ArevaEPRDCPEm Resource

From: BRYAN Martin (EXTERNAL AREVA) [Martin.Bryan.ext@areva.com]
Sent: Friday, January 14, 2011 9:08 AM
To: Tesfaye, Getachew
Cc: DELANO Karen (AREVA); ROMINE Judy (AREVA); NOXON David (AREVA); HALLINGER Pat (EXTERNAL AREVA); WILLIFORD Dennis (AREVA); RYAN Tom (AREVA)
Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 360, FSAR Ch 12, Supplement 6 - PHASE 4 RAI
Attachments: RAI 360 Supplement 7 Response US EPR DC - DRAFT.pdf

Getachew,

Attached is a draft response for RAI 360 question 12.03-12.04-21 in support of a final response date of February 14, 2011. Let me know if the staff has questions or if this response can be sent as final.

Thanks,

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

From: BRYAN Martin (External RS/NB)
Sent: Thursday, January 13, 2011 2:30 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); NOXON David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 360, FSAR Ch 12, Supplement 6 - PHASE 4 RAI

Getachew,

AREVA NP Inc. provided a schedule for a technically correct and complete response to RAI No. 360 on April 2, 2010. AREVA NP submitted Supplement 1 to the response on May 10, 2010, providing a technically correct and complete response to portions of one of the remaining 2 questions. AREVA NP submitted Supplement 2 to the response on June 28, 2010, providing a revised schedule for the remaining questions. AREVA NP submitted Supplement 3 to the response on July 12, 2010, providing technically correct and complete responses to two parts of one of the remaining questions and one part of the other remaining question. AREVA NP submitted Supplement 4 and Supplement 5 to the response on September 16, 2010 and November 22, 2010 respectively, providing a revised schedule for the one remaining question.

Additional time is required to complete a response to the remaining question and to interact with the NRC staff.

The schedule for providing a complete response to the remaining question has been revised as indicated below.

Question #	Response Date
12.03-12.04-21, Part 1	February 14, 2011

Sincerely,

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

From: BRYAN Martin (External RS/NB)
Sent: Monday, November 22, 2010 3:28 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); NOXON David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 360, FSAR Ch 12, Supplement 5 - PHASE 4 RAI

Getachew,

AREVA NP Inc. provided a schedule for a technically correct and complete response to RAI No. 360 on April 2, 2010. AREVA NP submitted Supplement 1 to the response on May 10, 2010, providing a technically correct and complete response to portions of one of the remaining 2 questions. AREVA NP submitted Supplement 2 to the response on June 28, 2010, providing a revised schedule for the remaining questions. AREVA NP submitted Supplement 3 to the response on July 12, 2010, providing technically correct and complete responses to two parts of one of the remaining questions and one part of the other remaining question. AREVA NP submitted Supplement 4 to the response on September 16, 2010, providing a revised schedule for the one remaining question.

Additional time is required to complete a response to the remaining question and to interact with the NRC staff.

The schedule for providing a complete response to the remaining question has been revised as indicated below.

Question #	Response Date
12.03-12.04-21, Part 1	January 13, 2011

Sincerely,

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

From: BRYAN Martin (External RS/NB)
Sent: Thursday, September 16, 2010 4:41 PM
To: 'Getachew.Tesfaye@nrc.gov'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); NOXON David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 360, FSAR Ch 12, Supplement 4 - PHASE 4 RAI

Getachew,

AREVA NP Inc. provided a schedule for a technically correct and complete response to RAI No. 360 on April 2, 2010. AREVA NP submitted Supplement 1 to the response on May 10, 2010, providing a technically correct and complete response to portions of one of the remaining 2 questions. AREVA NP submitted Supplement 2 to the response on June 28, 2010, providing a revised schedule for the remaining questions. AREVA NP submitted Supplement 3 to the response on July 12, 2010, providing technically correct and complete responses to two parts of one of the remaining questions and one part of the other remaining question, as committed.

Additional time is required to complete a response to the remaining question and to interact with the NRC staff.

The schedule for providing a complete response to the remaining question has been revised as indicated below.

Question #	Response Date
12.03-12.04-21, Part 1	November 22, 2010

Sincerely,

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

From: BRYAN Martin (EXT)
Sent: Monday, July 12, 2010 2:56 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); NOXON David B (AREVA NP INC); WILLIFORD Dennis C (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 360, FSAR Ch 12, Supplement 3 - PHASE 4 RAI

Getachew,

AREVA NP Inc. provided a schedule for a technically correct and complete response to RAI No. 360 on April 2, 2010. AREVA NP submitted Supplement 1 to the response on May 10, 2010, providing a technically correct and complete response to portions of one of the remaining 2 questions. AREVA NP submitted Supplement 2 to the response on June 28, 2010, providing a revised schedule for the remaining questions. The question number in the table for the first entry was incorrect in RAI 360 Supplement 2 and is corrected below here in RAI 360 Supplement 3. The attached file, “RAI 360 Supplement 3 Response US EPR DC” provides technically correct and complete responses to two parts of one of the remaining questions and one part of the other remaining question, 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 360 Questions 12.04-12.04-20, and 12.04-12.04-21.

The following table indicates the respective pages in the response document, “RAI 360 Supplement 3 Response US EPR DC,” that contain AREVA NP’s response to the subject questions.

Question #	Start Page	End Page
RAI 360 — 12.03-12.04-20, Parts 2 & 3	2	3

RAI 360 — 12.03-12.04-21, Part 2	4	5

The schedule for a technically correct and complete response to Part 1 of the remaining question is unchanged and is provided below:

Question #	Response Date
12.03-12.04-21, Part 1	September 16, 2010

Sincerely,

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

From: BRYAN Martin (EXT)
Sent: Monday, June 28, 2010 7:19 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); NOXON David B (AREVA NP INC); WILLIFORD Dennis C (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 360, FSAR Ch 12, Supplement 2 - PHASE 4 RAI

Getachew,

AREVA NP Inc. provided a schedule for a technically correct and complete response to RAI No. 360 on April 2, 2010. AREVA NP submitted Supplement 1 to the response on May 10, 2010, providing a technically correct and complete response to portions of one of the remaining 2 questions.

A revised schedule to complete the remaining responses is required in order to support interaction with the NRC.

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

Question #	Response Date
12.03-12.04-20	July 30, 2010
12.03-12.04-21, Part 2	July 30, 2010
12.03-12.04-21, Part 1	September 16, 2010

Sincerely,

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

From: WELLS Russell D (AREVA NP INC)
Sent: Monday, May 10, 2010 6:08 PM
To: 'Getachew Tesfaye'
Cc: BRYAN Martin (EXT); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 360, FSAR Ch 12, Supplement 1 - PHASE 4 RAI

Getachew,

AREVA NP Inc. provided a schedule for a technically correct and complete response to RAI No. 360 on April 2, 2010. The attached file, "RAI 360 Supplement 1 Response US EPR DC.pdf" provides a technically correct and complete response to portions of one of the remaining 2 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 360 Supplement 1 Question 12.03-12.04-20 (Part 1).

The following table indicates the respective pages in the response document, "RAI 360 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
12.03-12.04-20 (Parts 1 & 4)	2	4

A revised schedule to complete the remaining responses is required in order to address NRC reviewer concerns discussed during the Chapter 12 audit on April 23, 2010 and during the follow-up telecon on April 28, 2010. The revised schedule for technically correct and complete responses to the remaining questions is provided below:

Question #	Response Date
12.03-12.04-20 (Parts 2 & 3)	June 29, 2010
12.03-12.04-21	June 29, 2010

Sincerely,

(Russ Wells on behalf of)
Martin (Marty) C. Bryan
Licensing Advisory Engineer
AREVA NP Inc.
Tel: (434) 832-3016
Martin.Bryan.ext@areva.com

From: BRYAN Martin (EXT)
Sent: Friday, April 02, 2010 12:31 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); WILLIFORD Dennis C (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 360 (4132), FSAR Ch. 12 - PHASE 4 RAI

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 360 Response US EPR DC.pdf" provides a schedule since a technically correct and complete response to the 2 questions is not provided.

The following table indicates the respective pages in the response document, "RAI 360 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 360 — 12.03-12.04-20	2	2
RAI 360 — 12.03-12.04-21	3	3

A complete answer is not provided for the 2 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 360 — 12.03-12.04-20	May 10, 2010
RAI 360 — 12.03-12.04-21	May 10, 2010

Sincerely

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

From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Thursday, March 04, 2010 3:17 PM
To: ZZ-DL-A-USEPR-DL
Cc: Bernal, Sara; Roach, Edward; Jennings, Jason; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 360 (4132), FSAR Ch. 12 - PHASE 4 RAI

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on January 22, 2010, and discussed with your staff on March 2, 2010. No changes were made to the draft RAI 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: 2427

Mail Envelope Properties (199EBB4D1CD9644D9472AA84D5D8EFA711E950)

Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 360, FSAR Ch 12, Supplement 6 - PHASE 4 RAI
Sent Date: 1/14/2011 9:08:24 AM
Received Date: 1/14/2011 9:08:38 AM
From: BRYAN Martin (EXTERNAL AREVA)

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

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"DELANO Karen (AREVA)" <Karen.Delano@areva.com>
Tracking Status: None
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Tracking Status: None
"HALLINGER Pat (EXTERNAL AREVA)" <Pat.Hallinger.ext@areva.com>
Tracking Status: None
"WILLIFORD Dennis (AREVA)" <Dennis.Williford@areva.com>
Tracking Status: None
"RYAN Tom (AREVA)" <Tom.Ryan@areva.com>
Tracking Status: None
"Tesfaye, Getachew" <Getachew.Tesfaye@nrc.gov>
Tracking Status: None

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Files	**Size**	**Date & Time**
MESSAGE	13351	1/14/2011 9:08:38 AM
RAI 360 Supplement 7 Response US EPR DC - DRAFT.pdf	327288	

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

Response to

Request for Additional Information No. 360, Supplement 7

3/04/2010

U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 12.03-12.04 - Radiation Protection Design Features
Application Section: 12.03-12.04 - Radiation Protection Design Features

QUESTIONS for Health Physics Branch (CHPB)

Question 12.03-12.04-21:

This is a follow-up to OPEN ITEM RAI 228, Question No. 12.3-12.4-9

1. A review of Areva's response to RAI 228, Question 12.03-12.04-9, part 3, indicates that much of the information presented is a recap of system features and operational concepts already described in the FSAR. However, one aspect that is not well discussed for Section 11.5 are 10 CFR 20.1406 design features associated with process and effluent monitoring and sampling systems. There is a need to expand the discussion on design features of the process and effluent monitoring and sampling systems and their interconnections to non-radioactive systems. Subsystem interconnections to non-radioactive systems include purge air, purge water, instrument air, and makeup water for filling loop seals. The design features should describe how these non-radioactive system interconnections are protected from contamination due to leakage, spillage, valving errors, or other operating conditions. For example, for equipment requiring the use of purge air, the air should be taken from ambient or room atmosphere where the sampling subsystem is located, passed through prefilters, and then, upon demand, made available for purging, with the purged flow not returned to its supply source. For liquid process or effluent rad monitors that require flush water, the design of these interconnections should confirm that flush water supply is either temporarily connected during maintenance and then completely removed upon termination of the flush, or, if permanently connected, protected by backflow preventers and pressure differentials. Again, the purge flow should be forwarded to the most appropriate radioactive system and not returned to its supply source. Where loop seals are utilized, the loop seals should be isolated from the makeup water source by use of isolation valves and backflow preventers. Similar design features should be described for instrument air. This expanded discussion should be presented in FSAR Section 12.3.6.5.2 or 12.3.6.5.4, with internal cross-referencing. If, as part of this response, new or additional design features are described, then they should all be incorporated into the relevant FSAR sections where the systems are described.

"Refer to Sections 12.3.6.5.2 and 12.3.6.5.4 for process and effluent monitoring and sampling systems design features which demonstrate compliance with the requirements of Part 20.1406 and guidance of IE Bulletin 80-10."

Response to Question 12.03-12.04-21, Part 1:

The Response to RAI 23, Question12.03-12.04-1, Supplement 1 addresses how the process sampling system complies with 10 CFR 20.1406 with respect to minimizing contamination of the facility and the environment.

U.S. EPR FSAR Tier 2, Section 9.3 will be revised to include the following features:

- Maintenance and decontamination connections are either temporary or completely removed upon termination of the flush. Non-contaminated systems that are permanently connected are protected by a backflow preventer and differential pressure.

- Process sample systems prevent the inadvertent transfer of contaminated fluids to non-contaminated drainage systems by sending contaminated fluids either back to the system being sampled or to an appropriate radwaste system. Flushing or purging media are routed to the appropriate system.

- Sample lines are normally flushed with sample media.

- Sample glove boxes are used to confine spills and limit any liquid or gaseous release to environment.

- Sample glove boxes are purged by taking air from the room atmosphere. The air is passed through pre-filters, made available for purging, and then discharged to the appropriate gaseous system.

An internal cross-reference linking U.S. EPR FSAR Tier 2, Section 12.3.6.5.2 with U.S. EPR FSAR Tier 2, Section 9.3.2 will be added.

The compressed air system (CAS) interfaces with potentially contaminated systems in the Reactor Building, Safeguard Buildings, Nuclear Auxiliary Building, Fuel Building, and Radioactive Waste Processing Building, through both permanent and temporary connections. The CAS contains certain design features to prevent the cross-contamination of the CAS by interfacing systems. These CAS design features reflect the lessons learned from IE Bulletins 80-10 and IE 85-06, and show conformance with Title 10 of the Code of Federal Regulations, Part 20.1406 (10CFR20.1406), "Minimization of Contamination."

The minimum operating pressure of the CAS at each system interface is higher than that of the interfacing system and the air is not recycled. A pressure instrument and an isolation valve that closes to prevent backflow, are located at the entrance to each NI building in which CAS has a connection with a potentially contaminated system. There is also an isolation valve in the CAS piping as it enters the NI that can isolate the CAS piping to prevent contamination spread outside of the NI. All temporary hose connections are fitted with self-sealing quick disconnect connectors, and have normally-closed, branch manual isolation valves immediately upstream of the connections, which isolate individual connections from the remainder of the CAS. The CAS is designed to prevent backflow when compressor pressure is lost by ‘defense in depth’ consisting of sufficient capacity in the air receiver, and multiple barriers such as isolation valves.

The CAS is designed for a single unit and is not shared with other units. The CAS does not provide any breathing air.

The overall design configuration of the CAS and its interfaces with contaminated systems includes sufficient barriers to prevent radioactive contamination of the CAS.

U.S. EPR FSAR Tier 2, Section 12.3.6.5.10 will be changed to include the information as described in the response. An internal cross-reference linking U.S. EPR FSAR Tier 2, Section 12.3.6.5.10 with U.S. EPR FSAR Tier 2, Section 9.3.1 will be added.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 9.3.1, Section 9.3.2.1, Section 9.3.2.2.1.1, Section 12.3.6.5.2, and Section 12.3.6.5.10 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

9.3 Process Auxiliaries

9.3.1 Compressed Air System

The compressed air system (CAS) consists of compressors, dryers, filters, receivers and other equipment required for performing its non-safety-related functions.

9.3.1.1 Design Bases

The CAS provides compressed air for the following services:

- Instrument air for non-safety-related valves and other equipment located in the Conventional Island (CI).
- Instrument air for opening the containment ventilation purge dampers.
- Instrument air to valves, pumps and other equipment located in the Radioactive Waste Building, blowdown demineralization, fuel handling and other systems for non-safety-related functions.
- Service air throughout the plant (for using air-operated tools and purging tanks).

The containment isolation features for the containment penetrations in the CAS are described in Section 6.2.4.

There are no air-operated valves (AOV) or air-operated equipment required to function in response to an accident where the compressed air is provided by the CAS.

The design of the CAS is in compliance with the resolution of NUREG-0933, Generic Safety Issue 43, Reliability of Air Systems (Reference 1).

The CAS is designed for a single unit and is not shared with other units.

12.03-12.04-21

Instrument air is designed to meet ANSI/ISA 7.0.01-1996 (Reference 3).

Refer to Section 12.3.6.5.10 for compressed air system design features which demonstrate compliance with the requirements of 10 CFR 20.1406.

9.3.1.2 System Description

9.3.1.2.1 General Description

The CAS consists of a compressed air generation system and a compressed air distribution system. The compressed air generation system is located entirely in the Turbine Building (TB). It supplies compressed air to the compressed air distribution systems in the Nuclear Island (NI) and CI. The location of the compressed air generation system in the TB minimizes the likelihood of leakage from radioactive systems being ingested into the CAS.

AREVA NP Inc. has designed safety-related process and effluent radiological monitoring and sampling systems in accordance with the following criteria:

- Radiation detectors and black boxes are powered from the uninterruptible power supply system; sample pumps and heat-tracing systems are powered from Class 1E power.
- Components are environmentally qualified as applicable. Section 3.11 addresses the environmental qualification of instrumentation.
- Components are seismically qualified as applicable. Sections 3.10 and 3.11 address the qualification of instrumentation.
- Systems comply with the fire protection criteria addressed in Section 9.5.
- Multiple (redundant) systems are used and are physically separated in accordance with criteria addressed in Section 8.3.2.

Process and effluent radiological monitoring and sampling systems that sample airborne radioactive materials are designed in accordance with the general principles and guidance contained in ANSI Standard N.13.1-1999 (Reference 1). Use of this ANSI standard is in accordance with RG 1.21.

12.03-12.04-21

Refer to Section 12.3.6.5.4 for radioactive waste management system design features which demonstrate compliance with the requirements of 10 CFR 20.1406.

A COL applicant that references the U.S. EPR will fully describe, at the functional level, elements of the process and effluent monitoring and sampling programs required by 10 CFR Part 50, Appendix I and 10 CFR 52.79(a)(16). This program description, Offsite Dose Calculation Manual (ODCM), will specify how a licensee controls, monitors, and performs radiological evaluations of releases. The program will also document and report radiological effluents discharged to the environment.

A COL applicant that references the U.S. EPR design certification is responsible for deriving PERMSS subsystem's lower limits of detection or detection sensitivities, and set-points (alarms and process termination/diversion) for liquid and gaseous process radiation monitoring equipment not covered by the ODCM based on plant and site-specific conditions and operating characteristics of each installed radiation monitoring subsystem.

A COL applicant that references the U.S. EPR design certification is responsible for developing a plant-specific process and effluent radiological sampling and analysis plan for systems not covered by the ODCM, including provisions describing sampling and analytical frequencies, and radiological analyses for the expected types of liquid and gaseous samples and waste media generated by the LWMS, GWMS, and SWMS.

12.3.6.5.9 Safety Chilled Water System

The safety chilled water system is designed to minimize contamination of the facility and the environment as described in the general protective design features listed in Sections 12.3.6.1 and 12.3.6.2.

A process radiation monitor is provided in Trains 1 and 4 of the SCWS, downstream of the low head safety injection (LHSI) pump mechanical seal HX, to monitor for possible leakage of radioactive fluid from the HX. The LHSI pump mechanical seal is directly cooled by reactor coolant. This process radiation monitor satisfies the requirements of GDC 64, 10 CFR 52.47(a)(6), and 10 CFR 20.1406. Other than the previously mentioned potential for possible leakage, the SCWS is free of any radioactivity resulting from plant operation. The SCWS design is consistent with the U.S. EPR contaminant management philosophy to comply with the requirements of 10 CFR 20.1406. Migration of radioactive material from potentially radioactive systems is prevented with a minimum of two barriers. The CCWS is located between the SCWS and the RHRS. In addition to the CCWS/SCWS HX, there is a second HX barrier between the CCWS and RHRS. To directly transfer contaminated water to the SCWS, two HXs must fail simultaneously. It is unlikely that two monitored systems will fail simultaneously and remain undetected. Radiation monitors are located in the CCWS to detect radioactive contamination in the system.

12.3.6.5.10 Compressed Air System

12.03-12.04-21

The compressed air system is designed to minimize contamination of the facility and the environment as described in the general protective design features listed in Sections 12.3.6.1 and 12.3.6.2.

The CAS design is consistent with the U.S. EPR containment philosophy to comply with the requirements of 10 CFR 20.1406. This applies to both the instrument air and the service air portions of the CAS. The minimum operating pressure of the CAS at each system interface is higher than that of the interfacing system and the air is not recycled. A pressure instrument and an isolation valve that closes to prevent backflow are located at the entrance to each NI building in which CAS has a connection with a potentially contaminated system. There is also an isolation valve in the CAS piping as it enters the NI that can isolate the CAS piping to prevent contamination spread outside of the NI. The temporary hose connections are fitted with self-sealing quick disconnect connectors, and have normally-closed, branch manual isolation valves immediately upstream of the connections, which isolate individual connections from the remainder of the CAS. The CAS is designed to prevent backflow when compressor pressure is lost by "defense in depth" consisting of sufficient capacity in the air receiver, and multiple barriers such as isolation valves.

The CAS is designed for a single unit and is not shared with other units. The CAS does not provide any breathing air. The overall design configuration of the CAS and its interfaces with contaminated systems includes sufficient barriers to prevent radioactive contamination of the CAS.

~~The connections to instrument air are temporary in nature involving hose connections and quick release connectors. Immediately upstream of the quick connects are branch isolation valves used to isolate individual connections from the remainder of the instrument air header. Each instrument air sub-header contains an isolation valve that isolates the sub-header from the remainder of the instrument air system. These connections preclude contamination of other systems and components if contamination is detected. The instrument air system is normally pressurized and does not recycle air. There is no path for contamination to be picked up from interfacing systems and carried back through the instrument air system.~~

12.3.6.5.11 Demineralized Water Distribution System

The demineralized water distribution system (DWDS) storage tanks complex is west of the Turbine Island as shown in Figure 1.2-3. DWDS piping configuration is not buried where it interfaces with radioactive contaminated systems. This prevents direct uncontrolled releases of radioactivity to the environment in the event of pipe wall degradation and confirms the DWDS compliance with 10 CFR 20.1406. The DWDS supplies demineralized water to the following Nuclear Island contaminated consumers:

- Coolant degasification system.
- Coolant treatment system.
- Coolant purification system.
- Nuclear island drain and vent systems.
- Coolant supply and storage system.
- Nuclear sampling system.
- Fuel pool cooling and purification system.
- Reactor boron and water makeup system.
- Chemical control system.
- Pressure relief discharge system.
- Reactor coolant pump.
- In-containment refueling water storage tank system.

- Liquid waste processing/storage system.
- Solid waste system.
- Severe accident sampling system.

The DWDS interfaces with these contaminated systems in the RB, Safeguard Buildings, Nuclear Auxiliary Building, FB, and Radioactive Waste Processing Building. The DWDS is protected from contamination by system design and multiple interface barriers. The DWDS operating pressure is higher than the interfacing systems. The system pressure differential at the interface prevents contamination of the DWDS. Contamination of the DWDS when pressure is lost is prevented by defense in depth consisting of multiple barriers such as isolating valves, check valves, air gaps, and anti-siphoning features that isolate and prevent back flow. These mechanical barriers are part of the interfacing systems or DWDS to prevent contamination from reaching the DWDS. Additional barriers are in the DWDS to prevent upstream contamination such as isolating valves and check valves located at the NI Building entrances to further prevent upstream contamination outside of the NI. The overall design configuration of the DWDS and the contaminated interfacing systems contain sufficient barriers to prevent radioactive contamination of the DWDS.

12.03-12.04-20

12.3.6.5.12 Piping Design Requirements

With respect to piping that contains or can potentially contain radioactive fluids, the design requirements for minimizing contamination from pipe leakage include the following:

- Pipes embedded in concrete structures are to be avoided to the extent practical.
- Concrete embedment will not be relied upon as a shielding option because pipes embedded in concrete impede inspections and repairs, and increase dose and waste during decommissioning.
- Floor drain pipes at the lowest elevation are embedded in concrete and are provided with a concentric guard pipe fitted with an alarm moisture detection monitor.
- The only pathway allowed for the discharge of radioactive liquid effluent is subsequent to treatment by the liquid waste management system. Piping outside the Radioactive Waste Processing Building (RWB) will be provided with a concentric guard pipe. The outer pipe will be fitted with an alarmed leakage detection monitor, which detects any leakages. The double pipe system will extend to the discharge pipe outlet into the cooling water outfall. Samples can be taken from the outer pipe in the RWB in case of any leakage.
- To minimize the leakage of radioactive fluids to ground water, and the leakage of ground water into buildings, system and structural designs will avoid the use of below-grade conduit and piping penetrations through walls that form exterior

boundaries. This is particularly applicable to penetrations at or through the floor level.

- Penetrations through outer walls of a building containing radioactive systems will be sealed to prevent leaks to the environment. The integrity of such seals will be periodically verified.

12.3.6.5.13 Condensate and Feedwater System, Main Steam Supply System, and Auxiliary Steam System

The condensate and feedwater system (CFS) is designed to provide feedwater to the steam generators (SGs) at the required temperature, pressure, and flow rate. Condensate is pumped from the main condenser hotwell by the condensate pumps, passes through the low pressure feedwater heaters and the deaerator-feedwater storage tank to the main feedwater pumps, and is then pumped through the high pressure feedwater heaters to the steam generators. Except for the blowdown heat exchanger cooling water, the condensate system is located in the Turbine Building. The CFS is described in Section 10.4.7.

The main steam supply system (MSSS) conveys steam from the SGs to the high pressure turbine. The MSSS also provides steam to the second stage reheaters, deaerator pegging steam, and backup auxiliary steam. The MSSS is described in Section 10.3.

The CFS and the MSSS/auxiliary steam system are not normally radioactive. The designs are consistent with the U.S. EPR contaminant management philosophy in compliance with 10 CFR 20.1406:

- Radiation monitors detect steam generator tube ruptures (SGTR), which are described in Sections 12.3.6.1.5 and 5.2.5.5.4.
- The radiation monitors on each main steam line are located just outside the containment as shown in Figure 10.3-1—Main Steam Supply System, Sheet 1.
- MSSS design feature reduce contamination in the event of a SGTR by closing the dedicated main steam isolation valve (MSIV) to isolate the affected SG.
- CFS design features reduce contamination in the event of a SGTR by closing the main feedwater isolation valve and the full-load isolation valve to isolate the water side of the affected SG.
- For the portions outside of containment, the piping and equipment in MSSS, auxiliary steam system, and CFS are accessible for inspection. The isolation valves outside the containment are located in dedicated UJE valve rooms. The dedicated UJE valve rooms are placed in the upper section (> +64 ft) of the UJK buildings.