AREVAEPRDCPEm Resource

From: Pederson Ronda M (AREVA NP INC) [Ronda.Pederson@areva.com]
Sent: Tuesday, July 14, 2009 6:41 PM
To: Tesfaye, Getachew
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); WELLS Russell D (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 244, FSARCh. 5
Attachments: RAI 244 Response US EPR DC.pdf

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 244 Response US EPR DC.pdf" provides a technically correct and complete response to all 4 questions.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which supports the response to RAI 244 Questions 05.02.05-6, 05.02.05-7, and 05.02.05-8.

The following table indicates the respective pages in the response document, "RAI 244 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

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This concludes the formal AREVA NP response to RAI 244 and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

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To: ZZ-DL-A-USEPR-DL
Cc: Li, Chang; Segala, John; Bloom, Steven; Roy, Tarun; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 244 (2958), FSARCh. 5

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on June 5, 2009, and on June 12, 2009, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye
Sr. Project Manager
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Hearing Identifier: AREVA_EPR_DC_RAIs
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Response to

Request for Additional Information No. 244

6/15/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 05.02.05 - Reactor Coolant Pressure Boundary Leakage Detection
Application Section: 5.2.5

QUESTIONS for Balance of Plant Branch 2 (ESBWR/ABWR) (SBPB)

Question 05.02.05-5:

This RAI is a follow-up to **RAI 154, Question 05.02.05-1**. The acceptance of GDC 2 is based on the guidance of regulatory Guide (RG) 1.29, “Seismic Design Classification,” Regulatory Position C.1 for the safety-related portions of the systems and Position C.2 for the nonsafety-related portions of the system. The staff reviewed FSAR, Revision 0, Section 5.2.5 and Table 3.2.2-1, “Classification Summary,” against RG 1.29. The staff was not able to find the safety classification information in FSAR Section 5.2.5, and the reactor coolant pressure boundary (RCPB) leakage detection system is not identified in Table 3.2.2-1.

The applicant was requested, in RAI 154, Question 05.02.05-1, to clarify the safety classification of the RCPB leakage detection system in the FSAR. In the response to Question 05.02.05-1, the applicant referred to the response to RAI 168, Question 03.06.03-19. The staff reviewed the response to RAI 168, Question 03.06.03-19, and did not find the safety classification of the RCPB leakage detection system.

Therefore, the applicant is requested the second time to clarify the safety classification of the RCPB leakage detection system in the FSAR.

Response to Question 05.02.05-5:

As noted in U.S. EPR FSAR Tier 2, Section 5.2.5.1, the systems used to detect reactor coolant pressure boundary (RCPB) leakage are the following:

- Containment sump level and discharge flow monitoring system (U.S. EPR FSAR Tier 2, Section 5.2.5.1.1).
- Containment atmosphere radiation monitoring system (U.S. EPR FSAR Tier 2, Section 5.2.5.1.2).
- Containment air cooler condensate monitoring system (U.S. EPR FSAR Tier 2, Section 5.2.5.1.3).

The containment sump level and discharge flow monitors are part of the Nuclear Island drain/vent system (NIDVS) and are identified in U.S. EPR FSAR Tier 2, Table 3.2.2-1 as KKS component code 30KTC10 CL001/002 and have a safety classification of safety-related (S) (see the U.S. EPR FSAR markups for the Response to RAI 163, Supplement 5, Question 09.03.03-5). Additionally, the containment sump level and discharge flow monitoring system is seismically qualified (Seismic Category I) in accordance with RG 1.29 and RG 1.45.

The containment atmosphere radiation monitors are part of the sampling activity monitoring systems (SAMS) and are identified in U.S. EPR FSAR Tier 2, Table 3.2.2-1 as KKS component code 30KLK05 CR001/031/071/561. This system has a safety classification of NS-AQ. This classification, as defined in U.S. EPR FSAR Tier 2, Section 3.2, is assigned to those non-safety-related structures, systems, and components (SSC) that are classified as supplemented grade and will be included in the 10 CFR 50, Appendix B quality assurance program because their inclusion is explicitly invoked by a relevant “significant licensing requirement or commitment.” Additionally, these monitors have a seismic classification of Seismic Category I.

The containment air cooler condensate monitoring system is identified in U.S. EPR FSAR Tier 2, Table 3.2.2-1 as KKS component code JYH (leak detection system). The condensate level and flow sensors are part of the balance of the JYH system in U.S. EPR FSAR Tier 2, Table 3.2.2-1 and have a safety classification of NS-AQ and a seismic classification of Seismic Category II in accordance with RG 1.29.

FSAR Impact:

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

Question 05.02.05-6:

This RAI is a follow-up to **RAI 154, Question 05.02.05-2.** The staff reviewed the alarms and readouts of leakage in the control room in accordance with SRP Section 5.2.5, Subsection III.5. FSAR Section 5.2.5.5 states the leakage detection systems provide data to the instrumentation and control systems for indication, alarm, and archival. Operators in the main control room (MCR) are provided with the leakage rate, gallon per minute (gpm), from each detection system and a common leakage equivalent (gpm) from both identified and unidentified sources. Alarms indicate that leakage has exceeded predetermined limits. In reviewing the above, however, the staff could not find anywhere in the FSAR the procedures, chart, or graph that are promised for the operator to convert the instrument indications of various leakage detection (e.g., containment radioactivity monitor, containment sump monitor, containment air cooler condensate flow rate monitor) into common leakage rate (gpm). Therefore, the staff requested the applicant to provide the following information in RAI 154, Question 05.02.05-2:

a. Identify a combined license (COL) information item to require the COL applicant provide operators the procedures, chart, or graph that permits rapid conversion of instrument indications of various leakage detection instruments into common leak rate (gpm).

b. Define the alarm setpoints and demonstrate the setpoints are sufficiently low to provide an early warning for operator actions prior to Technical specification (TS) limits.

In the RAI response, the applicant stated that the requested information will be provided in site-specific plant operating procedures, which are the responsibility of the COL applicant as described in U.S. EPR FSAR Tier 2, Section 13.5. The staff reviewed FSAR Section 13.5 and did not find the COL information item that would require the COL applicant to provide information as related to conversion of instrument indications and alarm setpoint for early warning.

The applicant is requested the second time to identify a COL information item in FSAR Tier 2, Table 1.8-2, “Combined License Information Items,” to address the above COL information.

Response to Question 05.02.05-6:

The procedures that provide conversion of instrument indications of various leakage detection instruments into common leak rate (gpm) will be prepared as operating and emergency operating procedures which, as described in U.S. EPR FSAR Tier 2, Section 13.5.2.1, are the responsibility of the COL applicant (see U.S. EPR FSAR Tier 2, Table 1.8-1, item number 13.5-1). TS 3.4.12 and 3.4.14 contain operability and surveillance requirements for reactor coolant system (RCS) operational leakage and RCS leakage detection indication instrumentation, respectively. The alarm setpoints are determined by considering factors such as sensor's capability, background counts for radiation monitors, providing an early warning for operator actions prior to TS limits sensitivity, and during development of the surveillance procedures. Additionally, the information requested in the question is addressed in RG 1.45, Revision 1, which is discussed U.S. EPR FSAR Tier 2, Section 5.2.5. Therefore, no new COL information is required. Also, a similar position was addressed in NUREG-1793, Section 5.2.5.3 without the requirement to establish a COL information item.

U.S. EPR FSAR Tier 2, Section 5.2.5 will be revised to indicate that leakage conversion procedures are developed as part of operating and emergency operating procedures described in U.S. EPR FSAR Tier 2, Section 13.5.2.1.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 5.2.5 will be revised as described in the response and indicated on the enclosed markup.

Question 05.02.05-7:

This RAI is a follow-up to **RAI 154, Question 05.02.05-3.** An important safety issue lesson learned from the Davis Besse reactor vessel head leakage event of 1992 indicated that small RCS leakage and boron corrosion, if it lasts for a long time, can be a significant safety concern. This concern was not recognized in Revision 0 of RG 1.45 because it was published in 1973. However, in Revision 1 of RG 1.45, dated May 2008, the concern was identified. The FSAR does not state that procedures will be developed to adequately provide operators an early warning mechanism and provide guidance in response to a low-level leakage (well below TS limits) event such as the one occurred in Davis Besse. In RAI 154, Question 05.02.05-3, the staff requested the applicant to provide a COL information item regarding the requirement to develop procedures for determining operator responses (identifying, monitoring, trending, locating) to prolonged low-level leakage conditions. In the response to the RAI, the applicant referred to the response to Question 05.02.05-2 and did not provide the requested COL information item to manage the low level RCPB leakage.

The applicant is requested the second time to provide the COL information discussed above.

Response to Question 05.02.05-7:

AREVA NP acknowledges the need to establish procedures that specify operator actions in response to leakage rates less than the limits set forth in the plant technical specifications (TS). The procedures to specify operator actions for abnormal conditions will be prepared as operating- and emergency-operating procedures described in U.S. EPR FSAR Tier 2, Section 13.5.2.1 and are the responsibility of the COL applicant (see the Response to Question 05.02.05-6). Additionally, the information requested in the question is addressed in RG 1.45, Revision 1, which is discussed in U.S. EPR FSAR Tier 2, Section 5.2.5. Therefore, no new COL information is required. U.S. EPR FSAR Tier 2, Section 5.2.5 will be revised to indicate that leakage management procedures are included in the operating and emergency operating procedures described in Section 13.5.2.1.

The Response to RAI 208, Question 05.02.04-5 revised U.S. EPR FSAR Tier 2, Section 5.2.4.1.10 to provide a description of the program to control boric acid corrosion, which was the primary contributor to the Davis Besse event.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 5.2.5 will be revised as described in the response and indicated on the enclosed markup.

Question 05.02.05-8:

This RAI is a follow-up to **RAI 154, Question 05.02.05-4.** FSAR Tier 2, Table 14.3-8, "ITAAC Screening Summary (Sheet 6 of 7)," shows that the leakage detection is within the scope of Tier 1, and has an ITAAC. The staff found it in FSAR Tier 1 Section 2.4.8, "Leakage Detection." However, there is inadequate description of the leak detection systems and no ITAAC. The applicant was requested to provide a more detailed design description and appropriate ITAAC table to verify the design features of the leakage detection systems as described in FSAR Tier 2 in RAI 154, Question 05.02.05-4. In the response to the RAI, the applicant used its screening process and determined that the RCPB leakage detection system need not be in the ITAAC. The staff reviewed the applicant's response and found it not acceptable. The applicant's ITAAC screening process did not adequately considered the lesson learned for the operating experience of Davis Besse reactor vessel head leakage event of 1992, and therefore, did not recognize the safety significance of the RCPB leakage detection. It's determination of not providing ITAAC for RCPB leakage detection is inconsistent with all the other design certification applications.

The applicant is requested the second time to provide ITAAC for the RCPB leakage detection as discussed above.

Response to Question 05.02.05-8:

As noted in U.S. EPR FSAR Tier 2, Section 5.2.5.1, the systems used to detect reactor coolant pressure boundary (RCPB) leakage are the following:

- Containment sump level and discharge flow monitoring system.
- Containment atmosphere radiation monitoring system.
- Containment air cooler condensate monitoring system.

ITAAC for each of these systems regarding the detection of RCPB leakage has been established in the U.S EPR FSAR.

Containment Sump Level and Discharge Flow Monitoring System

As stated in U.S. EPR FSAR Tier 2, Section 5.2.5.1.1, the containment sump level and discharge flow monitoring is performed by the Nuclear Island drain/vent system (NIDVS) (KKS Code KT). The leakage detection function consists of water level measurements provided within the system sumps and collection tanks. ITAAC for the NIDVS for the Reactor Building (RB) sump level indication was added to U.S. EPR FSAR Tier 1, Section 2.9.5 in the Response to RAI 163, Supplement 5, Question 09.03.03-5. U.S. EPR FSAR Tier 1, Section 2.9.5 and U.S. EPR FSAR Tier 2, Section 9.3.3.1 will be revised to indicate that the NIVDS supports RCPB leakage detection.

U.S. EPR FSAR Tier 2, Section 5.2.5.1.1 notes that increased frequency of sump pump actuation may be an indication of reactor coolant system (RCS) leakage. Therefore, U.S. EPR FSAR Tier 1, Table 2.9.5-1 will be revised to add the RB sump pumps.

Containment Atmosphere Radiation Monitoring System

The containment atmosphere radiation monitoring system consists of gaseous and airborne particulate radiation monitors that are part of the sampling activity monitoring systems (SAMS) and monitor radioactivity levels in the containment atmosphere. The Response to Question 05.02.05-5 explains that these monitors are identified in U.S. EPR FSAR Tier 2, Table 3.2.2-1 as components 30KLK05 CR001/031/071/561. This system is also described in U.S. EPR FSAR Tier 1, Section 2.9.4 and U.S. EPR FSAR Tier 2, Section 9.4.7.1.

U.S. EPR FSAR Tier 1, Section 2.9.4 and U.S. EPR FSAR Tier 2, Section 9.4.7.1 will be revised to indicate that the containment building ventilation system (CBVS) supports RCPB leakage detection. U.S. EPR FSAR Tier 1, Table 2.9.4-1 will be revised to add the containment atmosphere radiation monitors. U.S. EPR FSAR Tier 1, Section 2.9.4 and Table 2.9.4-3 will be revised to add ITAAC related to these radiation monitors.

Containment Air Cooler Condensate Monitoring System

Condensate level and flow sensors are installed in the collection tank and drain line of each containment air cooler unit. The RB fan cooler condensate level indication is used to detect RCPB leakage. As noted in the Response to Question 05.02.05-5, the containment air cooler condensate monitoring system is identified in U.S. EPR FSAR Tier 2, Table 3.2.2-1 as KKS component code JYH (leakage detection system). This system is similarly described in U.S. EPR FSAR Tier 2, Table 14.3-8 and U.S. EPR FSAR Tier 1, Section 2.4.8. Therefore, U.S. EPR FSAR Tier 1, Section 2.4.8 will be revised to add ITAAC for the RB fan cooler condensate level indication. U.S. EPR FSAR Tier 2, Table 14.3-8 will also be revised to indicate that ITAAC has been established for U.S. EPR FSAR Tier 1, Section 2.4.8.

FSAR Impact:

U.S. EPR FSAR Tier 1, Section 2.4.8, Section 2.9.4, Section 2.9.5, Table 2.9.4-1, Table 2.9.4-3, and Table 2.9.5-1 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR FSAR Tier 2, Section 9.3.3.1, Section 9.4.7.1, and Table 14.3-8 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

2.4.8 Leakage Detection System

~~There are no Tier 1 entries for this system.~~

1.0 Description

The leakage detection system supports the identification of reactor coolant pressure boundary (RCPB) leakage.

2.0 I&C Design Features, Displays and Controls

2.1 Reactor Building fan cooler condensate collector level indication is provided in the MCR.

3.0 System Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.4.8-1 lists the Leakage Detection System ITAAC.

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Table 2.4.8-1—Leakage Detection System ITAAC

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
2.1	Reactor Building fan cooler condensate collector level indication is provided in the MCR.	Testing will be performed for the Reactor Building condensate collector level indications.	Condensate collector level change is indicated in the MCR on the Reactor Building condensate collector level indications. • Reactor Building Fan Cooler Level Condensate Levels JYH11 CF001 JYH14 CF001 JYH21 CF001 JYH22 CF001 JYH23 CF001 JYH24 CF001 JYH22 CF003 JYH22 CF004 JYH23 CF003 JYH23 CF004

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2.9.4 Sampling Activity Monitoring System

1.0 Description

The sampling activity monitoring system provides the following safety-related function:

- Provides a radioactivity indication that initiates isolation of the main control room (MCR) ventilation intake.

The sampling activity monitoring system provides the following non-safety-related function:

- Provides ventilation stack radiation monitoring indication in the MCR and remote shutdown station (RSS).

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- Supports reactor coolant pressure boundary (RCPB) leakage detection.

2.0 Arrangement

2.1 The functional arrangement of the sampling activity monitoring system is shown in Figure 2.9.4-1—Sampling Activity Monitoring System Functional Arrangement.

2.2 The location of the sampling activity monitoring system equipment is as listed in Table 2.9.4-1—Sampling Activity Monitoring System Equipment Mechanical Design.

3.0 Mechanical Design Features

3.1 Equipment identified as Seismic Category I in Table 2.9.4-1 can withstand seismic design basis loads without loss of safety function as listed in Table 2.9.4-1.

4.0 Displays and Controls

4.1 The MCR ventilation intake radioactivity monitors listed in Table 2.9.4-1 initiate a MCR alarm when radiation level exceeds a preset limit.

4.2 The sampling activity system provides ventilation stack radiation monitoring.

4.3 Reactor Building radiation level is indicated in the MCR. 05.02.05-8

5.0 Electrical Power Design Features

5.1 The components designated as Class 1E in Table 2.9.4-2—Sampling Activity Monitoring System Equipment I&C and Electrical Design are powered from a Class 1E division in a normal or alternate feed condition.

6.0 Equipment and System Performance

6.1 MCR Ventilation Intake Radioactivity Monitors initiate isolation of the MCR ventilation and initiation of supplemental filtration upon receipt of high radioactivity levels.

Table 2.9.4-1—Sampling Activity Monitoring System Equipment Mechanical Design

~~Equipment~~ Description	~~Equipment~~ Tag Number [(1)]	~~Equipment~~ Location	Function	Seismic Category
MCR Ventilation Intake Radioactivity Monitor	30KLK65CR001	Safeguard Building ~~Division~~ 2	Indicate Radioactivity Levels	I
MCR Ventilation Intake Radioactivity Monitor	30KLK65CR002	Safeguard Building ~~Division~~ 2	Indicate Radioactivity Levels	I
MCR Ventilation Intake Radioactivity Monitor	30KLK66CR001	Safeguard Building ~~Division~~ 3	Indicate Radioactivity Levels	I
MCR Ventilation Intake Radioactivity Monitor	30KLK66CR002	Safeguard Building ~~Division~~ 3	Indicate Radioactivity Levels	I
Ventilation Stack Radioactivity Monitor	30KLK95CR001	Vent Stack	Indicate Radioactivity Levels	Non-Seismic
Ventilation Stack Radioactivity Monitor	30KLK95CR002	Vent Stack	Indicate Radioactivity Levels	Non-Seismic
Reactor Building Radioactivity Monitor	30KLK05CR001	Reactor Building	Indicate Radioactivity Levels	I
Reactor Building Radioactivity Monitor	30KLK05CR031	Reactor Building	Indicate Radioactivity Levels	I
Reactor Building Radioactivity Monitor	30KLK05CR071	Reactor Building	Indicate Radioactivity Levels	I
Reactor Building Radioactivity Sampler	30KLK05CR561	Reactor Building	Indicate Radioactivity Levels	I

1) Equipment tag numbers are provided for information only and are not part of the certified design.

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Table 2.9.4-3—Sampling Activity Monitoring System ITAAC (2 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
4.2	The sampling activity system provides ventilation stack radiation monitoring.	A test will be performed.	a. Ventilation stack radiation monitors listed in Table 2.9.4-1 and Table 2.9.4-2 provide ventilation stack radiation indication in the MCR. b. Ventilation stack radiation monitors listed in Table 2.9.4-1 and Table 2.9.4-2 provide ventilation stack radiation indication in the RSS.
4.3	Reactor Building radiation is indicated in the MCR.	05.02.05-8 A testing will be performed to verify radiation level indication in the MCR.	Radiation level indication is provided in the MCR for the Reactor Building radiation monitors listed in Table 2.9.4-1.
5.1	The components designated as Class 1E in Table 2.9.4-2 are powered from a Class 1E division in a normal or alternate feed condition.	a. Testing will be performed for components designated as Class 1E in Table 2.9.4-2 by providing a test signal in each normally aligned division. b. Testing will be performed for components designated as Class 1E in Table 2.9.4-2 by providing a test signal in each division with the alternate feed aligned to the divisional pair.	a. The test signal provided in the normally aligned division is present at the respective Class 1E component identified in Table 2.9.4-2. b. The test signal provided in each division with the alternate feed aligned to the divisional pair is present at the respective Class 1E component identified in Table 2.9.4-2.
6.1	MCR Ventilation Intake Radioactivity Monitors listed in Table 2.9.4-1 initiate isolation of the MCR ventilation and initiation of supplemental filtration upon receipt of high radioactivity levels.	A test will be performed to verify that the MCR ventilation isolation and supplemental filtration is initiated upon radiation levels exceeding a preset limit.	The monitors listed in Table 2.9.4-1 initiate MCR ventilation isolation and supplemental MCR filtration when radiation level exceeds a preset limit.

Next File

2.9.5 Nuclear Island Drain and Vent System

~~There are no Tier 1 entries for this system.~~

1.0 Description

The nuclear island drain and vent system (NIDVS) collects, temporarily stores, and transfers radioactive fluids from the nuclear island area to other plant systems in a controlled manner. Portions of the NIDVS are classified as safety-related. The NIDVS operates during normal power, start-up, and shutdown conditions.

The NIDVS provides the following safety-related functions:

- Provides alarms in the main control room (MCR) to indicate a flooding event.
- Trips the essential service water system (ESWS) pump and closes the ESWS pump discharge valve in a Safeguard Building (SB) flooding event.
- 05.02.05-8 → Supports reactor coolant pressure boundary (RCPB) leakage detection.

2.0 Arrangement

2.1 The location of the sump level sensors is as listed in Table 2.9.5-1—NIDVS Equipment I&C and Electrical Design.

3.0 Instrumentation and Controls (I&C) Design Features, Displays, and Controls

3.1 Displays listed in Table 2.9.5-1 are retrievable in the main control room (MCR).

3.2 The sump level sensor in a Safeguard Building trips the ESWS pump and closes the pump discharge valve in response to a flooding signal.

4.0 Electrical Power Design Features

4.1 The sump level sensors designated as Class 1E in Table 2.9.5-1 are powered from the Class 1E division listed in Table 2.9.5-1.

5.0 Environmental Qualifications

5.1 The sump level sensors listed in Table 2.9.5-1 for EQ harsh environment can initiate an alarm in the MCR following exposure to the design basis environments for the time required.

6.0 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.9.5-2 lists the NIDVS ITAAC.

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Table 2.9.5-1—NIDVS Equipment I&C and Electrical Design

Equipment Description	Equipment Tag Number [1]	Equipment Location	IEEE Class 1E	EQ –Harsh Env.	MCR Display
Level Sensors for Sump 30KTE20 BB001	30KTE20CL001	Safeguard Building 1	Division 1	Yes	Yes
Level Sensors for Sump 30KTE20 BB002	30KTE20CL003	Safeguard Building 2	Division 2	Yes	Yes
Level Sensors for Sump 30KTE20 BB003	30KTE20CL005	Safeguard Building 3	Division 3	Yes	Yes
Level Sensors for Sump 30KTE20 BB004	30KTE20CL007	Safeguard Building 4	Division 4	Yes	Yes
Level Sensors for Sump 30KTC30 BB001	30KTC30CL001	Fuel Building	Division 1	Yes	Yes
Level Sensors for Sump 30KTC30 BB002	30KTC30CL003	Fuel Building	Division 4	Yes	Yes
Level Sensors for Sump 30KTD10 BB002	30KTD10CL002	Reactor Building Annulus	Division 4	No	Yes
Level Sensors for Sump 30KTC10 BB001	30KTC10CL001	Reactor Building	Division 1	Yes	Yes
	30KTC10CL002	Reactor Building	Division 1	Yes	Yes
Level Sensors for Sump 30KTC10 BB002	30KTC10CL005	Reactor Building	Division 4	Yes	Yes
Reactor Building Sump Pump	30 KTC10 AP001	Reactor Building	N/A	N/A	Start/Stop
Reactor Building Sump Pump	30 KTC10 AP002	Reactor Building	N/A	N/A	Start/Stop

1) Equipment tag numbers are provided for information only and are not part of the certified design.

05.02.05-8

- Leakage from the letdown line heat exchangers to the CCWS is detected by radiation monitors and flow sensors which indicate and alarm in the MCR. In the unlikely event of a tube rupture, CCWS flow to the letdown line heat exchanger automatically isolates.

These methods are supplemented by radiation monitors, process sampling, and laboratory analysis, which indicate increased CCWS system activity from small leaks. Section 9.2.2 and Section 11.5 further address the control of RCS leakage into the CCWS.

5.2.5.4 Inspection and Testing Requirements

The leakage detection systems are designed to permit operability testing and calibration during plant operation. Refer to Chapter 16 (SR 3.4.14) for surveillance requirements. Periodic testing of the floor drainage system verifies that it is free of blockage.

5.2.5.5 Instrumentation Requirements

The leakage detection systems provide data to the instrumentation and control systems for indication, alarm, and archival. Operators in the MCR are provided with the leakage rate (gpm) from each detection system and a common leakage equivalent (gpm) from both identified and unidentified sources. Alarms indicate that leakage has exceeded predetermined limits. The instrumentation system is described in Section 7.1.

05.02.05-6 & 05.02.05-7

Leakage conversion procedures are developed as part of operating and emergency operating procedures described in Section 13.5.2.1 to convert various indications to an identified and unidentified common leakage equivalent and leakage rate of change. Leakage management procedures are also included in the operating and emergency operating procedures described in Section 13.5.2.1. These procedures includes means to identify the leak source, monitor and trend leak rate and evaluate various corrective action plans in response to prolonged low leakage conditions that exceed normal leakage rates, but do not exceed the Technical Specification (TS) limit to provide the operator sufficient time to take corrective actions before the leakage exceeds the TS limit value.

5.2.5.5.1 RCDT Indications

The RCDT collects continuous flow during operation from PZR degassing and the RCP seals' leakoff. This flow is quantified from tank level and pump run time indications and a baseline normal in-leakage rate is established. Changes in this rate indicate leakage from additional components whose discharge is routed to the RCDT. Such leakage can be identified through indications from these components and, once quantified, can be monitored as identified leakage.

9.3.3 Equipment and Floor Drainage System

The nuclear island drain/vent system (NIDVS) collects, temporarily stores and discharges radioactive fluids from the nuclear island (NI) area to other plant systems in a controlled manner. Portions of the NIDVS are classified safety-related. The NIDVS operates during normal power, start-up and shutdown conditions.

9.3.3.1 Design Bases

The NIDVS performs the following safety-related function:

- Maintain containment isolation. NIDVS lines penetrating containment are capable of isolation upon receipt of a containment isolation signal (CIS) from the reactor protection system. (Refer to Section 6.2.4 and Section 7.3.)
- Flooding detection inside the RB (containment and annulus), SBs, and FB. (Refer to Section 9.3.3.3 and Section 9.3.3.5).
- Trips the essential service water system (ESWS) pump and closes the ESWS pump discharge valve in a Safeguard Building (SB) flooding event. (Refer to Section 9.3.3.3 and Section 9.3.3.5.)

05.02.05-8

- Supports reactor coolant pressure boundary (RCPB) leakage detection.

The NIDVS has the following design basis requirements:

- Safety-related portions of the NIDVS are designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami and seiches without loss of capability to perform their safety functions (GDC 2).
- Safety-related portions of the NIDVS are designed to accommodate the effects of and be compatible with the environmental conditions associated with normal operation, maintenance, surveillance testing and postulated accidents. These portions of the NIDVS are protected against dynamic effects, including the effects of missiles, pipe whipping and discharging fluids that may result from equipment failures and from events and conditions outside the nuclear power unit (GDC 4).
- Safety-related portions of the NIDVS design includes means to suitably control the release of radioactive materials in gaseous and liquid effluents produced during normal reactor operation, including anticipated operational occurrences (AOO) (GDC 60).

The NIDVS is designed to meet the following functional criteria:

- Facilitate optimized treatment of liquid and gaseous radioactive effluents.
- Evacuate potentially radioactive gases in the reactor coolant system (RCS).
- Cool primary system effluent to a temperature safe for the demineralizer resins contained in the coolant purification system (CPS).

  - 30 percent to 70 percent humidity.

- Maintains the following ambient conditions in the equipment compartments for protection and safe operation of the equipment:
  - A minimum temperature of 59°F.
  - A maximum temperature of 131°F.
  - 05.02.05-8 Supports reactor coolant pressure boundary (RCPB) leakage detection.

9.4.7.2 System Description

9.4.7.2.1 General Description

The supply air for the containment building ventilation system is conditioned outside air that is filtered, cooled or heated, and humidified by the nuclear auxiliary building ventilation system (NABVS) as described in Section 9.4.3. The supply air is delivered to the Containment Building through the Fuel Building plenum. The supply air is then distributed through the CBVS supply duct network if the containment purge subsystem is operating.

The CBVS is composed of the following separate subsystems:

- Containment purge subsystem.
- Internal filtration subsystem.
- Containment Building cooling subsystem.
- Service and equipment compartment cooling subsystem.

The containment isolation system is addressed in Section 6.2.4.

Containment Purge Subsystem

The containment purge subsystem includes low-flow and full-flow purge supply and exhaust systems. See Figure 9.4.7-1—Containment Building Low Flow and Full Flow Purge Supply Subsystem and Figure 9.4.7-2—Containment Building Low Flow and Full Flow Purge Exhaust Subsystem.

The containment low-flow purge subsystem is normally not in operation during the plant normal operation. However, the low-flow purge subsystem can be used during normal operation and outage conditions. The containment full-flow purge subsystem is used during plant outages. The supply side ducts receive air from NABVS (refer to 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

Table 14.3-8—ITAAC Screening Summary
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Structure, System, or Component	System KKS Code(s)	Within Scope of Tier 1	Has ITAAC in Tier 1	Tier 1 Section
Non-Class 1E Uninterruptible Power Supply	BRJ, BRU02, BTA, BTL, BUB, BUL, BUM, BRZ, BUZ	X	X	2.5.7
Normal Power Supply System	BB, BF, BH	X	X	2.5.10
Preferred (Offsite) Power Supply System	ACD	X	X	2.5.5
Power Transmission (Main Generator) System	BA, CHA, MK	X	X	2.5.6
Switchyard	ACA			
Instrumentation and Control Systems				
Boron Concentration Measurement System	CPF	X	X	2.4.11
Communication System	CY	X	X	2.4.21
Control Rod Drive Control System	BU	X	X	2.4.13
Excore Instrumentation System	JKT	X	X	2.4.17
Fatigue Monitoring System	JYL	X		2.4.18
Hydrogen Monitoring System	JMU	X	X	2.4.14
Incore Instrumentation System	JKS, JKQ, CNN	X	X	2.4.19
Leakage Detection System	JYH	X	X 05.02.05-8	2.4.8
Loose Parts Monitoring System	JYF	X		2.4.20
Main Control Room (Human Factors)	CW	X	X	3.4
Plant Fire Alarm System	CYE	X	X	2.4.6
Plant Physical Protection Systems	CZ			
Priority and Actuator Control System	DS, CLE6, CLF6, CLG6, CLH6	X	X	2.4.5
Process Automation System	CR	X	X	2.4.9
Process Information and Control System	CRU	X	X	2.4.10
Protection System	JR, CLE, CLF, CLG, CLH	X	X	2.4.1
Radiation Monitoring System	JYK	X	X	2.4.22