ArevaEPRDCPEm Resource

From: Pederson Ronda M (AREVA NP INC) [Ronda.Pederson@areva.com]
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
Attachments: RAI 273 Supplement 4 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. 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
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: 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
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: 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,

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: 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

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: 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: 1026

Mail Envelope Properties (5CEC4184E98FFE49A383961FAD402D31017904C8)

Subject: Response to U.S. EPR Design Certification Application RAI No. 273, FSAR Ch 11, Supplement 4
Sent Date: 12/10/2009 6:29:11 PM
Received Date: 12/10/2009 6:29:17 PM
From: Pederson Ronda M (AREVA NP INC)

Created By: Ronda.Pederson@areva.com

Recipients:
"BENNETT Kathy A (OFR) (AREVA NP INC)" <Kathy.Bennett@areva.com>
Tracking Status: None
"DELANO Karen V (AREVA NP INC)" <Karen.Delano@areva.com>
Tracking Status: None
"NOXON David B (AREVA NP INC)" <David.Noxon@areva.com>
Tracking Status: None
"WILLIFORD Dennis C (AREVA NP INC)" <Dennis.Williford@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	15956	12/10/2009 6:29:17 PM
RAI 273 Supplement 4 Response US EPR DC.pdf		256977

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

Response to

Request for Additional Information No. 273, Supplement 4

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 11.05-1:

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:

The design basis in U.S. EPR FSAR Tier 2, Section 11.5.1 will be revised to clarify conformance with RG 1.97 (Rev. 4), IE Bulletin 80-10, and RG 1.206. The radiological monitoring and sampling systems design will comply with the requirements of GDC 60, GDC 63, GDC 64, 10 CFR Part 50, Appendix I, 10 CFR 20.1301(e), and 10 CFR 20.1302.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 11.5.1 will be revised as described in this response and the FSAR markups provided by March 31, 2010.

Question 11.05-2:

In Sections 11.5.2, 11.5.3 and 11.5.4, the FSAR describes the various functions and components of PERMSS subsystems. A review of the description indicates that the information is presented inconsistently. Several components described in the text and Table 11.5-1 and Figure 11.5-1 are discussed in the text and not shown in a corresponding figure, or are not discussed in the text but shown in a figure. For example:

1) The descriptions do not address subsystem features to perform functional channel checks, source checks, and whether subsystems need to be brought off line to perform the surveillance and functional checks required by standard radiological effluent controls (see GL 89-01 and NUREG-1301).

2) The design features do not describe provisions and methods for offline radiation detectors to be purged or flushed with clean air or water, which portions of the LWMS and GWMS systems will contaminated purge or flush fluids be returned to, and provisions to prevent the cross-contamination of purge and flush supply systems.

3) The design features do not describe the calibration of subsystems under different operational conditions (e.g., routine, AOOs, and accident) given expected differences in radionuclide distributions; how raw instrument output data will be converted to meaningful radiological units in determining compliance with Part 20 Appendix B and Appendix I to Part 50; calibration frequencies of process and effluent of radiation monitoring subsystems and associated sampling equipment; and the QA/QC process that will be used to verify and validate computer codes and algorithm purchased through vendors or supplied with PERM instrumentation.

4) Subsystem figures and diagrams do not show sampling locations for liquid and gaseous process and effluent streams, and sample conditioning for specific systems to minimize sample loss and distortion of chemical and physical compositions. Also, the relationship with FSAR Section 9.3.2 is not well established in understanding shared used of equipment and sampling functions among LWMS and GWMS subsystems.

5) The design features do not address requirements for the derivation of lower limits of detection for liquid and gaseous effluent monitors and detection sensitivities for liquid and gaseous process monitors.

6) The design features do not address the placement of isolation or diversion valves and radiation detectors on process and effluent piping/ductwork in order to ensure the timely closure of such valves upon the detection of elevated radioactivity levels in liquid and gaseous effluent streams in terminating releases and isolating process streams from further contamination.

7) The design features of the liquid and gaseous monitoring systems do not consider how the failure of a radiation detector or its corresponding channel is indicated in local and control room panels. For example, does a detector or channel failure result in a high or zero instrumentation reading? Are there specific warnings differentiating various types of failures, such as loss of detector only, loss of an entire channel, loss of sampling flow from a process or effluent stream?

Collectively, these observations apply to nearly all PERMSS subsystem descriptions and should be reviewed against Section 11.5 of the SRP and Regulatory Guide 1.206 and corrected accordingly in FSAR subsystem descriptions and tables and figures.

Response to Question 11.05-2:

1) The Response to RAI 260, Question 14.02-106 revised U.S. EPR FSAR Tier 2, Section 7.1.1.5.5 to include information regarding subsystem checks, tests, and maintenance issues.

   U.S. EPR FSAR, Tier 2, Section 11.5.2, Section 11.5.3, and Section 11.5.4 will be revised to include a reference to U.S. EPR FSAR, Tier 2 Section 7.1.1.5.5.

2) The detector procurement specifications will require purging or flushing taps for cleaning the sampling pathway within the detector with clean air or water. The design allows the detector to be taken offline and isolated. Then, either the detector is replaced or removed for maintenance. Maintenance technicians would bag and tag the detector as required, transport it to the equipment decontamination facility for decontamination and purging or flushing, and transport it to the instrument shop for repair, cleaning, calibration, and functional checks, as appropriate. The detector would then be reinstalled.

   Purge or flush fluids will be captured in the equipment decontamination facility (see U.S. EPR FSAR Tier 2, Section 12.3.1.6) and sent to the liquid waste management system (LWMS). Gases are routed through a monitored exhaust. Provisions to prevent cross-contamination of purge and flush supply systems are described in the Response to RAI 228, Question 12.03-12.04-10, which demonstrates isolations to prevent cross-contamination of distributed purge and flush supply systems.

   This information will be added to U.S. EPR FSAR Tier 2, Section 11.5.2.

3) The design of the system incorporates different types and ranges of monitors that are used for different operational conditions. The calibration of a given subsystem does not need to be changed for different operational conditions.

   An overview of U.S. EPR instrumentation and controls (I&C) architecture is provided in U.S. EPR FSAR Tier 2, Section 7.1.1. As shown in U.S. EPR FSAR Tier 2, Figure 7.1-2, the PERMSS are Level 0 process interface systems. The measurement taken by a radiation monitor at Level 0 is sent to a Level 1 system. Digital conversion of the Level 0 input signal is performed via software at the Level 1 system that will convert the data into meaningful units, i.e., μCi/cc, μCi/ml, mrem/hr. The operator interface at Level 2 will provide a display of the digital signal produced by the Level 1 system. The operational specifics of equipment chosen for Level 0, Level 1, and Level 2 systems will be vendor dependent.

   Quality assurance and reliability assurance information is addressed in U.S. EPR FSAR Tier 2, Section 17.4. Information for verification and validation of software for safety-related applications is discussed in U.S. EPR FSAR Tier 2, Section 7.1.1.2.

4) U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised to include a cross-reference to subsystem figures where radiological measurement points are located. This includes instruments and grab samples at the radiological measurement points. The design will comply with ANSI/HPS-N13.1-1999 to verify that representative samples are analyzed by the detectors. The text for specific subsystems will describe methods employed to

analyze representative samples (e.g., sample location relative to bends, fans and duct junctions, electropolished lines).

U.S. EPR FSAR Tier 2, Section 9.3.2 will be revised to define which equipment and sampling functions are shared among the LWMS and the gas waste management system (GWMS) subsystems.

5) In reference to the Offsite Dose Calculation Manual (ODCM), U.S. EPR FSAR Tier 2, Section 11.5.2 will be revised to include the requirement to calculate the lower limits of detection (LLD) for liquid and gaseous effluent monitors and detection sensitivities for liquid and gaseous process monitors in accordance with the methodology provided in the ODCM.

6) U.S. EPR FSAR Tier 2, Section 11.5.1.2 will be revised to indicate that, for monitors that provide an automatic control feature, the isolation or diversion valves or ventilation dampers will be downstream of the monitor so that upon detection of elevated radioactivity levels in the effluent stream will terminate releases by closure of the valves or ventilation dampers in a timely manner to isolate the downstream process stream from further contamination.

7) An overview of the U.S. EPR I&C architecture is provided in U.S. EPR FSAR Tier 2, Section 7.1.1. As shown in U.S. EPR FSAR Tier 2, Figure 7.1-2, the radiation monitors are Level 0 process interface systems. The measurement taken by a radiation monitor at Level 0 is sent to a Level 1 system. Digital conversion of the Level 0 input signal is performed via software at the Level 1 system. The operator interface at Level 2 will provide a display of the digital signal produced by the Level 1 system, which includes detector measurement and equipment status. The operational specifics of equipment chosen for Level 0, Level 1, and Level 2 systems will be vendor dependent.

   There is no requirement for a detector failure indication. However, any failure of a radiation detector or a failure of its corresponding channel will be observable at local and control room panels at I&C architectural Level 2. The type of radiation detector used for a particular application will determine whether a detector failure will result in a high or zero instrumentation reading. The failure of an instrument will be readily discernible. (i.e., for a detector that fails to a zero reading, this reading signifies that either the detector or the corresponding channel has failed. For a detector that fails to a high reading, an off-scale high indication at I&C architectural Level 2 signifies that either the detector or the corresponding channel has failed.) For a detector or instrument failure on an effluent process system, the associated Level 1 system will automatically take actions to place the associated system in a safe condition.

   Additionally, the Response to RAI 260, Question 14.02-106 revised U.S. EPR FSAR Tier 2, Section 7.1.1.5.5 to include information regarding subsystem checks, early detection of failures, tests, and maintenance issues.

FSAR Impact:

1) U.S. EPR FSAR Tier 2, Section 11.5.2, Section 11.5.3, and Section 11.5.4 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

2) U.S. EPR FSAR Tier 2, Section 11.5.2 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

3) The U.S. EPR FSAR will not be changed as a result of this question.
4) U.S. EPR FSAR, Tier 2, Section 9.3.2 and Table 11.5-1 will be revised as described in the response and the FSAR markups provided by March 31, 2010.
5) U.S. EPR FSAR Tier 2, Section 11.5.2 will be revised as described in the response and the FSAR markups provided by March 31, 2010.
6) U.S. EPR FSAR Tier 2, Section 11.5.1.2 will be revised as described in the response and the FSAR markups provided by March 31, 2010.
7) The U.S. EPR FSAR will not be changed as a result of this question.

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:

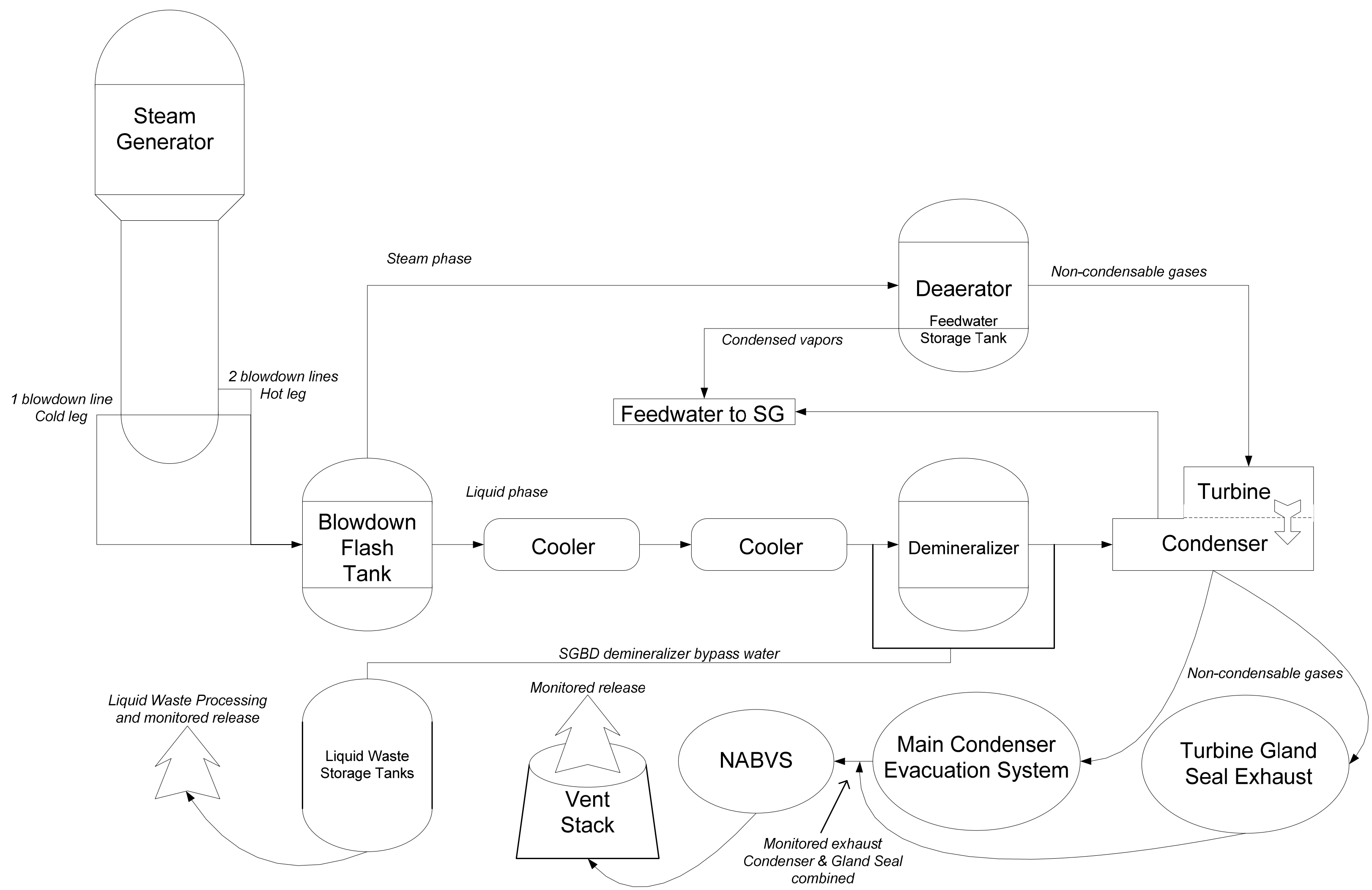
The Turbine Building (TB) atmosphere and roof ventilators are not a discharge pathway. The reference to this implied pathway in U.S. EPR FSAR Tier 2, Section 11.5.4.3 will be deleted. The flow path for steam generator blowdown (SGB) fluids remains the same regardless of whether it is in normal operation or there is a steam generator tube rupture (SGTR event). An alternate, manually-initiated SGB liquid bypass exists where the SGB is routed to the liquid waste storage tanks. See U.S. EPR FSAR Tier 2, Section 11.2.2.1.2 for further information.

SGB fluids are extracted from the secondary loop, impurities are removed, and the fluids are returned to the secondary loop (See Figure 11.05-4-1). Each SG has three blowdown lines, two from the hot leg and one from the cold leg. The SGB is extracted from the hot side and cold side of the tubesheet in various combinations (See U.S. EPR FSAR Tier 2, Figure 10.4.8-1 (Sheet 1)). All three lines are combined into one common blowdown header. This common line is routed to the flash tank where the blowdown fluid is separated into a liquid phase and a steam phase (See U.S. EPR FSAR Tier 2, Section 10.4.8.2 and Figure 10.4.8-1(Sheet 2)). The liquid phase is cooled and polished (See U.S. EPR FSAR Tier 2, Figure 10.4.8-2 (Sheet 2)), then routed back into the secondary system via the main condenser and is not normally discharged through any effluent pathway. An abnormal, manually-initiated bypass to the liquid waste storage tanks provides a means to collect SGB demineralizer water. This liquid would be processed and discharged through the liquid effluent release pathway. The steam phase is routed to the deaerator/feedwater storage tank where the condensed steam is fed back into feedwater and is not discharged through any effluent pathway. Non-condensable gases stripped from the steam in the deaerator are routed to the steam side of the turbine, where the gases are exhausted through the main condenser evacuation system, a monitored pathway.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 11.5.4.3 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

Figure 11.05-4-1—Simplified Steam Generator Blowdown Flow Paths



Question 11.05-5:

FSAR Sections 11.5.2 to 11.5.4 present the descriptions of PERMSS subsystems and Table 11.5-1 lists radiation monitoring instrumentation used to monitor process and effluent streams. However, a review of subsystems listed in Table 11.5-1 and Figure 11.5-1 indicates that the descriptions are inconsistent and incomplete. For example:

1) Several PERMSS subsystems listed in Table 11.5-1 are not described in FSAR Sections 11.5.2 to 11.5.4. Section 11.5.4 provides descriptions for six subsystems with in-process radiation detectors while Table 11.5-1 lists 15. Similarly, there are differences between the text and tables in nomenclatures used to describe subsystems, e.g., condenser air removal RMS (Section 11.5.4.2) vs condenser evacuation system (Table 11.5-1).
2) FSAR Table 11.5-1 does not differentiate between safety and non safety-related PERMSS subsystems.
3) FSAR Table 11.5-1 does not indicate which radiation detectors will be equipped with built-in radioactive check sources for the purpose of performing channel checks.
4) The operational range noted for the upstream radiation monitor of the GWMS delay beds is presented in a meaningless radiological unit. The range should be expressed in μCi/cc instead of counts per second (cps).
5) FSAR Section 10.4.3.2.2.states that the exhaust from the turbine gland seal exhausters is routed to the "turbine building air removal system" where they are monitored for radioactivity. Table 11.5-1 does not list a radiation monitor for the turbine air removal system. FSAR Section 9.4.4 states that the Turbine Building does not include the means to control radioactive effluents. Accordingly, the design descriptions of Section 10.4.3 and 9.4.4 should be reviewed and corrected to indicate that there is no turbine building air removal system and that instead the exhaust from the turbine gland seal exhausters is a system exhaust that is directed and discharged via the Nuclear Auxiliary Building Exhaust.
6) For the Nuclear Auxiliary Building exhaust, Figure 9.4.3-2 shows a radiation detector on the ductwork going into Cell 1 of the NABVS but it is not clear if this radiation detector is an extra one or is it the same as that shown in Figure 11.3-1 given its location.
7) Figure 9.4.3-2 shows a radiation detector in Cell 3 of the NABVS but it is not clear if this radiation detector is part of an existing PERMSS subsystem and not described in FSAR Sections 11.5 and 9.4.3, or is part of another system, such as used for monitoring ambient airborne radioactivity levels in radiological controlled areas.
8) Figure 9.4.3-3 does not include a radiation detector in the Reactor Building Exhaust (last input on lower left side of drawing).
9) FSAR Table 11.5-1 implies that there are two continuous noble gas monitors for the containment building ventilation purge subsystem, but FSAR Figure 9.4.7-2 shows one monitor on the low flow purge exhaust and none for the full flow purge exhaust.
10) FSAR Figure 11.5-1 shows a radiation monitor on the Turbine Building Plant drainage line, but this monitor is not listed in FSAR Table 11.5-1.

11) FSAR Table 11.5-1 does not indicate any automatic control features for GWMS, but FSAR Section 11.3.3.1 states that discharge requirements consider gaseous waste activity and “automatic isolation settings.”

12) FSAR Table 11.5-1 does not indicate any automatic control features for the NABVS, but FSAR Section 9.4.3.2.1 states that the exhaust from the NABVS is diverted to an iodine filtration system upon receiving a radiation alarm.

13) FSAR Table 11.5-1 does not indicate any automatic control features (ACF) for the SBVS, but FSAR Section 9.4.5.1 states that the exhaust from the SBVS is diverted to charcoal filtration beds upon receiving a radiation alarm.

14) FSAR Table 11.5-1 presents operational ranges for gaseous and liquid process and effluent radiation monitors. A review of this information indicates that it is incomplete. For gaseous process and effluent monitors, the supporting text to this table does not present the technical basis for the stated operational ranges for those that are included and does not provide corresponding sets of values for the plant vent radiation monitor used in confirming compliance with Part 20, Appendix B effluent concentration limits. For particulate, iodine, and tritium expected in gaseous streams, Table 11.5-1 does not include operational ranges and surrogate radionuclides for the corresponding radiation monitoring systems. The above comments also apply to radiation monitors assigned to liquid process and effluent streams.

15) FSAR Table 11.5-1 presents operational ranges for gaseous process and effluent radiation monitors. A review of this information indicates that it is incomplete. The description does not indicate whether the plant vent radiation monitoring system will be used to monitor radioactivity levels during normal operations and accident conditions with a sufficient range to encompass the entire range of effluent concentration levels listed in Regulatory Guide (RG) 1.97 (Rev. 3) and BTP 7-10 (SRP, NUREG-0800) for Type E variables, as they relate to compliance with Part 50.34(f)(2)(xvii) and (xxvii). If multiple radiation monitoring components are part of the design of the plant vent monitor to comply with the operational ranges of RG 1.97, the FSAR should describe the additional radiation monitoring components and address overall system accuracies in the overlapping ranges of the components of both systems when operating in the upper end of expected radioactivity levels.

Collectively, the above observations should be reviewed and, if confirmed, should be corrected in the FSAR.

Response to Question 11.05-5:

1) U.S. EPR FSAR Tier 2, Section 11.5.4 subsystem descriptions, including the terminology used, and the U.S. EPR FSAR Tier 2, Table 11.5-1 radiation detectors, including the terminology used were reviewed to establish consistency. Additional radiation detectors were added. U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised to include the detectors described in U.S. EPR FSAR Tier 2, Section 11.5 and those added by design changes using the same terminology.

   U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised to add the following columns: radiological measuring point, aerosol monitor range, iodine monitor range, liquid monitor range, figures, text, safety grade, and check source type. The existing range column will be renamed noble gas monitor range. The radiological measuring point column will sequentially number the connection points for the detectors and/or grab samples and use these numbers to identify connections on the figures in U.S. EPR FSAR Tier 2, Chapter 6, Chapter 9, and Chapter 11. Noble gas, aerosol, iodine ranges, and liquid monitors will be shown in separate columns. The safety grade column will indicate whether the instrument and/or grab sample point is safety, non-safety-advanced quality (NS-AQ), non-safety-related, or not applicable. The check source type column will identify whether the check source is portable for accessible monitors, built-in for inaccessible monitors, or not applicable. Those monitors and grab sample locations that must survive and operate following a severe accident are identified as accident devices in the existing monitor provisions and sample provisions columns.

U.S. EPR FSAR Tier 2, Section 11.5.3 will be revised to include a description of the following effluent subsystems:

– Gaseous waste processing system (GWPS).
– Main condenser evacuation system (MCEV).
– Sampling activity system.
– Containment building ventilation system (CBVS)- low flow purge.
– CBVS - Internal Filtration.
– Nuclear auxiliary building ventilation system (NABVS).
– Fuel building ventilation system (FBVS).
– Radioactive waste (processing) building ventilation system (RWBVS).
– Safeguard building ventilation system (SBVS).
– Annulus ventilation system (AVS).
– Control room air conditioning system (CRACS).
– Access building ventilation system (ABVS).
– Liquid radwaste (batch) effluent system.

U.S. EPR FSAR Tier 2, Section 11.5.4 will be revised to include a description of the following process subsystems:

– Service water system (SVS) and/or circulating water system (CWS).
– Component cooling water system (CCWS).
– Fuel pool purification system (FPPS).
– Nuclear island drain/vent system (NIDVS).
– Nuclear sampling and severe accident (SA) sampling.
– Laundry and decontamination systems.
– Solid radwaste system.
– Reactor boron and water make-up system (RBWMS).

- Steam generator blowdown system (SGBS) (batch and continuous).
- Turbine building drains and vents System.
- Chemical and volume control system (CVCS) high pressure coolers.
- Main steam lines (MSLs).
- Safety chilled water system (SCWS).
- Operational chilled water system (OCWS) for gaseous waste.
- Fuel handling.

Included in the text for each system will be a description of the detector(s) and/or grab sample(s), a description of the task, a description of any safety or non-safety automatic control features, a cross-reference to applicable figures, a description of the safety grade, and an indication of the type of check source used for performing channel checks. Additional information may be included for special cases (e.g., tritium, carbon-14).

U.S. EPR FSAR Tier 2, Tables 3.2.2-1, 3.10-1 and 3.11-1 will be updated with required changes for consistency with Chapter 11.

2) U.S. EPR FSAR Tier 2, Table 11.5-1 will differentiate between safety-related and non-safety-related systems. See Item 1) above.

3) Radiation detectors that are inaccessible during plant operation will have a built-in check source. The remaining detectors will be calibrated using a known test source. U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised to indicate the radiation detectors are equipped with a built-in radioactive check source.

4) U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised to express the operational range noted for the upstream radiation monitor of the GWMS delay beds in µCi/cc.

5) The turbine gland seal condenser vent system combined with the mechanical vacuum pump exhaust (hogging system) in a common header is exhausted through the NABVS. U.S EPR FSAR Tier 2, Section 9.4.3.2.1 will be revised to add the vent system for air removal as an additional exhaust pathway to the vent stack.

   The design description in U.S EPR FSAR Tier 2, Section 10.4.3.2.2, “Exhauster,” second paragraph, will be revised to read: “Steam and noncondensable gases from the gland steam exhauster are routed to the nuclear auxiliary building ventilation system.”

   U.S EPR FSAR Tier 2, Section 9.4.4 will be revised to note that the turbine building ventilation system (TBVS) does not exhaust turbine gland seal or condenser evacuation. These gaseous exhausts are directed to the NABVS, where they are exhausted through vent stack and monitored.

6) These two depictions of the gaseous waste processing exhaust are the same instrument, as shown in U.S. EPR FSAR Tier 2, Figure 9.4.3-2 and Figure 11.3-1.

7) Cell 3 in U.S. EPR FSAR Tier 2, Figure 9.4.3-2 is the hot workshop of the Nuclear Auxiliary Building (NAB). The radiation monitor is an aerosol monitor and a grab sample location on

the ventilation exhaust of the hot workshop. A descriptive phrase will be added to U.S. EPR FSAR Tier 2, Table 11.5-1 for clarity.

8) This comment refers to the containment building full-flow purge exhaust portion of the containment purge subsystem which can be operated only during an outage. The prerequisite for operating this portion of the subsystem is that the plant must be in Mode 5 - Cold Shutdown. Airborne radiation monitoring is not required. The purpose of the system is personnel comfort during outages. Refer to the containment purge subsystem discussion in U.S. EPR FSAR Tier 2, Section 9.4.7.2.1.

9) There are two redundant noble gas monitors for the low-flow purge portion of the containment purge subsystem in the same black box, and one circled "R" is shown.

   The containment building full-flow purge portion of the containment purge subsystem is operated only during an outage. The prerequisite for operating this portion of the subsystem is that the plant must be in Mode 5 - Cold Shutdown. Airborne radiation monitoring is not required. The purpose of the system is personnel comfort during outages. Refer to the containment purge subsystem discussion in U.S EPR FSAR Tier 2, Section 9.4.7.2.1.

10) The radiation monitor on the Turbine Building (TB) plant drainage line was inadvertently omitted from U.S. EPR FSAR Tier 2, Table 11.5-1. It will be added to the existing entry for turbine drains in U.S. EPR FSAR Tier 2, Table 11.5-1, sheet 8, row 3.

11) An automatic control feature to isolate the gaseous waste discharge will be added to the GWPS row in U.S. EPR FSAR Tier 2, Table 11.5-1 and will indicate that the discharge valve closes on high activity.

12) U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised to list "NABVS diverts exhaust to iodine filtration on high radiation" in the ACF column for the NABVS. It will include a footnote to explain that this is a non-safety-related, automatic control feature. Refer to the Response to Question 11.05-7 for additional information.

13) The SBVS has two separate exhaust trains, normal and accident, as shown in Figure 11.05-5-1. During normal operation, exhaust is directed down the normal pathway through the annulus, through the Fuel Building (FB), and into the NAB where it is labeled as "safeguard building hot area exhaust" on U.S. EPR FSAR Tier 2, Figure 9.4.3-3. At this point, the safeguard building exhaust enters the NABVS. This air flow is directed through a normal set of filters and discharged through the stack. On a high activity alarm from the radiation detector, flow is diverted within the normal pathway to the NABVS iodine filtration train shown on U.S. EPR FSAR Tier 2, Figure 9.4.3-4. However, on a containment isolation signal (e.g, triggered by a high radiation alarm on the in-containment high-radiation detector), the entire SBVS exhaust is diverted from the normal pathway to the accident pathway shown on Figure 11.05-5-1. SBVS exhaust is directed through the accident iodine filtration train in the FB and then discharged through the vent stack as shown on U.S. EPR FSAR Tier 2, Figure 9.4.5-2. For further information, refer to the Response to Question 11.05-8.

    U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised to indicate the automatic control feature that diverts flow to the NABVS iodine filtration train along with two footnotes. The first footnote will address that this is a non-safety-related automatic control feature. The second footnote will explain that the containment isolation signal automatically diverts the SBVS exhaust to the accident iodine filtration train in the fuel building.

14) A new subsection will be added to U.S. EPR FSAR Tier 2, Section 11.5 to provide the technical basis for the operational ranges. The ranges will be provided in a corresponding set of values for the plant vent radiation monitor to confirm compliance with 10 CFR 20, Appendix B. Ranges for particulate, iodine and tritium will be included in U.S. EPR FSAR Tier 2, Table 11.5-1. This information will be provided for liquid process and effluent streams as well as gaseous process and effluent monitors. Refer to the Response to Item 1) for further information.

15) The ranges will be provided for the designated accident monitors as well as the normal operating monitors and will demonstrate that each accident monitor has sufficient range to encompass the range of effluent concentrations listed in RG 1.97 (Rev 3) and BTP 7-10 for Type E variables. In cases where multiple radiation monitoring components are part of the design of the plant vent monitor to comply with the operational ranges of RG 1.97, U.S. EPR FSAR Tier 2, Section 11.5.3 or Section 11.5.4 will describe the additional radiation monitoring components and address overall system accuracies in the overlapping ranges of the components of both systems when operating in the upper end of expected radioactivity levels. Refer to the Response to Item 1) of this question for further information.

As described in the Response to RAI 273, Question 11.05-1, the design basis will be clarified to indicate conformance with RG 1.97 (Rev. 4).

FSAR Impact:

1) U.S. EPR FSAR Tier 2, Section 11.5.3, Section 11.5.4, and Tables 3.2.2-1, 3.10-1, 3.11-1, and 11.5-1 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

2) U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised as described in the response to item 1 and the FSAR markups provided by March 31, 2010.

3) U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

4) U.S. EPR FSAR Tier 2, Table 11.5-1, will be revised as described in the response and the FSAR markups provided by March 31, 2010.

5) U.S. EPR FSAR Tier 2, Section 9.4.3.2.1 and Section 10.4.3.2.2 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

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

7) U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised as described in the response and the FSAR markups provided by March 31, 2010..

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

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

10) U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

11) U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

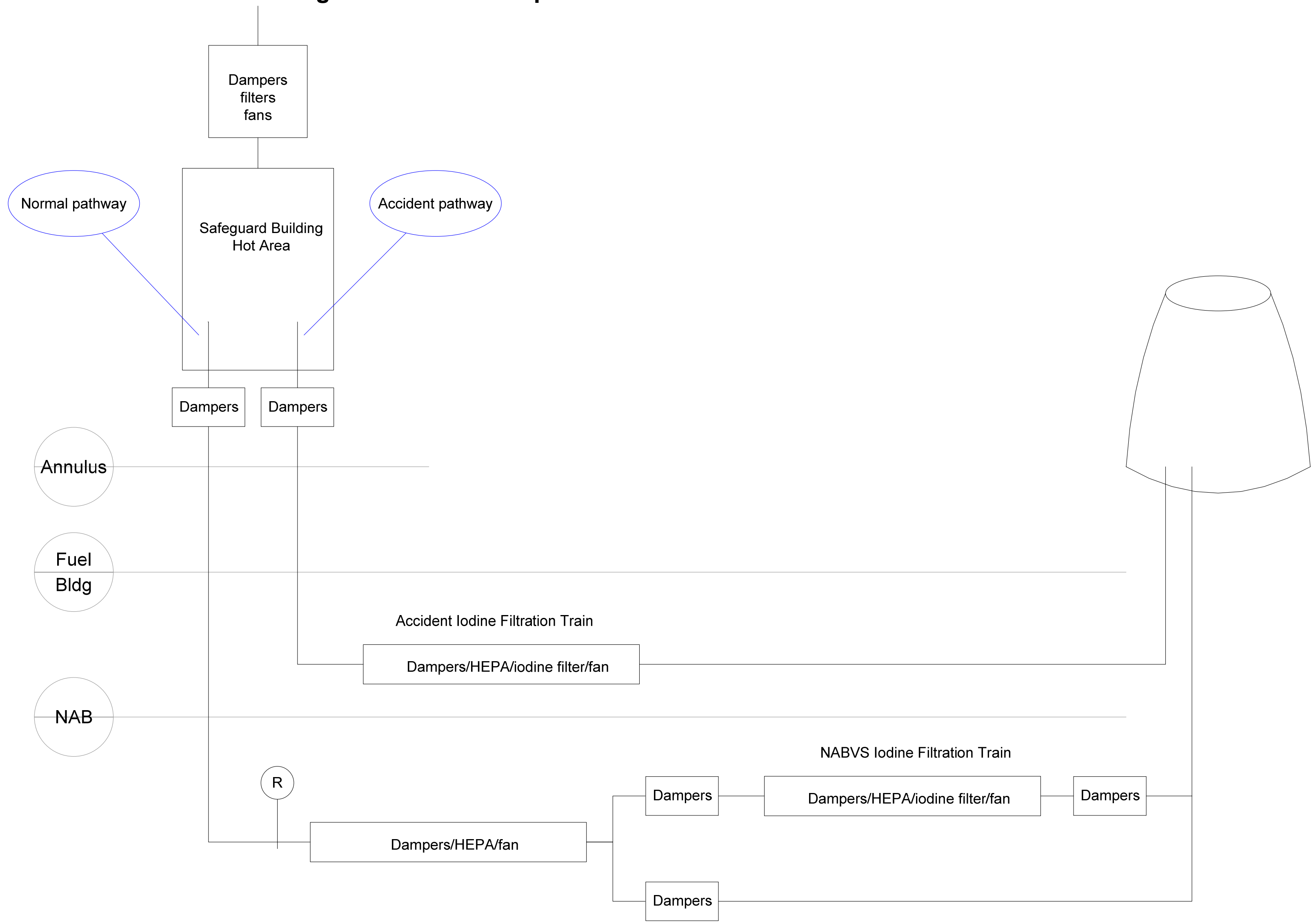
12) U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

13) U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

14) U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

15) EPR FSAR Tier 2 Table 11.5-1, Section 11.5.3, and Section 11.5.4 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

Figure 11.05-5-1–Simplified Sketch of SBVS Exhaust Trains



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:

a. The exhaust from FBVS Cell 4 and Cell 5 is directed to the nuclear auxiliary building ventilation system (NABVS). The radiation monitors for the FBVS Cell 4 and Cell 5 exhaust are not shown on U.S. EPR FSAR Tier 2, Figure 9.4.2-1, but they are shown on U.S. EPR FSAR Tier 2, Figure 9.4.3-3. U.S. EPR FSAR Tier 2, Figure 9.4.3-3 shows the Fuel Building (FB) Cell 4 and Cell 5 exhaust with radiation monitors.

   During normal operation, the FBVS exhaust is processed through the filtration trains of the NABVS prior to discharge through the plant stack (see FB Cell 4 and Cell 5 exhaust to NABVS on U.S. EPR FSAR Tier 2, Figure 9.4.3-3). If radioactive contamination is detected in the FB Cell 4 or Cell 5, the exhaust air is automatically diverted through the iodine filtration trains of the NABVS (see U.S. EPR FSAR Tier 2, Figure 9.4.3-3 and Figure 9.4.3-

4). The FB Cell 4 and Cell 5 exhaust air sampling activity monitors are shown on U.S. EPR FSAR Tier 2, Figure 9.4.3-3.

In the event of a fuel handling accident at the fuel pool floor in the FB, the exhaust and supply air of the space above the fuel pool floor is isolated automatically by closing the isolation dampers due to a high radiation signal on the radiation detector located at the fuel pool floor exhaust duct as shown in U.S. EPR FSAR Tier 2, Figure 9.4.2-1. The exhaust air from the fuel pool floor is then directed to the safeguard building (controlled area) ventilation system (SBVS) accident exhaust iodine filtration trains by automatically aligning the flow path to the SBVS accident exhaust iodine filtration trains. U.S. EPR FSAR Tier 2, Figure 9.4.5-2 shows the FB exhaust connection to the SBVS accident exhaust iodine filtration trains.

In the event of containment isolation signal or high radiation signal from the in-containment high range radiation monitors in the Reactor Building (RB), the FB is isolated from the NABVS by automatically closing the Cell 4 and Cell 5 air supply and exhaust dampers. The FBVS Cell 4 and Cell 5 isolation dampers to the NABVS are shown on U.S. EPR FSAR Tier 2, Figure 9.4.2-1. After the FB is isolated from the NABVS, the FB air to both Cells 4 and 5 exhaust shafts is automatically directed to the SBVS and processed through the SBVS accident exhaust iodine filtration trains as shown on U.S. EPR FSAR Tier 2, Figure 9.4.5-2.

No additional radiation monitors are required on the FBVS air exhaust.

b. In the event of fuel handling accident at the fuel pool floor, the area is automatically isolated by closing the air supply and exhaust air dampers located at the fuel pool floor (see the Response to Question 11.05-6 (a)). The air supply and exhaust for the fuel pool floor area is handled by the FBVS Cell 5. The radiation monitor is located in the exhaust duct from the fuel pool floor area (Cell 5), shown on U.S. EPR FSAR Tier 2, Figure 9.4.2-1. The ACF provision applies to the FBVS Cell 5 radiation monitor only.

   For normal operation, the radiation monitors for FBVS Cell 4 and Cell 5 exhaust air are shown on U.S. EPR FSAR Tier 2, Figure 9.4.3-3. If radioactive contamination is detected in the FB Cell 4 or Cell 5, the sampling activity monitors shown on U.S. EPR FSAR Tier 2, Figure 9.4.3-3 provide signal to automatically line up the dampers and to divert the exhaust flow from the FB to the iodine filtration trains of the NABVS (see U.S. EPR FSAR Tier 2, Figure 9.4.3-4).

   U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised to clarify the automatic control features of the radiation monitors.

c. U.S. EPR FSAR Tier 2, Section 9.4.2.5 regarding the FBVS will be revised to refer to U.S. EPR FSAR Tier 2, Section 11.5.

FSAR Impact:

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

b. U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

c. U.S. EPR FSAR Tier 2, Section 9.4.2.5 will be revised as described in the response and indicated on the enclosed markup.

Question 11.05-7:

FSAR Sections 11.5.2 to 11.5.4 present the descriptions of PERMSS subsystems and Table 11.5-1 lists radiation monitoring instrumentation used to monitor airborne effluent streams from the Nuclear Auxiliary Building Ventilation System (NABVS), as described in FSAR Section 9.4.3. A review of subsystems listed in Table 11.5-1 and Figures 11.5-1 and 9.4.3-2 to 9.4.3-4 indicates that the descriptions are inconsistent and incomplete. Specifically:

a. Table 11.5-1 does not identify the Automatic Control Features (ACF) of the radiation monitor for the NABVS radiation monitoring system. A review of FSAR Section 9.4.3 indicates that if elevated radiation levels are detected, the NABS exhaust flow is diverted to the iodine filtration train prior to discharge via the plant vent. Accordingly, the ACF provisions of Table 11.5-1 for the NABVS should be reviewed and revised to note whether the isolation of NABS Cells 1, 2 and 3 is part of the ACF design features for that radiation monitor.

b. FSAR Section 9.4.3.5 provides information on instrumentation requirements. However, Section 9.4.3.5 does not refer to FSAR Section 11.5 and Table 11.5-1 for specific details on the associated radiation monitoring equipment. Accordingly, FSAR Sections 11.5 and 9.4.3 should be 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.

c. In support to FSAR Table 11.5-1, FSAR Section 11.5.3.1 should list all radiological exhaust ventilation systems supported by radiation monitoring instrumentation and sampling systems. Accordingly, FSAR Sections 9.3, 9.4, 11.2, 11.3, 11.4, and 11.5 should be reviewed and revised to ensure a complete and consistent presentation of all systems serviced by radiation instrumentation in controlling and monitoring airborne radioactivity releases via the plant vent.

Response to Question 11.05-7:

a. U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised to list “NABVS diverts exhaust to iodine filtration on high activity” in the ACF column for NABVS. If high radiation is detected in any of the rooms within the Nuclear Auxiliary Building (NAB) (Cells 1, 2, and 3), Reactor Building (RB), Fuel Building (FB) (Cells 4 and 5), or Safeguard Building (SB) (Cell 6), the NABVS exhaust is diverted to an iodine filtration plenum. Refer to U.S. EPR FSAR Tier 2, Section 9.4.3.2.1 for more information. Isolation of NABVS Cells 1, 2, and 3 is not part of the ACF design features for the NABVS radiation monitors. The ACF design feature diverts flow to an iodine filtration train.

   U.S. EPR FSAR Tier 2, Figure 9.4.3-3 will be revised to clarify the exhaust for the SB and RB.

   The NABVS is not required to operate during a design basis accident (DBA). In case of a DBA, the NABVS is isolated from other heating, ventilation, and air conditioning (HVAC) systems (see U.S. EPR FSAR Tier 2, Section 9.4.3.3). The NABVS exhaust flow diversion to the iodine filtration trains is a non-safety-related ACF.

b. U.S. EPR FSAR Tier 2, Section 9.4.3.5 regarding the NABVS will be revised to refer to U.S. EPR FSAR Tier 2, Section 11.5.

c. The first paragraph of U.S. EPR FSAR Tier 2, Section 11.5.3.1 will be revised to include the remaining ventilation systems supported by radiation monitoring and sampling systems, including the reactor containment building (RCB) low flow purge subsystem, the RCB internal filtration subsystem, and the annulus ventilation system (AVS). Additionally, U.S. EPR FSAR Tier 2, Section 9.3, Section 9.4, Section 11.2, Section 11.3, Section 11.4, and Section 11.5 were reviewed and will be revised where appropriate for consistency. A cross-reference of figures and text sections will be added to U.S. EPR FSAR Tier 2, Table 11.5-1.

FSAR Impact:

a. U.S. EPR FSAR Tier 2, Table 11.5-1 and Figure 9.4.3-3 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

b. U.S. EPR FSAR Tier 2, Section 9.4.3.5 will be revised as described in the response and indicated on the enclosed markup.

c. U.S. EPR FSAR Tier 2, Section 9.3, Section 9.4, Section 11.2, Section 11.3, Section 11.4, Section 11.5, and Table 11.5-1 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

Question 11.05-8:

FSAR Sections 11.5.2 to 11.5.4 present the descriptions of PERMSS subsystems and Table 11.5-1 lists radiation monitoring instrumentation used to monitor airborne effluent streams from the Safeguard Building Controlled-Area Ventilation System (SBVS), as described in FSAR Section 9.4.5. A review of subsystems listed in Table 11.5-1 and Figures 11.5-1 and 9.4.5-2 indicates that the descriptions are inconsistent and incomplete. Specifically:

a. Table 11.5-1 does not identify the Automatic Control Features (ACF) of the radiation monitor for the SBVS radiation monitoring system. A review of FSAR Section 9.4.5 indicates that if elevated radiation levels are detected, the SBVS exhaust flow is diverted to the iodine filtration train located in the Fuel Building prior to discharge via the plant vent. Sections 9.4.5.1 and 9.4.5.2.3 also state that in the event of an accident in the Fuel Building or Reactor Building, the exhaust flows from these systems are diverted to the iodine train of the SBVS. However, it is not clear if all stated isolation and diversion functions of exhaust flows from these systems are automatic or whether some require manual operation for the described abnormal operating conditions and accidents. Accordingly, the ACF provisions of Table 11.5-1 for the SBVS should be reviewed and revised to distinguish the automatic isolation of SBVS dampers in directing exhaust to the SBVS iodine filtration train, and isolation features (automatic or manual as the case may be) for abnormal operations and accident conditions occurring in the FB and RB but which depend on the design features of the SBVS.

b. Although FSAR Table 11.5-1 identifies the use of a multi-function process radiation monitor, its location could not be readily determined in FSAR Figure 9.4.5-2. Accordingly, Figure 9.4.5-2 should be reviewed to confirm whether its location is indicated and, if not, it should be added to the figure to ensure a complete representation of the system.

c. FSAR Section 9.4.5.5 provides information on instrumentation requirements. However, Section 9.4.5.5 does not refer to FSAR Section 11.5 and Table 11.5-1 for specific details on the associated radiation monitoring equipment. Accordingly, FSAR Sections 11.5 and 9.4.5 should be 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 11.05-8:

a. The stated isolation and diversion functions of the SBVS exhaust flows are automatic.

   During normal operation, if radioactive contamination is detected in the Safeguard Building (SB) valve rooms, the hot area exhaust air to the nuclear auxiliary building ventilation system (NABVS) is automatically directed through the KLE iodine filtration trains. The radiation monitor located at KLC Cell 6 (see U.S. EPR FSAR Tier 2, Figure 9.4.3-3) sends the signal to divert the exhaust air flow through KLE iodine filtration trains (see U.S. EPR FSAR Tier 2, Figure 9.4.3-4).

   In the event of an accident, the accident air from the SB is automatically directed through the KLC accident exhaust iodine filtration trains located in the Fuel Building (FB) (see U.S. EPR FSAR Tier 2, Figure 9.4.5-2). The radiation monitor located downstream of the KLC accident exhaust iodine filtration trains monitors and records the release of radioactive contaminants to the vent stack.

In the event of containment isolation signal or high radiation at the in-containment high range monitors in the Containment Building, the radioactive contaminated air from FB or Containment Building is also automatically directed through the KLC accident exhaust iodine filtration trains located in the FB (see U.S. EPR FSAR Tier 2, Figure 9.4.5-2).

U.S. EPR FSAR Tier 2, Figure 9.4.5-2 will be revised to label the KLC accident exhaust iodine filtration trains.

b. The multi-function monitor that measures noble gas, aerosol, and iodine in the SBVS exhaust is not on U.S. EPR FSAR Tier 2, Figure 9.4.5-2. However, it is on U.S. EPR FSAR Tier 2, Figure 9.4.3-3 on the SB hot area exhaust (lower left, second from the bottom). Although this multi-function monitor measures the activity in the SBVS exhaust, it is located within the NABVS, and is therefore located in Figure 9.4.3-3. There are two noble gas monitors, in the same detector housing (shown as 1 circled R), on the exhaust of the accident iodine filtration trains on U.S. EPR FSAR Tier 2, Figure 9.4.5-2. These monitors are in the SBVS system.

   U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised to clarify the location of radiation monitors for the SB.

c. U.S. EPR FSAR Tier 2, Section 9.4.5.5 will be revised to refer to U.S. EPR FSAR Tier 2, Section 11.5.

FSAR Impact:

a. U.S. EPR FSAR Tier 2, Figure 9.4.5-2 will be revised as described in the response and indicated on the enclosed markup.

b. U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

c. U.S. EPR FSAR Tier 2, Section 9.4.5.5 will be revised as described in the response and indicated on the enclosed markup.

Question 11.05-9:

FSAR Sections 11.5.2 to 11.5.4 present the descriptions of PERMSS subsystems and Table 11.5-1 lists radiation monitoring instrumentation used to monitor airborne effluent streams from the Radioactive Waste Building Ventilation System (RWBVS), as described in FSAR Section 9.4.8. A review of subsystems listed in Table 11.5-1 and Figures 11.5-1 and 9.4.8-1 and 9.4.8-2 indicates that the descriptions are inconsistent and incomplete. Specifically:

a. In FSAR Table 11.5-1, the entry on Automatic Control Features (ACF) for the RWBVS radiation monitoring system should state “n/a” or “none” as opposed to the ambiguous entry shown as “--- “. In addition, there is a need to ensure a consistent use of system nomenclature between figures and descriptions. For example, FSAR Sections 11.5 and 9.4.8 do not refer to RWBVS Cells 1 and 2 exhausts, while Figure 9.4.8-2 makes a distinction in differentiating sources with different radioactivity levels. Accordingly, FSAR Sections 11.5 and 9.4.8 should be reviewed and revised to ensure a consistent presentation of design features and nomenclatures used in demonstrating compliance with effluent concentration limits of Appendix B to Part 20.

b. Based on a review of FSAR Sections 11.5 and 9.4.8 figures and descriptions, it is not clear if a radiation detector is missing or one needs to be relocated in Figure 9.4.8-2 on the line coming from the RWBVS Processing Rooms (Line C from Sheet 1 to Sheet 2). In contrast, the corresponding lines from RWBVS Cells 1 and 2 show a radiation detector for Lines A and B from Sheet 1 to Sheet 2 before the filter trains. Accordingly, FSAR Sections 11.5 and 9.4.8 should be reviewed and revised to ensure a consistent presentation of design and operational features in understanding how RWBVS radiation monitors function and alert operators when effluent releases could exceed the effluent concentration limits of Appendix B to Part 20.

c. In FSAR Table 11.5-1, the entry for the RWBVS radiation monitoring system indicates that there are two iodine radiation monitors and four aerosol radiation monitors. A review of FSAR Figures 11.5-1 and 9.4.8-2 indicates that the placements of these monitors is not clear given that there are three input flows to the RWBVS exhaust, one for Cell 1 and one for Cell 2 (Lines A and B from Sheet 1 to Sheet 2), and one for the RWBVS Processing Rooms (Line C from Sheet 1 to Sheet 2). There is no rationale provided for having one set of radiation monitors before each particulate/charcoal train for Cells 1 and 2 vent exhausts and none after it, and no explanations for the placement of the Processing Rooms monitor after the particulate/charcoal train with none before it. Accordingly, FSAR Sections 11.5 and 9.4.8 should be reviewed and revised to provide the technical rationale for the placement of radiation monitoring instrumentation in ensuring that effluent releases do not exceed the effluent concentration limits of Appendix B to Part 20.

d. FSAR Section 9.4.8.5 provides information on instrumentation requirements. However, Section 9.4.8.5 does not refer to FSAR Section 11.5 and Table 11.5-1 for specific details on the associated radiation monitoring equipment. Accordingly, FSAR Sections 11.5 and 9.4.8 should be 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 11.05-9:

a. U.S. EPR FSAR Tier 2, Table 11.5-1 will be revised to include an entry on the ACF column for the RWBVS monitoring system.

   U.S. EPR FSAR Tier 2, Section 9.4.8 and Figure 9.4.8-2 will be revised to clarify the room air exhaust (Cell 1 and Cell 2) and system exhaust air. As discussed in U.S. EPR FSAR Tier 2, Section 9.4.8, the “system exhaust” draws air from Radioactive Waste Building (RWB) locations where radioactivity is likely. The room air exhaust (Cell 1 and Cell 2) draws air from the RWB rooms that are not normally expected to contain radioactivity.

b. The location of radiation detectors is correctly located as shown on U.S. EPR FSAR Tier 2, Figure 9.4.8-2. The sampling activity monitors for room air exhaust Cell 1 and Cell 2 (lines A and B on U.S. EPR FSAR Tier 2, Figure 9.4.8-2) are located upstream of the filtration units. The radiation detector for the system exhaust (line C on U.S. EPR FSAR Tier 2, Figure 9.4.8-2) is located downstream of the iodine filtration trains. The justification for the location of radiation detectors is provided in Part c.

c. The room air exhaust from the RWB Cell 1 and Cell 2 (lines A and B on U.S. EPR FSAR Tier 2, Figure 9.4.8-2) takes exhaust air from the areas that do not normally contain radioactive contamination. The exhaust air upstream of the air filtration units is monitored by the sampling activity monitor system. During normal operation, the exhaust air bypasses the iodine filtration train when no radioactive contamination is detected. In the event of radioactive contamination, which is monitored by the Cell 1 or Cell 2 sampling activity monitors located upstream of the filtration units, the exhaust air is manually directed through the iodine filtration trains. The location of radiation detectors located upstream of filtration units provides an alarm if the exhaust air contains radioactive contamination and the exhaust air should be directed through the iodine filtration trains.

   The system exhaust air takes exhaust from the RWB areas where radioactivity is likely, and the exhaust air is always processed through the iodine filtration trains (Line C on U.S. EPR FSAR Tier 2, Figure 9.4.8-2). The exhaust air upstream of the iodine filtration trains does not need to be monitored for radioactivity contamination because the exhaust air is continuously processed through one of the iodine filtration trains. The other iodine filtration train is on standby. The radiation monitor located downstream of the iodine filtration trains monitors and records the release of radioactive contaminants to the vent stack. If radioactive contaminants are detected in the exhaust air, the operating iodine filtration train is isolated and the exhaust air is redirected through the standby iodine filtration train.

d. U.S. EPR FSAR Tier 2, Section 9.4.8.5 will be revised to refer to U.S. EPR FSAR Tier 2, Section 11.5.

FSAR Impact:

a. U.S. EPR FSAR Tier 2, Section 9.4.8, Figure 9.4.8-2, and Table 11.5-1 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

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

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

d. U.S. EPR FSAR Tier 2, Section 9.4.8.5 will be revised as described in the response and indicated on the enclosed markup.

Question 11.05-10:

FSAR Sections 11.5.2 to 11.5.4 present the descriptions of PERMSS subsystems and Table 11.5-1 lists radiation monitoring instrumentation used to monitor airborne effluent streams from the Access Building Ventilation System (ABVS), as described in FSAR Section 9.4.14. A review of subsystems listed in Table 11.5-1 and Figures 11.5-1 and 9.4.14-2 indicates that the descriptions are inconsistent and incomplete.

a. FSAR Table 11.5-1 identifies only a sampling system for the ABVS, while FSAR Figure 9.4.14-2 identifies a radiation monitor instead before the filtration train. Accordingly, FSAR Sections 11.5 and 9.4.14 should be reviewed and revised to ensure a consistent description of radiation instrumentation and design features used in controlling airborne radioactivity releases via the plant vent.

b. FSAR Section 9.4.14.6 provides information on instrumentation requirements for the ABVS. However, Section 9.4.14.6 does not refer to FSAR Section 11.5 and Table 11.5-1 for specific details on the associated radiation monitoring equipment for the ABVS. Accordingly, FSAR Sections 11.5 and 9.4.14 should be 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 11.05-10:

a. U.S. EPR FSAR Tier 2, Table 11.5-1 and Figure 9.4.14-2 will be revised. A radioactivity measuring point that represents radiation monitors and/or sample locations, listed as an R-xx number in the table and designated by a circled R on the figure, will present the type radiation monitors and/or type of sample available at that location. In the example presented in part a of the question, there is a grab sample point for iodine and aerosol available at that radioactivity measuring point.

b. U.S. EPR FSAR Tier 2, Section 9.4.14.6, which discusses the ABVS, will be revised to include a reference to U.S.EPR FSAR Tier 2, Section 11.5.

FSAR Impact:

a. U.S. EPR FSAR Tier 2, Figure 9.4.14-2 and Table 11.5-1 will be revised as described in the response and the FSAR markups provided by March 31, 2010.

b. U.S. EPR FSAR Tier 2, Section 9.4.14.6 will be revised as described in the response and indicated on the enclosed markup.

Question 11.05-11:

FSAR Sections 11.5.2 to 11.5.4 present the descriptions of PERMSS subsystems and Table 11.5-1 lists radiation monitoring instrumentation used to monitor airborne effluent streams from the Containment Building Ventilation System (CBVS), as described in FSAR Section 9.4.7. A review of subsystems listed in Table 11.5-1 and Figures 11.5-1 and 9.4.7-1 to 9.4.7-5 indicates that the descriptions are inconsistent and incomplete.

a. In FSAR Table 11.5-1, the two entries for the CBVS radiation monitoring systems indicate that there are a total of four noble gas monitors (two process and two effluents), two aerosol monitors, two iodine monitors, and one tritium monitor, all as process monitors. A review of FSAR Figures 11.5-1, 9.4.7-2 and 9.4.7-3 indicates that the placements of these monitors is not clear given that there are two input flows to the CBVS exhaust, one from the low flow and one from the full flow purge exhaust. The figures also show the placement of radiation monitors at three locations. The locations are: one out of the low flow purge exhaust; one after the CBVS dual particulate/charcoal filter train servicing only the low flow purge exhaust; and one before the single particulate/charcoal filter train of the CBVS internal filtration subsystem. There is no rationale provided for the placement of radiation monitors at these locations, no explanation for the lack of a radiation monitor on the full flow purge exhaust line before being routed to the Nuclear Auxiliary Building Ventilation System (NABVS) and no details are provided in reconciling their locations shown in Figures 9.4.7-2 and 9.4.7-3. Accordingly, FSAR Sections 11.5 and 9.4.7 should be reviewed and revised to provide the technical rationale for the number and placement of radiation monitoring instrumentation in ensuring that effluent releases do not exceed the effluent concentration limits of Appendix B to Part 20.

b. In FSAR Table 11.5-1, the entries on Automatic Control Features (ACF) for the CBVS radiation monitoring system are left blank with no details as to whether this system includes features that perform automatic functions upon receiving a high radiation signal. A review of FSAR Sections 9.4.3, 9.4.5, and 9.4.7 indicates that if elevated radiation levels are detected, the CBVS exhaust flow can be diverted to the Safeguard Building Controlled-Area Ventilation System (SBVS) and Nuclear Auxiliary Building Ventilation System (NABVS). However, it is not clear if the isolation and diversion functions of exhaust flows from the CBVS are automatic based only on responses of the monitors listed for the CBVS; are dependent on conditions associated with the operations of the monitors assigned to the SBVS and NABVS; or require manual operations based on the described abnormal operating conditions and accidents. Accordingly, the ACF provisions of Table 11.5-1 for the CBVS should be expanded upon in distinguishing the automatic isolation of CBVS dampers in directing exhaust flows to the SBVS and NABVS, and isolation features (automatic or manual as the case may be) for abnormal operations and accident conditions in demonstrating compliance with effluent concentration limits of Appendix B to Part 20.

c. FSAR Section 9.4.7.5 provides information on instrumentation requirements for the CBVS. However, Section 9.4.7.5 does not refer to FSAR Section 11.5 and Table 11.5-1 for specific details on the associated radiation monitoring equipment for the CBVS. Accordingly, FSAR Sections 11.5 and 9.4.7 should be 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 11.05-11:

a. The containment purge system is composed of the low flow and full flow purge systems. The low flow purge system operates during outages and during normal operation as needed for containment entry. Prior to containment entry, the low flow purge system is used to clean the air in containment. The radiation in the low flow purge exhaust air is monitored continuously upstream of the iodine filtration banks. The radiation monitor located downstream of the low flow purge exhaust iodine filtration trains monitors and records the release of radioactive contaminants to the vent stack.

   The full flow purge exhausts to the NABVS, which filters the exhaust air before discharging to the vent stack. The full flow purge operates only during Modes 5 and 6. The full flow purge is not operated until the containment atmosphere has been cleaned up by the low flow purge system. The internal filtration subsystem of the CBVS reduces the airborne radioactivity inside the equipment compartments in containment by circulation and filtration of the air during normal operation of the plant. The internal filtration subsystem runs continuously. Radiation monitors on the upstream side of the iodine filtration banks provide monitoring of the radiation levels in the equipment compartments.

   U.S. EPR FSAR Tier 2, Section 9.4.7.2.1 will be revised to include information on locations of radiation monitors.

b. The radiation monitoring detectors listed for the CBVS in U.S. EPR FSAR Tier 2, Table 11.5-1 do not initiate any automatic control of the CBVS upon detection of high radiation. However, in the event of containment isolation signal or high radiation at the in-containment high range monitors in the Containment Building, the Containment Building exhaust, fuel building ventilation system (FBVS) exhaust, and the SBVS exhaust are automatically directed through the KLC accident exhaust iodine filtration trains located in the Fuel Building (FB) (see U.S. EPR FSAR Tier 2, Figure 9.4.5-2).

   Additional ACFs for the CBVS are:

   - Upon receipt of a containment isolation signal (CIS), the low flow purge and full flow purge isolation valves are closed.
   - During the movement of fuel assemblies, radiation levels are monitored in the region of the refueling machine within containment. On high radioactivity in the containment, the full flow purge isolation valves and the low flow supply air isolation valves are closed and the low flow purge exhaust is switched over to the iodine filtration trains of the SBVS.

c. U.S. EPR FSAR Tier 2, Section 9.4.7.5 regarding the CBVS will be revised to refer to U.S. EPR FSAR Tier 2, Section 11.5.

FSAR Impact:

a. U.S. EPR FSAR Tier 2, Section 9.4.7.2.1 will be revised as described in the response and indicated on the enclosed markup.

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

c. U.S. EPR FSAR Tier 2, Section 9.4.7.5 will be revised as described in the response and indicated on the enclosed markup.

Question 11.05-12:

FSAR Sections 11.5.2 to 11.5.4 present the descriptions of PERMSS subsystems and Table 11.5-1 lists radiation monitoring methods used to monitor airborne effluent streams from the Annulus Ventilation System (AVS), as described in FSAR Section 6.2.3. However, Section 6.2.3.5 does not refer to FSAR Section 11.5 and Table 11.5-1 for specific details on the associated radiation monitoring equipment for the AVS. Accordingly, FSAR Sections 11.5 and 6.2.3 should be 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 11.05-12:

U.S. EPR FSAR Tier 2, Section 6.2.3.5 will be revised to refer to Section 11.5.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 6.2.3.5 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

- In-place leakage testing of the filters.

The functionality of the AVS is verified by testing alarms and indications and by confirming the availability of selectors in the MCR and by manual operation of heaters and dampers. A periodic switchover of system fans is performed during operation to check the functioning of each fan.

The AVS system is designed to permit access and periodic inspection of the system components. The operating equipment is accessible for visual inspection during all plant operating modes. Lighting inside filter banks between the rows of filters and inspection portholes in the filter housing doors allow for viewing while in operation.

6.2.3.5 Instrumentation Requirements

Indication of the operational status of the AVS equipment, position of dampers, instrument indications and alarms are provided in the MCR. Fans, motor-operated dampers, heaters and cooling units are operable from the MCR. Local instruments are provided to measure differential pressure across filters, flow, temperature and pressure. The fire detection and sensors information is delivered to the fire detection system. The radiation instrumentation requirements for controlling airborne radioactivity releases via the plant stack are addressed in Section 11.5.

11.05-12

- Safety-related components can function as required with failure of a single active component. The safety-related redundant components are powered from different electrical divisions so that the system can remain operable in case of failure of one of the electrical divisions.

9.4.2.4 Inspection and Testing Requirements

Refer to Section 14.2 (test abstracts #081and #203) for initial plant startup test program. Initial in-place acceptance testing of FBVS components will be performed in accordance with Reference 1.

9.4.2.5 Instrumentation Requirements

Indication of the operational status of the equipment, position of dampers, instrument indications and alarms are provided in the MCR. Fans, motor-operated dampers, heaters and cooling units are operable from the MCR. Local instruments are provided to measure ~~differential pressure across filters,~~ flow, temperature, and pressure. The fire detection and sensors information is delivered to the fire detection system. The radiation instrumentation requirements for controlling airborne radioactivity releases via the plant stack are addressed in Section 11.5.

11.05-6c

~~The minimum instrumentation, indication and alarms for ESF filter systems are provided in Table 9.4.1-1.~~

9.4.2.6 References

1. ASME AG-1-2003, “Code on Nuclear Air and Gas Treatment,” The American Society of Mechanical Engineers, 2003 (including the AG-1a, 2004 Addenda).

2. UL 555, “Standard for Fire Dampers,” Underwriter’s Laboratories, Sixth Edition, June 1999.

Next File

9.4.3.5 Instrumentation Requirements

Indication of the operational status of the equipment, position of dampers, instrument indications and alarms are provided in the MCR. Fans, motor-operated dampers, heaters, and cooling units are operable from the MCR. Local instruments are provided to measure differential pressure across filters, flow, temperature and pressure.

The fire detection and sensors information is delivered to the fire detection system.

All instrumentation provided with the filtration units is as required by RG 1.140.

11.05-7b → The radiation instrumentation requirements for controlling airborne radioactivity releases via the plant stack are addressed in Section 11.5.

9.4.3.6 References

1. ASME AG-1-2003, "Code on Nuclear Air and Gas Treatment," The American Society of Mechanical Engineers, 2003 (including the AG-1a, 2004 Addenda).

2. ANSI/ASHRAE Standard 52.2-1999, "Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size," ANSI/American Society of Heating, Refrigerating and Air Conditioning Engineers, 1999.

3. ASME N510-1989 (R1995), "Testing of Nuclear Air-Treatment Systems," The American Society of Mechanical Engineers, 1989.

4. ANSI/AMCA-210-99, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating," American National Standards Institute/Air Movement and Control Association International, December 1999.

5. ANSI/AMCA-211-1987, "Certified Ratings Program–Air Performance," American National Standards Institute/Air Movement and Control Association International, 1987.

6. ANSI/AMCA-300-1985, "Reverberant Room Method of Testing Fans for Rating Purposes," American National Standards Institute/Air Movement and Control Association International, 1985.

7. UL 555, "Standard for Fire Dampers," Underwriter's Laboratories, Sixth Edition, June 1999.

Next File

Confinement of the four SB hot mechanical areas and startup of the SBVS accident iodine filtration trains is initiated by the safety automation system (SAS) signal.

Isolation dampers in the supply and exhaust ducts are provided for the SB division one through four rooms where safety injection and residual heat removal system equipment is located. These dampers close during RHR operation to prevent the spread of steam and airborne contamination due to a RHR system pipe failure.

Redundant components are powered from different electrical divisions to remain available in case of failure of one division. As a backup, power is supplied to the engineered safety equipment by the emergency diesel generators (EDG).

Capability for withstanding or coping with an SBO event is met by the design of the AAC power source satisfying the ten minute criteria; (i.e., the AAC power source can be started from the main control room (MCR) within ten minutes of the onset of an SBO event). The SBO diesel generators are designed to operate for a minimum of twenty-four hours with available onsite fuel supplies.

9.4.5.4 Inspection and Testing Requirements

Refer to Section 14.2 (test abstracts #083 and #203) for initial plant startup test program. Initial inplace acceptance testing of SBVS components is performed in accordance with Reference 2, and Reference 4.

Refer to Section 16 (SR 3.7.12) for surveillance requirements.

9.4.5.5 Instrumentation Requirements

11.05-8c

Indication of the operational status of the equipment, position of dampers, instrument indications and alarms are provided in the MCR. Fans, motor-operated dampers, heaters and cooling units are operable from the MCR. Local instruments are provided to measure differential pressure across filters, flow, temperature and pressure. The fire detection and sensors information is delivered to the fire detection system. The radiation instrumentation requirements for controlling airborne radioactivity releases via the plant stack are addressed in Section 11.5.

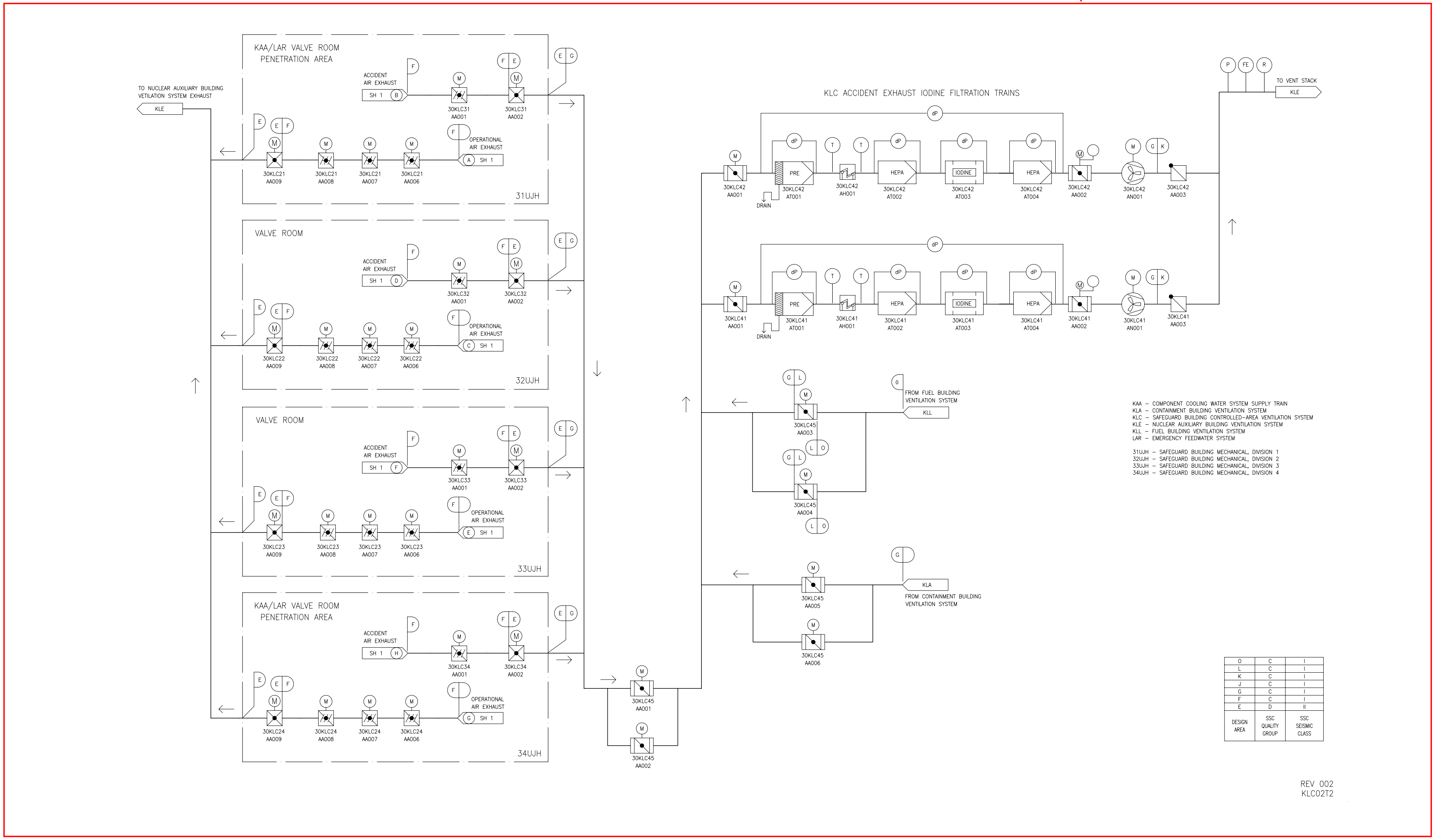
The minimum instrumentation, indication and alarms for ESF filter systems are provided in Table 9.4.1-1.

9.4.5.6 References

1. NUREG-CR/0660, Boner, G.L. and Hanners, H.W., “Enhancement of Onsite Emergency Diesel Generator Reliability,” (subsection A–item 2, and subsection C-item 1), University of Dayton Research Institute UDR-TR-79-07 for U.S. Nuclear Regulatory Commission, January 1979.

11.05-8a

Figure 9.4.5-2—Safeguard Buildings Exhaust Air Subsystem



DESIGN AREA	SSC QUALITY GROUP	SSC SEISMIC CLASS
O	C	I
L	C	I
K	C	I
J	C	I
G	C	I
F	C	I
E	D	II

Next File

Section 9.4.3) through the Fuel Building (FB) concrete plenum. The supply air is then directed through the containment annulus penetration ducts into the containment plenum which discharges air into the service compartments of the Containment Building. The service compartments include technical rooms, instrument rooms, staircases, tank rooms, annular space at the operating floor, and annular space at the lower level. With the purge subsystem in operation, the air from the service compartments flows into equipment compartments as a result of pressure differential.

11.05-11a

The low-flow purge exhaust subsystem contains two redundant filtration trains located in the FB. Radiation monitors are located upstream of the filtration trains for monitoring the containment exhaust air prior to filtration. The filtration trains receive air from the exhaust duct of the low-flow purge exhaust subsystems. The full-flow purge exhaust is directed to the NABVS. The CBVS low flow purge exhaust can also be directed to the safeguard building controlled-area ventilation system (SBVS) iodine filtration trains in an emergency for redundancy (refer to Section 9.4.5). Each filtration train consists of an electric heater, prefilter, upstream HEPA filters, carbon adsorber, downstream HEPA filters, and exhaust fan. The exhaust air from the filtration trains is directed to the plant vent stack. The radiation monitor located downstream of the CBVS low flow purge iodine filtration trains monitors and records the release of radioactive contaminants to the vent stack. The full-flow purge exhaust subsystem directs the containment exhaust air through the NABVS exhaust filtration train (refer to Section 9.4.3).

The dampers downstream of the supply plenum regulate pressure inside the Containment Building. The equipment compartment exhaust dampers regulate differential pressure between the service and equipment compartments when the low-flow purge subsystem is operating.

The containment purge subsystems provide automatic isolation of containment atmosphere by quick closure of containment isolation valves and closure of the air supply in front of the hatch.

The containment purge subsystem is designed in accordance with ASME AG-1-2003 (Reference 1) and RG 1.52 for atmospheric cleanup.

Internal Filtration Subsystem

The internal filtration subsystem (See Figure 9.4.7-3—Containment Building Internal Filtration Subsystem) limits the release of radioactive material by reducing radioactive iodine contamination inside the equipment compartment with air circulation and filtration during normal plant operation. The internal filtration subsystem contains one filtration train which consists of an electric heater, prefilter, upstream HEPA filter, carbon adsorbers, and a downstream HEPA filter; with two redundant fans downstream of the filtration train. The air is drawn from the equipment compartments, filtered, and returned to the equipment compartments.

11.05-11a

Radiation monitors are located upstream of the filtration trains for monitoring the radiation in the equipment compartments prior to filtration.

The system is designed in accordance with Reference 1 and RG 1.140.

Containment Building Cooling Subsystem

The containment building cooling subsystem (See Figure 9.4.7-4—Containment Building Cooling Subsystem) provides cool air into a concrete circular header located above the residual heat removal-safety injection room, and into the reactor pit cooling fan plenum. The containment building cooling subsystem provides cool air to the reactor coolant pumps, steam generators, chemical volume control system (CVCS), control rod drive mechanism system (CRDMS), and vent and drain system. There are two trains of two main fans and four cooling coils located in the equipment compartments. The cooling coils receive cold water from the operational chilled water system (OCWS).

Two trains of two reactor pit cooling fans located in the equipment compartments supply cool air to the reactor pit area. These fans are used to ventilate the reactor pit during normal and station blackout (SBO) conditions. The reactor pit is cooled by air from a plenum between the main fans and the reactor pit cooling fans. The supply air subsystem to the reactor pit is composed of a 16 duct layout around the main coolant piping.

The exhaust from these areas is recycled through the cooling coils located in the equipment compartments.

Service Compartments Cooling Subsystem

The service compartment cooling subsystem (See Figure 9.4.7-5—Containment Building Service Compartments Cooling Subsystem) contains 12 recirculating cooling units. Each air cooling unit is equipped with a cooling coil connected to the OCWS. The recirculation cooling units provide ventilation and cooling for the service compartments. The service compartments include safety injection system valve rooms, steam generator blowdown system tank and heat exchanger rooms, instrument measuring cabinets and table rooms, and containment dome and annular space.

9.4.7.2.2 Component Description

The major components of the CBVS are listed in the following paragraphs, along with the applicable code and standards. Refer to Section 3.2 for the seismic and system quality group classification of these components.

instruments are provided to measure differential pressure across filters, flow, temperature and pressure. The fire detection and sensors information is delivered to the fire detection system.

The minimum instrumentation, indication and alarms for ESF filter systems are provided in Table 9.4.1-1.

11.05-11c The radiation instrumentation requirements for controlling airborne radioactivity releases via the plant stack are addressed in Section 11.5.

9.4.7.6 References

1. ASME AG-1-2003, "Code on Nuclear Air and Gas Treatment," The American Society of Mechanical Engineers, 2003 (including the AG-1a, 2004 Addenda).

2. ANSI/ASHRAE Standard 52.2-1999, "Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size," ANSI/American Society of Heating, Refrigerating and Air Conditioning Engineers, 1999.

3. ASME N510-1989 (R1995), "Testing of Nuclear Air-Treatment Systems," The American Society of Mechanical Engineers, 1989.

4. ANSI/AMCA-210-99, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating," American National Standards Institute/Air Movement and Control Association International, December 1999.

5. ANSI/AMCA-211-1987, "Certified Ratings Program–Air Performance," American National Standards Institute/Air Movement and Control Association International, 1987.

6. ANSI/AMCA-300-1985, "Reverberant Room Method of Testing Fans for Rating Purposes," American National Standards Institute/Air Movement and Control Association International, 1985.

7. UL 555, "Standard for Fire Dampers," Underwriter's Laboratories, Sixth Edition, June 1999.

8. NUREG-0800, BTP 6-4, Revision 3, "Containment Purging During Normal Plant Operations," U.S. Nuclear Regulatory Commission, March 2007.

Next File

9.4.8.3 Safety Evaluation

The RWBVS is not required for the safe shutdown of the plant or for mitigating the consequences of a design basis accident or a 10 CFR Part 100 event. Therefore, the RWBVS has no safety-related function.

9.4.8.4 Inspection and Testing Requirements

Refer to Section 14.2 (test abstracts #080 and #203) for initial plant startup test program. Initial inplace acceptance testing of RWBVS components is performed in accordance with Reference 1, and Reference 3.

9.4.8.5 Instrumentation Requirements

Indication of the operational status of the equipment, position of dampers, instrument indications and alarms are provided in the MCR. Fans, motor-operated dampers, heaters, and cooling units are operable from the MCR. Local instruments are provided to measure differential pressure across filters, flow, temperature and pressure.

The fire detection and sensors information is delivered to the fire detection system.

11.05-9d → The radiation instrumentation requirements for controlling airborne radioactivity releases via the plant stack are addressed in Section 11.5.

All instrumentation provided with the filtration units is as required by RG 1.140.

9.4.8.6 References

1. ASME AG-1-2003, "Code on Nuclear Air and Gas Treatment," The American Society of Mechanical Engineers, 2003 (including the AG-1a, 2004 Addenda).

2. ANSI/ASHRAE Standard 52.2-1999, "Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size," ANSI/American Society of Heating, Refrigerating and Air Conditioning Engineers, 1999.

3. ASME N510-1989 (R1995), "Testing of Nuclear Air-Treatment Systems," The American Society of Mechanical Engineers, 1989.

4. ANSI/AMCA-210-99, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating," American National Standards Institute/Air Movement and Control Association International, December 1999.

5. ANSI/AMCA-211-1987, "Certified Ratings Program–Air Performance," American National Standards Institute/Air Movement and Control Association International, 1987.

6. ANSI/AMCA-300-1985, "Reverberant Room Method of Testing Fans for Rating Purposes," American National Standards Institute/Air Movement and Control Association International, 1985.

Next File

9.4.14.6 Instrumentation Requirements

Indication of the operational status of the equipment, position of dampers, instrument indications and alarms are provided in the MCR. Fans, motor-operated dampers, heaters and cooling units are operable from the MCR. Local instruments are provided to measure differential pressure across filters, flow, temperature and pressure. The fire detection and sensors information is delivered to the fire detection system.

11.05-10b

The radiation instrumentation requirements for controlling airborne radioactivity releases via the plant stack are addressed in Section 11.5.

9.4.14.7 References

1. UL 555, "Standard for Fire Dampers," Underwriter's Laboratories, Sixth Edition, June 1999.

2. ASME N509-2002, "Nuclear Power Plant Air-Cleaning Units and Components," The American Society of Mechanical Engineers, 2002.

3. ASME N510-1989 (R1995), "Testing of Nuclear Air-Treatment Systems," The American Society of Mechanical Engineers, 1989.

4. ASME AG-1-2003, "Code on Nuclear Air and Gas Treatment," The American Society of Mechanical Engineers, 2003 (including the AG-1a, 2004 Addenda).