ArevaEPRDCPEm Resource

From: BRYAN Martin (EXT) [Martin.Bryan.ext@areva.com]
Sent: Wednesday, March 31, 2010 4:36 PM
To: Tesfaye, Getachew
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); NOXON David B (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 273, FSAR Ch 11, Supplement 5
Attachments: RAI 273 Supplement 5 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. (AREVA NP) provided technically correct and complete responses to 10 of the 42 questions of RAI No. 273 on October 14, 2009. Supplement 1 to RAI No. 273 was sent on November 6, 2009 which responded to 17 of the 32 remaining questions and provided partial responses to 4 of the remaining 32. AREVA NP provided Supplement 2 on November 25, 2009 and Supplement 3 on December 8, 2009 to revise the commitment date for 11 of the remaining questions. AREVA NP provided Supplement 4 on December 10, 2009 to provide response to 11 of the 15 remaining questions with a schedule to provide an FSAR markup for 9 of the questions. The attached file, "RAI 273 Supplement 5 Response US EPR DC.pdf," provides a technically correct and complete response to 1 of the 4 remaining questions and provides FSAR markups for 3 of the 9 questions.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the responses to RAI 273 Questions 11.03 -13, 11.05-01, 11.05 -04, and 11.05-6.

The following table indicates the respective pages in the response document, "RAI 273 Supplement 5 Response US EPR DC.pdf," that contain AREVA NP's responses to the subject questions.

Question #	Start Page	End Page
RAI 273 — 11.03-13	2	3
RAI 273 — 11.05-1	4	4
RAI 273 — 11.05-4	5	5
RAI 273 — 11.05-6	6	6

Based on additional time needed to update engineering source documents, a complete FSAR markup is not provided for 6 of the questions as originally scheduled for March 31, 2010. The revised schedule for the remaining 6 FSAR markups is provided below:

Question #	Supplement Date (providing FSAR Markup)
RAI 273 — 11.05-2	May 19, 2010
RAI 273 — 11.05-5	May 19, 2010
RAI 273 — 11.05-7	May 19, 2010
RAI 273 — 11.05-8	May 19, 2010
RAI 273 — 11.05-9	May 19, 2010
RAI 273 — 11.05-10	May 19, 2010

The schedule for a technically correct and complete response to the remaining 3 questions is revised based on the March 24, 2010 Chapter 11 audit and is provided below.

Question #	Response Date
RAI 273 — 11.02-14	May 19, 2010

RAI 273 — 11.03-12	May 19, 2010
RAI 273 — 11.04-15	May 19, 2010

Sincerely,

Martin (Marty) C. Bryan
Licensing Advisory Engineer
AREVA NP Inc.
Tel: (434) 832-3016
Martin.Bryan@areva.com

From: Pederson Ronda M (AREVA NP INC)
Sent: Thursday, December 10, 2009 6:29 PM
To: 'Tesfaye, Getachew'
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); NOXON David B (AREVA NP INC); WILLIFORD Dennis C (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 273, FSAR Ch 11, Supplement 4

Getachew,

AREVA NP Inc. (AREVA NP) provided technically correct and complete responses to 10 of the 42 questions of RAI No. 273 on October 14, 2009. Supplement 1 to RAI No. 273 was sent on November 6, 2009 which responded to 17 of the 32 remaining questions and provided partial responses to 4 of the remaining 32. Supplements 2 and Supplement 3 on revised the commitment date for 11 of the remaining questions. The attached file, "RAI 273 Supplement 4 Response US EPR DC.pdf," provides a technically correct and complete response to 11 of the 15 remaining questions, as committed.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 273 Questions 11.05 -06, 11.06-07, 11.05 -08, 11.06-09, 11.05 -10, 11.06-11, and 11.06-12.

A complete FSAR markup is not provided for the RAI 273 questions. As agreed by NRC staff during an FSAR Chapter 11 audit on October 7, 2009, FSAR markups may be submitted after Phase 2 completion to support Staff review to close confirmatory items. Therefore, a complete FSAR markup for the RAI 273 questions will be provided as indicated in the following table:

Question #	**Supplement Date (providing FSAR Markup)**
RAI 273 — 11.05-1	March 31, 2010
RAI 273 — 11.05-2	March 31, 2010
RAI 273 — 11.05-4	March 31, 2010
RAI 273 — 11.05-5	March 31, 2010
RAI 273 — 11.05-6	March 31, 2010
RAI 273 — 11.05-7	March 31, 2010
RAI 273 — 11.05-8	March 31, 2010
RAI 273 — 11.05-9	March 31, 2010
RAI 273 — 11.05-10	March 31, 2010

The following table indicates the respective pages in the response document, "RAI 273 Supplement 4 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	**Start Page**	**End Page**

RAI 273 — 11.05-1	2	2
RAI 273 — 11.05-2	3	6
RAI 273 — 11.05-4	7	8
RAI 273 — 11.05-5	9	16
RAI 273 — 11.05-6	17	19
RAI 273 — 11.05-7	20	21
RAI 273 — 11.05-8	22	23
RAI 273 — 11.05-9	24	26
RAI 273 — 11.05-10	27	27
RAI 273 — 11.05-11	28	30
RAI 273 — 11.05-12	31	31

The schedule for a technically correct and complete response to the remaining 4 questions is unchanged and provided below.

Question #	Response Date
RAI 273 — 11.02-14	March 31, 2010
RAI 273 — 11.03-12	March 31, 2010
RAI 273 — 11.03-13	March 31, 2010
RAI 273 — 11.04-15	March 31, 2010

Sincerely,

Ronda Pederson
ronda.pederson@areva.com
Licensing Manager, U.S. EPR Design Certification
AREVA NP Inc.
An AREVA and Siemens company
3315 Old Forest Road
Lynchburg, VA 24506-0935
Phone: 434-832-3694
Cell: 434-841-8788

From: Pederson Ronda M (AREVA NP INC)
Sent: Tuesday, December 08, 2009 6:22 PM
To: 'Tesfaye, Getachew'
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); NOXON David B (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 273, FSAR Ch 11, Supplement 3

Getachew,

AREVA NP is unable to provide a technically correct and complete response to the 11 remaining questions for RAI 273 today, as committed, and a revised schedule for a technically correct and complete response to the remaining questions is provided below.

Question #	Response Date
RAI 273 — 11.05-1	**December 11, 2009**
RAI 273 — 11.05-2	**December 11, 2009**

RAI 273 — 11.05-4	**December 11, 2009**
RAI 273 — 11.05-5	**December 11, 2009**
RAI 273 — 11.05-6	**December 11, 2009**
RAI 273 — 11.05-7	**December 11, 2009**
RAI 273 — 11.05-8	**December 11, 2009**
RAI 273 — 11.05-9	**December 11, 2009**
RAI 273 — 11.05-10	**December 11, 2009**
RAI 273 — 11.05-11	**December 11, 2009**
RAI 273 — 11.05-12	**December 11, 2009**
RAI 273 — 11.02-14	March 31, 2010
RAI 273 — 11.03-12	March 31, 2010
RAI 273 — 11.03-13	March 31, 2010
RAI 273 — 11.04-15	March 31, 2010

Sincerely,

Ronda Pederson
ronda.pederson@areva.com
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From: WELLS Russell D (AREVA NP INC)
Sent: Wednesday, November 25, 2009 2:38 PM
To: 'Getachew Tesfaye'; 'Michael Miernicki'
Cc: Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 273, FSAR Ch 11, Supplement 2

Getachew,

AREVA NP Inc. (AREVA NP) provided technically correct and complete responses to 10 of the 42 questions of RAI No. 273 on October 14, 2009. AREVA NP submitted Supplement 1 on November 6, 2009 which provided a technically correct and complete response to 17 of the remaining questions and indicated that a response to 11 of the remaining 15 questions would be provided by November 25, 2009. However, AREVA NP is unable to provide a technically correct and complete response to 11 of the 15 remaining questions for RAI 273 as committed and a revised schedule for a technically correct and complete response to the remaining 15 questions is provided below.

Question #	**Response Date**
RAI 273 — 11.05-1	**December 8, 2009**
RAI 273 — 11.05-2	**December 8, 2009**
RAI 273 — 11.05-4	**December 8, 2009**
RAI 273 — 11.05-5	**December 8, 2009**
RAI 273 — 11.05-6	**December 8, 2009**
RAI 273 — 11.05-7	**December 8, 2009**
RAI 273 — 11.05-8	**December 8, 2009**
RAI 273 — 11.05-9	**December 8, 2009**

RAI 273 — 11.05-10	**December 8, 2009**
RAI 273 — 11.05-11	**December 8, 2009**
RAI 273 — 11.05-12	**December 8, 2009**
RAI 273 — 11.02-14	March 31, 2010
RAI 273 — 11.03-12	March 31, 2010
RAI 273 — 11.03-13	March 31, 2010
RAI 273 — 11.04-15	March 31, 2010

Sincerely,

(Russ Wells on behalf of)

Ronda Pederson
ronda.pederson@areva.com
Licensing Manager, U.S. EPR Design Certification
New Plants Deployment
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An AREVA and Siemens company
3315 Old Forest Road
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Cell: 434-841-8788

From: Pederson Ronda M (AREVA NP INC)
Sent: Friday, November 06, 2009 9:58 PM
To: 'Tesfaye, Getachew'
Cc: MCINTYRE Brian (AREVA NP INC); DELANO Karen V (AREVA NP INC); SLIVA Dana (AREVA NP INC); WILLIFORD Dennis C (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 273, FSAR Ch. 11, Supplement 1

Getachew,

AREVA NP Inc. (AREVA NP) provided technically correct and complete responses to 10 of the 42 questions of RAI No. 273 on October 14, 2009. The attached file, “RAI 273 Supplement 1 Response US EPR DC.pdf,” provides a technically correct and complete response to 17 of the remaining questions and partial responses to 4 of the remaining questions.

Appended to this file are the affected pages of the U.S. EPR Final Safety Analysis Report (FSAR) in redline-strikeout format which support the response to RAI 273 Question 11.02-4, 11.02-5, 11.02-6, 11.02-7, 11.02-8, 11.02-9, 11.02-12, 11.02-13, 11.02-15, 11.03-4, 11.03-5 , 11.03-8, 11.04-7, 11.04-8, 11.04-10, 11.04-14, 11.04-15, and 11.05-3.

Also included are related markups to AREVA NP's document, ANP-10292, Revision 1, "U.S. EPR Conformance with Standard Review Plan (NUREG-0800) Technical Report."

A complete FSAR markup is not provided for four of the answered questions. As agreed by NRC staff during an FSAR Chapter 11 audit on October 7, 2009, FSAR markups may be submitted after Phase 2 completion to support Staff review to close confirmatory items. Therefore, a complete FSAR markup for the four questions will be provided as indicated in the following table:

Question #	**Supplement Date (providing FSAR Markup)**
RAI 273 — 11.02-14	March 31, 2010
RAI 273 — 11.03-12	March 31, 2010
RAI 273 — 11.03-13	March 31, 2010

RAI 273 — 11.04-15	March 31, 2010

The following table indicates the respective page(s) in the response document, "RAI 273 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 273 — 11.02-4	2	2
RAI 273 — 11.02-5	3	4
RAI 273 — 11.02-6	5	5
RAI 273 — 11.02-7	6	6
RAI 273 — 11.02-8	7	7
RAI 273 — 11.02-9	8	9
RAI 273 — 11.02-12	10	10
RAI 273 — 11.02-13	11	11
RAI 273 — 11.02-14	12	12
RAI 273 — 11.02-15	13	14
RAI 273 — 11.03-4	15	15
RAI 273 — 11.03-5	16	16
RAI 273 — 11.03-8	17	18
RAI 273 — 11.03-12	19	19
RAI 273 — 11.03-13	20	20
RAI 273 — 11.04-7	21	22
RAI 273 — 11.04-8	23	24
RAI 273 — 11.04-10	25	25
RAI 273 — 11.04-14	26	26
RAI 273 — 11.04-15	27	27
RAI 273 — 11.05-3	28	28

A complete answer is not provided for 15 of the 42 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 273 — 11.02-14	March 31, 2010
RAI 273 — 11.03-12	March 31, 2010
RAI 273 — 11.03-13	March 31, 2010
RAI 273 — 11.04-15	March 31, 2010
RAI 273 — 11.05-1	November 25, 2009
RAI 273 — 11.05-2	November 25, 2009
RAI 273 — 11.05-4	November 25, 2009
RAI 273 — 11.05-5	November 25, 2009
RAI 273 — 11.05-6	November 25, 2009
RAI 273 — 11.05-7	November 25, 2009
RAI 273 — 11.05-8	November 25, 2009
RAI 273 — 11.05-9	November 25, 2009
RAI 273 — 11.05-10	November 25, 2009
RAI 273 — 11.05-11	November 25, 2009
RAI 273 — 11.05-12	November 25, 2009

Sincerely,

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From: Pederson Ronda M (AREVA NP INC)
Sent: Wednesday, October 14, 2009 5:45 PM
To: 'Tesfaye, Getachew'
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); WILLIFORD Dennis C (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 273, FSAR Ch. 11

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 273 Response US EPR DC.pdf" provides technically correct and complete responses to 10 of the 42 questions.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 273, Questions 11.02-11, 11.03-7, 11.03-9, 11.03-10, 11.04-10, 11.04-11 and 11.04-12.

The following table indicates the respective pages in the response document, "RAI 273 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 273 — 11.02-4	2	2
RAI 273 — 11.02-5	3	3
RAI 273 — 11.02-6	4	4
RAI 273 — 11.02-7	5	5
RAI 273 — 11.02-8	6	6
RAI 273 — 11.02-9	7	7
RAI 273 — 11.02-10	8	8
RAI 273 — 11.02-11	9	9
RAI 273 — 11.02-12	10	10
RAI 273 — 11.02-13	11	11
RAI 273 — 11.02-14	12	12
RAI 273 — 11.02-15	13	13
RAI 273 — 11.03-4	14	14
RAI 273 — 11.03-5	15	15
RAI 273 — 11.03-6	16	16
RAI 273 — 11.03-7	17	17
RAI 273 — 11.03-8	18	18
RAI 273 — 11.03-9	19	19

RAI 273 — 11.03-10	20	21
RAI 273 — 11.03-11	22	22
RAI 273 — 11.03-12	23	23
RAI 273 — 11.03-13	24	24
RAI 273 — 11.04-7	25	25
RAI 273 — 11.04-8	26	26
RAI 273 — 11.04-10	27	28
RAI 273 — 11.04-11	29	29
RAI 273 — 11.04-12	30	30
RAI 273 — 11.04-13	31	31
RAI 273 — 11.04-14	32	32
RAI 273 — 11.04-15	33	33
RAI 273 — 11.05-1	34	34
RAI 273 — 11.05-2	35	36
RAI 273 — 11.05-3	37	37
RAI 273 — 11.05-4	38	38
RAI 273 — 11.05-5	39	40
RAI 273 — 11.05-6	41	41
RAI 273 — 11.05-7	42	42
RAI 273 — 11.05-8	43	43
RAI 273 — 11.05-9	44	44
RAI 273 — 11.05-10	45	45
RAI 273 — 11.05-11	46	47
RAI 273 — 11.05-12	48	48

A complete answer is not provided for 32 of the 42 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	**Response Date**
RAI 273 — 11.02-4	November 6, 2009
RAI 273 — 11.02-5	November 6, 2009
RAI 273 — 11.02-6	November 6, 2009
RAI 273 — 11.02-7	November 6, 2009
RAI 273 — 11.02-8	November 6, 2009
RAI 273 — 11.02-9	November 6, 2009
RAI 273 — 11.02-12	November 6, 2009
RAI 273 — 11.02-13	November 6, 2009
RAI 273 — 11.02-14	November 6, 2009
RAI 273 — 11.02-15	November 6, 2009
RAI 273 — 11.03-4	November 6, 2009
RAI 273 — 11.03-5	November 6, 2009
RAI 273 — 11.03-8	November 6, 2009
RAI 273 — 11.03-12	November 6, 2009
RAI 273 — 11.03-13	November 6, 2009
RAI 273 — 11.04-7	November 6, 2009
RAI 273 — 11.04-8	November 6, 2009
RAI 273 — 11.04-10 (Part 3)	November 6, 2009
RAI 273 — 11.04-14	November 6, 2009

RAI 273 — 11.04-15	November 6, 2009
RAI 273 — 11.05-1	November 6, 2009
RAI 273 — 11.05-2	November 6, 2009
RAI 273 — 11.05-3	November 6, 2009
RAI 273 — 11.05-4	November 6, 2009
RAI 273 — 11.05-5	November 6, 2009
RAI 273 — 11.05-6	November 6, 2009
RAI 273 — 11.05-7	November 6, 2009
RAI 273 — 11.05-8	November 6, 2009
RAI 273 — 11.05-9	November 6, 2009
RAI 273 — 11.05-10	November 6, 2009
RAI 273 — 11.05-11	November 6, 2009
RAI 273 — 11.05-12	November 6, 2009

Sincerely,

Ronda Pederson
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AREVA NP Inc.
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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Monday, September 14, 2009 3:12 PM
To: ZZ-DL-A-USEPR-DL
Cc: Dehmel, Jean-Claude; Frye, Timothy; Jennings, Jason; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 273 (3450, 3459,3460, 3462), FSAR Ch. 11

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on August 11, 2009, and discussed with your staff on August 25, 2009. Draft RAI Question 11.04-9 was deleted, and Draft RAI Questions 11.02-4, 11.02-14, 11.03-4, 11.03-12, 11.03-13, 11.04-7, 11.04-12, 11.05-1, 11.05-4, and 11.05-5 were 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: 1276

Mail Envelope Properties (BC417D9255991046A37DD56CF597DB7105B81DBA)

Subject: Response to U.S. EPR Design Certification Application RAI No. 273, FSAR Ch 11, Supplement 5
Sent Date: 3/31/2010 4:35:51 PM
Received Date: 3/31/2010 4:36:10 PM
From: BRYAN Martin (EXT)

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

Recipients:
"DELANO Karen V (AREVA NP INC)" <Karen.Delano@areva.com>
Tracking Status: None
"ROMINE Judy (AREVA NP INC)" <Judy.Romine@areva.com>
Tracking Status: None
"BENNETT Kathy A (OFR) (AREVA NP INC)" <Kathy.Bennett@areva.com>
Tracking Status: None
"NOXON David B (AREVA NP INC)" <David.Noxon@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	18786	3/31/2010 4:36:10 PM
RAI 273 Supplement 5 Response US EPR DC.pdf	106347	

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

Response to

Request for Additional Information No. 273, Supplement 5

9/14/2009

U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 11.02 - Liquid Waste Management System
SRP Section: 11.03 - Gaseous Waste Management System
SRP Section: 11.04 - Solid Waste Management System
SRP Section: 11.05 - Process and Effluent Radiological Monitoring Instrumentation and Sampling Systems

Application Section: Chapter 11

QUESTIONS for Health Physics Branch (CHPB)

Question 11.03-13:

In Section 11.3.2.4, the FSAR presents a failure analysis of the GWMS. However, a review indicates that for each type of failure or event identified, the discussion does not address the associated radiological consequences, such as potential for radioactive releases, system or facility contamination, unmonitored releases to the environment, etc. Also, the analysis should identify an event associated the ~~failure~~ malfunction of GWMS radiation monitoring system and detectors located before and after the charcoal delay beds given that they have different radiation response characteristics, and one involving an operator error that include an estimate of the duration of the event and mitigating measures applied in terminating the event to a safe end point. For example, the equipment malfunction analysis should identify equipment assumed to fail (e.g., radiation monitor), describe the postulated malfunction (e.g., fails to indicate high radioactivity levels), describe the results (e.g., reading lost), and identify alternate or mitigating actions (e.g., conduct manual sampling and restore operability of instrumentation).

Response to Question 11.03-13:

An equipment malfunction analysis has been performed for the gaseous waste processing system. The summarized results will be added to U.S. EPR FSAR Tier 2, Section 11.3 as Table 11.3-10. U.S. EPR FSAR Tier 2, Section 11.3.2.4 will also be modified:

> "An equipment malfunction analysis is presented in Table 11.3-10. The analysis was performed in accordance with SRP Section 11.3 and BTP 11.5. The analysis results comply with the acceptance criteria of SRP Section 11.3 and BTP 11-5."

The release of radioactivity to the environment, as a result of GWPS delay bed failure or operator error resulting in bypass of the delay beds from the coolant degasification column, has been examined. The analysis was performed in accordance with BTP 11-5. The envelope case described in the U.S. EPR FSAR is for the inadvertent bypass of the delay beds and was chosen because it is applicable for the case where the GWPS is classified as RW-IIa. The analysis is discussed in U.S. EPR FSAR Tier 2, Section 11.3.3.6.

The results and the mitigating or alternate actions of a malfunction of the gaseous radwaste system radiation monitors will be provided in the added U.S. EPR FSAR Tier 2, Table 11.05-10. The upstream radiation monitor provides only indication functions, and its malfunction does not lead to radiological consequences. Malfunction of the downstream radiation monitor is mitigated by other monitors in the nuclear auxiliary building ventilation system which can process waste gas through charcoal filters prior to release if the activity is high. Activity is also monitored in the plant stack.

Radioactive contamination of chilled water supplies is unlikely because the chilled water delivery pressure is higher than the gaseous waste processing system process pressure. The chilled water supply for the gaseous waste disposal sampling system, addressed in U.S. EPR FSAR Tier 2, Section 11.5.4.7, provides an indication of contamination entering the operational chilled water system.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 11.3.2.4 will be revised and Table 11.3-10 will be added as described in the response and indicated on the enclosed markup.

Question 11.05-1:

In Section 11.5.1, the FSAR describes the design basis of the PERMSS. However, a review indicates that the design basis does not acknowledge SRP acceptance criteria, such as implications of Rev. 3 vs Rev. 4 of Regulatory Guide 1.97 in defining operating ranges for Type E variables, and IE Bulletin 80-10. Also, the design basis does not consistently acknowledge the related commitments described in U.S. EPR Conformance with Standard Review Plan (NUREG-0800) Technical Report (AREVA, ANP-10292, Rev. 1). Accordingly, the applicant is requested to review the commitments made in ANP-10292 (Rev, 1) and Section 11.5 and BTP 7-10 of the SRP and Regulatory Guide 1.206 and confirm that the design basis is consistent with applicable SRP criteria and, if not, provide the justification that the alternate approach provides acceptable methods of compliance with NRC regulations.

Response to Question 11.05-1:

This question was addressed in the Response to RAI 273, Supplement 4.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 11.5.1 will be revised as described in the response and indicated on the enclosed markup.

Question 11.05-4:

In Section 11.5.4.3, the FSAR describes the radiation monitoring system for the SG Blowdown. The discussion refers to releases occurring via TB roof ventilators in the event of SG tube ruptures. A review of FSAR Figure 11.5-1 indicates that this discharge path is not identified, as all gaseous effluent releases are shown to be discharged via the plant stack and FSAR Table 11.5-1 identifies this radiation monitor as a liquid effluent monitor and not as a gaseous effluent monitor. Accordingly, the applicant is requested to provide further information on whether releases from TB roof ventilators are unmonitored and uncontrolled release points to the environment. If the system design, as described in Section 11.5.4.3, allows the means to determine radionuclide distributions and concentrations during and after a SG tube rupture, describe methods and sources of radiological information with which to characterize such releases via TB roof ventilators and assess offsite doses to members of the public.

Response to Question 11.05-4:

This question was addressed in the Response to RAI 273, Supplement 4.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 11.5.4.3 will be revised as described in the response and indicated on the enclosed markup.

Question 11.05-6:

FSAR Sections 11.5.2 to 11.5.4 present descriptions of PERMSS subsystems and Table 11.5-1 lists radiation monitoring instrumentation used to monitor airborne effluent streams from the Fuel Building Ventilation System (FBVS), as described in FSAR Section 9.4.2. A review of subsystems listed in Table 11.5-1 and Figures 11.5-1 and 9.4.2-1 indicates that the descriptions are inconsistent and incomplete. Specifically:

a. Table 11.5-1states that the FBVS radiation monitor isolates the ventilation system on high radioactivity levels. However, Section 9.4.2.1 and Figure 9.4.2-1 show a radiation monitor only on the exhaust flow from Cell 5 and none on Cell 4 of the FBVS, but the FSAR states that iodine radioactivity is detected separately in each cell and each cell services about half of the FB's ventilation needs. Similarly, the exhaust from Cell 5 leading to the Safeguard Building Ventilation System does not show a radiation monitor and isolation dampers on the line going to the SBVS. Accordingly, system descriptions should be reviewed and revised as it is not clear if there is a need to show other radiation monitors on the exhaust line from Cell 4 before connecting to its exhaust shaft. Also, there is a need to clarify the isolation of the FBVS given the connection to the SBVS since the design basis implies a full isolation of the FBVS on detection of high radiation levels in exhaust duct of Cells 4 and 5.

b. Table 11.5-1states that the FBVS radiation monitor isolates the ventilation system on high radioactivity levels, but Section 9.4.2.1 and Figure 9.4.2-1 show a radiation monitor only on the exhaust flow from Cell 5 and none on Cell 4 of the FBVS. Accordingly, the automatic control features (ACF) provisions of Table 11.5-1 for the FBVS should be reviewed and revised to note whether the isolation of FB Cells 4 and 5 is part of the ACF design features for that radiation monitor.

c. A comparison of FSAR Sections 11.5 and 9.4.2 indicates that FSAR Section 9.4.2 does not refer to FSAR Section 11.5 for the associated airborne process radiation monitoring systems. Also, FSAR Section 9.4.2.5 refers to FSAR Table 9.4.1-1 for details on instrumentation, but this table addresses generic ESF features and not specifically those of the FBVS. Accordingly, FSAR Sections 11.5 and 9.4.2 should reviewed and revised to ensure a consistent use of internal references on radiation instrumentation design features in controlling airborne radioactivity releases via the plant vent.

Response to Question 11.05-6:

This question was addressed in the Response to RAI 273, Supplement 4.

FSAR Impact:

U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

this case, two normally open motor-operated isolation valves are closed to remove both waste gas compressors from the gaseous waste process flow, and a motor-operated valve is opened to provide an alternate system flow path.

The first delay bed may be isolated and bypassed if water intrusion reduces the adsorptive capability of the activated charcoal. The two normally open delay bed isolation valves are closed to remove the first delay bed from gaseous waste processing delay system flow path, and the normally closed delay bed bypass valve is opened to provide an alternate delay system flow path to the second delay bed.

11.3.2.3.20 Materials

The components and piping of the gaseous waste processing system are made of stainless steel. Austenitic stainless steel is used for components and piping subject to higher levels of chlorides, such as the recombiner.

11.3.2.4 Failure Tolerance

The gaseous waste processing system incorporates features that make it more resistant to, or tolerant of, system faults and operator errors.

11.03-13

An equipment malfunction analysis is presented in Table 11.3-10. The analysis was performed in accordance with SRP Section 11.3 and BTP 11.5, and the results comply with the acceptance criteria of SRP Section 11.3 and BTP 11-5.

11.3.2.4.1 Hydrogen Ignition

The gaseous waste processing system prevents hydrogen ignition in the purge gas return system and in the connected components by maintaining a continuous flow of nitrogen purge gas through connected components. This purge gas flow sweeps out the hydrogen present in the gaseous waste processing return line before the hydrogen can accumulate in potentially explosive concentrations. The aggregate gaseous waste processing return stream is continually monitored for hydrogen and oxygen concentration, and the upstream measurement cabinets send signals to the gas supply subsystems to provide batch hydrogen or oxygen additions as necessary to maintain a stoichiometric ratio for recombination, as well as to inject nitrogen if necessary to dilute the hydrogen, or oxygen, concentration. The recombiner uses a catalytic process that recombines hydrogen and oxygen to form water vapor, which is removed from the gaseous waste processing purge flow downstream of the waste gas compressor. In addition to the automatic control signals, alarms are generated in the main control room if excessive hydrogen or oxygen concentrations are detected upstream or downstream of the recombiner. The nitrogen gas supply system can also inject a nitrogen blanket on some connected components if there is an interruption in gaseous waste processing purge flow.

11.03-13

Table 11.3-10—Equipment Malfunction Analysis
Sheet 1 of 3

Equipment Item	Malfunction	Result(s)	Mitigating or Alternate Action(s)
Upstream radiation monitor	Fails to indicate.	Reading lost.	Upstream radiation monitor does not provide control functions. Manual grab sampling may be performed until monitor is repaired or replaced.
Downstream radiation monitor	Fails to indicate.	Reading lost. Failure of automatic isolation function.	Indication of activity is provided in the NABVS which can process waste gas through charcoal filters if activity is high. Grab sampling may be performed until monitor is repaired or replaced. Closure of release isolation valve may be controlled manually by operator.
Gel drier	Damage to desiccant.	Drying capability of gel drier is inhibited.	Gel drier can be isolated and desiccant replaced.
Delay beds	Delay bed is exposed to moisture. Delay bed performance gradually deteriorates and holdup of radioactive gases decreases.	Holdup of radioactive gases is inadequate. Plant emissions gradually increase.	Bypass first delay bed or isolate delay section. Dispose of spent charcoal and replace if necessary.
Condensate collecting tank level control	Level control of condensate collecting tank fails.	Level control of condensate collecting tank lost.	Delay section is isolated to prevent moisture carryover on high level, or drain valve is manually closed by operator on low level.
Sealing liquid tanks level control	Level control of sealing liquid tank fails.	Level control of sealing liquid tank lost.	Operator switches to alternate waste gas compressor train.
Waste gas compressor	Waste gas compressor does not start or fails.	Temporary reduction in ability to sweep connected components. Dual compressor operation not possible.	Operator switches to alternate waste gas compressor train. System is designed to function adequately with one compressor in operation.

11.03-13

Table 11.3-10—Equipment Malfunction Analysis
Sheet 2 of 3

Equipment Item	Malfunction	Result(s)	Mitigating or Alternate Action(s)
Upstream H_2/O_2 sensors	Fails to indicate.	Indication lost.	Operator switches control and indication to alternate measuring cabinet.
Downstream H_2/O_2 sensors	Fails to indicate.	Indication lost.	Manual grab sampling can be performed to monitor recombiner performance until measuring cabinet is repaired or replaced.
Upstream measuring gas compressor	Working diaphragm rupture.	Failure of measuring gas compressor.	Operator switches off affected compressor and starts redundant compressor. System operation continues.
Downstream measuring gas compressor	Working diaphragm rupture.	Failure of measuring gas compressor.	Operator switches off affected compressor and starts redundant compressor. System operation continues.
Upstream measuring gas drier	Failure of temperature control.	Inaccurate H_2/O_2 measurement.	Upstream measuring gas drier can be replaced with downstream measuring gas drier until drier is repaired or replaced. Grab sampling may be performed downstream.
Downstream measuring gas drier	Failure of temperature control.	Inaccurate H_2/O_2 measurement.	Manual grab sampling may be performed until measuring gas drier is repaired or replaced.
Recombiner	Failure or temperature control.	Incomplete recombination of hydrogen and oxygen to water.	Malfunctioning heating element(s) switched off and replaced if necessary.
Gas cooler	Chilled water loss to cooler.	Inaccurate H_2/O_2 measurement. High humidity of waste gas.	Chilled water supply restored.
	Corrosion of tubes in cooler.	Leakage of water into process stream.	Plug tubes or replace cooler if there is considerable leakage.

11.03-13

Table 11.3-10—Equipment Malfunction Analysis
Sheet 3 of 3

Equipment Item	Malfunction	Result(s)	Mitigating or Alternate Action(s)
Pre drier	Chilled water loss to drier.	Possible carryover of moisture to delay section.	Chilled water supply restored. Delay section is isolated if necessary.
	Corrosion of tubes in drier.	Leakage of water into process stream.	Plug tubes or replace cooler if there is considerable leakage. Delay section is isolated if necessary.
Gas drier	Chilled water loss to drier.	Inaccurate H_2/O_2 measurement.	Chilled water supply restored.
	Corrosion of tubes in drier.	Leakage of water into process stream.	Plug tubes or replace cooler if there is considerable leakage.
Sealing liquid coolers	Chilled water loss to cooler.	Inadequate cooling of sealing liquid to waste gas compressor.	Operator switches to alternate waste gas compressor train.
	Corrosion of tubes in drier.	Leakage of water into process stream.	Operator switches to alternate waste gas compressor train.
Nitrogen gas supply valve	Nitrogen gas supply valve fails open.	Pressure in purging section of GWPS increases.	Operator manually closes nitrogen gas supply valve. The recombiner if necessary.
Instruments	Fails to indicate.	Indication lost.	Essential instruments are redundant or provided with one-out-of-two voting. Other instruments are replaceable.
Gaseous Waste Processing System Pressure Boundary	Failure of GWPS pressure boundary.	Waste gas released to equipment compartment/ environment.	In-leakage is detectable by oxygen and flow sensors. Most ruptures can be isolated by operator or automatic actions. Doses are within design guidance of BTP 11-5.

11.5 Process and Effluent Radiological Monitoring and Sampling Systems

The process and effluent radiological monitoring and sampling systems monitor, record, and (for certain subsystems) control the release of radioactive materials that may be generated during normal operation, anticipated operational occurrences (AOO), and postulated accidents. These systems monitor and record radioactivity levels in plant process streams and atmospheres, indicate and alarm excessive radioactivity levels, automatically initiate protective isolation actions, and record the rate of release of radioactive materials to the environment. The systems consist of permanently installed, continuous monitoring devices together with a program of, and provisions for, specific sample collections and laboratory analyses.

Process sampling systems are summarized in this section; a detailed description of these systems is included in Section 9.3.2. In addition to the process and effluent monitoring and sampling systems described in this section, the U.S. EPR also uses the following radioactivity monitoring systems:

- Area radioactivity and airborne monitoring (addressed in Section 12.3).
- Personnel monitoring (addressed in Section 12.5).
- Contamination monitoring (addressed in Section 12.5).
- Radiation monitoring of waste packages (addressed in Section 11.4).

11.5.1 Design Basis

AREVA NP Inc. has designed the process and effluent radiological monitoring and sampling systems in accordance with the requirements of 10 CFR Parts 20, 10 CFR 50.34(a), 10 CFR 50.34(f)(2)(xvii) and 10 CFR 50.34 (f)(2)(xxvii) as these requirements relate to TMI action items and 50.36(a). Additionally, the design for these systems complies with the ANSI standards N13.1-1999 (Reference 1) and ANSI N42.18-2004 (Reference 2), as well as the guidance in RGs 1.21, 1.33, 1.97, 4.15, 1.206, IE Bulletin 80-10, GDC 60, GDC 63, GDC 64, 10 CFR Part 50, Appendix I, 10 CFR 20.1301(e), 10 CFR 20.1302, and NUREG-0800, BTP 7-10 (Reference 3), NUREG-0737 (Reference 4), NUREG-0718 (Reference 5), Generic Letter 89-01 (Reference 6), and Appendix 11.5-A of NUREG-0800 (Reference 7).

11.05-1

Consistent with the requirements of 10 CFR 20.1406, the U.S. EPR, including the process and effluent radiological monitoring and sampling systems, is designed to minimize, to the extent practicable, contamination of the facility and the environment; facilitate eventual decommissioning; and minimize, to the extent practicable, the generation of radioactive waste. Minimization of contamination and radioactive waste generation is described in Section 12.3.6.

monitors because the activity level is too low. Together with manually extracted samples analyzed in the laboratory, this system also allows the calculation of radioactivity discharged from the secondary system due to leakage into the Turbine Building atmosphere. ~~The system also allows calculation of radioactivity discharged via roof ventilators into the environment in the event of a steam generator tube leak.~~ This system does not initiate automatic actions.

11.05-4

The steam generator blowdown radiation monitoring system functional location is shown on Figure 11.5-1. Measurement ranges of the steam generator radiation monitoring system are shown in Table 11.5-1.

11.5.4.4 Component Cooling Water Radiation Monitoring System

The component cooling water system consists of a closed-loop system of coolers (heat exchangers) used to transfer heat from nuclear components to service water. Since it is a closed-loop system, the component cooling water system does not release radioactivity to the service water (and subsequently to the environment) in the event of leaks in the associated coolers. The system consists of two subsystems: the general component cooling water radiation monitoring subsystem and the high-pressure (HP) cooling water radiation monitoring subsystem. The component cooling water radiation monitoring system functional location (including subsystems) is shown in Figure 11.5-1. Measurement ranges of the component cooling water radiation monitoring system are shown in Table 11.5-1.

The general component cooling water radiation monitoring subsystem uses gamma-sensitive radiation detectors in each of its four separate safety-related trains to monitor the fluid for the escape of radioactivity from the various radioactivity-containing systems that make up the nuclear components served by the component cooling circuits. The gamma-sensitive detectors are lead-shielded and are installed adjacent to the piping in this subsystem. This subsystem provides local and control room alarms in the event that component cooling water gamma radiation levels exceed the monitor setpoint, but does not initiate automatic actions.

The HP cooling water radiation monitoring subsystem consists of two gamma-sensitive radiation detectors upstream and two gamma-sensitive radiation detectors downstream on the component cooling water lines feeding/exiting the two high-pressure coolers of the volume control system. In the event of a leak in an HP cooler, in which high-activity primary coolant leaks into the component cooling water system, the radiation detector downstream of the defective cooler indicates the entry of radioactivity from this HP cooler into the component cooling loop that is running at the time. If the radioactivity exceeds a pre-determined limit, the defective HP cooler is automatically isolated on the primary side and an associated control room alarm is activated. This automatic action is suppressed if the limit value of the radiation

Table 11.5-1—Radiation Monitor Detector Parameters[1]
Sheet 2 of 9

Process System[2]	Monitor Provisions			Sample Provisions			Range
	In Process Continuous	ACF	In Effluent Continuous	In Process Grab sample	In Effluent Grab sample	Continuous	
Containment Building Ventilation System – Containment Purge Subsystem (Containment Purge System)	1* noble gas, 1* aerosol, 1* iodine, and 1* H-3 monitor		2* noble gas monitors	1 aerosol sample point		1 aerosol sample point	3E-7 - 1E-2 µCi/cc (Kr-85, Xe-133)
Containment Building Ventilation System – Internal Filtration Subsystem	1* noble gas, 1* aerosol, 1* iodine monitor			1 aerosol sampler		1 aerosol sampler	3E-7 - 1E-2 µCi/cc (Kr-85, Xe-133)
Nuclear Auxiliary Building Ventilation System	3* noble gas, 3* iodine, and 5* aerosol monitors on ventilation exhaust	---	---	5 aerosol sample points in the ventilation exhaust	1 iodine and 1 aerosol sample points in the ventilation exhaust	1 iodine and 6 aerosol sample points in the ventilation exhaust	3E-7 - 1E-2 µCi/cc (Kr-85, Xe-133)
Fuel Building Ventilation System (Fuel Storage Area Ventilation System)	4* noble gas, 2* aerosol, and 2* iodine monitors on ventilation exhaust 11.05-6	isolate fuel handling area ventilation on high exhaust activity, ~~2~~1 noble gas monitor~~s~~ supplies~~y~~ the signal	---	2 aerosol sample points in the ventilation exhaust	---	2 aerosol sample points in the ventilation exhaust	3E-7 - 1E-2 µCi/cc (Kr-85, Xe-133)