Response to

Request for Additional Information No. 12, Revision 0

6/03/2008

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 06.02.06 - Containment Leakage Testing
SRP Section: 06.02.04 - Containment Isolation System
Application Section: 6.2
SPCV Branch

Question 06.02.06-01

As-found and as-left testing requirements need to be clarified: Paragraph 9.2.5 of NEI 94-01, Revision 0, states: The As-found Type A test leakage rate must be less than the acceptance criteria of 1.0 La given in the plant technical specifications. Prior to entering a mode where containment integrity is required, the As-left Type A leakage rate shall not exceed 0.75 La. The As-left and As-Found values are as determined by the appropriate testing methodology specifically described in ANSI/ANS 56.3-1994. Technical Specification (TS) 5.5.15.d.1 states: Containment leakage rate acceptance criterion is 1.0 La. During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are <0.60 La for the Type B and C tests and ≤0.75 La for Type A tests. FSAR paragraph 6.2.6.1 also identifies ≤ 0.75 La as the acceptance criteria for the pre-service test and in-service Type A tests. In view of the above, please clarify the statement of TS 5.5.15.d.1 to clearly conform to the requirements of NEI 94-01. Specifically, TS 5.5.15.d.1 should make it clear that: a. That 1.0 La is the as-found value, and b. That ≤ 0.75 La is the as-left value that applies to both the preoperational (prior to unit initial startup) and the subsequent periodic Type A tests. If 1.0 La is not the as-found value or ≤ 0.75 La is not the as-left value, please provide an appropriate description and justification.

Response to Question 06.02.06-01:

The requested change of adding as-found and as-left to TS 5.5.15.d.1 conflicts with the improved Standard Technical Specifications (STS) provided in NUREG-1431, Revision 3.1, "Standard Technical Specifications Westinghouse Plants." The wording "as-found value ≤ 1.0 L_a" or the phrase "as-left value ≤ 0.75 L_a," should not be added without a discussion with NRC's Technical Specification Branch (TSB). The preface of NUREG-1431 states the following:

"This NUREG contains the improved Standard Technical Specifications (STS) for Westinghouse plants. Revision 3 incorporates the cumulative changes to Revision 1 and 2, which was published in April 1995 and April 2001, respectively. The changes reflected in Revision 3 resulted from the experience gained from license amendment applications to convert to these improved STS or to adopt partial improvements to existing technical specifications. This publication is the result of extensive public technical meetings and discussions among the Nuclear Regulatory Commission (NRC) staff and various nuclear power plant licensees, Nuclear Steam Supply System (NSSS) Owners Groups, and the Nuclear Energy Institute (NEI)."

FSAR, Tier 2, Chapter 16, "Technical Specifications" is based on NUREG-1431, Revision 3.1, and the wording of FSAR Chapter 16 TS program 5.5.15.d.1 is taken directly from this NUREG. However, the other owner group NUREGs include the symbol "≤" in TS 5.5.15.d.1, "Containment leakage rate acceptance criterion is ≤ 1.0 L_a." To be consistent with these other NUREGs for the improved STS, the U.S. EPR will be modified to add the symbol "≤" to FSAR, Tier 2, Chapter 16 TS program 5.5.15.d.1, "Containment leakage rate acceptance criterion is ≤ 1.0 L_a."

In addition, to clarify the as-found and as-left criteria for the Type A test, FSAR, Tier 2, Section 6.2.6.1 will be modified to state "the as-found value shall be ≤ 1.0 L_a and the as-left value shall be ≤ 0.75 L_a. The as-left requirement applies to both the preoperational (prior to unit initial startup) and the subsequent periodic Type A tests."

FSAR Impact:

FSAR, Tier 2, Chapter 16, Section 5.5.15.d.1 and Section 6.2.6.1 will be revised as described in the response and indicated on the enclosed markup.

Question 06.02.06-02:

Incomplete inspection and test requirements need to be specified: 1. Does the DCD require visual containment inspections during two refueling outages where Type A testing intervals are extended to 10 years NEI 94-01 paragraph 9.2.1)? If so, where in the DCD is this requirement specified? 2. Which containment isolation valves are tested with pressure in a direction opposite to post-accident pressure (FSAR 6.2.6.3)? Also, where are justifications provided for this testing? 3. Is any Type B or Type C test conducted hydraulically rather than pneumatically? If so, what conservative bounding calculations are performed to convert the results to gaseous leakage and where is this documented? 4. What is the basis for exempting the fuel transfer tube from Type C testing?

Response to Question 06.02.06-02:

1. Visual containment inspections will be performed during two refueling outages when the Type A test intervals have been extended to 10 years as directed in NEI 94-01. FSAR, Tier 2, Section 6.2.6.1 will be modified to specifically state this requirement.
2. No containment isolation valves are tested with pressure in a direction opposite to the post-accident pressure.
3. All Type B and Type C tests are planned to be performed pneumatically.
4. The fuel transfer tube is sealed at both ends by an airtight and watertight manually operated gate valve. Each valve incorporates a double seal gasket system. One set of seals is on the valve flange mated to the transfer tube flange, and another set is on the valve seat. The volume between the seals is connected to the Leak-Off System (Containment Leakage Exhaust Subsystem) for continuous leak monitoring during operation. The seals receive preoperational and periodic Type B leak rate tests in accordance with ANSI 56.8.

FSAR Impact:

FSAR, Tier 2, Section 6.2.6.1 will be revised as described in the response and indicated on the enclosed markup.

Question 06.02.04-01:

Containment Isolation Valves (CIVs) require power for operability and to fulfill their safety functions in accordance with 10 CFR 50, Appendix A, General Design Criteria. It is not clear how operability is maintained if CIVs are powered by normally open breakers. DCA Tier 2, Table 6.2.4-1, Containment Isolation Valve and Actuator Data, shows numerous CIVs being powered from either MCC 31, 32, 33 or 34BRA, many of which are shown as normally open during operation. Per Tier 2, Figure 8.3-2, Emergency Power Supply System Single Line Drawing, Sheets 2 and 3, these MCCs are shown isolated from their respective 1E buses by normally open and manually operated breakers (see Note 1). Section 16, Technical Specifications, Section 3.6.3, requires each containment isolation valve to be Operable during normal operation. Per Page 1.1-4, Operable is defined as including all normal or emergency electrical power supplies. Considering the above, provide the following clarifications regarding the subject valves: 1) Are these CIVs provided with power during normal operation? If not, how does the Stage 1 isolation signal interface with power supplies which appear de-energized? 2) Clarify how Operability is maintained for the subject valves with respect to electrical power.

Response to Question 06.02.04-01:

1. The CIVs are provided with power during normal operation as described below.
2. As shown on FSAR, Tier 2, Figure 8.3-5, Class 1E Uninterruptible Power Supply System Single Line Drawing, for Division 1, 31 BRA Class 1E 480 VAC motor control center (MCC) are normally powered from 31 BUC Class 1E 250 VDC switchboard through 31 BRU01 250 VDC/480 VAC inverter. The BUC switchboard is backed up by the 2 Hour Battery. Divisions 2, 3, and 4 are powered similar to Division 1, but numbered 32, 33, and 34, respectively on FSAR, Tier 2, Figure 8.3-5.

   The normally open and manually operated breakers referred to in the question are maintenance breakers that are closed to provide power to the BRA MCC when the associated inverter is taken out of service for maintenance.

FSAR Impact:

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

Question 06.02.04-02:

General Design Criterion 55, 56 and 57 require that isolation valves outside containment shall be located as close to the containment as practical. The DCA, while committing to this, does not provide any design criteria associated with this requirement. DCA Tier 1, Section 3.5, states that specifications exist for the components and piping configurations shown in Figure 3.5-1 and Table 3.5-1. DCA Tier 2, Section 6.2.4.2.1, General System Design, states that isolation valves outside containment are located as close as practical to the containment or shield building walls. Provide the specifications and criteria for the location of CIVs outside containment. Describe how the criteria supports that the GDC requirements are met. For example, for IRWST embedded piping with guard-pipe (no inside CIVs), what is the maximum allowable distance from the containment wall to the first outside CIV?

Response to Question 06.02.04-02:

FSAR, Tier 1 provides design commitments and ITAAC that will be satisfied by the COL holder prior to completing plant construction and testing. After the ITAAC are satisfied and closed by the COL holder, the NRC makes a 10 CFR 52.103(g) determination authorizing fuel load into the reactor vessel. The design commitments in Tier 1, including design commitments 3.5.3.5 and 3.5.3.6, therefore are commitments that will be satisfied by the licensee and not statements providing detailed design information. In addition, the Tier 1 design commitments 3.5.3.5 and 3.5.3.6 referenced in the question only apply to the components and piping themselves and not to their installed location relative to containment.

As noted in the question, the FSAR identifies the GDC requirement that containment isolation valves outside containment shall be located as close as practical to the containment or shield building wall. As part of the overall design control process for the U.S. EPR, higher level design requirements, such as GDCs identified in the FSAR, will be implemented into detailed design documents using System Design Requirements Documents (SDRDs) and System Description Documents (SDDs). For containment isolation barriers, the final design documents include specifications for allowable distances (minimums and maximums) from containment or shield building walls.

FSAR Impact:

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

Question 06.02.04-03:

10 CFR 50.34(f)(2)(xiv)(A) states that containment isolation systems ensure all non-essential systems are isolated automatically by the containment isolation system. However, a number of valves listed in DCA Tier 2, Table 6.2.4-1 are listed as non-essential (a “no” listed in column 6), but are provided with no containment isolation signal. Examples include valves, KAB30 AA052/51, KAB30 AA053/55/56. In addition, a number of CEC and CSC air system penetrations which are listed as non-essential penetrate containment with normally open inside and outside manual valves (12 valves, sheet 11 of DCA Tier 2, Table 6.2.4-1). What is the bases for meeting 10 CFR 50.34(f)(2)(xiv)(A) for the above CIVs?

Response to Question 06.02.04-03:

The subject Component Cooling Water System (CCWS) valves are the supply and return containment isolations valves for the CCWS to the Reactor Coolant Pumps (RCP) seals thermal barrier coolers. These valves are essential because the RCPs require cooling of the thermal barriers when they are running. These valves do not receive a stage 1 or stage 2 signal to close, and are remotely operated from the Main Control Room in the event of a leak in the thermal barrier heat exchanger of the RCP.

In addition, the CCWS penetrations are incorrectly listed as 3-inch pipe diameter in FSAR, Tier 2, Table 6.2.4-1. The pipe diameter for these penetrations is 4 inches. Therefore, FSAR, Tier 2, Table 6.2.4 -1 will be modified to indicate that the lines are essential and are 4 inches in diameter.

CEC and CSC instrument lines are connected to pressure transmitters outside containment. Signals from these transmitters can initiate safety injection and containment isolation on high containment pressure. The lines are designed to implement the recommendations of ANSI/ANS-56.2 under the allowance of “other defined bases.” These lines are required to remain functional following a LOCA or steam break; therefore, the lines are essential and must remain open and not be isolated following an accident. FSAR, Tier 2, Table 6.2.4-1 will be modified to indicate that these instrument lines are essential.

FSAR Impact:

FSAR, Tier 2, Table 6.2.4-1 will be revised as described in the response and indicated on the enclosed markup.

Question 06.02.04-04:

The DCA did not identify the methods, types, or number of containment isolation devices used for instrumentation and control lines. DCA Tier 2, Section 6.2.4.1, states that instrumentation and control lines that penetrate containment are designed to the requirements of RG 1.11. Please provide the following additional design information regarding EPR instrumentation relative to containment isolation. 1) Are instrument lines provided with automatic isolation (e.g., excess flow check valves), other devices capable of automatic isolation, or do they rely on remote-manual isolation and detection? 2) Will flow restrictors (e.g., orifices, etc.) be utilized to reduce the rate of coolant loss following instrument line breaks? What is the maximum distance allowed from the containment wall for devices such as orifices or excess flow check valves, if utilized? 3) Approximately, how many instrument lines penetrate containment for the EPR?

Response to Question 06.02.04-04:

1. Neither automatic isolation nor remote-manual isolation are incorporated in the U.S. EPR for these penetrations. FSAR, Tier 2, Section 6.2.4.2.1 states, "Instrumentation and control lines that penetrate containment are designed to the requirements of RG 1.11." This section additionally references ANSI/ANS-56.2. ANSI/ANS-56.2 describes guidelines supplementary to the explicit requirements of General Design Criteria 55 and 56 for specific classes of lines which are acceptable on the "other defined bases." Instrument lines penetrating containment may be included in that category and RG 1.11 provides a suitable basis for acceptability.

   Another option is available for containment pressure instrumentation lines without installing automatic or remote-manual isolation valves. ANSI/ANS-56.2 Section 3.6.2 Instrument Lines states, "A suitable basis for demonstrating the acceptability of the instrument lines penetrating the containment is available. In addition, instrument lines with closed system both inside and outside of containment, such as containment pressure instrumentation, which are designed to withstand the maximum containment structural integrity test pressure, the containment design temperature, and are protected from missiles and dynamic effects are acceptable without isolation valves."

   The U.S. EPR employs this option to satisfy the GDC requirements. This discussion will be incorporated into FSAR, Tier 2, Section 6.2.4.2.1 to justify the configuration of the instrumentation lines.
2. Instrumentation lines will not utilize flow restrictors because they meet the criteria as stated in part 1 above.
3. Twelve instrumentation lines penetrate the U.S. EPR containment. These are identified in RAI 12 Question 06.02.04-3 part 2.

FSAR Impact:

FSAR, Tier 2, Section 6.2.4.2.1 will be revised as described in the response and indicated on the enclosed markup.

Question 06.02.04-05:

DCA Tier 2, Table 6.2.4-1, Containment Isolation Valve and Actuator Data, and DCA Tier 1, Table 2.6.8-1 shows that CVS supply and exhaust valves KLA30 AA003, KLA30 AA002, KLA40 AA001, and KLA40 AA002, are containment isolation valves that receive a Stage 1 isolation signal. However, inconsistent with what is stated in Section 6.2.4.2.6, Isolation Valve Closure Times (12 inches in diameter close within one minute), no valve closure times are associated with these valves. For example, valves KLA40 AA001 and KLA40 AA002 associated with the full flow purge exhaust as shown on DCA Tier 1 Figure 2.6.8-1. In the LOCA radiological analyses (Section 15.0.3.11.2), at the start of the accident, the containment is assumed to be in the purge mode. The purge flow is stated as being terminated within 10 seconds because of PC isolation. Provide the bases and justification for not having valve closure times for these CIVs.

Response to Question 06.02.04-05:

The containment ventilation system (CVS) full flow supply and exhaust isolation valves (30KLA30 AA003, 30KLA30AA002, 30KLA40AA001, and 30KLA40AA002) are used during plant shutdown or refueling and are not used during normal plant operation. (See FSAR, Tier 2, Sections 9.4.7.1, 9.4.7.2.1, 9.4.7.2.3, and 9.4.7.3 for an explanation of system operations.) The associated radiological analyses in FSAR, Tier 2, Section 15.0.3.11.2 do not credit a closure time for these CVS full flow supply and exhaust isolation valves because they are closed during plant operation, Modes 1, 2, 3 and 4. During shutdown or refueling operations when these valves may be open, the radiological analyses in Section 15.0.3 do not require closure of these valves. Therefore, although these valves receive a stage 1 containment isolation signal, there is no closure time requirement during any plant condition. FSAR, Tier 2, Section 6.2.4 will be modified to describe the exception for these CVS valves to the closure time requirements for valves greater than 12 inches in diameter.

The CVS low-flow purge supply and exhaust valves (30KLA20AA001, 30KLA20AA003, 30KLA10AA003, and 30KLA10AA001) may be used during normal plant in MODES 1, 2, 3, and 4. The low flow containment purge supply and exhaust valves must be capable of isolation within 10 seconds in accordance with the radiological analyses of FSAR, Tier 2, Section 15.0.3.11.2.

FSAR Impact:

FSAR, Tier 2, Section 6.2.4.2.6 will be revised as described in the response and indicated on the enclosed markup.

Question 06.02.04-06:

Section 6.2.4.2.7, Penetrations Overpressure Protection, states that overpressure protection is provided for liquid-filled piping between containment isolation barriers to prevent damage when the piping is isolated…and that lines with gate, diaphragm, or butterfly valves have overpressure protection provided by either a bypass check valve or a pressure relief valve. Containment penetration overpressure protection configurations are shown in Figure 6.2.4-2-Containment Isolation Valve Arrangements for Overpressure Protection. Examples have been identified where there are configurations not shown on Figure 6.2.4-2 (typically two MOVs in series). Clarify how overpressure protection is provided for two valves in series. Examples include: 1) DCA Tier 1, Figure 2.2.5-1, Sheet 2, which shows CIVs 30FAL12, AA001 and AA002 as two MOVs without a bypass check valve or pressure relief valve. 2) DCA Tier 1, Figure 2.2.6-1, Sheet 1, which shows CIVs 30KBA14, AA002 and AA003 as two MOVs without a bypass check valve or pressure relief valve. 3) DCA Tier 1, Figure 2.2.2-1, Sheet 1, which shows CIVs 30JNK10, AA013 and AA009 as two MOVs without a bypass check valve or pressure relief valve.

Response to Question 06.02.04-06:

The examples stated are Tier 1 representations for the systems. The overpressure protection is not a Tier 1 function and is therefore not shown on Tier 1 figures. The Tier 2 figures associated with the Fuel Pool Cooling and Purification System (FPCPS) and the Chemical and Volume Control System (CVCS) show the overpressure protection function. These are shown in the following:

Example 1 FSAR, Tier 1, Figure 2.2.5-1 represents FPCPS. The associated FSAR, Tier 2, figure for this system is Figure 9.1.3-2—Fuel Pool Purification System, sheet 1 of 5. This figure shows the overpressure protection for CIVs 30FAL12AA001 and 30FAL12AA002.

Example 2 FSAR, Tier 1, Figure 2.2.6-1 represents the CVCS. The associated FSAR, Tier 2 figure for this system is Figure 9.3.4-1—Chemical and Volume Control System, sheet 2 of 9. This figure shows the overpressure protection for CIVs 30KBA14AA002 and 30KBA14AA003.

Example 3 FSAR, Tier 1, Figure 2.2.2-1 represents the in-containment refueling water storage tank system (IRWSTS). The associated FSAR, Tier 2 figure for this system is Figure 6.3-3—IRWST Layout. The overpressure protection is for the containment penetrations and the piping between the 30JNK10AA013 and 30JNK10AA009 is not a containment penetration. Therefore, the piping between the two MOVs does not require overpressure protection.

FSAR Impact:

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

Question 06.02.04-07:

During the review a number of inconsistencies or discrepancies in Tables were identified. Please answer the following questions regarding information provided in the DCA. 1) DCA Tier 2, Section 6.2.4.2.2, discusses the exception of having both an inside and outside CIV for IRWST suction piping penetrations. A total of eight (8) CIVs located outside of containment are provided (4, one each for the SIS sumps; and 2 for each of the CVCS and SAHRS penetrations). Why is only one (JMQ40AA001) of these eight valves is located in DCA Tier 1, Table 3.5-1? 2) DCA Tier 1, Table 3.5-1, lists 93 CIVs, whereas Tier 2, Table 6.2.4-1 shows that there are 246 CIVs or devices credited for primary containment isolation. While Table 3.5-1 generally does not include items like hatches, airlocks, guard pipe, or a number of essential systems which do not receive automatic isolation signals, numerous other CIVs appear missing from the Tier 1 section. Examples include CIVs associated with the fuel pool cooling system, emergency boration system, CVCS seal injection, severe accident heat removal system, and CVS supply and exhaust. What is the bases behind why a small subset of CIVs is listed in Tier 1 Table 3.5-1? 3) Valves JEW50 AA001, JEW50 AA002, JEW01 AA005 are listed in DCA Tier 1, Table 3.5-2 but are not listed in Table 3.5-1. Why are these valves not included in Table 3.5-1? 4) Why is valve KTC10 AA010 not listed in DCA Tier 1, Table 3.5.2? Per Tier 2, Table 6.2.4-1 it is powered by an MOV, thus it appears as though it should be listed. 5) DCA Tier 1, Figure 3.5-1, Representative Containment Isolation Valve Arrangements, shows arrangements 2, 3, 4 and 7. However, Tier 1, Table 3.5-1, does not list any Configuration Type 2, 3, 4 or 7 arrangements for CIVs. Does the EPR utilize any of these general arrangements? If so, please provide which valves. If not, state why this information is provided in Tier 1, Figure 3.5-1. 6) DCA Tier 1, Figure 1.3-1 and 2.2.5-1 show valves 30FAL12 AA001 and AA002 (as well as several others) as globe valves. However, Tier 2, Table 6.2.4-1 lists these valves as gate valves. Do the figures provided accurately reflect whether or not a valve is a gate or globe valve? 7) Tier 1, Figure 2.3.3-1, SAHR System, shows a safety-related class break at a T-connection in the piping (base-mat cooling line to core melt stabilization system). This class break appears misplaced on the figure. Clarify where the break occurs. 8) Tier 1, Figure 2.3.3-1 shows valve 30JNK11 AA009 as what appears to be a motor operated relief valve. This valve type is not shown on the valve legend Tier 1, Figure 1.3-1 or what is shown on Figure 2.2.2-1 for the same valve. Which Figure is correct? 9) Tier 2, Table 6.2.4-1, Sheet 8 shows CIV JNK11 AA009 as being associated with an essential system (i.e., column 6 is marked “yes”). This is inconsistent with other portions of the table which considers SAHRS as a non-essential system. Which designation is correct?

Response to Question 06.02.04-07:

1. The purpose of FSAR, Tier 1, Section 3.5 is to collect all systems with a containment isolation function which are not otherwise represented in a Tier 1 section. The valve (JMQ40AA001) is listed incorrectly in FSAR, Tier 1, Table 3.5-1 and will be deleted.

   The eight CIVs, four from the Safety Injection (SI) sumps (valves 30 JNK 10 AA001, 30 JNK 20 AA001, 30 JNK 30 AA001 & 30 JNK 40 AA001), two from Chemical and Volume Control System (CVCS) (valves 30JNK10 AA009 & 30JNK10 AA013) and one from the Severe Accident Heat Removal System (SAHRS) (30JNK11AA009) penetrations, are listed in the Tier 1 section for the In-containment Refueling Water Storage Tank (IRWST) in FSAR, Tier 1, Table 2.2.2-1—IRWST Equipment Mechanical Design. SAHRS second isolation valve (30JMQ40AA001) from the IRWST sump is listed in FSAR, Tier 1, Table 2.3.3-1—SAHRS Equipment Mechanical Design.

2. As explained in the response to RAI 12 question 06.02.04-7, part 1, the purpose of FSAR, Tier 1, Section 3.5 is to collect all systems with a containment isolation function that are not otherwise represented in a Tier 1 section.

   CIVs associated with the fuel pool cooling system are specified in FSAR, Tier 1, Section 2.2.5 and listed in Table 2.2.5-1—FPCPS Equipment Mechanical Design.

   CIVs associated with the extra borating system, not the emergency boration system, are specified in FSAR, Tier 1, Section 2.2.7 and listed in Table 2.2.7-1 - EBS Equipment Mechanical Design.

   CIVs associated with the CVCS seal injection are specified in FSAR, Tier 1, Section 2.2.6 and listed in Table 2.2.6-1—CVCS Equipment Mechanical Design.

   CIVs associated with the SAHRS are specified in FSAR, Tier 1, Section 2.3.3 and listed in Table 2.3.3-1—SAHRS Equipment Mechanical Design.

   CIVs associated with the containment ventilation supply and exhaust system are specified in FSAR, Tier 1, Section 2.6.8 and listed in Table 2.6.8-1—Containment Building Ventilation System Containment Isolation Valves Mechanical Design.

   Therefore, the above CIVs are represented in the appropriate Tier 1 sections and will not be duplicated in FSAR, Tier 1, Section 3.5.

3. The valves (JEW50AA001, JEW50AA002, and JEW01AA005) were listed incorrectly in FSAR, Tier 1, Table 3.5-2. These valves will be deleted as shown in the enclosed FSAR markup.

   These valves are listed in FSAR, Tier 1, Section 2.2.6. The valves are listed in both Table 2.2.6-1—CVCS Equipment Mechanical Design and Table 2.2.6-2—CVCS Equipment I&C and Electrical Design.

4. The valve (KTC10AA010) should be listed in FSAR, Tier 1, Section, 3.5. This valve will be added to Table 3.5-2 as shown in the enclosed FSAR markup.

5. Configuration type 2, 3, 4, 7 and 8 arrangements are not required for FSAR, Tier 1, Section 3.5 and will be deleted from Figure 3.5-1 as shown in the enclosed FSAR markup.

6. The symbol for the valves in FSAR, Tier 1, Figure 1.3-1 will be modified to indicate that the symbol represents a globe or a gate valve as shown in the enclosed FSAR markup.

7. The class of piping represented on FSAR, Tier 1, Figure 2.3.3-1 shows the piping from the IRWST is Class 1 not the T-connection. The piping from the IRWST through devices JMQ42BP001 and JMQ42BP003 is classified a Class 1 to preclude the possibility of obstruction of the IRWST water to the Safety Injection function or potentially draining IRWST water to the spreading area. FSAR, Tier 1, Figure 2.3.3-1 will be modified to add two isolation valves and to place the class break on the lines at the second isolation valve from the IRWST as shown in the enclosed FSAR markup.

8. FSAR, Tier 1, Figure 2.3.3-1 is not correct. FSAR, Tier 1, Figure 2.2.2-1 is correct. Figure 2.3.3-1 will be modified to indicate the representation for the 30JNK11AA009 as a motor operated valve as shown in the enclosed FSAR markup.

9. The IRWST has a system designation of JNK. The isolation valve in FSAR, Tier 2, Table 6.2.4-1, Sheet 8 shows JNK11AA009 as part of an essential system. The JNK11AA009 valve is in series with valve JMQ 40 AA001 which is a part of the SAHRS and has a JMQ designation. JMQ 40 AA001 is a part of the non-essential system for SAHRS isolation on a containment isolation signal. The IRWST is an essential system and the SAHRS is a non-essential system. These classifications are consistent and considered correct.

FSAR Impact:

FSAR, Tier 1, Table 3.5-1, Table 3.5-2, Figure 1.3-1, Figure 2.3.3-1, and Figure 3.5-1 will be revised as described in the response and indicated in the enclosed FSAR markup.

U.S. EPR Final Safety Analysis Report Markups

5.5 Programs and Manuals

5.5.14 Safety Function Determination Program (SFDP) (continued)

c. The SFDP identifies where a loss of safety function exists. If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered. When a loss of safety function is caused by the inoperability of a single Technical Specification support system, the appropriate Conditions and Required Actions to enter are those of the support system.

5.5.15 Containment Leakage Rate Testing Program

a. A program shall establish the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September, 1995, as modified by the approved exceptions.

b. The calculated peak containment internal pressure for the design basis loss of coolant accident is 52.0 psig. P_a is conservatively assumed to be 55 psig. The containment design pressure is 62 psig.

c. The maximum allowable containment leakage rate, La, at Pa, shall be 0.25% of containment air weight per day.

d. Leakage rate acceptance criteria are: 06.02.06-01

1. Containment leakage rate acceptance criterion is ≤1.0 L_a. During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are < 0.60 L_a for the Type B and C tests and ≤ 0.75 L_a for Type A tests.

2. Air lock testing acceptance criteria are:

a) Overall air lock leakage rate is ≤ 0.05 L_a when tested at ≥ P_a.

b) For each door, leakage rate is ≤ 0.01 L_a when pressurized to ≥ 10 psig.

Inservice Test

- Peak pressure tests—A test is performed at pressure P_a to measure the leakage rate L_{am}.
- Peak pressure acceptance criteria—The leakage rate L_{am} is less than 0.75 L_a. If local leakage measurements are taken to effect repairs in order to meet the acceptance criteria, these measurements are taken at a test pressure P_a.

06.02.06-01

- The as-found value for L_a shall be ≤ 1.0.
- The as-left value for L_a shall be ≤ 0.75 L_a. This applies to both the preoperational (prior to unit initial startup) and the subsequent periodic Type A tests.
- If a Type A test fails to meet this criterion, the test schedule for subsequent tests is adjusted in accordance with the requirements of 10 CFR 50, Appendix J, as directed by the CLRT program.

6.2.6.2 Containment Penetration Leakage Rate Tests (Type B)

Preoperational and periodic testing of containment penetrations (i.e., Type B leakage rate tests) are performed in accordance with 10 CFR 50, Appendix J. A list of containment penetrations subject to Type B tests is provided in Table 6.2.4-1.

The following containment penetrations receive preoperational and periodic Type B leakage rate tests:

- Penetrations designed with resilient seals, gaskets or sealant compounds.
- Air locks and associated door seals.
- Equipment and access hatches and associated seals.

Portable test panels are used to perform the testing of containment penetration and isolation valve leak testing using either air or nitrogen. The panels include pressure regulators, filters, pressure gauges, and flow instrumentation as required to perform specific tests.

Containment penetrations and testing requirements are identified in Table 6.2.4-1. Type B testing is performed at a pressure of P_a.

Airlock testing acceptance criteria are:

- Overall air lock leakage ≤ 0.05 L_a tested at ≥ P_a.
- Leakage for each door ≤ 0.01 La when pressurized to ≥ 10 psig.

Subsection IWE, except where relief has been authorized by the NRC. Corrective action is taken prior to performing the Type A test if there is evidence of structural deterioration.

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- Containment visual inspections will be performed during two refueling outages when Type A test intervals have been extended to 10 years.
- The structural deterioration and corrective action are reported in accordance with 10 CFR 50, Appendix J.
- During the period between the initiation of the containment inspection and the performance of the Type A test, no repairs or adjustments are made so that the containment can be tested in as close to the "as-is" condition as practical.
- All test instrument calibrations are verified as being current prior to initiation of the CILRT.
- The containment isolation valves are closed without performing preliminary exercising or adjustments. Table 6.2.4-1 provides the postaccident position for the valves and identifies any exceptions to valve position during testing.
- During the CILRT, flow paths that would be open to the containment atmosphere following a loss of coolant accident (LOCA) are drained and vented to the containment atmosphere. Flowpaths that are considered open are those that may have the system fluid drained or driven off by the LOCA or as a result of the line rupturing inside the containment.
- Fluid systems that are open directly to the containment atmosphere under post-accident conditions are opened or vented to the containment atmosphere prior to and during the test.
- Systems that would be normally operating under post-LOCA conditions are not vented during the test and are identified as essential systems in Table 6.2.4-1.
- Tanks inside the containment are vented to the containment atmosphere as necessary to protect them from the effects of external test pressure or to preclude leakage that could affect test results. Similarly, instrumentation and other components that could be adversely affected by the test pressure are vented or removed from containment.
- Certain instrumentation lines that penetrate containment are identified in the test plan and isolated during the CILRT. For those lines isolated, valves are aligned as appropriate and local leak rate testing (LLRT) performed. Results of these LLRTs are added to the CILRT result. Upon completion of the CILRT, valves are realigned to return these instrumentation lines to their normal configurations.

In accordance with 10 CFR 50, Appendix J, the containment atmospheric conditions are allowed to stabilize for a period of time prior to beginning the leakage rate test. The CILRT test procedure addresses the specific time period.

**Table 6.2.4-1—Containment Isolation Valve and Actuator Data
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Pent-ration No. (JMK)	GDC Req.	System Name	Fluid	Line Size (in)	Essent System	Potent Bypass Path	Valve Number	Valve Location	Type C Leak Test	Valve Type and Operator	Pri-mary Act-uation	Secon-dary Act-uation	Normal Position	Shut-down Position	Post Accident Position	Power Failure Position	Cont. Isolation Signal	Valve Closure Time	Power Source
60BQ108	57	CCWS & CVCS to RCP	water	12.0	no	no	KAB60 AA019	outside	yes	gate/ MOV	PS	RM	open	o/c	close	as-is	stage 2	≤ 60 sec	31BNB03
60BQ113	57	CCWS to HVAC & PEH	water	10.0	no	no	KAB40 AA002	inside	yes	swing check	self	self	open	o/c	close	n/a	n/a	n/a	n/a
60BQ113	57	CCWS to HVAC & PEH	water	10.0	no	no	KAB40 AA001	outside	yes	gate/ MOV	PS	RM	open	o/c	close	as-is	stage 1	≤ 50 sec	31BNB03
60BQ114	57	CCWS return HVAC & PEH	water	10.0	no	no	KAB40 AA012	inside	yes	gate/ MOV	PS	RM	open	o/c	close	as-is	stage 1	≤ 50 sec	34BRA
60BQ114	57	CCWS return HVAC & PEH	water	10.0	no	no	KAB40 AA006	outside	yes	gate/ MOV	PS	RM	open	o/c	close	as-is	stage 1	≤ 50 sec	31BNB03
60BQ117	57	CCWS supply to RCP	water	~~3.0~~4.0	yes	no	KAB30 AA050	inside	yes	swing check	self	self	open	open	open	n/a	n/a	n/a	n/a
60BQ117	57	CCWS supply to RCP	water	~~3.0~~4.0	yes	no	KAB30 AA049	outside	yes	gate/ MOV	RM	RM	open	open	open	as-is	no	≤ 15 sec	31BNB03
60BQ118	57	CCWS return RCP	water	~~3.0~~4.0	~~no~~yes	no	KAB30 AA052	outside	yes	gate/ MOV	RM	RM	open	open	open	as-is	no	≤ 15 sec	31BNB03
60BQ118	57	CCWS return RCP	water	~~3.0~~4.0	~~no~~yes	no	KAB30 AA051	inside	yes	gate/ MOV	RM	RM	open	open	open	as-is	no	≤ 15 sec	34BRA
60BQ407	57	CCWS & CVCS to RCP	water	12.0	no	no	KAB70 AA014	inside	yes	swing check	self	self	open	o/c	close	n/a	n/a	n/a	n/a
60BQ407	57	CCWS & CVCS to RCP	water	12.0	no	no	KAB70 AA013	outside	yes	gate/ MOV	PS	RM	open	o/c	close	as-is	stage 2	≤ 60 sec	34BNB03

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Table 6.2.4-1—Containment Isolation Valve and Actuator Data
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Pent-ration No. (JMK)	GDC Req.	System Name	Fluid	Line Size (in)	Essent System	Potent Bypass Path	Valve Number	Valve Location	Type C Leak Test	Valve Type and Operator	Pri-mary Act-uation	Secon-dary Act-uation	Normal Position	Shut-down Position	Post Accident Position	Power Failure Position	Cont. Isolation Signal	Valve Closure Time	Power Source
60BQ408	57	CCWS & CVCS return RCP	water	12.0	no	no	KAB70 AA018	inside	yes	gate/ MOV	PS	RM	open	o/c	close	as-is	stage 2	≤ 60 sec	31BRA
60BQ408	57	CCWS & CVCS return RCP	water	12.0	no	no	KAB70 AA019	outside	yes	gate/ MOV	PS	RM	open	o/c	close	as-is	stage 2	≤ 60 sec	34BNB03
60BQ420	57	CCWS supply to RCP	water	~~3.0~~4.0	~~no~~yes	no	KAB30 AA054	inside	yes	swing check	self	self	open	open	open	n/a	n/a	n/a	n/a
60BQ420	57	CCWS supply to RCP	water	~~3.0~~4.0	~~no~~yes	no	KAB30 AA053	outside	yes	gate/ MOV	RM	RM	open	open	open	as-is	no	≤ 15 sec	34BNB03
60BQ421	57	CCWS return RCP	water	~~3.0~~4.0	~~no~~yes	no	KAB30 AA055	inside	yes	gate/ MOV	RM	RM	open	open	open	as-is	no	≤ 15 sec	31BRA
60BQ421	57	CCWS return RCP	water	~~3.0~~4.0	~~no~~yes	no	KAB30 AA056	outside	yes	gate/ MOV	RM	RM	open	open	open	as-is	no	≤ 15 sec	34BNB03
10BQ002	55	CVCS Charging	water	4.0	no	no	KBA34 AA003	inside	yes	swing check	self	self	open	close	close	n/a	n/a	n/a	n/a
10BQ002	55	CVCS Charging	water	4.0	no	no	KBA34 AA002	outside	yes	globe/ MOV	PS	RM	open	close	close	as-is	stage 2	≤ 20 sec	31BNB03
10BQ003	55	CVCS Letdown	water	6.0	no	no	KBA14 AA002	inside	yes	globe/ MOV	PS	RM	open	close	close	as-is	stage 1	≤ 30 sec	31BRA
10BQ003	55	CVCS Letdown	water	6.0	no	no	KBA14 AA003	outside	yes	globe/ MOV	PS	RM	open	close	close	as-is	stage 1	≤ 30 sec	34BNB03
30BQ044	56	CVS supply	air	39.0	no	no	KLA30 AA003	inside	yes	special/air	PS	RM	close	o/c	close	close	stage 1	n/a	n/a
30BQ044	56	CVS supply	air	39.0	no	no	KLA30 AA002	outside	yes	special/air	PS	RM	close	o/c	close	close	stage 1	n/a	n/a
40BQ045	56	CVS exhaust	air	39.0	no	no	KLA40 AA001	inside	yes	special/air	PS	RM	close	o/c	close	close	stage 1	n/a	n/a

are designated safety related, Quality Group B, and Seismic Category I. Component classifications are presented in Section 3.2. Systems used for accident mitigation or required for safe shutdown are identified as essential systems in Table 6.2.4-1.

Upon loss of actuating power, automatic isolation valves, with the exception of motor-operated valves (MOV), are designed to fail to the position that provides greater safety, as identified in Table 6.2.4-1. For lines equipped with MOVs, a loss of actuating power may leave the affected valve in the "as-is" position, which may be the open position. In this case, the redundant isolation valve provides the isolation function for the penetration.

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Section 3.6.2 of ANSI/ANS-56.2 (Reference 7) allows an additional basis for demonstrating the acceptability of the instrument lines penetrating the containment. Instrument lines with closed system both inside and outside of containment, such as containment pressure instrumentation, that are designed to withstand the maximum containment structural integrity test pressure, the containment design temperature, and are protected from missiles and dynamic effects are acceptable without isolation valve. The containment isolation provisions for instrumentation and control sensing lines that penetrate the containment are designed to the requirements of RG 1.11.

6.2.4.2.2 Isolation of Lines Serving as Part of the RCPB or Connected Directly to the Containment Atmosphere

Lines that penetrate containment and are part of the RCPB or directly connect to the containment atmosphere have one of the following isolation valve configurations:

- One locked closed isolation valve inside and one locked closed isolation valve outside containment.
- One automatic isolation valve inside and one locked closed isolation valve outside containment.
- One locked closed isolation valve inside and one automatic isolation valve outside containment. A simple check valve is not used as the automatic isolation valve outside containment.
- One automatic isolation valve inside and one automatic isolation valve outside containment. A simple check valve is not used as the automatic isolation valve outside containment.

Certain containment isolation valves in systems required for accident mitigation do not receive a containment isolation actuation signal because their systems are required for accident mitigation. However, the containment isolation function may be required postaccident; therefore, the valves can be closed remotely from the main control room (MCR).

6.2.4.2.5 Electrical Power Supplies

The MOV isolation valves inside the containment are supplied from Class 1E 480Vac buses and are backed up by the ~~2-hour batteries~~ Class 1E uninterruptable power supply system and emergency diesel generators. ~~The electrical buses provide an uninterruptible power source (UPS).~~

The MOV isolation valves outside the containment are supplied from Class 1E 480Vac buses. These are normally backed up by the emergency diesel generators, but can also be supplied from the station blackout diesel generators. Additionally, the 12-hour UPS can be manually connected to provide power to these buses.

The power supplies for containment isolation valves, and for valve position indication, satisfy station blackout requirements. Station blackout is addressed in Section 8.4.

Electrical alternate feeds provide standby power when certain electrical components are out of service. Containment isolation valves are allocated to electrical divisions, so that two series valves are not powered by an alternate feed pair, thus maintaining the required redundancy. Alternate feeds are addressed in Section 8.3.1.1.1.

The use of motor-operated valves that fail in the as-is position upon loss of actuating power is based on the consideration of what valve position provides for the plant safety requirements.

6.2.4.2.6 Isolation Valve Closure Times

Valve closure times consider the containment isolation requirements, the capabilities and requirements of the individual fluid system (e.g., water hammer), and the effect of closure time on the valve reliability. Isolation valve closure times, including detection and actuation time are such that the intended safety functions of the valves are achieved. Closure time requirements are as follows:

- In general, power operated valves $3^1/_2$ inches to 12 inches in diameter close at least within the time determined by dividing the nominal valve diameter by 12 inches per minute.
- Valves 3 inches and less close within 15 seconds.
- All valves larger than 12 inches in diameter close within one minute.
- Valves in the containment building ventilation system that are associated with containment purging operations close within five seconds. The shorter closure time requirement supports the radiological release evaluations in Section 15.0.3.

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- An exception to the valve closing time requirements is the containment full flow ventilation subsystem. Supply and exhaust valves in the full flow portion of the system are maintained closed during normal plant operation (MODES 1, 2, 3, and

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4). This portion of the system is used only during plant shutdown or refueling operations. No closure times are required to be listed for these valves.

In determining appropriate valve closure times, a variety of factors are considered, including time delays due to loss of offsite power, valve stroke times, instrument and control delay times, motive power delay times (e.g., diesel start delays), and possible adverse transient conditions unique to isolating a given system.

Individual valve closure times are listed in Table 6.2.4-1. Valve testing requirements are described by the inservice testing program for valves in Section 3.9.6.

6.2.4.2.7 Penetrations Overpressure Protection

Overpressure protection is provided for liquid-filled piping between containment isolation barriers to prevent damage when the piping is isolated unless it can be demonstrated that the pressure between the isolation barriers cannot exceed the design pressure of the isolation barriers or the piping between the isolation barriers.

Mechanical system lines that use a check valve as one of the containment isolation valves have inherent overpressure protection. Other lines with gate, diaphragm, or butterfly valves have overpressure protection provided by either a bypass check valve or a pressure relief valve. The overpressure protection method utilized provides such protection at the maximum back pressure condition that could exist during a loss of coolant accident (LOCA). Containment penetration overpressure protection configurations are shown in Figure 6.2.4-2—Containment Isolation Valve Arrangements for Overpressure Protection.

6.2.4.3 Design Evaluation

Containment isolation valves are protected from the effects of external hazards by virtue of their placement in Seismic Category I structures. Protection from internal hazards is addressed in Section 3.4 (flooding), Section 3.6 (pipe rupture), and Section 9.5.1 (fire). Environmental qualification of CIS components is addressed in Section 3.11. Containment isolation valves are capable of tight shutoff against leakage to minimize radioactive material release following a postulated accident.

The CIS can perform its safety function in the event of any single active failure. The containment isolation system includes double isolation barriers at the containment penetrations. Redundant isolation valves are powered from separate electrical divisions to provide containment isolation in the event of a single active failure in the electrical system. Alternate electrical feeds, described in Section 8.3.1.1.1, ~~extend~~maintain single failure ~~protection to~~ criteria during conditions where ~~an~~certain electrical ~~division is~~components are out of service. Alternate onsite power sources provide power to the valves to close in time to achieve safety functions in case of a loss

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Table 3.5-1—Containment Isolation Equipment Mechanical Design (8 Sheets)						
Equipment Description	**Equipment Tag Number (1)**	**Equipment Location**	**Figure 3.5-1 Configuration Type**	**ASME Code Section III**	**Function(2)**	**Seismic Category**
Hydrogen Monitoring System - Analyzer 2 - CIV	JMU51AA089	Reactor Building	5B	Yes	Open/ Close(a)	I
Hydrogen Monitoring System - Analyzer 2 - CIV	JMU51AA090	Safeguard Building	5A	Yes	Open/ Close(a)	I
Hydrogen Monitoring System - Analyzer 2 - CIV	JMU51AA091	Reactor Building	5B	Yes	Open/ Close(a)	I
Hydrogen Monitoring System - Analyzer 2 - CIV	JMU51AA092	Safeguard Building	5A	Yes	Open/ Close(a)	I
Hydrogen Monitoring System - Analyzer 2 return to containment - CIV	JMU51AA093	Safeguard Building	5A	Yes	Open/ Close(a)	I
Hydrogen Monitoring System - Analyzer 2 Return to Containment -CIV	JMU51AA094	Reactor Building	5B	Yes	Open/ Close(a)	I
~~IRWST - Sump Suction SAHRS - CIV~~	~~JMQ40AA001~~	~~Safeguard Building~~	~~5A~~	~~Yes~~	~~Close(b)~~	~~I~~
Containment Equip Compartment pressure - CIV	KLA60AA701	Safeguard Building	1A	Yes	Open	I
Containment Equip Compartment pressure - CIV	KLA60AA702	Fuel Building	1A	Yes	Open	I
Containment Equip Compartment pressure - CIV	KLA60AA703	Safeguard Building	1A	Yes	Open	I
Containment Equip Compartment pressure - CIV	KLA60AA704	Fuel Building	1A	Yes	Open	I
Containment Service Compartment pressure – CIV	KLA70AA701	Safeguard Building	1A	Yes	Open	I

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Table 3.5-2—Containment Isolation Equipment I&C and Electrical Design (5 Sheets)

Equipment Description	Equipment Tag Number (1)	IEEE Class 1E (2)	EQ - Harsh Environment	PACS	MCR Displays	MCR Controls
Demineralized Water Distribution System - CIV	GHC74AA001	$1^{(N)}$ $2^{(A)}$	No	Yes	Position	Open / Close
Demineralized Water Distribution System - CIV	GHC74AA002	$4^{(N)}$ $3^{(A)}$	Yes	Yes	Position	Open / Close
~~Chemical & Volume Control System - Seal Injection - CIV~~	~~JEW01AA005~~	~~$1^{(N)}$ $2^{(A)}$~~	~~No~~	~~Yes~~	~~Position~~	~~Open / Close~~
~~Chemical & Volume Control System - Seal Return – CIV~~	~~JEW50AA001~~	~~$4^{(N)}$ $3^{(A)}$~~	~~Yes~~	~~Yes~~	~~Position~~	~~Open / Close~~
~~Chemical & Volume Control System - Seal Return – CIV~~	~~JEW50AA002~~	~~$1^{(N)}$ $2^{(A)}$~~	~~No~~	~~Yes~~	~~Position~~	~~Open / Close~~
Leak Off System - Inflating/Deflating Subsystem – CIV	JMM10AA006	$4^{(N)}$ $3^{(A)}$	Yes	Yes	Position	Open / Close
Leak Off System - Inflating/Deflating Subsystem – CIV	JMM10AA007	$1^{(N)}$ $2^{(A)}$	No	Yes	Position	Open / Close
Leak Off System - Leakage Exhaust Subsystem – CIV	JMM23AA001	$1^{(N)}$ $2^{(A)}$	Yes	Yes	Position	Open / Close
Leak Off System - Leakage Exhaust Subsystem – CIV	JMM23AA002	$4^{(N)}$ $3^{(A)}$	No	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 1 - CIV	JMU50AA075	$3^{(N)}$ $4^{(A)}$	Yes	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 1 - CIV	JMU50AA076	$4^{(N)}$ $3^{(A)}$	No	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 1 - CIV	JMU50AA077	$3^{(N)}$ $4^{(A)}$	Yes	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 1 - CIV	JMU50AA078	$4^{(N)}$ $3^{(A)}$	No	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 1 - CIV	JMU50AA079	$3^{(N)}$ $4^{(A)}$	Yes	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 1 - CIV	JMU50AA080	$4^{(N)}$ $3^{(A)}$	No	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 1 - CIV	JMU50AA081	$3^{(N)}$ $4^{(A)}$	Yes	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 1 - CIV	JMU50AA082	$4^{(N)}$ $3^{(A)}$	No	Yes	Position	Open / Close

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Table 3.5-2—Containment Isolation Equipment I&C and Electrical Design (5 Sheets)						
Equipment Description	**Equipment Tag Number (1)**	**IEEE Class 1E (2)**	**EQ - Harsh Environment**	**PACS**	**MCR Displays**	**MCR Controls**
Hydrogen Monitoring System - Analyzer 1 Return to containment - CIV	JMU50AA083	$4^{(N)}$ $3^{(A)}$	No	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 1 return to containment - CIV	JMU50AA084	$3^{(N)}$ $4^{(A)}$	Yes	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 2 - CIV	JMU51AA085	$2^{(N)}$ $1^{(A)}$	Yes	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 2 - CIV	JMU51AA086	$1^{(N)}$ $2^{(A)}$	No	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 2 - CIV	JMU51AA087	$2^{(N)}$ $1^{(A)}$	Yes	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 2 - CIV	JMU51AA088	$1^{(N)}$ $2^{(A)}$	No	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 2 - CIV	JMU51AA089	$2^{(N)}$ $1^{(A)}$	Yes	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 2 - CIV	JMU51AA090	$1^{(N)}$ $2^{(A)}$	No	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 2 - CIV	JMU51AA091	$2^{(N)}$ $1^{(A)}$	Yes	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 2 - CIV	JMU51AA092	$1^{(N)}$ $2^{(A)}$	No	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 2 Return to containment - CIV	JMU51AA093	$1^{(N)}$ $2^{(A)}$	No	Yes	Position	Open / Close
Hydrogen Monitoring System - Analyzer 2 Return to containment - CIV	JMU51AA094	$2^{(N)}$ $1^{(A)}$	Yes	Yes	Position	Open / Close
IRWST - Sump Suction SAHRS - CIV	JMQ40AA001	$1^{(N)}$ $2^{(A)}$	No	Yes	Position	Open / Close
Gaseous Waste Processing System - CIV	KPL84AA003	$1^{(N)}$ $2^{(A)}$	Yes	Yes	Position	Open / Close
Gaseous Waste Processing System - CIV	KPL84AA002	$4^{(N)}$ $3^{(A)}$	No	Yes	Position	Open / Close
Gaseous Waste Processing System - CIV	KPL85AA003	$1^{(N)}$ $2^{(A)}$	Yes	Yes	Position	Open / Close
Gaseous Waste Processing System - CIV	KPL85AA004	$4^{(N)}$ $3^{(A)}$	No	Yes	Position	Open / Close
Nuclear Island Drain & Vent System – CIV	KTC10AA010	$4^{(N)}$ $3^{(A)}$	No	Yes	Position	Open / Close
Nuclear Island Drain & Vent System - CIV	KTA10AA017	$4^{(N)}$ $3^{(A)}$	Yes	Yes	Position	Open / Close

Figure 2.3.3-1—Severe Accident Heat Removal System Functional Arrangement

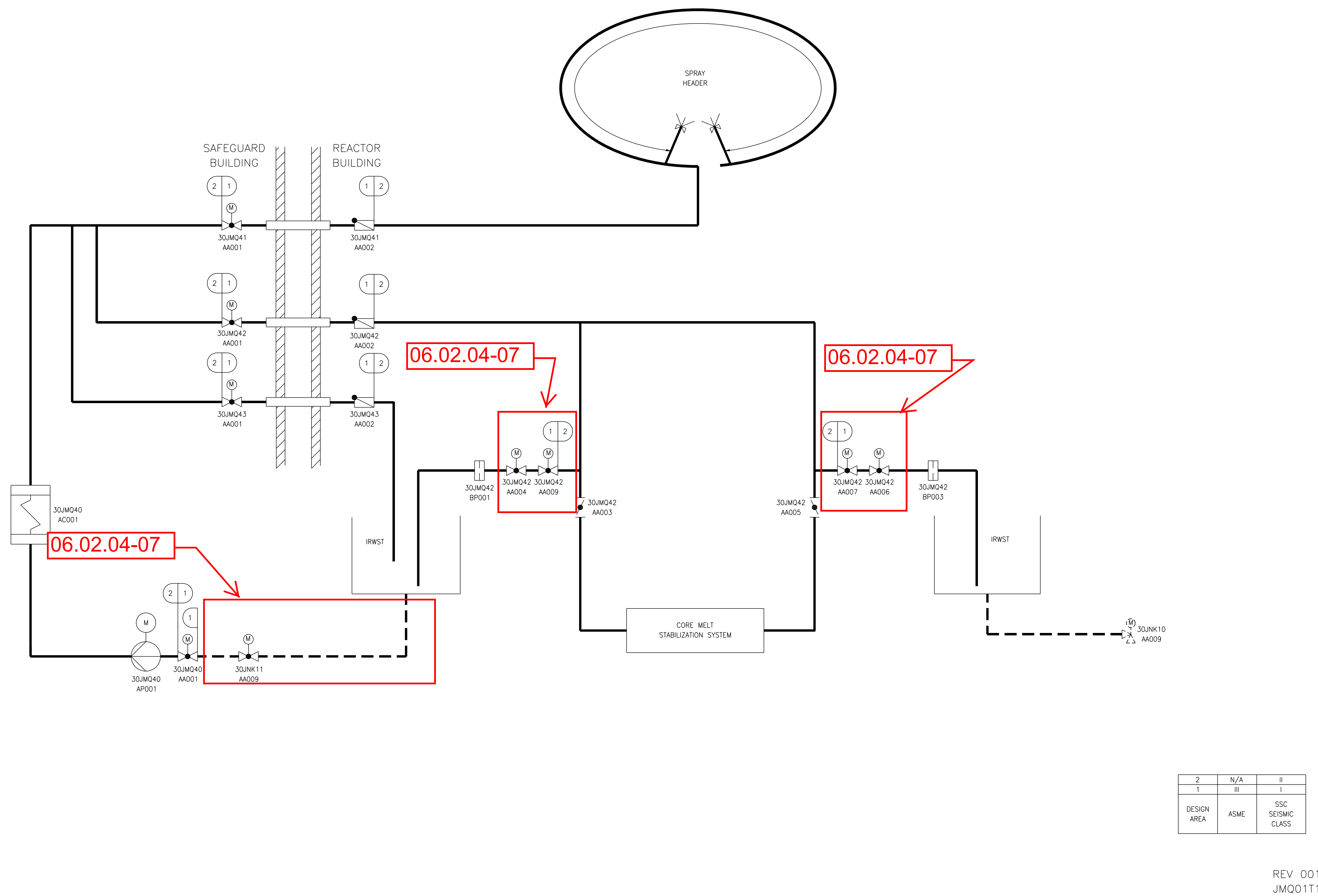

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Figure 3.5-1—Representative Containment Isolation Valve Arrangement

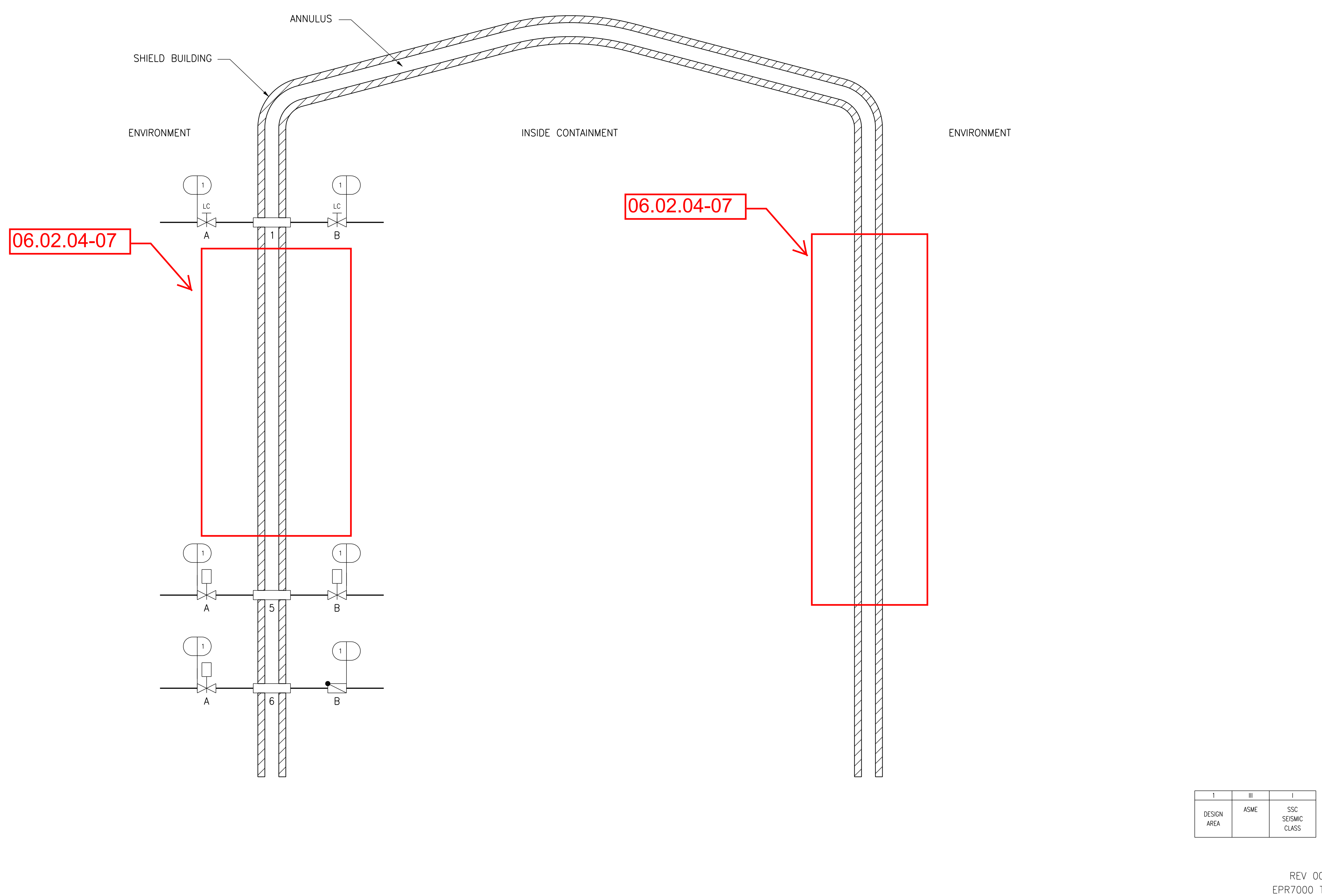

Figure 1.3-1—Functional Arrangement Symbol Legend