time for interaction between AREVA and the NRC staff, a revised schedule for submittal of final responses for these 7 questions is provided in this e-mail.

The schedule for technically correct and complete responses to the questions has been revised and is provided below:

| Question # | Response Date |
|---|---|
| RAI 386 — 14.02-149 | September 9, 2010 |
| RAI 386 — 14.02-150 | September 9, 2010 |
| RAI 386 — 14.02-151 | August 26, 2010 |
| RAI 386 — 14.02-152 | August 26, 2010 |
| RAI 386 — 14.02-153 | September 9, 2010 |
| RAI 386 — 14.02-154 | September 9, 2010 |
| RAI 386 — 14.02-155 | September 9, 2010 |
| RAI 386 — 14.02-156 | August 26, 2010 |
| RAI 386 — 14.02-157 | September 9, 2010 |
| RAI 386 — 14.02-158 | August 26, 2010 |
| RAI 386 — 14.02-159 | August 26, 2010 |
| RAI 386 — 14.02-160 | September 9, 2010 |
| RAI 386 — 14.03.02-44 | August 26, 2010 |
| RAI 386 — 14.03.02-45 | August 26, 2010 |
| RAI 386 — 14.03.02-46 | August 26, 2010 |
| RAI 386 — 14.03.02-47 | August 26, 2010 |
| RAI 386 — 14.03.02-48 | August 26, 2010 |
| RAI 386 — 14.03.02-49 | August 26, 2010 |
| RAI 386 — 14.03.02-50 | August 26, 2010 |
| RAI 386 — 14.03.02-51 | August 26, 2010 |
| RAI 386 — 14.03.03-37 | August 26, 2010 |
| RAI 386 — 14.03.03-46 | August 26, 2010 |
| RAI 386 — 14.03.08-2 | August 26, 2010 |
| RAI 386 — 14.03.08-3 | August 26, 2010 |

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
702 561-3528 cell
Martin.Bryan.ext@areva.com

**From:** BRYAN Martin (EXT)
**Sent:** Thursday, July 15, 2010 1:03 PM
**To:** 'Tesfaye, Getachew'
**Cc:** DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); LENTZ Tony F (EXT)
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 386, FSAR Ch. 14, Supplement 1

Getachew,

AREVA NP Inc. provided a schedule for technically correct and complete responses to the 24 questions in RAI No. 386 on June 3, 2010.

AREVA NP Inc. provided technically correct and complete DRAFT responses to 7 of the 24 questions in RAI No. 386 on July 8, 2010. To allow additional time for interaction between AREVA and the NRC staff, a revised schedule for submittal of final responses for these 7 questions is provided in this e-mail (386-14.02-149, 150, 153, 154, 155, 157 and 160).

The schedule for technically correct and complete responses to the questions has been revised and is provided below:

| Question # | Response Date |
|---|---|
| RAI 386 — 14.02-149 | **August 12, 2010** |
| RAI 386 — 14.02-150 | **August 12, 2010** |
| RAI 386 — 14.02-151 | August 26, 2010 |
| RAI 386 — 14.02-152 | August 26, 2010 |
| RAI 386 — 14.02-153 | **August 12, 2010** |
| RAI 386 — 14.02-154 | **August 12, 2010** |
| RAI 386 — 14.02-155 | **August 12, 2010** |
| RAI 386 — 14.02-156 | August 26, 2010 |
| RAI 386 — 14.02-157 | **August 12, 2010** |
| RAI 386 — 14.02-158 | August 26, 2010 |
| RAI 386 — 14.02-159 | August 26, 2010 |
| RAI 386 — 14.02-160 | **August 12, 2010** |
| RAI 386 — 14.03.02-44 | August 26, 2010 |
| RAI 386 — 14.03.02-45 | August 26, 2010 |
| RAI 386 — 14.03.02-46 | August 26, 2010 |
| RAI 386 — 14.03.02-47 | August 26, 2010 |
| RAI 386 — 14.03.02-48 | August 26, 2010 |
| RAI 386 — 14.03.02-49 | August 26, 2010 |
| RAI 386 — 14.03.02-50 | August 26, 2010 |
| RAI 386 — 14.03.02-51 | August 26, 2010 |
| RAI 386 — 14.03.03-37 | August 26, 2010 |
| RAI 386 — 14.03.03-46 | August 26, 2010 |
| RAI 386 — 14.03.08-2 | August 26, 2010 |
| RAI 386 — 14.03.08-3 | August 26, 2010 |

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager

AREVA NP Inc.
Tel: (434) 832-3016
702 561-3528 cell
Martin.Bryan.ext@areva.com

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**From:** BRYAN Martin (EXT)
**Sent:** Thursday, June 03, 2010 7:02 PM
**To:** 'Tesfaye, Getachew'
**Cc:** DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); LENTZ Tony F (EXT); RYAN Tom (AREVA NP INC)
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 386(4306,4418,4532,4349,2666,4512,4341), FSAR Ch. 14

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 386 Response US EPR DC.pdf" provides a schedule since a technically correct and complete response to the 24 questions is not provided.

The following table indicates the respective pages in the response document, "RAI 386 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

| Question # | Start Page | End Page |
|---|---|---|
| RAI 386 — 14.02-149 | 2 | 2 |
| RAI 386 — 14.02-150 | 3 | 3 |
| RAI 386 — 14.02-151 | 4 | 4 |
| RAI 386 — 14.02-152 | 5 | 5 |
| RAI 386 — 14.02-153 | 6 | 6 |
| RAI 386 — 14.02-154 | 7 | 7 |
| RAI 386 — 14.02-155 | 8 | 8 |
| RAI 386 — 14.02-156 | 9 | 9 |
| RAI 386 — 14.02-157 | 10 | 10 |
| RAI 386 — 14.02-158 | 11 | 11 |
| RAI 386 — 14.02-159 | 12 | 12 |
| RAI 386 — 14.02-160 | 13 | 13 |
| RAI 386 — 14.03.02-44 | 14 | 15 |
| RAI 386 — 14.03.02-45 | 16 | 16 |
| RAI 386 — 14.03.02-46 | 17 | 17 |
| RAI 386 — 14.03.02-47 | 18 | 18 |
| RAI 386 — 14.03.02-48 | 19 | 19 |
| RAI 386 — 14.03.02-49 | 20 | 20 |
| RAI 386 — 14.03.02-50 | 21 | 21 |
| RAI 386 — 14.03.02-51 | 22 | 22 |
| RAI 386 — 14.03.03-37 | 23 | 23 |
| RAI 386 — 14.03.03-46 | 24 | 24 |
| RAI 386 — 14.03.08-2 | 25 | 26 |
| RAI 386 — 14.03.08-3 | 27 | 27 |

A complete answer is not provided for the 24 questions. The schedule for a technically correct and complete response to these questions is provided below.

| Question # | Response Date |
|---|---|
| RAI 386 — 14.02-149 | July 15, 2010 |
| RAI 386 — 14.02-150 | July 15, 2010 |
| RAI 386 — 14.02-151 | August 26, 2010 |
| RAI 386 — 14.02-152 | August 26, 2010 |
| RAI 386 — 14.02-153 | July 15, 2010 |
| RAI 386 — 14.02-154 | July 15, 2010 |
| RAI 386 — 14.02-155 | July 15, 2010 |
| RAI 386 — 14.02-156 | August 26, 2010 |
| RAI 386 — 14.02-157 | July 15, 2010 |
| RAI 386 — 14.02-158 | August 26, 2010 |
| RAI 386 — 14.02-159 | August 26, 2010 |
| RAI 386 — 14.02-160 | July 15, 2010 |
| RAI 386 — 14.03.02-44 | August 26, 2010 |
| RAI 386 — 14.03.02-45 | August 26, 2010 |
| RAI 386 — 14.03.02-46 | August 26, 2010 |
| RAI 386 — 14.03.02-47 | August 26, 2010 |
| RAI 386 — 14.03.02-48 | August 26, 2010 |
| RAI 386 — 14.03.02-49 | August 26, 2010 |
| RAI 386 — 14.03.02-50 | August 26, 2010 |
| RAI 386 — 14.03.02-51 | August 26, 2010 |
| RAI 386 — 14.03.03-37 | August 26, 2010 |
| RAI 386 — 14.03.03-46 | August 26, 2010 |
| RAI 386 — 14.03.08-2 | August 26, 2010 |
| RAI 386 — 14.03.08-3 | August 26, 2010 |

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
702 561-3528 cell
Martin.Bryan.ext@areva.com

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**From:** Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
**Sent:** Tuesday, May 04, 2010 1:52 PM
**To:** ZZ-DL-A-USEPR-DL
**Cc:** Keim, Andrea; Rasmussen, Richard; Dehmel, Jean-Claude; Bernal, Sara; Roach, Edward; Jeng, David; Hawkins, Kimberly; Ng, Ching; Dixon-Herrity, Jennifer; Miernicki, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource
**Subject:** U.S. EPR Design Certification Application RAI No. 386(4306,4418,4532,4349,2666,4512,4341), FSAR Ch. 14

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on April 6, 2010, and discussed with your staff on May 4, 2010. Drat RAI Question 14.03.02-47 was modified as a result of that discussion. 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/NARP
(301) 415-3361

**Hearing Identifier:** AREVA_EPR_DC_RAIs
**Email Number:** 2096

**Mail Envelope Properties** (BC417D9255991046A37DD56CF597DB7107CE7286)

**Subject:** DRAFT Response to U.S. EPR Design Certification Application RAI No. 386, FSAR Ch. 14,
**Sent Date:** 10/6/2010 10:54:06 AM
**Received Date:** 10/6/2010 10:54:31 AM
**From:** BRYAN Martin (EXTERNAL AREVA)

**Created By:** Martin.Bryan.ext@areva.com

**Recipients:**
"DELANO Karen (AREVA)" <Karen.Delano@areva.com>
Tracking Status: None
"ROMINE Judy (AREVA)" <Judy.Romine@areva.com>
Tracking Status: None
"BENNETT Kathy (AREVA)" <Kathy.Bennett@areva.com>
Tracking Status: None
"LENTZ Tony (EXTERNAL AREVA)" <Tony.Lentz.ext@areva.com>
Tracking Status: None
"HALLINGER Pat (EXTERNAL AREVA)" <Pat.Hallinger.ext@areva.com>
Tracking Status: None
"WILLIFORD Dennis (AREVA)" <Dennis.Williford@areva.com>
Tracking Status: None
"RYAN Tom (AREVA)" <Tom.Ryan@areva.com>
Tracking Status: None
"Tesfaye, Getachew" <Getachew.Tesfaye@nrc.gov>
Tracking Status: None

**Post Office:** AUSLYNCMX02.adom.ad.corp

| **Files** | **Size** | **Date & Time** |
|---|---|---|
| MESSAGE | 16509 | 10/6/2010 10:54:31 AM |
| RAI 386 Supplement 6 Response US EPR DC - DRAFT.pdf | 480451 | |

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

**Response to**

**Request for Additional Information No. 386, Supplement 4 (4306, 4418, 4532, 4349, 2666, 4512, 4341), Revision 0, Supplement 6**

**5/4/2010**

**U. S. EPR Standard Design Certification**
**AREVA NP Inc.**
**Docket No. 52-020**
**SRP Section: 14.02 - Initial Plant Test Program - Design Certification and New License Applicants**
**SRP Section: 14.03.02 - Structural and Systems Engineering - Inspections, Tests, Analyses, and Acceptance Criteria**
**SRP Section: 14.03.03 - Piping Systems and Components - Inspections, Tests, Analyses, and Acceptance Criteria**
**SRP Section: 14.03.08 - Radiation Protection Inspections, Tests, Analyses, and Acceptance Criteria**

**Application Section: SRP 14.02 (NUREG 0800)**

**QUESTIONS for Quality and Vendor Branch 2 (ESBWR/ABWR) (CQVB)**
**QUESTIONS for Health Physics Branch (CHPB)**
**QUESTIONS for Structural Engineering Branch 2 (ESBWR/ABWR Projects) (SEB2)**
**QUESTIONS for Engineering Mechanics Branch 2 (ESBWR/ABWR Projects) (EMB2)**

DRAFT

**Question 14.02-151:**

**Follow-up to RAI 313, Question 14.02-128**

The response to RAI 14.02-128 refers to the criteria said to be contained in FSAR Section 9.3.2, Table 9.3.2-2 (Secondary Side). However, the current version of Table 9.3.2-2 does not provide this level of detail and the response does not commit to update Table 9.3.2-2 to ensure that the revised acceptance criteria are complemented with supporting FSAR data. The response should include a commitment to a parallel revision of Table 9.3.2-2 to ensure consistency.

**Response to Question 14.02-151:**

U.S. EPR FSAR Tier 2, Table 9.3.2-2—Secondary Side Sampling Points will be revised to include process instrument parameters.

Laboratory equipment used to measure grab samples is site-specific and is not specified in the U.S. EPR FSAR.

U.S. EPR FSAR Tier 2, Section 14.2.12.7.13, Subsection 5.1.4 and Section 14.2.12.18.5, Subsection 5.4 will be revised to reflect that laboratory equipment used to measure grab samples is site-specific and is not specified in the U.S. EPR FSAR.

**FSAR Impact:**

U.S. EPR FSAR Tier 2, Table 9.3.2-2 and Sections 14.2.12.7.13 and 14.2.12.18.5 will be revised as described in the response and indicated on the enclosed markup.

DRAFT

**Question 14.02-152:**

**Follow-up to RAI 313, Question 14.02-129**

The response to RAI 14.02-129 refers to the criteria said to be contained in FSAR Section 9.3.2, Table 9.3.2-2 (Secondary Side). However, the current version of Table 9.3.2-2 does not provide this level of detail and the response does not commit to update Table 9.3.2-2 to ensure that the revised acceptance criteria are complemented with supporting FSAR data. The response should commit to a parallel revision of Table 9.3.2-2 to ensure consistency.

**Response to Question 14.02-152:**

Refer to the Response to RAI 386, Question 14.02-151.

**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.

DRAFT

**Question 14.02-156:**

**Follow-up to RAI 313, Question 14.02-137**

The response to RAI 14.02-137 refers to the criteria said to be contained in FSAR Section 9.3.2, Table 9.3.2-2 (Secondary Side), but needs to include FSAR Table 9.3.2-1 (Primary Side). Also, the current versions of Tables 9.3.2-1 and 9.3.2-2 do not provide this level of detail and the response does not commit to update Tables 9.3.2-1 and 9.3.2-2 to ensure that the revised acceptance are complemented with supporting FSAR data. The response should commit to a revision of Tables 9.3.2-1 and 9.3.2-2 and include their citation in Test No. 155 to ensure consistency.

**Response to Question 14.02-156:**

U.S. EPR FSAR Tier 2, Table 9.3.2-1—Primary Side Sampling Points will be revised to include process instrument parameters.

Laboratory equipment used to measure grab samples is site-specific and is not specified in the U.S. EPR FSAR.

U.S. EPR FSAR Tier 2, Section 14.2.12.18.6, Subsections 2.3 and 5.4, and Section 14.2.12.12.9, Subsection 5.3 will be revised to include a citation to U.S. EPR FSAR Tier 2, Tables 9.3.2-1 and 9.3.2-2.

**FSAR Impact:**

U.S. EPR FSAR Tier 2, Table 9.3.2-1 and Sections 14.2.12.18.6 and 14.2.12.12.9 will be revised as described in the response and indicated on the enclosed markup.

DRAFT

**Question 14.02-158:**

**Follow-up to RAI 313, Question 14.02-139**

The response to RAI 14.02-139 refers to the criteria said to be contained in FSAR Section 9.3.2, Table 9.3.2-2 (Secondary Side). The test needs to also cite FSAR Table 9.3.2-1 (Primary Side) since Test No. 204 is for sampling the primary and secondary systems. Omitting a citation of Table 9.3.2-1 results in the definition of an incomplete set of acceptance criteria. In addition, the current versions of Tables 9.3.2-1 and 9.3.2-2 do not provide this level of detail and the response does not commit to update Tables 9.3.2-1 and 9.3.2-2 to ensure that the revised acceptance are complemented with supporting FSAR data. The response should commit to a revision of Tables 9.3.2-1 and 9.3.2-2 and include their citation in Test No. 204 to ensure consistency.

**Response to Question 14.02-158:**

Refer to the Response to RAI 386, Question 14.02-151.

**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.

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**Question 14.02-159:**

**Follow-up to RAI 313, Question 14.02-140**

The response to RAI 14.02-140 refers to the criteria said to be contained in FSAR Section 9.3.2, Table 9.3.2-2 (Secondary Side), but needs to include Table 9.3.2-1 for the primary side. The test is for failed fuel detection and the response should cite FSAR Table 9.3.2-1 (Primary Side) since Test No. 205 is for sampling the primary system. Omitting a citation of Table 9.3.2-1, results in the definition of an incomplete set of acceptance criteria. In addition, the current version of Table 9.3.2-1 does not provide this level of detail and the response does not commit to updating Table 9.3.2-1 to ensure that the revised acceptance are complemented with supporting FSAR data. Finally, the response refers to FSAR Section 11.5, Table 11.5-1 for supporting information. However, the current version of Table 11.5-1 does not provide this level of detail. The response should commit to a revision of Tables 9.3.2-1 and 11.5-1 and include their citation in Test No. 205 to ensure consistency.

**Response to Question 14.02-159:**

Refer to the response in RAI 386, Question 14.02-156 concerning the revision of U.S. EPR FSAR Tier 2, Table 9.3.2-1 and citation in U.S. EPR FSAR Tier 2, Section 14.2, Test No. 205.

Refer to the responses in RAI 273, Supplement 4, Questions 11.05-1 through 11.05-10 and RAI 290, Supplement 1 and 4, Question 11.05-15 concerning the revision of U.S. EPR FSAR Tier 2, Table 11.5-1.

**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.

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**Question 14.03.08-2:**

**Follow-up to RAI 43, Question 14.03.08-1**

In response to RAI 43, Question 14.3.8-1, Supplement 1, Revision 0, the applicant revised Tier 1 to include additional detail for the Radiation Monitoring System, specifically ITAAC for the safety-related radiation monitors and a sentence describing the non safety related monitors. This revision is satisfactory except for the following which is needed to demonstrate compliance with 10 CFR Part 52.47(b)(1).

As detailed in Staff RAI 292, Question 14.3.7-33, dated September 18, 2009, the staff evaluation of the applicant's responses to prior RAIs (RAI No. 43, 105, and 116) indicates that the approach being used in addressing ITAAC is based on previous certified designs and that the EPR FSAR Tier 1 incorporates safety significant features credited to comply with the requirements of 10 CFR Parts 20, 50, 52, 73, or 100. However, 10 CFR Part 52.47(b)(1) states that a design certification application must contain the following:

> "*The proposed inspections, tests, and analyses, …that the licensee shall perform, and the acceptance criteria that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a facility that incorporates the design certification has been constructed and will be operated in conformity with the combined license, the provisions of the Act, and the Commission's rules and regulations*."

The staff concludes that Tier 1 safety significant radiation protection structures, systems and components (SSC), which the applicant has credited for complying with the requirements of 10 CFR Part 20, do not contain sufficient detail to provide reasonable assurance that the facility will be constructed and operated in accordance with the Commission's rules and regulations, specifically 10 CFR Part 20, GDC 63 and GDC 64. For this reason, RG 1.206 Part C.II states that additional Tier 1 and ITAAC detail should be provided for those SSCs necessary to demonstrate compliance with 10 CFR Part 20, although they are not safety-related SSCs. As an example, the AP1000 certified design which the applicant referenced in its response to RAI 43, Question 14.3.8-1, has recognized this and, therefore, includes Tier 1 information and ITAAC for the non-safety related radiation monitoring system relevant to demonstrating the design's compliance with 10 CFR Part 20, GDC 63, and GDC 64 in accordance with 10 CFR Part 52.47(b)(1). Similarly, the ESBWR Design Certification Document (Rev. 6) includes specific ITAACs for area and airborne radiation monitors. The staff maintains that these radiation monitors are equivalent in purpose and safety significance to corresponding monitors in the U.S. EPR design, for which FSAR Tier 1, Rev. 1 does not provide equivalent ITAACs. Therefore the EPR's non-safety related radiation monitoring system should include additional Tier 1 information and ITAACs in order to demonstrate compliance with NRC regulations.

It is recognized that the level of Tier 1 and ITAAC details for these systems will be less than that required for safety related SSCs. However, without sufficient details the staff cannot complete its evaluation and conclude, with reasonable assurance, that if the tests and inspections were performed and acceptance criteria were met, that all design commitments will be fulfilled and that the plant will be built and operated in accordance with the design certification and comply with applicable NRC regulations. Accordingly, the applicant is requested to provide Tier 1 information and ITAACs for the U.S. EPR radiation monitoring system as described above.

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**Response to Question 14.03.08-2:**

AREVA NP based its development of U.S. EPR FSAR Tier 1 on Standard Review Plan (SRP) 14.3. SRP 14.3 states that not all information required for compliance with regulations and described in Tier 2 is required to be in Tier 1 and have ITAAC. SRP 14.3 describes a graded approach to selecting information from Tier 2 and including that information in Tier 1 with ITAAC. SRP 14.3 specifies specific non-safety-related criteria for inclusion in Tier 1 such as severe accident, anticipated transient without scram (ATWS), and fire protection.

U.S. EPR FSAR Tier 2 material is screened to determine if it is ”safety significant” as described in U.S. EPR FSAR Tier 2, Section 14.3. This screening process uses criteria developed from SRP 14.3, Appendixes A and C. The first process uses discipline checklists that include ITAAC criteria based on guidance in SRP, Section 14.3. For example, the discipline checklist for systems provides guidance to create ITAAC for the following features:

- Major safety-related features.
- Equipment that is seismic, EQ, or 1E.
- Safety-related equipment.
- Design features provided for severe accident mitigation, station blackout (SBO), and ATWS.
- Significant system features identified in the applicable SRPs for the system.
- Significant safety-related (and non-safety-related) functions derived from those listed in system design requirements documents.

The second process involves an expert review panel that selects safety-significant features based on assumptions and insights from key safety and integrated plant safety analyses in U.S. EPR FSAR Tier 2, where plant performance is dependent on contributions from multiple systems. This process is based on guidance in SRP 14.3, Page 14.3-21. Results of the expert review panel meetings are provided in U.S. EPR FSAR Tier 2, Tables 14.3-1 through 14.3-7.

Specifically:

SRP 14.3, Appendix A, Page 14.3-16 states:

> “The applicant should put the top-level design features and performance characteristics that were the most significant to safety in the Tier 1 design descriptions. The level of detail in Tier 1 is governed by a graded approach to the SSCs of the design, based on the safety significance of the functions they perform.”
>
> “For example, safety-related SSCs should be described in Tier 1 with a relatively greater amount of information. Other SSCs should also be included based on their importance to safety, such as containment isolation aspects of non-safety systems. Some non-safety aspects of SSCs need not be discussed in Tier 1. This graded approach recognizes that although many aspects of the design are important to safety, the level of design detail in Tier 1 and verification of the key design features and performance characteristics should be commensurate with the significance of the safety functions to be performed.”

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SRP 14.3, Page 14.3-17 states:

> "The level of detail specified in the ITAAC should be commensurate with the safety significance of the functions and bases for that SSC."

SRP 14.3, Appendix A, Page 14.3-21 states:

> "The staff is particularly interested in ensuring that the assumptions and insights from key safety and integrated plant safety analyses in Tier 2, where plant performance is dependent on contributions from multiple systems of the design, are adequately considered in Tier 1. Addressing these assumptions and insights in Tier 1 ensures that the integrity of the fundamental analyses for the design are preserved in an as-built facility referencing the certified design. These analyses include flooding analyses, over-pressure protection, containment analyses, core cooling analyses, fire protection, transient analyses, anticipated transient without scram analyses, steam generator tube rupture analyses (PWRs only), radiological analyses, USIs/GSIs and TMI items, or other key analyses as specified by the staff. Therefore, applicants should provide information, in tabular form, in Section 14.3 that cross references the important design information and parameters of these analyses to their treatment in Tier 1. The cross-references should be sufficiently detailed to allow a COL applicant or licensee to consider whether a proposed design change impacts the treatment of these parameters in Tier 1."

SRP 14.3, Appendix A, Page 14.3-17 states:

> "Also, the scope of the ITAAC is consistent with the SSCs that are in the design descriptions. In general, each system has one or more ITAAC that verify the information in the design descriptions. The system ITAAC should verify that the key design characteristics and performance requirements of the SSCs are verified. The level of detail specified in the ITAAC should be commensurate with the safety significance of the functions and bases for that SSC."

SRP 14.3, Appendix C, Page 14.3-24 states:

> "This section is not repeated here, but it provides a discussion of what should be included as a 'key feature', and therefore by exclusion what does not have to be addressed in Tier 1and hence ITAAC."

As is stated in this question, these non-safety-related monitors are less "safety significant" than the safety-related monitors.

Lack of inclusion in U.S. EPR FSAR Tier 1 does not mean the COL applicant does not have to address the items described in U.S. EPR FSAR Tier 2. The COL applicant must comply with U.S. EPR FSAR Tier 2 or take exception to it. Further evidence of this is provided in the inspection manual chapters have separate chapters on ITAAC (IMC 2503) inspections and non-ITAAC (2504) inspections.

**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.

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# U.S. EPR Final Safety Analysis Report Markups

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~~Table 9.3.2-1—Primary Side Sampling Points~~

| ~~Process or Equipment~~ | ~~Number of Sample Points~~ | ~~Type of Sample~~ | ~~Process Measurement~~ |
|---|---|---|---|
| ~~LHSI / RHR~~ | ~~4~~ | ~~Grab~~ | ~~See Note~~ |
| ~~CVCS~~ | ~~2~~ | ~~Process~~ | ~~Boron, hydrogen, oxygen, conductivity and activity beta.~~ |
| ~~RCS~~ | ~~2~~ | ~~Process~~ | ~~Boron, hydrogen, oxygen, conductivity and activity beta.~~ |
| ~~Pressurizer~~ | ~~1~~ | ~~Process~~ | ~~Boron, hydrogen, oxygen, conductivity and activity beta.~~ |
| ~~CPS~~ | ~~6~~ | ~~Grab~~ | ~~See Note~~ |
| ~~SIS accumulators~~ | ~~4~~ | ~~Grab~~ | ~~See Note~~ |
| ~~RBWMS (boric acid pump)~~ | ~~2~~ | ~~Grab~~ | ~~See Note~~ |
| ~~FPCS~~ | ~~2~~ | ~~Grab~~ | ~~See Note~~ |
| ~~FPPS~~ | ~~2~~ | ~~Grab~~ | ~~See Note~~ |
| ~~CDS~~ | ~~2~~ | ~~Grab~~ | ~~See Note~~ |
| ~~CTS~~ | ~~2~~ | ~~Grab~~ | ~~See Note~~ |
| ~~GWPS~~ | ~~4~~ | ~~Grab~~ | ~~See Note~~ |
| ~~CSSS~~ | ~~1~~ | ~~Grab~~ | ~~See Note~~ |
| ~~NIDVS (primary effluents)~~ | ~~3~~ | ~~Grab~~ | ~~See Note~~ |
| ~~NSS (back feed tank)~~ | ~~1~~ | ~~Grab~~ | ~~See Note~~ |

~~NOTE:~~

1. ~~Specific properties of liquid and gaseous grab samples to be measured are identified in plant procedures.~~

14.02-156

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**Table 9.3.2-1—Primary Side Sampling Points**
**Sheet 1 of 3**

| Process or Equipment | Number of Sample Points | Type of Sample[5] | Process Measurement | Range[4] | Response Time[4] | Sensitivity[4] | Maximum anticipated drift between calibrations[4] |
|---|---|---|---|---|---|---|---|
| LHSI/RHR | 4 | Grab | See Notes 1,2 | | | | |
| CVCS | 2 | Continuous | Boron | 0.015-20 ppb | 6 minutes | ± 3% or 0.005 ppb, whichever is greater | <1% of reading (per year) |
| | | | Hydrogen | 0-10 ppm | 20 seconds | ± 3% or ± 60 ppb, whichever is greater | <1% of reading (per year) |
| | | | Oxygen | 0-20,000 ppb | 30 seconds | ± 2 ppb | <1% of reading (per year) |
| | | | Conductivity | 0.02-2,000 µS/cm | 20 seconds | ± 0.1 °F of temperature | <1% of reading (per year) |
| | | | Activity (Beta) | See Table 11.5-1 | | | |
| RCS | 2 | Continuous | Boron | 0.015-20 ppb | 6 minutes | ± 3% or 0.005 ppb, whichever is greater | <1% of reading (per year) |
| | | | Hydrogen | 0-10 ppm | 20 seconds | ± 3% or ± 60 ppb, whichever is greater | <1% of reading (per year) |
| | | | Oxygen | 0-20,000 ppb | 30 seconds | ± 2 ppb | <1% of reading (per year) |
| | | | Conductivity | 0.02-2,000 µS/cm | 20 seconds | ± 0.1 °F of temperature | ± 0.1 °F of temperature |
| | | | Activity (Beta) | See Table 11.5-1 | | | |

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**Table 9.3.2-1—Primary Side Sampling Points**
**Sheet 2 of 3**

| Process or Equipment | Number of Sample Points | Type of Sample[5] | Process Measurement | Range[4] | Response Time[4] | Sensitivity[4] | Maximum anticipated drift between calibrations[4] |
|---|---|---|---|---|---|---|---|
| Pressurizer | 1 | Continuous | Boron | 0.015-20 ppb | 6 minutes | ± 3% or 0.005 ppb, whichever is greater | <1% of reading (per year) |
| | | | Hydrogen | 0-10 ppm | 20 seconds | ± 3% or ± 60 ppb, whichever is greater | <1% of reading (per year) |
| | | | Oxygen | 0-20,000 ppb | 30 seconds | ± 2 ppb | <1% of reading (per year) |
| | | | Conductivity | 0.02-2,000 µS/cm | 20 seconds | ± 0.1 °F of temperature | <1% of reading (per year) |
| | | | Activity (Beta) | See Table 11.5-1 | | | |
| CPS | 6 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| SIS Accumulators | 4 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| RBWMS (boric acid pump) | 2 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| FPCS | 2 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| FPPS | 2 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| CDS | 2 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| CTS | 2 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| GWPS | 4 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| CSSS | 1 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |

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**Table 9.3.2-1—Primary Side Sampling Points**
**Sheet 3 of 3**

| Process or Equipment | Number of Sample Points | Type of Sample[5] | Process Measurement | Range[4] | Response Time[4] | Sensitivity[4] | Maximum anticipated drift between calibrations[4] |
|---|---|---|---|---|---|---|---|
| NIDVS (primary effluents) | 3 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| NSS (backfeed tank) | 1 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| Severe Accident Sampling System (SASS) | 2 | Grab | See Note 6 | N/A | N/A | N/A | N/A |

**Notes:**

1. Specific properties of liquid and gaseous grab samples to be measured are identified in plant procedures.
2. Laboratory instruments used to measure grab samples are identified in plant procedures. Manufacturer's operating manual shall be consulted for calibration, measuring, maintenance, and cleaning and storage requirements.
3. Calibrating gases and solution for instrumentation are per the manufacturer's operating manual.
4. Values are typical; the actual values will meet or exceed the listed parameters.
5. Continuous on-line monitoring systems will be in accordance with ASTM D 3864.
6. Contains containment atmosphere and IRWST.

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~~Table 9.3.2-2—Secondary Side Sampling Points~~

| ~~Process or Equipment~~ | ~~Number of Sample Points~~ | ~~Type of Sample~~ | ~~Process Measurement of Continuous Samples~~ |
|---|---|---|---|
| ~~SG blowdown~~ | ~~15~~ | ~~Continuous/grab~~ | ~~Activity gamma, cation conductivity, specific conductivity, sodium, and pH~~ |
| ~~Feedwater (upstream valve chamber)~~ | ~~1~~ | ~~Continuous/grab~~ | ~~Specific conductivity, cation conductivity, pH and oxygen~~ |
| ~~Feedwater pumps discharge (combined with start-up feedwater pump)~~ | ~~1 per pump (5 total)~~ | ~~Continuous/grab~~ | ~~Hydrazine, specific conductivity, cation conductivity, pH, $O_2$ and Na~~ |
| ~~Main steam (upstream HP turbine)~~ | ~~4~~ | ~~Continuous/grab~~ | ~~Cation conductivity, degassed cation conductivity and sodium~~ |
| ~~Main steam (downstream reheater)~~ | ~~2~~ | ~~Continuous/grab~~ | ~~Cation conductivity, degassed cation conductivity and sodium~~ |
| ~~Reheater drains~~ | ~~4~~ | ~~Continuous/grab~~ | ~~Cation conductivity, degassed cation conductivity and Na~~ |
| ~~Auxiliary steam system~~ | ~~1~~ | ~~Grab~~ | |
| ~~Auxiliary steam condensate~~ | ~~1~~ | ~~Grab~~ | |
| ~~Condensate pump discharge~~ | ~~1~~ | ~~Continuous/grab~~ | ~~Specific conductivity, cation conductivity, $O_2$ and Na~~ |
| ~~Condensate polisher discharge~~ | ~~Site specific~~ | ~~Continuous/grab~~ | ~~Cation conductivity, $O_2$ and Na~~ |
| ~~Condenser hotwells~~ | ~~6~~ | ~~Continuous~~ | ~~Cation conductivity, $O_2$ and Na~~ |
| ~~Moisture separator drains~~ | ~~2~~ | ~~Grab~~ | |
| ~~HP heater drains~~ | ~~2~~ | ~~Grab~~ | |
| ~~LP heater drains~~ | ~~2~~ | ~~Grab~~ | |
| ~~Clean drains~~ | ~~1~~ | ~~Grab~~ | |
| ~~Demineralized water storage tank~~ | ~~1~~ | ~~Grab~~ | |
| ~~Closed cooling water system~~ | ~~1~~ | ~~Grab~~ | |
| ~~Circulating water cooling water basin makeup~~ | ~~1~~ | ~~Continuous~~ | ~~pH/ORP and specific conductivity~~ |

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**Table 9.3.2-2—Secondary Side Sampling Points**
**Sheet 1 of 5**

| Process or Equipment | Number of Sample Points | Type of Sample[5] | Process Measurement of Continuous Samples | Range[4] | Response Time[4] | Sensitivity[4] | Maximum anticipated drift between calibrations[4] |
|---|---|---|---|---|---|---|---|
| SG blowdown | 15 | Continuous/grab | Activity (gamma) | See Table 11.5-1 | | | |
| | | | Cation Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |
| | | | Specific Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |
| | | | Sodium | 0.1 – 1000 ppb | 2 minutes | ±0.1 ppb | <1% of reading (per year) |
| | | | pH | 1-11 pH | 30 seconds | ±0.02 pH | <1% of reading (per standard solution volume) |
| Feedwater (upstream valve chamber) | 1 | Continuous/grab | Specific Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |
| | | | Cation Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |
| | | | pH | 1-11 pH | 30 seconds | ±0.02 pH | <1% of reading (per standard solution volume) |
| | | | Oxygen | 0-20,000 ppb | 30 seconds | ± 2 ppb | <1% of reading (per year) |

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**Table 9.3.2-2—Secondary Side Sampling Points Sheet 2 of 5**

| Process or Equipment | Number of Sample Points | Type of Sample[5] | Process Measurement of Continuous Samples | Range[4] | Response Time[4] | Sensitivity[4] | Maximum anticipated drift between calibrations[4] |
|---|---|---|---|---|---|---|---|
| Feedwater pumps discharge (combined with start-up feedwater pump) | 1 per pump (4 total) | Continuous/grab | Hydrazine | 0-200 ppb | 4 minutes | ±2 ppb | <1% of reading (per year) |
| | | | Specific Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |
| | | | Cation Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |
| | | | pH | 1-11 pH | 30 seconds | ±0.02 pH | <1% of reading (per standard solution volume) |
| | | | Oxygen | 0-20,000 ppb | 30 seconds | ± 2 ppb | <1% of reading (per year) |
| | | | Sodium | 0.1 – 1000 ppb | 2 minutes | ±0.1 ppb | <1% of reading (per year) |
| Main Steam (upstream HP turbine) | 4 | Continuous/grab | Cation Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |
| | | | Degassed Cation Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |
| | | | Sodium | 0.1 – 1000 ppb | 2 minutes | ±0.1 ppb | <1% of reading (per year) |
| Main Steam (downstream reheater) | 2 | Continuous/grab | Cation Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |
| | | | Degassed Cation Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |
| | | | Sodium | 0.1 – 1000 ppb | 2 minutes | ±0.1 ppb | <1% of reading (per year) |

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**Table 9.3.2-2—Secondary Side Sampling Points Sheet 3 of 5**

| Process or Equipment | Number of Sample Points | Type of Sample[5] | Process Measurement of Continuous Samples | Range[4] | Response Time[4] | Sensitivity[4] | Maximum anticipated drift between calibrations[4] |
|---|---|---|---|---|---|---|---|
| Reheater Drain | 4 | Continuous/grab | Cation Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |
| | | | Degassed Cation Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |
| | | | Sodium | 0.1 – 1000 ppb | 2 minutes | ±0.1 ppb | <1% of reading (per year) |
| Auxiliary Steam System | 1 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| Auxiliary Steam Condensate | 1 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| Condensate Pump Discharge | 1 | Continuous/grab | Specific Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |
| | | | Cation Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |
| | | | Oxygen | 0-20,000 ppb | 30 seconds | ± 2 ppb | <1% of reading (per year) |
| | | | Sodium | 0.1 – 1000 ppb | 2 minutes | ±0.1 ppb | <1% of reading (per year) |

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**Table 9.3.2-2—Secondary Side Sampling Points**
**Sheet 4 of 5**

| Process or Equipment | Number of Sample Points | Type of Sample[5] | Process Measurement of Continuous Samples | Range[4] | Response Time[4] | Sensitivity[4] | Maximum anticipated drift between calibrations[4] |
|---|---|---|---|---|---|---|---|
| Condensate Polisher Discharge | Site Specific | Continuous/grab | Cation Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |
| | | | Oxygen | 0-20,000 ppb | 30 seconds | ± 2 ppb | <1% of reading (per year) |
| | | | Sodium | 0.1 – 1000 ppb | 2 minutes | ±0.1 ppb | <1% of reading (per year) |
| Condenser Hotwell | 6 | Continuous | Cation Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |
| | | | Oxygen | 0-20,000 ppb | 30 seconds | ± 2 ppb | <1% of reading (per year) |
| | | | Sodium | 0.1 – 1000 ppb | 2 minutes | ±0.1 ppb | <1% of reading (per year) |
| Moisture Separator Drains | 2 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| HP Heater Drain | 2 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| LP Heater Drain | 2 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| Clean Drains | 1 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| Demineralized water storage tank | 1 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |

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**Table 9.3.2-2—Secondary Side Sampling Points**
**Sheet 5 of 5**

| Process or Equipment | Number of Sample Points | Type of Sample[5] | Process Measurement of Continuous Samples | Range[4] | Response Time[4] | Sensitivity[4] | Maximum anticipated drift between calibrations[4] |
|---|---|---|---|---|---|---|---|
| Closed Cooling Water System | 1 | Grab | See Notes 1,2,3 | N/A | N/A | N/A | N/A |
| Circulating Water Cooling Water Basin Makeup | 1 | Continuous | pH | 1-11 pH | | ±0.02 pH | <1% of reading (per standard solution volume) |
| | | | Specific Conductivity | 0.06 to 1000 µS/cm | 30 seconds | 0.001 to 1 µS/cm (depends on range) | ± 1% of measured value or ± digit (whichever is greater) |

**Notes:**

1. Specific properties of liquid and gaseous grab samples to be measured are identified in plant procedures.
2. Laboratory instruments used to measure grab samples are identified in plant procedures. Manufacturer's operating manual shall be consulted for calibration, measuring, maintenance, and cleaning and storage requirements.
3. Calibrating gases and solution for instrumentation are per the manufacturer's operating manual.
4. Values are typical; the actual values will meet or exceed the listed parameters.
5. Continuous on-line monitoring systems will be in accordance with ASTM D 3864.

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3.6 Verify power-operated valves fail upon loss of motive power as designed (refer to Section 9.3.2).

3.7 Verify that continuous monitors and sample flow rate meets design requirements.

3.8 Check electrical independence and redundancy of power supplies for safety-related functions by selectively removing power and determining loss of function.

4.0 DATA REQUIRED

4.1 Setpoints at which alarms and interlocks occur.

4.2 Sampling flow rate from each sample point.

4.3 Analytical instrument data.

4.4 Valve performance data, where required.

4.5 Valve position indication.

4.6 Position response of valves to loss of motive power.

5.0 ACCEPTANCE CRITERIA

5.1 The SECSS meets design requirements (refer to Section 9.3.2):

5.1.1 SECSS alarms, interlocks, and controls (manual and automatic) function as designed.

5.1.2 SECSS valves perform as designed (i.e., opening times, closing times, and pressure/temperature controls).

5.1.3 SECSS meet design requirements for representative samples.

5.1.4 Continuous ~~and chemistry lab~~ instrumentation used to analyze SECSS parameters described in Table 9.3.2-2 will meet the design requirements for the measurements. This includes, but is not limited to, the following (that could adversely impact the ability to accurately measure the parameters described in Table 9.3.2-2):

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- Range.
- Response time.
- Sensitivity.
- Maximum anticipated drift between calibrations.

5.2 Verify that safety-related components meet electrical independence and redundancy requirements.

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2.5 Plant systems required to support testing are functional to the extent necessary to perform the testing or suitable simulation of this system is used.

2.6 Verify preoperational Test #143 has been satisfactorily completed for radiation monitoring instrumentation.

3.0 TEST METHOD

3.1 Verify power sources to post accident related equipment.

3.2 Validate that external inputs are received and processed correctly by the appropriate system devices.

3.3 Verify that alarms and indication displays respond correctly to actual or simulated inputs.

3.4 Verify the functionality of required software application programs.

3.5 Verify the correct operation of data output devices and displays at applicable work stations and terminals.

4.0 DATA REQUIRED

4.1 Computer generated summaries of external input data, data processing, analysis functions, displayed information, and permanent data records.

5.0 ACCEPTANCE CRITERIA

5.1 The instruments that are designated as the post-accident monitoring instruments have been verified to include all of the instruments listed in the emergency operating procedures (Abnormal Operating Procedures, Emergency Operating Procedures, Severe Accident Mitigation Guidelines, etc.)

5.2 The PAM functions as described in Section 7.5.

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5.3 ~~Radiation~~Continuous monitoring instrumentation used to perform post-accident monitoring that is described in ~~Section 9.3.2~~Tables 9.3.2-1 and 9.3.2-2 will meet the design requirements for the radiation monitor. This includes, but is not limited to, the following (that could adversely impact the ability to measure the parameters described in ~~Section 9.3.2~~Tables 9.3.2-1 and 9.3.2-2):

5.3.1 Range.

5.3.2 Response time.

5.3.3 Sensitivity.

5.3.4 Maximum anticipated drift between calibrations.

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4.0 DATA REQUIRED

4.1 Reactor power level.

4.2 Temperature data in designated locations (i.e., general area and adjacent to major heat loads).

4.3 Equipment operating data.

5.0 ACCEPTANCE CRITERIA

5.1 Temperature conditions are maintained within the operable limits in areas as designed (refer to Section 9.4).

### 14.2.12.18.5 Sampling Primary and Secondary Systems (Test #204)

1.0 OBJECTIVE

1.1 To collect chemistry samples of the RCS and secondary at various power levels to record the following:

1.1.1 Boron concentration and boron-10 isotopic abundance.

1.1.2 Concentration of non-radioactive elements and soluble particulates.

1.1.3 Measured pH of the fluids.

1.1.4 Radio isotopic concentration data of the radioactive elements (e.g., cesium, iodine, iron, cobalt).

1.2 To demonstrate performance of permanent plant sampling and analysis procedures, while confirming that primary and secondary chemistry requirements are being met.

1.3 To verify that the primary and secondary systems are operating within design limits. This procedure shall be performed at the following plateau:

1.3.1 25 percent reactor power in accordance with RG 1.68.

1.3.2 50 percent reactor power in accordance with RG 1.68.

1.3.3 75 percent reactor power in accordance with RG 1.68.

1.3.4 ≥98 percent reactor power in accordance with RG 1.68.

2.0 PREREQUISITES

2.1 The reactor is stable at the desired power level.

2.2 Required sampling systems are functional and analysis instrumentation are calibrated using calibration gases and solutions as referenced in the radioactive and non-radioactive analyses of

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3.0 TEST METHOD

3.1 Samples shall be collected from the RCS and secondary system at various power levels and analyzed in the laboratory using applicable sampling and analysis procedures.

3.2 Collect samples at various process radiation monitors, perform analysis in the laboratory, and compare the samples with the process radiation monitor output.

3.3 Verify that primary and secondary sample results meet design limits.

4.0 DATA REQUIRED

4.1 Reactor power.

4.2 RCS and secondary temperature.

4.3 Boron concentration and boron-10 isotopic abundance.

4.4 Core average burnup.

4.5 Isotopic activities.

5.0 ACCEPTANCE CRITERIA

5.1 Measured activity levels are within their limits.

5.2 Laboratory analyses and process radiation monitors agree with the within measurement uncertainties as designed (refer to Section 9.3.2), or investigation of the discrepancies has been initiated.

5.3 Samples of RCS and secondary fluids can be obtained from design locations as designed (refer to Sections 9.3.2 and 11.5).

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5.4 Continuous ~~and chemistry lab~~ instrumentation used to analyze primary and secondary sampling parameters described in Table 9.3.2-1 and Table 9.3.2-2 will meet the design requirements for the measurements. This includes, but is not limited to, the following (that could adversely impact the ability to measure the parameters described in Table 9.3.2-1 and Table 9.3.2-2):

5.4.1 Range.

5.4.2 Response time.

5.4.3 Sensitivity.

5.4.4 Maximum anticipated drift between calibrations.

5.5 Radiation monitoring instrumentation used to perform radiation monitoring that is described in Table 11.5-1 will meet the design requirements for the radiation monitor. This includes, but is not limited to, the following (that could adversely impact the ability to measure the parameters described in Table 11.5-1):

5.5.1 Range.

5.5.2 Response time.

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5.5.3 Sensitivity.

5.5.4 Maximum anticipated drift between calibrations.

### 14.2.12.18.6 Failed Fuel Detection (Test #205)

1.0 OBJECTIVE

1.1 To collect chemistry samples of the RCS and secondary at the specified power level to record the following:

1.1.1 Boron concentration and boron-10 isotopic abundance.

1.1.2 Concentration of non-radioactive elements and soluble particulates.

1.1.3 Measured pH of the fluids.

1.1.4 Radioisotopic concentration data of the radioactive elements (e.g., cesium, iodine, strontium, barium, cerium, and noble gases).

1.2 To demonstrate performance of permanent plant sampling and analysis procedures. There is typically some RCS activity from tramp, fuel dust that is on the outer surface of the cladding.

1.3 To perform a cross-check of the failed fuel monitor instrumentation.

1.4 This test shall be performed at the following power plateaus:

1.4.1 25 percent reactor power.

1.4.2 ≥98 percent reactor power.

2.0 PREREQUISITES

2.1 The reactor is stable at the desired power level.

2.2 Required sampling systems are functional.

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2.3 Calibrating gases and solutions are available for radioactive and non-radioactive analyses referenced in ~~Table 9.3.2-2~~Tables 9.3.2-1 and 9.3.2-2.

3.0 TEST METHOD

3.1 Samples shall be collected from the RCS and secondary system at various power levels and analyzed in the laboratory using applicable sampling and analysis procedures.

3.2 Collect samples at various process radiation monitors, perform analysis in the laboratory, and compare the samples with the process radiation monitor output.

4.0 DATA REQUIRED

4.1 Reactor power.

4.2 RCS and secondary temperature.

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4.3 Boron concentration and boron-10 isotopic abundance.

4.4 Core average burnup.

4.5 Isotopic activities.

5.0 ACCEPTANCE CRITERIA

5.1 Measured activity levels are within their limits.

5.2 Laboratory analyses and process radiation monitors agree with the within measurement uncertainties as designed (refer to Section 9.3.2 or investigation of the discrepancies has been initiated.

5.3 Samples of RCS and secondary fluids can be obtained from design locations as designed (refer to Sections 9.3.2 and 11.5).

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5.4 ~~Chemistry lab~~Continuous instrumentation used to analyze primary sampling parameters described in ~~Table 9.3.2-2~~Tables 9.3.2-1 and 9.3.2-2 will meet the design requirements for the measurements. This includes, but is not limited to, the following (that could adversely impact the ability to measure the parameters described in ~~Table 9.3.2-2~~Tables 9.3.2-1 and 9.3.2-2):

5.4.1 Range.

5.4.2 Response time.

5.4.3 Sensitivity.

5.4.4 Maximum anticipated drift between calibrations.

5.5 Radiation monitoring instrumentation used to perform primary system monitoring that is described in Table 11.5-1 will meet the design requirements for the radiation monitor. This includes, but is not limited to, the following (that could adversely impact the ability to measure the parameters described in Table 11.5-1):

5.5.1 Range.

5.5.2 Response time.

5.5.3 Sensitivity.

5.5.4 Maximum anticipated drift between calibrations.

### 14.2.12.18.7 Self Powered Neutron Detector Calibration (Test #206)

1.0 OBJECTIVE

1.1 To perform a test on the Aeroball Measurement System (AMS) to verify the adequacy of time dependent decay constant functions of the vanadium steel flux measurement balls.

1.2 To perform a full core flux map using the following:

1.2.1 Moveable incore system - AMS.

1.2.2 Fixed incore system - Self powered neutron detectors (SPND).

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