Technical Specifications Task Force
Improved Standard Technical Specifications Change Traveler

Relocation of the HPCI and RCIC Low Steam Line Pressure Isolation Functions

NUREGs Affected: ☐ 1430 ☐ 1431 ☐ 1432 ☑ 1433 ☑ 1434

Classification 1) Technical Change

Recommended for CLIIP?: Yes

Correction or Improvement: Improvement

NRC Fee Status: Not Exempt

Benefit: Increases Equipment Operability

Changes Marked on ISTS Rev 5.0

PWROG RISD & PA (if applicable): N/A N/A

Revision History

OG Revision 0 Revision Status: Active

Revision Proposed by: Cooper

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 30-Dec-25

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 21-Jan-26

TSTF Review Information

TSTF Received Date: 17-Feb-26 Date Distributed for Review 17-Feb-26

TSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 06-Apr-26

Affected Technical Specifications

Bkgnd 3.3.6.1 Bases	Primary Containment Isolation Instrumentation
S/A 3.3.6.1 Bases	Primary Containment Isolation Instrumentation
LCO 3.3.6.1	Primary Containment Isolation Instrumentation Change Description: Table 3.3.6.1-1
Action 3.3.6.1 Bases	Primary Containment Isolation Instrumentation

Model Application

1. SUMMARY DESCRIPTION

The proposed change revises Boiling Water Reactor (BWR) Standard Technical Specifications (STS) to relocate the BWR/4 High Pressure Coolant Injection (HPCI) System, and the BWR/4 and BWR/6 Reactor Core Isolation Cooling (RCIC) System, "Steam Supply Line Pressure - Low" Functions to licensee control. The proposed change affects the STS in NUREG-1433 and NUREG-1434[1].

2. DETAILED DESCRIPTION

2.1 System Design and Operation

The NUREG-1433 (BWR/4) TS 3.5.1, "Emergency Core Cooling System (ECCS) - Operating," requires the High Pressure Coolant Injection (HPCI) system to be operable in Mode 1, and in Modes 2 and 3 when reactor steam dome pressure is > [150][2] psig. The NUREG-1433 and NUREG-1434 (BWR/6) TS 3.5.3, "Reactor Core Isolation Cooling (RCIC) System," requires the RCIC system to be operable in Mode 1, and in Modes 2 and 3 when reactor steam dome pressure is > [150] psig. When reactor steam dome pressure is ≤ [150] psig, HPCI and RCIC are not required to be operable because the low pressure ECCS subsystems can provide sufficient flow.

NUREG-1433 TS 3.3.6.1, "Primary Containment Isolation Instrumentation," Function 3.b, "HPCI Steam Supply Line Pressure - Low," is Applicable in Modes 1, 2, and 3 and requires automatic HPCI isolation when steam supply line pressure is < [100] psig. NUREG-1433 Function 4.b and NUREG-1434 Function 3.c, "RCIC Steam Supply Line Pressure - Low," are Applicable in Modes 1, 2, and 3, and automatic RCIC isolation is required when steam line pressure is less than [3] [60] psig (NUREG-1433) or [53] psig (NUREG-1434).

For both the HPCI and RCIC isolation Functions, the TS Bases state that the function is for equipment protection, because the Main Steam Line (MSL) pressure may be too low to continue operation of the associated system's turbine. The TS Bases also state that the isolation functions are not assumed in any transient or accident analysis in the Updated Final Safety Analysis Report (UFSAR).

2.2 Current Technical Specifications Requirements

NUREG-1433 TS 3.3.6.1, "Primary Containment Isolation Instrumentation," Function 3, "HPCI System Isolation," Function 3.b, "HPCI Steam Supply Line Pressure - Low," is Applicable in Modes 1, 2, and 3. [Two] channels are required per trip system. The allowable value for the Function is ≥ [100] psig.

---

[1] NUREG-1433 provides the STS for BWR/4 plant designs, but is also representative of the BWR/2, BWR/3, and, in some cases, of the BWR/5 plant design.
NUREG-1434 provides the STS for BWR/6 plant designs, but is also representative of the BWR/5 plant design in this traveler.

[2] In the STS, values in brackets are plant-specific, but represent typical values.

[3] Note that the inequality symbol associated with the NUREG-1433 Function 4.b allowable value is incorrect. It should be ≥ instead of ≤.

In the STS, the Function is subject to the following Surveillances:

- Channel Check
- Channel Functional Test
- Trip Unit Calibration
- Channel Calibration
- Logic System Functional Test
- Isolation System Response Time

NUREG-1433 Function 4.b and NUREG-1434 Function 3.c, "RCIC System Isolation," "RCIC Steam Supply Line Pressure - Low," are Applicable in Modes 1, 2, and 3. In NUREG-1433, [2] channels are required per trip system. In NUREG-1434, [1] channel is required per trip system. The NUREG-1433 allowable value for the Function is ≤ [60] psig (see Footnote 3) and the NUREG-1434 allowable value for the Function is ≥ [53] psig.

In the STS, the Functions are subject to the following Surveillances:

- Channel Check
- Channel Functional Test
- Trip Unit Calibration
- Channel Calibration
- Logic System Functional Test
- NUREG-1434 only: Isolation System Response Time

For all of these functions, if a channel is inoperable it must be placed in trip within 24 hours, or in accordance with the Risk Informed Completion Time Program, if applicable.

2.3 Reason for Proposed Change

There is a small difference in pressure between the HPCI and RCIC isolation setpoints and the system operability requirements. This small difference creates a "pinch point" during startup. The HPCI and RCIC systems must be unisolated and placed in standby before exceeding a steam pressure of [150] psig, but after exceeding the isolation setpoints. If pressure drops below the setpoint, the functions will actuate, isolating the HPCI and RCIC systems and requiring the system startup to be repeated. If steam line pressure exceeds [150] psig before the systems are unisolated, the ECCS TS is not met.

During this period of startup, there are many concurrent activities that can affect steam pressure, such as admitting steam to the turbine building, reactor heatup, reactor pressure vessel (RPV) level control using the control rod drive and cleanup systems, placing steam seals in service, and transfer of pressure control to the steam bypass valves. The operator must maintain awareness of HPCI and RCIC instrumentation and be prepared to clear the low steam line pressure isolation Functions after the Function setpoint is exceeded. In addition, the steam lines must be unisolated and pressurized to place HPCI and RCIC in standby prior to exceeding 150 psig.

This complex set of circumstances has resulted in plants failing to place HPCI and RCIC into service before exceeding a steam pressure of 150 psig, resulting in the HPCI and RCIC systems being declared inoperable. In at least one case, the situation was reportable (Hatch Unit 2 on April 22, 2020 LER 2020-002-00).

The HPCI and RCIC low steam pressure isolation Functions are described in the TS Bases as being equipment protection functions that are not credited in any design basis accident or transient analysis. The proposed change will relocate the functions to licensee control, typically to the Technical Requirements Manual (TRM) or equivalent document. This relocation will permit licensees to revise the plant design and procedural requirements under 10 CFR 50.59 to provide additional operational margin during startup while continuing to provide any necessary equipment protection capability.

2.4 Description of the Proposed Change

NUREG-1433, TS 3.3.6.1, Table 3.3.6.1-1, is revised to delete Function 3.b and 4.b. Subsequent functions are renumbered. The functions, including the Surveillance Requirements, Allowable Value, and Actions, are relocated to licensee control under 10 CFR 50.59.

NUREG-1434, TS 3.3.6.1, Table 3.3.6.1-1, is revised to delete Function 3.c. Subsequent functions are renumbered. The functions, including the Surveillance Requirements, Allowable Value, and Actions, are relocated to licensee control under 10 CFR 50.59.

The TS Bases are revised to reflect the deletions and renumbering.

Note that plant-specific adoption of this change may mark the affected functions as not used or deleted instead of renumbering the subsequent functions.

3. TECHNICAL EVALUATION

The HPCI and RCIC Steam Supply Line Pressure - Low isolation Functions were compared to each of the criteria in 10 CFR 50.36(c)(2)(ii) to determine if they are required to be retained in the TS. The criteria application considers the Commission's discussion of each criteria in the Commission's Final Policy Statement.

Criterion 1. Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.

Discussion of Criterion 1 from the Final Policy Statement:

A basic concept in the adequate protection of the public health and safety is the prevention of accidents. Instrumentation is installed to detect significant abnormal degradation of the reactor coolant pressure boundary so as to allow operator actions to either correct the condition or to shut down the plant safely, thus reducing the likelihood of a loss-of-coolant accident.

This criterion is intended to ensure that Technical Specifications control those instruments specifically installed to detect excessive reactor coolant system leakage. This criterion should not, however, be interpreted to include instrumentation to detect precursors to reactor coolant pressure boundary leakage or instrumentation to identify the source of actual leakage (e.g., loose parts monitor, seismic instrumentation, valve position indicators).

Evaluation of Criterion 1

The HPCI and RCIC Steam Supply Line Pressure - Low isolation Functions actuate to isolate the HPCI and RCIC from the main steam lines (MSLs). The MSLs are part of the reactor coolant pressure boundary (RCPB). However, the HPCI and RCIC Steam Supply Line Pressure - Low isolation Functions are not used to detect a significant abnormal degradation of the RCPB. The Main Steam Line Flow - High isolation function (TS 3.3.6.1, Function 1.c, in both NUREG-1433 and NUREG-1434) are credited to isolate the MSLs should a significant degradation occur. As stated in the TS Bases, the HPCI and RCIC system isolation functions are for equipment protection and are not credited in any design basis accident or transient analysis. This purpose does not satisfy Criterion 1. Therefore, the HPCI and RCIC Steam Supply Line Pressure - Low isolation Functions do not satisfy Criterion 1.

Criterion 2. A process variable, design feature, or operating restriction that is an initial condition of a Design Basis Accident or Transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Excerpt from the Discussion of Criterion 2 from the Final Policy Statement:

The purpose of this criterion is to capture those process variables that have initial values assumed in the Design Basis Accident and Transient analyses, and which are monitored and controlled during power operation. As long as these variables are maintained within the established values, risk to the public safety is presumed to be acceptably low. This criterion also includes active design features (e.g., high pressure /low pressure system valves and interlocks) and operating restrictions (pressure/temperature limits) needed to preclude unanalyzed accidents and transients.

Evaluation of Criterion 2

The HPCI and RCIC Steam Supply Line Pressure - Low isolation Functions actuate to isolate the HPCI and RCIC from the MSLs. As stated in the TS Bases, the functions are equipment protection functions that are not credited in any design basis accident or transient analysis. Therefore, these isolation functions are not an initial condition of any Design Basis Accident or Transient analysis, and no initial value is assumed. Automatic isolation of the HPCI or RCIC based on low steam line pressure is not an operating restriction needed to preclude unanalyzed accidents and transients. The analysis for large breaks, including a Main Steam Line Break (MSLB), bounds any accidents or transients associated with the steam supply to the HPCI or RCIC. Therefore, the HPCI and RCIC Steam Supply Line Pressure - Low isolation Functions do not satisfy Criterion 2.

Criterion 3: A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a Design Basis Accident or Transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Excerpt from the Discussion of Criterion 3 from the Final Policy Statement:

It is the intent of this criterion to capture into Technical Specifications only those structures, systems, and components that are part of the primary success path of a safety sequence analysis. Also captured by this criterion are those support and actuation systems that are necessary for items in the primary success path to successfully function. The primary success path for a particular mode of operation does not include backup and diverse equipment (e.g., rod withdrawal block which is a backup to the average power range monitor high flux trip in the startup mode, safety valves which are backup to low temperature overpressure relief valves during cold shutdown).

Evaluation of Criterion 3

As stated in the TS Bases, the HPCI and RCIC Steam Supply Line Pressure - Low isolation Functions are not credited in any design basis accident or transient analysis. The isolation functions are not a structure, system, or component which functions or actuates to mitigate a Design Basis Accident or Transient. Therefore, the HPCI and RCIC Steam Supply Line Pressure - Low isolation Functions do not satisfy Criterion 3.

Criterion 4: A structure, system, or component which operating experience or probabilistic safety assessment has shown to be significant to public health and safety.

Excerpt from the Discussion of Criterion 4 from the Final Policy Statement:

It is the Commission policy that licensees retain in their Technical Specifications LCOs, action statements and Surveillance Requirements for the following systems (as applicable), which operating experience and PSA have generally shown to be significant to public health and safety.

Evaluation of Criterion 4

The HPCI and RCIC Steam Supply Line Pressure - Low isolation Functions are not risk-significant contributors (either as explicitly modeled or are unmodeled due to low risk contribution) in plant's probabilistic risk assessments. A review of Event Notifications since 1998 and Licensee Event Reports since 1996 did not reveal any instances in which the HPCI or RCIC Steam Supply Line Pressure - Low isolation Functions performed a credited safety function or prevented performance of a credited safety function. Consequently, operating experience has not shown that the functions are significant to public health and safety. Therefore, the HPCI and RCIC Steam Supply Line Pressure - Low isolation Functions do not satisfy Criterion 4.

Since the HPCI and RCIC Steam Supply Line Pressure - Low isolation Functions do not meet the criteria in 10 CFR 50.36(c)(2)(ii) requiring a TS LCO, the functions may be relocated to the TRM or the plant-specific equivalent, and any subsequent changes will be adequately controlled by the provisions of 10 CFR 50.59. These provisions will continue to be implemented by appropriate station procedures (i.e., operating procedures, maintenance procedures, surveillance and testing procedures, and work control procedures).

4. REGULATORY EVALUATION

The regulation at Title 10 of the Code of Federal Regulations (10 CFR) Section 50.36(b) requires:

> Each license authorizing operation of a … utilization facility … will include technical specifications. The technical specifications will be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto, submitted pursuant to [10 CFR] 50.34 ["Contents of applications; technical information"]. The Commission may include such additional technical specifications as the Commission finds appropriate.

Regulation 10 CFR 50.36(c), Paragraph (2)(i), states that when a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met. The proposed change provides a remedial action to be taken when the limiting condition for operation is not met and is in compliance with 10 CFR 50.36(c)(2)(i).

Regulation 10 CFR 50.36(c), Paragraph (3), states that surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met. The proposed change revises the surveillance requirements while ensuring the limiting conditions for operation will be met, and is in compliance with 10 CFR 50.36(c)(3).

Per 10 CFR 50.90, whenever a holder of a license desires to amend the license, application for an amendment must be filed with the Commission, fully describing the changes desired, and following as far as applicable, the form prescribed for original applications.

Section IV, "The Commission Policy," of the "Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors" (58 FR 39132), dated July 22, 1993, states in part that improved STS have been developed and will be maintained for each NSSS owners group. The Commission Policy encourages licensees to use the improved STS as the basis for plant-specific Technical Specifications." The industry's proposal of travelers and the NRC's approval of travelers is the method used to maintain the improved STS as described in the Commission's Policy. Following NRC approval, licensees adopt travelers into their plant-specific technical specifications following the requirements of 10 CFR 50.90. Therefore, the traveler process facilitates the Commission's policy while satisfying the requirements of the applicable regulations.

The regulation at 10 CFR 50.36(a)(1) also requires the application to include a "summary statement of the bases or reasons for such specifications, other than those covering administrative controls." The proposed traveler revises the Bases to be consistent with the changes to the TS, and therefore complies with 10 CFR 50.36(a)(1).

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission’s regulations, and (3)

the approval of the proposed change will not be inimical to the common defense and security or to the health and safety of the public.

5. REFERENCES

None.

Model Application

[DATE] 10 CFR 50.90

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

PLANT NAME
DOCKET NO. [50]-[xxx]
SUBJECT: Application to Revise Technical Specifications to Adopt TSTF-613, "Relocation of the HPCI and RCIC Low Steam Line Pressure Isolation Functions"

Pursuant to 10 CFR 50.90, [LICENSEE] is submitting a request for an amendment to the Technical Specifications (TS) for [PLANT NAME, UNIT NOS.].

[LICENSEE] requests adoption of TSTF-613, "Relocation of the HPCI and RCIC Low Steam Line Pressure Isolation Functions," which is an approved change to the Standard Technical Specifications (STS), into the [PLANT NAME, UNIT NOS] TS. TSTF-613 relocates the [High Pressure Coolant Injection (HPCI) and] Reactor Core Isolation Cooling (RCIC) low steam line pressure isolation function[s] from the TS.

The enclosure provides a description and assessment of the proposed changes. Attachment 1 provides the existing TS pages marked to show the proposed changes. [Attachment 2 provides revised (clean) TS pages.] [Attachment [3] provides the existing TS Bases pages marked to show the changes associated with the proposed TS changes and is provided for information only.]

[LICENSEE] requests that the amendment be reviewed under the Consolidated Line Item Improvement Process (CLIIP). [Approval of the proposed amendment is requested by [DATE]. Describe the basis for the requested date.] Once approved, the amendment shall be implemented within [90] days.

There are no regulatory commitments in this letter.

[In accordance with 10 CFR 50.91, a copy of this application, with attachments, is being provided to the designated [STATE] Official.]

[In accordance with 10 CFR 50.30(b), a license amendment request must be executed in a signed original under oath or affirmation. This can be accomplished by attaching a notarized affidavit confirming the signature authority of the signatory, or by including the following statement in the cover letter: "I declare under penalty of perjury that the foregoing is true and correct. Executed on (date)." The alternative statement is pursuant to 28 USC 1746. It does not require notarization.]

If you should have any questions regarding this submittal, please contact [NAME, TELEPHONE NUMBER].

Sincerely,

[Name, Title]

Enclosure: Description and Assessment

Attachments: 1. Proposed Technical Specification Changes (Mark-Up)
[2. Revised Technical Specification Pages]
[3. Proposed Technical Specification Bases Changes (Mark-Up) – For Information Only]

[The attachments are to be provided by the licensee and are not included in the model application.]

cc: NRC Project Manager
NRC Regional Office
NRC Resident Inspector
State Contact

ENCLOSURE

DESCRIPTION AND ASSESSMENT

1.0 DESCRIPTION

[LICENSEE] requests adoption of TSTF-613, "Relocation of the HPCI and RCIC Low Steam Line Pressure Isolation Functions," which is an approved change to the Standard Technical Specifications (STS), into the [PLANT NAME, UNIT NOS] TS. The traveler relocates the [High Pressure Coolant Injection (HPCI) and] Reactor Core Isolation Cooling (RCIC) low steam line pressure isolation function[s] from the TS.

2.0 ASSESSMENT

2.1 Applicability of Safety Evaluation

[LICENSEE] has reviewed the safety evaluation for TSTF-613 provided to the Technical Specifications Task Force in a letter dated [DATE]. This review included the NRC staff's evaluation, as well as the information provided in TSTF-613. [LICENSEE] has concluded that the justifications presented in TSTF-613 and the safety evaluation prepared by the NRC staff are applicable to [PLANT, UNIT NOS.] and justify this amendment for the incorporation of the changes to the [PLANT] TS.

[[PLANT, UNIT NOS.] is of the [BWR/6] plant design. Therefore, only the RCIC low steam pressure isolation function appears in the TS and is relocated to licensee control.]

2.2 Variations

[[LICENSEE] is not proposing any variations from the TS changes described in TSTF-613 or the applicable parts of the NRC staff's safety evaluation.] [[LICENSEE] is proposing the following variations from the TS changes described in TSTF-613 or the applicable parts of the NRC staff's safety evaluation:]

[In lieu of eliminating the Function [3.b/3.c] and [4.b] and renumbering the subsequent functions, the function[s] are marked as not used or deleted. This difference is administrative and does not affect the applicability of TSTF-613.]

[The [PLANT] TS utilize different [numbering][and][titles] than the STS on which TSTF-613 was based. Specifically, [describe differences between the plant-specific TS numbering and/or titles and the TSTF-613 numbering and titles.] These differences are administrative and do not affect the applicability of TSTF-613 to the [PLANT] TS.]

[The [PLANT] TS contain requirements that differ from the STS on which TSTF-613 was based but are encompassed in the TSTF-613 justification. [Describe the differences and why TSTF-613 is still applicable.]]

[The [PLANT] design is different from the plant design described in the STS and TSTF-613, but is encompassed in the TSTF-613 justification. [Describe the differences and why TSTF 613 is still applicable.]]

3.0 REGULATORY ANALYSIS

3.1 No Significant Hazards Consideration Analysis

[LICENSEE] requests adoption of TSTF-613, "Relocation of the HPCI and RCIC Low Steam Line Pressure Isolation Functions," which is an approved change to the Standard Technical Specifications (STS), into the [PLANT NAME, UNIT NOS] TS. The proposed change relocates the [High Pressure Coolant Injection (HPCI) and] Reactor Core Isolation Cooling (RCIC) low steam line pressure isolation function[s] from the TS.

[LICENSEE] has evaluated if a significant hazards consideration is involved with the proposed amendment(s) by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No

   The proposed change relocates the [HPCI and] RCIC low steam line pressure isolation function[s] from the TS.

   The [HPCI and] RCIC low steam line pressure isolation function[s] are not initiators to any previously analyzed accident. The isolation function[s] are not assumed to actuate to mitigate any accident previously evaluated. The relocation of these function[s] from the TS to licensee control under 10 CFR 50.59 will ensure that any change to the requirements will be evaluated.

   Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No

   The proposed change relocates the [HPCI and] RCIC low steam line pressure isolation function[s] from the TS.

   The [HPCI and] RCIC low steam line pressure isolation function[s] provide equipment protection for the [HPCI and] RCIC system turbine[s]. The equipment protection functions are placed under licensee control. Any change to the function[s] will be evaluated under 10 CFR 50.59, which will ensure that changes will not create the possibility of a new or different kind of accident.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

The proposed change relocates the [HPCI and] RCIC low steam line pressure isolation function[s] from the TS.

The proposed change does not affect any Safety Limits or controlling numerical values for a parameter established in the updated final safety analysis report or any specific values that define margin that are established in the plant's licensing basis. The [HPCI and] RCIC low steam line pressure isolation function[s] are not credited as a mitigating feature in any analysis which establishes thermal limits, evaluates peak vessel pressure, evaluates peak containment or drywell pressure, or evaluates onsite and offsite radiological consequences.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, [LICENSEE] concludes that the proposed change presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

3.2 Conclusion

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

4.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or a significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

Technical Specifications Changes

Table 3.3.6.1-1 (page 3 of 7)
Primary Containment Isolation Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION C.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
3. HPCI System Isolation					
~~b. HPCI Steam Supply Line Pressure - Low~~	~~1, 2, 3~~	~~[2]~~	~~F~~	~~SR 3.3.6.1.1~~ ~~SR 3.3.6.1.2~~ ~~[SR 3.3.6.1.3]~~ ~~SR 3.3.6.1.6~~ ~~SR 3.3.6.1.7~~ ~~SR 3.3.6.1.8~~	~~≥ [100] psig~~
~~b~~c. HPCI Turbine Exhaust Diaphragm Pressure - High	1, 2, 3	[2]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.6 SR 3.3.6.1.7	≤ [20] psig
~~c~~d. Drywell Pressure - High	1, 2, 3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.6 SR 3.3.6.1.7 [SR 3.3.6.1.8]	≤ [1.92] psig
~~d~~e. HPCI Pipe Penetration Room Temperature - High	1, 2, 3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.6 SR 3.3.6.1.7	≤ [169] °F
~~e~~f. Suppression Pool Area Ambient Temperature - High	1, 2, 3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.6 SR 3.3.6.1.7	≤ [169]°F
~~f~~g. Suppression Pool Area Temperature - Time Delay Relays	1, 2, 3	[1]	F	SR 3.3.6.1.5 SR 3.3.6.1.6 SR 3.3.6.1.7	≥ [NA] [minutes]
~~g~~h. Suppression Pool Area Differential Temperature - High	1, 2, 3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.6 SR 3.3.6.1.7	≤ [42]°F

Table 3.3.6.1-1 (page 4 of 7)
Primary Containment Isolation Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION C.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
3. HPCI System Isolation					
~~h~~i. Emergency Area Cooler Temperature - High	1, 2, 3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.6 SR 3.3.6.1.7	≤ [169]°F
[~~i~~j. Manual Initiation	1, 2, 3	[1 per group]	G	SR 3.3.6.1.7	NA]
4. Reactor Core Isolation Cooling (RCIC) System Isolation					
a. RCIC Steam Line Flow - High	1, 2, 3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.6 SR 3.3.6.1.7 SR 3.3.6.1.8	≤ [307]% rated steam flow
~~b. RCIC Steam Supply Line Pressure - Low~~	~~1, 2, 3~~	~~[2]~~	~~F~~	~~SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.6 SR 3.3.6.1.7~~	~~≤ [60] psig~~
~~b~~c. RCIC Turbine Exhaust Diaphragm Pressure - High	1, 2, 3	[2]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.6 SR 3.3.6.1.7	≤ [20] psig
~~c~~d. Drywell Pressure - High	1, 2, 3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.6 SR 3.3.6.1.7 [SR 3.3.6.1.8]	≤ [1.92] psig
~~d~~e. RCIC Suppression Pool Ambient Area Temperature - High	1, 2, 3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.6 SR 3.3.6.1.7	≤ [169]°F

Table 3.3.6.1-1 (page 5 of 7)
Primary Containment Isolation Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION C.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
4. RCIC System Isolation					
~~e~~f. Suppression Pool Area Temperature - Time Delay Relays	1, 2, 3	[1]	F	SR 3.3.6.1.5 SR 3.3.6.1.6 SR 3.3.6.1.7	≥ [NA] [minutes]
~~f~~g. RCIC Suppression Pool Area Differential Temperature - High	1, 2, 3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.6 SR 3.3.6.1.7	≤ [42]°F
~~g~~h. Emergency Area Cooler Temperature - High	1, 2, 3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.6 SR 3.3.6.1.7	≤ [169]°F
[~~h~~i. RCIC Equipment Room Temperature - High	1, 2, 3	[1]	F	[SR 3.3.6.1.1] SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.4 SR 3.3.6.1.7	≤ [ ] °F]
[~~i~~j. RCIC Equipment Room Differential Temperature - High	1, 2, 3	[1]	F	[SR 3.3.6.1.1] SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.4 SR 3.3.6.1.7	≤ [ ] °F]
[~~j~~k. Manual Initiation	1, 2, 3	[1 per group]	G	SR 3.3.6.1.7	NA]
5. Reactor Water Cleanup (RWCU) System Isolation					
a. Differential Flow - High	1, 2, 3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.6 SR 3.3.6.1.7 SR 3.3.6.1.8	≤ [79] gpm

B 3.3 INSTRUMENTATION

B 3.3.6.1 Primary Containment Isolation Instrumentation

BASES

BACKGROUND

The primary containment isolation instrumentation automatically initiates closure of appropriate primary containment isolation valves (PCIVs). The function of the PCIVs, in combination with other accident mitigation systems, is to limit fission product release during and following postulated Design Basis Accidents (DBAs). Primary containment isolation within the time limits specified for those isolation valves designed to close automatically ensures that the release of radioactive material to the environment will be consistent with the assumptions used in the analyses for a DBA.

The isolation instrumentation includes the sensors, relays, and switches that are necessary to cause initiation of primary containment and reactor coolant pressure boundary (RCPB) isolation. Most channels include electronic equipment (e.g., trip units) that compares measured input signals with pre-established setpoints. When the setpoint is exceeded, the channel output relay actuates, which then outputs a primary containment isolation signal to the isolation logic. Functional diversity is provided by monitoring a wide range of independent parameters. The input parameters to the isolation logics are (a) reactor vessel water level, (b) area ambient and differential temperatures, (c) main steam line (MSL) flow measurement, (d) Standby Liquid Control (SLC) System initiation, (e) condenser vacuum, (f) main steam line pressure, (g) high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) steam line flow, (h) drywell radiation and pressure, ~~(i) HPCI and RCIC steam line pressure,~~ (**i**~~j~~) HPCI and RCIC turbine exhaust diaphragm pressure, (**j**~~k~~) reactor water cleanup (RWCU) differential flow, and (**k**~~l~~) reactor steam dome pressure. Redundant sensor input signals from each parameter are provided for initiation of isolation. The only exception is SLC System initiation. In addition, manual isolation of the logics is provided.

Primary containment isolation instrumentation has inputs to the trip logic of the isolation functions listed below.

1. Main Steam Line Isolation

Most MSL Isolation Functions receive inputs from four channels. The outputs from these channels are combined in a one-out-of-two taken twice logic to initiate isolation of all main steam isolation valves (MSIVs). The outputs from the same channels are arranged into two two-out-of-two logic trip systems to isolate all MSL drain valves. Each MSL drain line has two isolation valves with one two-out-of-two logic system associated with each valve.

BASES

BACKGROUND (continued)

Primary Containment Isolation Drywell Pressure - High and Reactor Vessel Water Level - Low, Level 3 Functions isolate the Group 2, 6, 7, 10, and 12 valves. Reactor Building and Refueling Floor Exhaust Radiation - High Functions isolate the Group 6, 10, and 12 valves. Primary Containment Isolation Drywell Radiation - High Function isolates the containment purge and vent valves.

3, 4. High Pressure Coolant Injection System Isolation and Reactor Core Isolation Cooling System Isolation

Most Functions that isolate HPCI and RCIC receive input from two channels, with each channel in one trip system using a one-out-of-one logic. Each of the two trip systems in each isolation group is connected to one of the two valves on each associated penetration.

The exception~~s~~ **is** ~~are~~ the HPCI and RCIC Turbine Exhaust Diaphragm Pressure - High ~~and Steam Supply Line Pressure - Low~~ Function~~s~~. Thi~~e~~s~~e~~ Function~~s~~ receive**s** inputs from four turbine exhaust diaphragm pressure ~~and four steam supply pressure~~ channels for each system. The output~~s~~ from the turbine exhaust diaphragm pressure ~~and steam supply pressure~~ channels **is**~~are each~~ connected to two two-out-of-two trip systems. Each trip system isolates one valve per associated penetration.

HPCI and RCIC Functions isolate the Group 3, 4, 8, and 9 valves.

5. Reactor Water Cleanup System Isolation

The Reactor Vessel Water Level - Low Low, Level 2 Isolation Function receives input from four reactor vessel water level channels. The outputs from the reactor vessel water level channels are connected into two two-out-of-two trip systems. The Differential Flow - High and SLC System Initiation Functions receive input from two channels, with each channel in one trip system using a one-out-of-one logic. The Area Temperature - High Function receives input from six temperature monitors, three to each trip system. The Area Ventilation Differential Temperature - High Function receives input from six differential temperature monitors, three in each trip system. These are configured so that any one input will trip the associated trip system. Each of the two trip systems is connected to one of the two valves on each RWCU penetration.

RWCU Functions isolate the Group 5 valves.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~3.b, 4.b. HPCI and RCIC Steam Supply Line Pressure – Low~~

~~Low MSL pressure indicates that the pressure of the steam in the HPCI or RCIC turbine may be too low to continue operation of the associated system's turbine. These isolations are for equipment protection and are not assumed in any transient or accident analysis in the FSAR. However, they also provide a diverse signal to indicate a possible system break. These instruments are included in Technical Specifications (TS) because of the potential for risk due to possible failure of the instruments preventing HPCI and RCIC initiations (Ref. 3).~~

~~The HPCI and RCIC Steam Supply Line Pressure - Low signals are initiated from transmitters (four for HPCI and four for RCIC) that are connected to the system steam line. Four channels of both HPCI and RCIC Steam Supply Line Pressure - Low Functions are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.~~

~~The Allowable Values are selected to be high enough to prevent damage to the system's turbine.~~

~~These Functions isolate the Group 3 and 4 valves, as appropriate.~~

3.**b**~~c~~, 4.**b**~~c~~. HPCI and RCIC Turbine Exhaust Diaphragm Pressure – High

High turbine exhaust diaphragm pressure indicates that the pressure may be too high to continue operation of the associated system's turbine. That is, one of two exhaust diaphragms has ruptured and pressure is reaching turbine casing pressure limits. These isolations are for equipment protection and are not assumed in any transient or accident analysis in the FSAR. These instruments are included in the TS because of the potential for risk due to possible failure of the instruments preventing HPCI and RCIC initiations (Ref. 3).

The HPCI and RCIC Turbine Exhaust Diaphragm Pressure - High signals are initiated from transmitters (four for HPCI and four for RCIC) that are connected to the area between the rupture diaphragms on each system's turbine exhaust line. Four channels of both HPCI and RCIC Turbine Exhaust Diaphragm Pressure - High Functions are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Allowable Values are high enough to prevent damage to the system's turbine.

These Functions isolate the Group 3 and 4 valves, as appropriate.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

3.~~c~~d, 4.~~c~~d. Drywell Pressure – High

High drywell pressure can indicate a break in the RCPB. The HPCI and RCIC isolation of the turbine exhaust is provided to prevent communication with the drywell when high drywell pressure exists. A potential leakage path exists via the turbine exhaust. The isolation is delayed until the system becomes unavailable for injection (i.e., low steam line pressure). The isolation of the HPCI and RCIC turbine exhaust by Drywell Pressure - High is indirectly assumed in the FSAR accident analysis because the turbine exhaust leakage path is not assumed to contribute to offsite doses.

High drywell pressure signals are initiated from pressure transmitters that sense the pressure in the drywell. Two channels of both HPCI and RCIC Drywell Pressure - High Functions are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Allowable Value was selected to be the same as the ECCS Drywell Pressure - High Allowable Value (LCO 3.3.5.1), since this is indicative of a LOCA inside primary containment.

This Function isolates the Group 8 and 9 valves.

3.~~d~~e, 3.~~e~~f, 3.~~g~~h, 3.~~h~~i, 4.~~d~~e, 4.~~f~~g. 4.~~g~~h, 4.~~h~~i, 4.~~i~~j. Area and Differential Temperature – High

Area and differential temperatures are provided to detect a leak from the associated system steam piping. The isolation occurs when a very small leak has occurred and is diverse to the high flow instrumentation. If the small leak is allowed to continue without isolation, offsite dose limits may be reached. These Functions are not assumed in any FSAR transient or accident analysis, since bounding analyses are performed for large breaks such as recirculation or MSL breaks.

Area and Differential Temperature - High signals are initiated from thermocouples that are appropriately located to protect the system that is being monitored. Two instruments monitor each area. Two channels for each HPCI and RCIC Area and Differential Temperature - High Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

Eight thermocouples provide input to the Area Ventilation Differential Temperature - High Function. The output of these thermocouples is used to determine the differential temperature. Each channel consists of a differential temperature instrument that receives inputs from

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

thermocouples that are located in the inlet and outlet of the area cooling system for a total of four available channels (two for RCIC and two for HPCI).

The Allowable Values are set low enough to detect a leak equivalent to 25 gpm.

These Functions isolate the Group 3 and 4 valves, as appropriate.

3.~~f~~g, 4.~~e~~f. Suppression Pool Area Temperature - Time Delay Relay

The Suppression Pool Area Temperature - Time Delay Relays are provided to allow all the other systems that may be leaking into the pool area (as indicated by the high temperature) to be isolated before HPCI and/or RCIC are automatically isolated. This ensures maximum HPCI and RCIC System operation by preventing isolations due to leaks in other systems. These Functions are not assumed in any FSAR transient or accident analysis.

There are four time delay relays (two for HPCI and two for RCIC). Two channels each for both HPCI and RCIC Suppression Pool Area Temperature - Time Delay Relay Functions are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Allowable Values are based on maximizing the availability of the HPCI and RCIC systems. That is, they provide sufficient time to isolate all other potential leakage sources in the suppression pool area before HPCI and RCIC are isolated.

These Functions isolate the Group 3 and 4 valves, as appropriate.

3.h~~i~~, 4.j~~k~~. Manual Initiation

The Manual Initiation push button channels introduce signals into the HPCI and RCIC systems' isolation logics that are redundant to the automatic protective instrumentation and provide manual isolation capability. There is no specific FSAR safety analysis that takes credit for these Functions. They are retained for overall redundancy and diversity of the isolation function as required by the NRC in the plant licensing basis.

There are two push buttons for each of the logics (HPCI and RCIC), one manual initiation push button per trip system. There is no Allowable Value for these Functions, since the channels are mechanically actuated based solely on the position of the push buttons.

BASES

ACTIONS (continued)

Times based on initial entry into the Condition. However, the Required Actions for inoperable primary containment isolation instrumentation channels provide appropriate compensatory measures for separate inoperable channels. As such, a Note has been provided that allows separate Condition entry for each inoperable primary containment isolation instrumentation channel. When the Required Channels in Table 3.3.6.1-1 are specified (e.g., on a per steam line, per loop, etc., basis) then the Condition may be entered separately for each steam line, loop, as appropriate.

A.1

Because of the diversity of sensors available to provide isolation signals and the redundancy of the isolation design, an allowable out of service time of 12 hours for Functions 2.a, 2.b, and 6.b and 24 hours for Functions other than Functions 2.a, 2.b, and 6.b has been shown to be acceptable (Refs. 5 and 6) to permit restoration of any inoperable channel to OPERABLE status. This out of service time is only acceptable provided the associated Function is still maintaining isolation capability (refer to Required Action B.1 Bases). [Alternatively, a Completion Time can be determined in accordance with the Risk Informed Completion Time Program.] If the inoperable channel cannot be restored to OPERABLE status within the allowable out of service time, the channel must be placed in the tripped condition per Required Action A.1. Placing the inoperable channel in trip would conservatively compensate for the inoperability, restore capability to accommodate a single failure, and allow operation to continue with no further restrictions. Alternately, if it is not desired to place the channel in trip (e.g., as in the case where placing the inoperable channel in trip would result in an isolation), Condition C must be entered and its Required Action taken.

B.1

Required Action B.1 is intended to ensure that appropriate actions are taken if multiple, inoperable, untripped channels within the same Function result in redundant automatic isolation capability being lost for the associated penetration flow path(s). The MSL Isolation Functions are considered to be maintaining isolation capability when sufficient channels are OPERABLE or in trip, such that both trip systems will generate a trip signal from the given Function on a valid signal. The other isolation functions are considered to be maintaining isolation capability when sufficient channels are OPERABLE or in trip, such that one trip system will generate a trip signal from the given Function on a valid signal. This ensures that one of the two PCIVs in the associated penetration flow path

BASES

ACTIONS (continued)

can receive an isolation signal from the given Function. For Functions 1.a, 1.b, 1.d, and 1.f, this would require both trip systems to have one channel OPERABLE or in trip. For Function 1.c, this would require both trip systems to have one channel, associated with each MSL, OPERABLE or in trip. For Functions 1.e and 1.g, each Function consists of channels that monitor several locations within a given area (e.g., different locations within the main steam tunnel area). Therefore, this would require both trip systems to have one channel per location OPERABLE or in trip. For Functions 2.a, 2.b, 2.d, 2.e, ~~3.b,~~ 3.~~c~~**b**, ~~4.b,~~ 4.**b**~~c~~, 5.e, and 6.b, this would require one trip system to have two channels, each OPERABLE or in trip. For Functions 2.c, 3.a, 3.**c**~~d~~, 3.**d**~~e~~, 3.**e**~~f~~, 3.**f**~~g~~, 3.**g**~~h~~, 3.**h**~~i~~, 4.a, 4.**c**~~d~~, 4.**d**~~e~~, 4.**e**~~f~~, 4.**f**~~g~~, 4.**g**~~h~~, 4.**h**~~i~~, 4.**j**~~j~~, 5.a, 5.d, and 6.a, this would require one trip system to have one channel OPERABLE or in trip. For Functions 5.b and 5.c, each Function consists of channels that monitor several different locations. Therefore, this would require one channel per location to be OPERABLE or in trip (the channels are not required to be in the same trip system). The Condition does not include the Manual Initiation Functions (Functions 1.h, 2.d, 3.**i**~~j~~, 4.**j**~~k~~, and 5.f), since they are not assumed in any accident or transient analysis. Thus, a total loss of manual initiation capability for 24 hours (as allowed by Required Action A.1) is allowed.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The 1 hour Completion Time is acceptable because it minimizes risk while allowing time for restoration or tripping of channels.

C.1

Required Action C.1 directs entry into the appropriate Condition referenced in Table 3.3.6.1-1. The applicable Condition specified in Table 3.3.6.1-1 is Function and MODE or other specified condition dependent and may change as the Required Action of a previous Condition is completed. Each time an inoperable channel has not met any Required Action of Condition A or B and the associated Completion Time has expired, Condition C will be entered for that channel and provides for transfer to the appropriate subsequent Condition.

Table 3.3.6.1-1 (page 3 of 7)
Primary Containment Isolation Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION C.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
2. Primary Containment Isolation					
g. Containment and Drywell Ventilation Exhaust Radiation-High	1,2,3	[2]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.6 SR 3.3.6.1.7	≤ [4.0] mR/hr
	[(b)]	[2]	K	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.6 SR 3.3.6.1.7	≤ [4.0] mR/hr
[h. Manual Initiation	1,2,3	[2]	G	SR 3.3.6.1.6	NA]
3. Reactor Core Isolation Cooling (RCIC) System Isolation					
a. RCIC Steam Line Flow - High	1,2,3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.5 SR 3.3.6.1.6 SR 3.3.6.1.7	≤ [64] inches water
[b. RCIC Steam Line Flow Time Delay	[1,2,3]	[1]	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≥ [3] seconds and ≤ [7] seconds]
~~c. RCIC Steam Supply Line Pressure - Low~~	~~1,2,3~~	~~[1]~~	~~F~~	~~SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.5 SR 3.3.6.1.6 SR 3.3.6.1.7~~	~~≥ [53] psig~~
~~c~~d. RCIC Turbine Exhaust Diaphragm Pressure - High	1,2,3	[2]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.5 SR 3.3.6.1.6	≤ [20] psig

[(b) During movement of [recently] irradiated fuel assemblies in [primary or secondary containment.]

Table 3.3.6.1-1 (page 4 of 7)
Primary Containment Isolation Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION C.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
3. RCIC System Isolation					
~~d~~e. RCIC Equipment Room Ambient Temperature - High	1,2,3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.6	≤ [191]°F
~~e~~f. RCIC Equipment Room Differential Temperature - High	1,2,3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.6	≤ [128]°F
~~f~~g. Main Steam Line Tunnel Ambient Temperature - High	1,2,3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.6	≤ [191]°F
~~g~~h. Main Steam Line Tunnel Differential Temperature - High	1,2,3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.6	≤ [104]°F
~~h~~i. Main Steam Line Tunnel Temperature Timer	1,2,3	[1]	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ [30] minutes
~~i~~j. RHR Equipment Room Ambient Temperature - High	1,2,3	[1 per room]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.6	≤ [171]°F
~~j~~k. RHR Equipment Room Differential Temperature - High	1,2,3	[1 per room]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.6	≤ [102]°F
~~k~~l. RCIC/RHR Steam Line Flow - High	1,2,3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.5 SR 3.3.6.1.6	≤ [43] inches water
~~l~~m. Drywell Pressure - High	1,2,3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 [SR 3.3.6.1.3] SR 3.3.6.1.5 SR 3.3.6.1.6 SR 3.3.6.1.7	≤ [1.44] psig

Table 3.3.6.1-1 (page 5 of 7)
Primary Containment Isolation Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION C.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
3. RCIC System Isolation					
[~~m~~n. Manual Initiation	1,2,3	[2]	G	SR 3.3.6.1.6	NA]
4. Reactor Water Cleanup (RWCU) System Isolation					
a. Differential Flow - High	1,2,3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.6 [SR 3.3.6.1.7]	≤ [89] gpm
b. Differential Flow - Timer	1,2,3	[1]	F	SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.6	≤ [57] seconds
c. RWCU Heat Exchanger Equipment Room Temperature-High	1,2,3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.6	≤ [126]°F
d. RWCU Heat Exchanger Equipment Room Differential Temperature - High	1,2,3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.6	≤ [66]°F
e. RWCU Pump Rooms Temperature - High	1,2,3	[1] [1 per room]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.6	≤ [176]°F
f. RWCU Pump Rooms Differential Temperature - High	1,2,3	[1] [1 per room]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.6	≤ [118]°F
g. RWCU Valve Nest Room Temperature - High	1,2,3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.6	≤ [141]°F
h. RWCU Valve Nest Room Differential Temperature - High	1,2,3	[1]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.6	≤ [73]°F

B 3.3 INSTRUMENTATION

B 3.3.6.1 Primary Containment Isolation Instrumentation

BASES

BACKGROUND

The primary containment isolation instrumentation automatically initiates closure of appropriate primary containment isolation valves (PCIVs). The function of the PCIVs, in combination with other accident mitigation systems, is to limit fission product release during and following postulated Design Basis Accidents (DBAs). Primary containment isolation within the time limits specified for those isolation valves designed to close automatically ensures that the release of radioactive material to the environment will be consistent with the assumptions used in the analyses for a DBA.

The isolation instrumentation includes the sensors, relays, and switches that are necessary to cause initiation of primary containment and reactor coolant pressure boundary (RCPB) isolation. Most channels include electronic equipment (e.g., trip units) that compares measured input signals with pre-established setpoints. When the setpoint is exceeded, the channel output relay actuates, which then outputs a primary containment isolation signal to the isolation logic. Functional diversity is provided by monitoring a wide range of independent parameters. The input parameters to the isolation logic are (a) reactor vessel water level, (b) ambient and differential temperatures, (c) main steam line (MSL) flow measurement, (d) Standby Liquid Control (SLC) System initiation, (e) condenser vacuum loss, (f) main steam line pressure, (g) reactor core isolation cooling (RCIC) and RCIC/residual heat removal (RHR) steam line flow, (h) ventilation exhaust radiation, ~~(i) RCIC steam line pressure,~~ (**i**~~i~~) RCIC turbine exhaust diaphragm pressure, (**j**~~k~~) reactor water cleanup (RWCU) differential flow, (**k**~~l~~) reactor steam dome pressure, and (**l**~~m~~) drywell pressure. Redundant sensor input signals are provided from each such isolation initiation parameter. The only exception is SLC System initiation. In addition, manual isolation of the logics is provided.

The primary containment isolation instrumentation has inputs to the trip logic from the isolation Functions listed below.

1. Main Steam Line Isolation

Most Main Steam Line Isolation Functions receive inputs from four channels. The outputs from these channels are combined in one-out-of-two taken twice logic to initiate isolation of all main steam isolation valves (MSIVs). The outputs from the same channels are arranged into two two-out-of-two logic trip systems to isolate all MSL drain valves. Each MSL drain line has two isolation valves with one two-out-of-two logic system associated with each valve.

BASES

BACKGROUND (continued)

The exception to this arrangement is the Main Steam Line Flow - High Function. This Function uses 16 flow channels, four for each steam line. One channel from each steam line inputs to one of four trip strings. Two trip strings make up each trip system, and both trip systems must trip to cause an MSL isolation. Each trip string has four inputs (one per MSL), any one of which will trip the trip string. The trip strings within a trip system are arranged in a one-out-of-two taken twice logic. Therefore, this is effectively a one-out-of-eight taken twice logic arrangement to initiate isolation of the MSIVs. Similarly, the 16 flow channels are connected into two two-out-of-two logic trip systems (effectively, two one-out-of-four twice logic), with each trip system isolating one of the two MSL drain valves.

2. Primary Containment Isolation

Each Primary Containment Isolation Function receives inputs from four channels. The outputs from these channels are arranged into two two-out-of-two logic trip systems. One trip system initiates isolation of all inboard PCIVs, while the other trip system initiates isolation of all outboard PCIVs. Each trip system logic closes one of the two valves on each penetration so that operation of either trip system isolates the penetration.

3. Reactor Core Isolation Cooling System Isolation

Most Functions receive input from two channels, with each channel in one trip system using one-out-of-one logic. Functions 3.~~ij~~ and 3.~~jk~~ (RHR Equipment Room Temperature) have one channel in each trip system in each room for a total of four channels per Function; but the logic is the same (one-out-of-one). Each of the two trip systems is connected to one of the two valves on each RCIC penetration so that operation of either trip system isolates the penetration. The exception to this arrangement is the RCIC Turbine Exhaust Diaphragm Pressure - High Function. This Function receives input from four turbine exhaust diaphragm pressure channels. The outputs from the turbine exhaust diaphragm pressure channels are connected into two two-out-of-two trip systems, each trip system isolating one of the two RCIC valves.

4. Reactor Water Cleanup System Isolation

Most Functions receive input from two channels with each channel in one trip system using one-out-of-one logic. Functions 4.e and 4.f (RWCU Pump Room Temperature) have one channel in each trip system in each room for a total of four channels per Function, but the logic is the same (one-out-of-one). Each of the two trip systems is connected to one of the two valves on each RWCU penetration so that operation of either trip

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

This Function isolates the Group 4 valves.

3.b. RCIC Steam Line Flow Time Delay

The RCIC Steam Line Flow Time Delay is provided to prevent false isolations on RCIC Steam Line Flow - High during system startup transients and therefore improves system reliability. This Function is not assumed in any FSAR transient or accident analyses.

The Allowable Value was chosen to be long enough to prevent false isolations due to system starts but not so long as to impact offsite dose calculations.

Two channels for RCIC Steam Line Flow Time Delay Functions are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

~~3.c. RCIC Steam Supply Line Pressure - Low~~

~~Low MSL pressure indicates that the pressure of the steam in the RCIC turbine may be too low to continue operation of the associated system's turbine. This isolation is for equipment protection and is not assumed in any transient or accident analysis in the FSAR. However, it also provides a diverse signal to indicate a possible system break. These instruments are included in the Technical Specifications (TS) because of the potential for risk due to possible failure of the instruments preventing RCIC initiations.~~

~~The RCIC Steam Supply Line Pressure - Low signals are initiated from two transmitters that are connected to the system steam line. Two channels of RCIC Steam Supply Line Pressure - Low Functions are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.~~

~~The Allowable Value is selected to be high enough to prevent damage to the system's turbines.~~

~~This Function isolates the Group 4 valves.~~

3.**c**~~d~~. RCIC Turbine Exhaust Diaphragm Pressure - High

High turbine exhaust diaphragm pressure indicates that the pressure may be too high to continue operation of the associated system's turbine. That is, one of two exhaust diaphragms has ruptured and pressure is reaching turbine casing pressure limits. This isolation is for equipment protection and is not assumed in any transient or accident analysis in the FSAR.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

These instruments are included in the TS because of the potential for risk due to possible failure of the instruments preventing RCIC initiations (Ref. 3).

The RCIC Turbine Exhaust Diaphragm Pressure - High signals are initiated from four transmitters that are connected to the area between the rupture diaphragms on each system's turbine exhaust line. Four channels of RCIC Turbine Exhaust Diaphragm Pressure - High Functions are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Allowable Values are high enough to prevent damage to the system's turbines.

This Function isolates the Group 4 valves.

3.~~d~~e, 3.~~e~~f, 3.ij, 3.j~~k~~. Ambient and Differential Temperature - High

Ambient and Differential Temperatures are provided to detect a leak from the associated system steam piping. The isolation occurs when a very small leak has occurred and is diverse to the high flow instrumentation. If the small leak is allowed to continue without isolation, offsite dose limits may be reached. These Functions are not assumed in any FSAR transient or accident analysis, since bounding analyses are performed for large breaks such as recirculation or MSL breaks.

Ambient and Differential Temperature - High signals are initiated from thermocouples that are appropriately located to protect the system that is being monitored. Two instruments monitor each area. Six channels for RHR and RCIC Ambient Temperature - High Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function. There are two for the RCIC room and four for the RHR area.

There are 12 thermocouples (four for the RCIC room and eight for the RHR area) that provide input to the Area Ventilation Differential Temperature - High Function. The output of these thermocouples is used to determine the differential temperature. Each channel consists of a differential temperature instrument that receives inputs from thermocouples that are located in the inlet and outlet of the area cooling system for a total of six (two for the RCIC room and four for the RHR area) available channels.

The Allowable Values are set low enough to detect a leak equivalent to 25 gpm.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

This Function isolates the Group 4 valves.

3.~~f~~g, 3.~~g~~h. Main Steam Line Tunnel Ambient and Differential Temperature - High

Ambient and Differential Temperature - High is provided to detect a leak in the RCPB and provides diversity to the high flow instrumentation. The isolation occurs when a very small leak has occurred. If the small leak is allowed to continue without isolation, offsite limits may be reached. However, credit for these instruments is not taken in any transient or accident analysis in the FSAR, since bounding analyses are performed for large breaks such as MSLBs.

Ambient temperature signals are initiated from thermocouples located in the area being monitored. Two channels of Main Steam Tunnel Temperature - High Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function. Each Function has one temperature element.

Four thermocouples provide input to the Main Steam Tunnel Differential Temperature - High Function. The output of these thermocouples is used to determine the differential temperature. Each channel consists of a differential temperature instrument that receives inputs from thermocouples that are located in the inlet and outlet of the area cooling system for a total of two available channels.

The Allowable Values are chosen to detect a leak equivalent to 25 gpm.

This Function isolates the Group 4 valves.

3.h~~i~~. Main Steam Line Tunnel Temperature Timer

The Main Steam Line Tunnel Temperature Timer is provided to allow all the other systems that may be leaking in the main steam tunnel (as indicated by the high temperature) to be isolated before RCIC is automatically isolated. This ensures maximum RCIC System operation by preventing isolations due to leaks in other systems. This Function is not assumed in any FSAR transient or accident analysis; however, maximizing RCIC availability is an important function.

Two channels for RCIC Main Steam Line Tunnel Timer Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The Allowable Values are based on maximizing the availability of the RCIC System; that is, providing sufficient time to isolate all other potential leakage sources in the main steam tunnel before RCIC is isolated.

This Function isolates the Group 4 valves.

3.k~~l~~. RCIC/RHR High Steam Line Flow - High

RCIC/RHR high steam line flow is provided to detect a break of the common steam line of RCIC and RHR (steam condensing mode) and initiates closure of the isolation valves for both systems. If the steam were allowed to continue flowing out of the break, the reactor would depressurize and the core could uncover. Therefore, the isolation is initiated at high flow to prevent or minimize core damage. Specific credit for this Function is not assumed in any FSAR accident or transient analysis since the bounding analysis is performed for large breaks such as recirculation and MSL breaks. However, these instruments prevent the RCIC/RHR steam line break from becoming bounding.

The RCIC/RHR steam line flow signals are initiated from two transmitters that are connected to the steam line. Two channels with one channel in each trip system are available and required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function. The Allowable Value is selected to ensure that the trip occurs to prevent fuel damage and maintains the MSLB as the boundary event.

This Function actuates the Group 4 valves.

3.l~~m~~. Drywell Pressure – High

High drywell pressure can indicate a break in the RCPB. The RCIC isolation of the turbine exhaust is provided to prevent communication with the drywell when high drywell pressure exists. A potential leakage path exists via the turbine exhaust. The isolation is delayed until the system becomes unavailable for injection (i.e., low steam line pressure). The isolation of the RCIC turbine exhaust by Drywell Pressure - High is indirectly assumed in the FSAR accident analysis because the turbine exhaust leakage path is not assumed to contribute to offsite doses.

High drywell pressure signals are initiated from pressure transmitters that sense the pressure in the drywell. Two channels of RCIC Drywell Pressure - High Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The Allowable Value was selected to be the same as the ECCS Drywell Pressure - High Allowable Value (LCO 3.3.5.1), since this is indicative of a LOCA inside primary containment.

This Function isolates the Group 9 valves.

3.m~~n~~. Manual Initiation

The Manual Initiation push button channels introduce signals into the RCIC System isolation logic that are redundant to the automatic protective instrumentation and provide manual isolation capability. There is no specific FSAR safety analysis that takes credit for this Function. It is retained for overall redundancy and diversity of the isolation function as required by the NRC in the plant licensing basis.

There are four push buttons for RCIC, two manual initiation push buttons per trip system. There is no Allowable Value for this Function since the channels are mechanically actuated based solely on the position of the push buttons.

Four channels of RCIC Manual Initiation are available and are required to be OPERABLE.

4. Reactor Water Cleanup System Isolation

4.a. Differential Flow - High

The high differential flow signal is provided to detect a break in the RWCU System. This will detect leaks in the RWCU System when area or differential temperature would not provide detection (i.e., a cold leg break). Should the reactor coolant continue to flow out of the break, offsite dose limits may be exceeded. Therefore, isolation of the RWCU System is initiated when high differential flow is sensed to prevent exceeding offsite doses. A time delay is provided to prevent spurious trips during most RWCU operational transients. This Function is not assumed in any FSAR transient or accident analysis, since bounding analyses are performed for large breaks such as MSLBs.

The high differential flow signals are initiated from two transmitters that are connected to the inlet (from the reactor vessel) and four transmitters from the outlets (to condenser and feedwater) of the RWCU System. The outputs of the transmitters are compared (in two different summers) and the outputs are sent to two high flow trip units. If the difference between the inlet and outlet flow is too large, each trip unit generates an isolation

BASES

ACTIONS (continued)

B.1

Required Action B.1 is intended to ensure that appropriate actions are taken if multiple, inoperable, untripped channels within the same Function result in redundant automatic isolation capability being lost for the associated penetration flow path(s). The MSL isolation Functions are considered to be maintaining isolation capability when sufficient channels are OPERABLE or in trip such that both trip systems will generate a trip signal from the given Function on a valid signal. The other isolation Functions are considered to be maintaining isolation capability when sufficient channels are OPERABLE or in trip such that one trip system will generate a trip signal from the given Function on a valid signal. This ensures that one of the two PCIVs in the associated penetration flow path can receive an isolation signal from the given Function. For Functions 1.a, 1.b, 1.d, 1.e, and 1.f, this would require both trip systems to have one channel OPERABLE or in trip. For Function 1.c, this would require both trip systems to have one channel, associated with each MSL, OPERABLE or in trip. For Functions 2.a, 2.b, 2.c, 2.d, 2.e, 2.f, 2.g, 3.**c**~~d~~, 4.k, 5.c, 5.d, and 5.e, this would require one trip system to have two channels, each OPERABLE or in trip. For Functions 3.a, 3.b, ~~3.c,~~ 3.**d**~~e~~, 3.**e**~~f~~, 3.**f**~~g~~, 3.**g**~~h~~, 3.**h**~~i~~, 3.**k**~~l~~, 3.**l**~~m~~, 4.a, 4.b, 4.c, 4.d, 4.g, 4.h, 4.i, 4.j, and 4.l, this would require one trip system to have one channel OPERABLE or in trip. For Functions 3.**i**~~j~~, 3.**j**~~k~~, 4.e, 4.f, 5.a, and 5.b, each Function consists of channels that monitor several different locations. Therefore, this would require one channel per location to be OPERABLE or in trip (the channels are not required to be in the same trip system). The Condition does not include the Manual Initiation Functions (Functions 1.g, 2.h, 3.**m**~~n~~, and 4.m), since they are not assumed in any accident or transient analysis. Thus, a total loss of manual initiation capability for 24 hours (as allowed by Required Action A.1) is allowed.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The Completion Time is acceptable because it minimizes risk while allowing time for restoration or tripping of channels.

C.1

Required Action C.1 directs entry into the appropriate Condition referenced in Table 3.3.6.1-1. The applicable Condition specified in Table 3.3.6.1-1 is Function and MODE or other specified condition dependent and may change as the Required Action of a previous Condition is completed. Each time an inoperable channel has not met