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MFN 08-162 Supplement 1

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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 134 Related to ESBWR Design Certification Application – Technical Specifications – RAI Numbers 16.2-164**

Enclosures 1 and 2 contain the GE Hitachi Nuclear Energy (GEH) responses to the subject NRC RAIs transmitted via the Reference 1 letter.

Verified DCD changes associated with this RAI response are identified in the enclosed DCD markups by enclosing the text within a black box. The marked-up pages may contain unverified changes in addition to the verified changes resulting from this RAI response. Other changes shown in the markup(s) may not be fully developed and approved for inclusion in DCD Revision 5.

If you have any questions or require additional information regarding the information provided here, please contact me.

Sincerely,

James C. Kinsey

James C. Kinsey
Vice President, ESBWR Licensing

D068
NRO

Reference:

1. MFN 08-033, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 134 Related to ESBWR Design Certification Application*, January 14, 2008

Enclosures:

1. MFN 08-162 Supplement 1 – Response to Portion of NRC Request for Additional Information Letter No. 134 Related to ESBWR Design Certification Application – Technical Specifications – RAI Number 16.2-164
2. MFN 08-162 Supplement 1 - RAI Number 16.2-164 DCD Revision 5 Mark Ups

cc:

AE Cubbage	USNRC (with enclosures)
DH Hinds	GEH (with enclosures)
RE Brown	GEH (with enclosures)
eDRFs	83-4506

Enclosure 1

MFN 08-162, Supplement 1

Response to Portion of NRC Request for

Additional Information Letter No. 134

Related to ESBWR Design Certification Application

- Technical Specifications -

RAI Number 16.2-164

NRC RAI 16.2-164

In Revision 4 of the ESBWR DCD Chapter 16, GEH proposes to change the definition of a curly bracket from a value, parameter, or information that will be provided by the design certification applicant to a value, parameter, or information that will be provided by the combined license (COL) holder. This proposed change is unacceptable. All the curly brackets need to be removed during the design certification review unless the information is closely associated with design acceptance criteria (DAC) or is site specific. In the latter two cases, the brackets can be changed to square brackets.

Please provide a schedule for revising the generic technical specifications (GTS) and Bases so they do not contain any curly brackets. For curly brackets associated with DACs, modify the DCD to include an appropriately worded proposed COL Information item for the COL applicant or holder, depending on the wording of the DAC; and for curly brackets associated with site specific information please modify the DCD to include an appropriately worded proposed COL Information item for the COL applicant.

GEH Response

In DCD Revision 5, all Chapter 16 and Chapter 16B COL Information Items will be shown with square brackets. Revision 5 will also reflect two COL Information Items in Section 16.0; one for COL applicant (COL-A) items and one for COL holder (COL-H) items. Each of these COL items will refer to a COL Table (i.e., two tables: COL-A and COL-H Tables) placed in DCD Section 16.0 that will list each issue within the GTS, and that will also contain the applicable Reviewer's Note detailing the actions required by the COL applicant and holder to finalize the bracketed material.

These COL Table entries will provide a unique number identifier consisting of the applicable Specification number followed by a sequential number within each Specification. These identification numbers will be cross-reference to labels located in the left margin by each occurrence of brackets (or one label for multiple occurrences of the same issue in the same paragraph) in the Technical Specifications and Bases, providing a direct link to the Reviewer's Notes within the COL Tables.

The tables enclosed with this RAI response include an additional column elaborating the justification for the item being classified as a COL-A or COL-H item. These justifications will not be presented in the DCD Revision 5 COL Tables.

In general, the justifications provided for presenting bracketed COL-H items are based on the necessity of completing ITAAC identified in Tier 1, or on the necessity of manufacturer-specific as-procured and as-built information. These COL-H items will be completed and the brackets removed in subsequent amendment(s) to the COL (for Technical Specifications) or under the control of the Bases Control Program (for Bases) prior to initial fuel loading, as specified in DCD 16.0.

The COL-A items are to be dispositioned at the time of COL application(s) based on site-specific details and certain elected optional flexibilities as outlined in the Reviewer's Notes.

The curly brackets shown in Revision 4, which are not shown in the enclosed COL Tables, will be dispositioned in DCD Revision 5.

DCD Impact

DCD Section 16.0 will be revised in Revision 5 to include the COL Tables shown in Enclosure 2, except for the "Justification" column. The associated item(s) within the Technical Specifications and Bases will include a cross-reference label to the unique number identifier in the COL Tables. The curly brackets associated with items in these COL Tables will be revised to square brackets. The remaining curly brackets will be dispositioned in DCD Revision 5.

Enclosure 2 contains a portion of the DCD Chapter 16 and Chapter 16B Revision 5 changes to illustrate the revised brackets and labels related to the new COL Tables. Similar changes for all other COL Table items will be included in DCD Revision 5.

Enclosure 2

MFN 08-162, Supplement 1

RAI Number 16.2-164

DCD Revision 5 Mark Ups

Verified DCD changes associated with this RAI response are identified in the enclosed DCD markups by enclosing the text within a black box. The marked-up pages may contain unverified changes in addition to the verified changes resulting from this RAI response. Other changes shown in the markup(s) may not be fully developed and approved for inclusion in DCD Revision 5.

change reflects an initiative to recognize that plant temperatures below 215.6°C (420°F) are an acceptable stable, safe shutdown condition.

Limiting Conditions for Operation (LCOs) for the ESBWR Technical Specifications reflect the criteria specified in 10 CFR 50.36 consistent with evaluations of these criteria as reflected in the Standard Technical Specifications for the most recent Boiling Water Reactor (BWR) designs, NUREG-1434, Revision 3.1. Where the ESBWR passive design presented new features and analyses, these were evaluated against the criteria for inclusion in these Generic Technical Specifications. In general, the ESBWR passive design results in a significant reduction in the number of structures, systems, and parameters for which LCOs are required. Elimination of LCO requirements for offsite electrical circuits, emergency diesel generators, and active decay heat removal systems are examples of significant differences between the ESBWR Technical Specifications and NUREG-1434.

The completion times used in the ESBWR Technical Specifications for the actions required when LCOs are not met are generally consistent with NUREG-1434 for similar conditions, where practical. In some instances, the NUREG-1434 completion times are overly conservative for the ESBWR because they do not reflect the reliability of the ESBWR passive design.

Surveillance requirements and frequencies for monitoring plant status and testing are generally consistent with NUREG-1434, where practical. Again, in some instances, the NUREG-1434 surveillance requirements and frequencies are overly conservative for the ESBWR because they do not reflect the reliability of the ESBWR passive design.

On completion of the Combined License Information requirements, Technical Specifications are incorporated into an appendix to the Combined License (COL) when issued. Subsequent amendments are controlled in accordance with 10 CFR 50.90. Further, the Technical Specifications requirements will become effective/applicable as identified in the COL. The supporting Bases document is not incorporated into the license, but subsequent to the issuance of the COL, the Bases document is separately controlled/revised in accordance with the Technical Specifications Bases Control Program included within the Technical Specifications Programs and Manuals section.

Manuals, reports, and program documents identified in the Technical Specifications are also not considered a part of this document, nor a part of the Technical Specifications or Bases documents.

~~**COL Information** Item 16.0-1~~

This set of generic Technical Specifications is provided as a guide for the development of plant specific Technical Specifications for COL applications. ~~Combined License~~COL applicants referencing the ESBWR DCD will replace the preliminary information provided in ~~"square"~~ brackets ("[...]"), and annotated with "16.0-1-A" labels, with final plant specific information (16.0-1-A). Table 16.0-1-A summarizes the COL applicant items and provides the associated Reviewer's Notes. The guidance of associated Reviewer's Notes ~~included (typically in Chapter 16B) in the generic Technical Specifications~~ is for information only as an aide to COL applicant disposition of the item.~~and is deleted on completion of the COL Information Item.~~

~~{Generic Technical Specifications (GTS) Open Items~~

~~Certain information remains in "curly" brackets ("{...}").~~This set of generic Technical Specifications is also provided as a guide for the completion of plant specific Technical Specifications post-COL issuance. COL holders referencing the ESBWR DCD will replace the preliminary information provided in brackets ("[...]"), and annotated with "16.0-2-H" labels, with final plant specific information (16.0-2-H). Table 16.0-2-H summarizes the COL holder items and provides the associated Reviewer's Notes. The guidance of associated Reviewer's Notes is for information only as an aide to COL holder disposition of the item.

SRP 16.0 provides a License Condition to be included with the COL to address final closure of these COL holder items. These items will be completed and the brackets removed in subsequent amendment(s) to the COL (for Technical Specifications) or under the control of the Bases Control Program (for Bases) prior to initial fuel loading.~~}~~

~~{Additionally, certain GTS Open Items are not yet reflected in the specifics of the proposed Chapters 16 and 16B. These additional GTS Open Items are listed below:~~

- ~~Mitigative features credited in the Loss of Feedwater Heating (LOFWH) with failure of Select Control Rod Run In (SCRRI) event as identified in response to RAI 16.0-1~~
- ~~Diverse Protection System (DPS) features indicated in response to RAI 19.1.0-2.~~
- ~~RWCU/SDC Interlock preventing SDC operation during power operation as identified in DCD subsections 5.4.8.1.1, 7.4.3.1.3, and 15A.3.7.2.~~
- ~~Control Rod Separation Switch - Control Rod block as identified in DCD 4.6.1.2.2, "Control Rod Separation Detection" and DCD 15.4.6.3}~~

16.0.1 COL Information

16.0-1-A COL Applicant Bracketed Items

COL applicants referencing the ESBWR DCD will replace the preliminary information provided in brackets ("[...]"), and annotated with "16.0-1-A" labels, with final plant specific information.

16.0-2-H COL Holder Bracketed Items

COL holders referencing the ESBWR DCD will replace the preliminary information provided in brackets ("[...]"), and annotated with "16.0-2-H" labels, with final plant specific information.

COL TABLEs 16.0-1-A and 16.0-2-H to be inserted in Revision 5

INSERT COL-A

INSERT COL-H

Table 16.0-1-A COL - Applicant Open Items			RAI Response Only -- Not Included in DCD --
COL Item	**Description**	**Reviewer's Note**	**Justification**
3.1.3-1	Stuck control rod separation requirements between "slow" control rod(s)	"Slow" scram time allowance is optional based upon analysis as outlined in the LCO Bases for Specification 3.1.4. With "slow" scram time option elected verification of the additional separation to stuck control rods is necessary (first bracketed option remains); when the "slow" scram time allowance is not elected, the optional Required Action A.1 (and associated Bases) is deleted.	COL applicant item provided as placeholder for formatting future flexibility
3.1.3-2	Maximum scram time limits for operable control rods	"Slow" scram time allowance is optional based upon analysis as outlined in the LCO Bases for Specification 3.1.4. With "slow" scram time option elected the first bracketed option remains (brackets removed) and the second option is deleted. Acceptance criteria for OPERABLE control rod scram times (time to % insertion) are to be included. With "slow" scram time allowance not elected, the first bracketed option is deleted and the second option remains (brackets removed).	COL applicant item provided as placeholder for formatting future flexibility
3.1.4-1	"Slow" control rod optional allowances	"Slow" scram time allowance is optional based upon analysis as outlined in the LCO Bases for Specification 3.1.4. The options are presented with pairs of brackets. With "slow" scram time option elected the first bracketed option remains (brackets removed) and the second option is deleted. Acceptance criteria for Control Rod Scram times for slow control rods including limits for the maximum number of slow and inoperable control rods are to be included. With "slow" scram time allowance not elected, the first bracketed option is deleted and the second option remains (brackets removed).	COL applicant item provided as placeholder for formatting future flexibility

Table 16.0-1-A COL - Applicant Open Items			RAI Response Only -- Not Included in DCD --
COL Item	**Description**	**Reviewer's Note**	**Justification**
3.1.7-1	Alternative Action for sodium pentaborate concentration not within limits	Applicant may propose alternatives including examples such as: (i) degradations and appropriate compensatory times for single versus multiple accumulators; (ii) level degradations; (iii) concentration degradations; (iv) pressure degradations. In general, degradations that impact ATWS mitigation capability, but continue to provide cold SDM capability, would be allowed Completion Times on the order of 72-hours. Similarly, degradations that impact single failure assumed post-accident flooding assumptions, but continue to provide adequate flooding support without assuming an additional single failure may propose Completion Times on the order of 7 days.	COL applicant item provided as placeholder for formatting future flexibility
3.3.1.1-2	Allowance to exclude certain sensors or other instrumentation components from Response Time Testing	Applicants or Licensees may remove brackets and adopt this provision by application of Specification 5.5.7, "Bases Control Program," after appropriate assessment and incorporation into the plant licensing basis of an NRC approved methodology evaluating sensor and instrumentation loop response time requirements. All implementation requirements of the NRC Safety Evaluation Report for the methodology must be addressed. This allowance is provided as a template for potential future assessments.	COL applicant item provided as placeholder for formatting future flexibility
3.3.1.2-1	Allowance to exclude certain portions of the actuation circuitry from Response Time Testing	Applicants or Licensees may remove brackets and adopt this provision by application of Specification 5.5.7, "Bases Control Program," after appropriate assessment and incorporation into the plant licensing basis of an NRC approved methodology evaluating sensor and instrumentation loop response time requirements. All implementation requirements of the NRC Safety Evaluation Report for the methodology must be addressed. This allowance is provided as a template for potential future assessments.	COL applicant item provided as placeholder for formatting future flexibility

Table 16.0-1-A
COL - Applicant Open Items

COL Item	Description	Reviewer's Note	RAI Response Only -- Not Included in DCD -- Justification
3.3.1.4-2	Allowance to exclude certain sensors or other instrumentation components from Response Time Testing	Applicants or Licensees may remove brackets and adopt this provision by application of Specification 5.5.7, "Bases Control Program," after appropriate assessment and incorporation into the plant licensing basis of an NRC approved methodology evaluating sensor and instrumentation loop response time requirements. All implementation requirements of the NRC Safety Evaluation Report for the methodology must be addressed. This allowance is provided as a template for potential future assessments.	COL applicant item provided as placeholder for formatting future flexibility
3.3.1.5-2	Allowance to exclude certain portions of the actuation circuitry from Response Time Testing	Applicants or Licensees may remove brackets and adopt this provision by application of Specification 5.5.7, "Bases Control Program," after appropriate assessment and incorporation into the plant licensing basis of an NRC approved methodology evaluating sensor and instrumentation loop response time requirements. All implementation requirements of the NRC Safety Evaluation Report for the methodology must be addressed. This allowance is provided as a template for potential future assessments.	COL applicant item provided as placeholder for formatting future flexibility
3.3.3.2-1	Post Accident Monitoring (PAM) Instrumentation	This Technical Specification and the associated Administrative Controls 5.6.5, "Post Accident Monitoring Report," are not required to be incorporated in the plant-specific COL applicant Technical Specifications. This Generic Technical Specification is provided as a template for potential future design changes.	The ESBWR design does not include any Post Accident Monitoring Instrumentation that is designated as Type A
3.3.5.1-2	Allowance to exclude certain sensors or other instrumentation components from Response Time Testing	Applicants or Licensees may remove brackets and adopt this provision by application of Specification 5.5.7, "Bases Control Program," after appropriate assessment and incorporation into the plant licensing basis of an NRC approved methodology evaluating sensor and instrumentation loop response time requirements. All implementation requirements of the NRC Safety Evaluation Report for the methodology must be addressed. This allowance is provided as a template for potential future assessments.	COL applicant item provided as placeholder for formatting future flexibility

Table 16.0-1-A COL - Applicant Open Items			RAI Response Only -- Not Included in DCD --
COL Item	**Description**	**Reviewer's Note**	**Justification**
3.3.5.2-1	Allowance to exclude certain portions of the actuation circuitry from Response Time Testing	Applicants or Licensees may remove brackets and adopt this provision by application of Specification 5.5.7, "Bases Control Program," after appropriate assessment and incorporation into the plant licensing basis of an NRC approved methodology evaluating sensor and instrumentation loop response time requirements. All implementation requirements of the NRC Safety Evaluation Report for the methodology must be addressed. This allowance is provided as a template for potential future assessments.	COL applicant item provided as placeholder for formatting future flexibility
3.3.5.3-2	Allowance to exclude certain sensors or other instrumentation components from Response Time Testing	Applicants or Licensees may remove brackets and adopt this provision by application of Specification 5.5.7, "Bases Control Program," after appropriate assessment and incorporation into the plant licensing basis of an NRC approved methodology evaluating sensor and instrumentation loop response time requirements. All implementation requirements of the NRC Safety Evaluation Report for the methodology must be addressed. This allowance is provided as a template for potential future assessments.	COL applicant item provided as placeholder for formatting future flexibility
3.3.5.4-1	Allowance to exclude certain portions of the actuation circuitry from Response Time Testing	Applicants or Licensees may remove brackets and adopt this provision by application of Specification 5.5.7, "Bases Control Program," after appropriate assessment and incorporation into the plant licensing basis of an NRC approved methodology evaluating sensor and instrumentation loop response time requirements. All implementation requirements of the NRC Safety Evaluation Report for the methodology must be addressed. This allowance is provided as a template for potential future assessments.	COL applicant item provided as placeholder for formatting future flexibility
3.3.6.1-2	Allowance to exclude certain sensors or other instrumentation components from Response Time Testing	Applicants or Licensees may remove brackets and adopt this provision by application of Specification 5.5.7, "Bases Control Program," after appropriate assessment and incorporation into the plant licensing basis of an NRC approved methodology evaluating sensor and instrumentation loop response time requirements. All implementation requirements of the NRC Safety Evaluation Report for the methodology must be addressed. This allowance is provided as a template for potential future assessments.	COL applicant item provided as placeholder for formatting future flexibility

Table 16.0-1-A COL - Applicant Open Items			RAI Response Only -- Not Included in DCD --
COL Item	**Description**	**Reviewer's Note**	**Justification**
3.3.6.2-1	Allowance to exclude certain portions of the actuation circuitry from Response Time Testing	Applicants or Licensees may remove brackets and adopt this provision by application of Specification 5.5.7, "Bases Control Program," after appropriate assessment and incorporation into the plant licensing basis of an NRC approved methodology evaluating sensor and instrumentation loop response time requirements. All implementation requirements of the NRC Safety Evaluation Report for the methodology must be addressed. This allowance is provided as a template for potential future assessments.	COL applicant item provided as placeholder for formatting future flexibility
3.3.6.3-2	Allowance to exclude certain sensors or other instrumentation components from Response Time Testing	Applicants or Licensees may remove brackets and adopt this provision by application of Specification 5.5.7, "Bases Control Program," after appropriate assessment and incorporation into the plant licensing basis of an NRC approved methodology evaluating sensor and instrumentation loop response time requirements. All implementation requirements of the NRC Safety Evaluation Report for the methodology must be addressed. This allowance is provided as a template for potential future assessments.	COL applicant item provided as placeholder for formatting future flexibility
3.3.6.4-1	Allowance to exclude certain portions of the actuation circuitry from Response Time Testing	Applicants or Licensees may remove brackets and adopt this provision by application of Specification 5.5.7, "Bases Control Program," after appropriate assessment and incorporation into the plant licensing basis of an NRC approved methodology evaluating sensor and instrumentation loop response time requirements. All implementation requirements of the NRC Safety Evaluation Report for the methodology must be addressed. This allowance is provided as a template for potential future assessments.	COL applicant item provided as placeholder for formatting future flexibility
3.3.7.1-2	Control Room Habitability Area option for design features to protect occupant exposures to hazardous chemicals	Based on DCD COL Information Item 6.4-2-A if the applicant determines that the maximum concentrations for the room intakes for a given chemical do not exceed the toxicity limits from RG 1.78 prior to 2 minutes, toxic gas monitoring instrumentation is not required and the bracketed phrases are deleted.	Information required is plant specific

Table 16.0-1-A COL - Applicant Open Items			RAI Response Only -- Not Included in DCD --
COL Item	**Description**	**Reviewer's Note**	**Justification**
3.3.7.1-3	Allowance to exclude certain sensors or other instrumentation components from Response Time Testing	Applicants or Licensees may remove brackets and adopt this provision by application of Specification 5.5.7, "Bases Control Program," after appropriate assessment and incorporation into the plant licensing basis of an NRC approved methodology evaluating sensor and instrumentation loop response time requirements. All implementation requirements of the NRC Safety Evaluation Report for the methodology must be addressed. This allowance is provided as a template for potential future assessments.	COL applicant item provided as placeholder for formatting future flexibility
3.3.7.2-1	Control Room Habitability Area option for design features to protect occupant exposures to hazardous chemicals	Based on DCD COL Information Item 6.4-2-A if the applicant determines that the maximum concentrations for the room intakes for a given chemical do not exceed the toxicity limits from RG 1.78 prior to 2 minutes, toxic gas monitoring instrumentation is not required and the bracketed phrases are deleted.	Information required is plant specific
3.3.7.2-2	Allowance to exclude certain portions of the actuation circuitry from Response Time Testing	Applicants or Licensees may remove brackets and adopt this provision by application of Specification 5.5.7, "Bases Control Program," after appropriate assessment and incorporation into the plant licensing basis of an NRC approved methodology evaluating sensor and instrumentation loop response time requirements. All implementation requirements of the NRC Safety Evaluation Report for the methodology must be addressed. This allowance is provided as a template for potential future assessments.	COL applicant item provided as placeholder for formatting future flexibility
3.7.2-1	Control Room Habitability Area option for design features to protect occupant exposures to hazardous chemicals	Based on DCD COL Information Item 6.4-2-A if the applicant determines that the maximum concentrations for the room intakes for a given chemical do not exceed the toxicity limits from RG 1.78 prior to 2 minutes, toxic gas monitoring instrumentation is not required and the bracketed phrases are deleted. .	Information required is plant specific

Table 16.0-1-A COL - Applicant Open Items			RAI Response Only -- Not Included in DCD --
COL Item	**Description**	**Reviewer's Note**	**Justification**
3.7.4-1	Main Turbine Bypass System COLR-MCPR penalty option for TBV out of service	An MCPR penalty is optional based upon completion of the required analyses to demonstrate that, given the specific inoperabilities that can be postulated and the number of turbine bypass valves (TBVs) affected for each inoperability, sufficient margin exists to operate the unit with an MCPR penalty without exceeding the Fuel Cladding Integrity Safety Limit (FCISL) and the cladding 1% plastic strain limit during the licensing basis events requiring an acceptable operating MCPR limit as an initial condition. NRC approved analytical methods that evaluate the MCPR penalty must be included in TS 5.6.3, COLR, list of methods.	COL applicant item provided as placeholder for formatting future flexibility
3.7.4-2	Turbine Bypass Valve cycling frequency	For SR 3.7.4.1, a Frequency of 31 days shall be specified unless an evaluation is performed and approved by the NRC using sufficient industry, site-specific, or manufacturer's operating experience or reliability studies that justifies extension to a longer Frequency (e.g., 92 days), a Reference to the evaluation and NRC approval is added to these Bases, and a commitment is made to establish appropriate procedural controls governing valve operation that support the extended Frequency.	COL applicant item provided as placeholder for formatting future flexibility
3.7.6-1	SCRRI/SRI COLR-MCPR penalty option for inoperable control rods	An MCPR penalty is optional based upon completion of the required analyses to demonstrate that, given the specific inoperabilities that can be postulated and the number of selected control rods affected for each inoperability, sufficient margin exists to operate the unit with an MCPR penalty without exceeding the Fuel Cladding Integrity Safety Limit (FCISL) and the cladding 1% plastic strain limit during the licensing basis events requiring an acceptable operating MCPR limit as an initial condition. NRC approved analytical methods that evaluate the MCPR penalty must be included in TS 5.6.3, COLR, list of methods.	COL applicant item provided as placeholder for formatting future flexibility
4.1-1	Plant-specific description of site location.	The plant specific description of site location. The intent of the description is to convey the exclusion area as defined by 10CFR Part 100. A Figure is an acceptable option.	The COL applicant must provide the plant specific description of the site location.

Table 16.0-1-A COL - Applicant Open Items			RAI Response Only -- Not Included in DCD --
COL Item	**Description**	**Reviewer's Note**	**Justification**
5.2.1-1	Non-licensed operator manning requirements	Applicant to determine if unit will be on a multi-unit site. Two unit sites with both units shutdown or defueled require a total of three non-licensed operators for the two units.	Information required is plant specific
5.3.1-1	Unit staff qualifications requirements	Minimum qualifications for members of the unit staff shall be specified by use of an overall qualification statement referencing an ANSI Standard acceptable to the NRC staff or by specifying individual position qualifications. Generally, the first method is preferable; however, the second method is adaptable to those unit staffs requiring special qualification statements because of unique organizational structures.	Information required is plant specific
5.4.1-1	Guidance documents for procedures and emergency operating procedures	Applicant to provide appropriate guidance documents required to implement the requirements of NUREG-0737 and to NUREG-0737, Supplement 1.	Information required is plant specific
5.5.6-1	Outdoor Liquid Storage Tank Radioactivity Monitoring Program	Applicants incorporating unprotected outdoor liquid radioactive waste storage tanks in their design must incorporate the bracketed requirements and surveillance program for unprotected outdoor storage tanks.	Information required is plant specific
5.5.9-1	Containment Leakage Rate Testing Program exceptions to Regulatory Guide 1.163	Applicants are to determine if additional exception(s) to Regulatory Guide 1.163 are applicable and describe the additional exception(s).	Information required is plant specific
5.5.12-1	Control Room Habitability Area (CRHA) Boundary Program requirements for hazardous chemical releases	The applicant will identify potential site-specific toxic or hazardous materials that may affect control room habitability in order to meet the requirements of TMI Action Plan III. D.3.4 and GDC 19	Information required is plant specific
5.6.1-1	Annual Radiological Environmental Operating Report allowance for multiple unit stations to submit a single report	Applicant to determine if allowance is applicable and remove brackets, or delete statement, as appropriate.	Information required is plant specific

Table 16.0-1-A COL - Applicant Open Items			RAI Response Only -- Not Included in DCD --
COL Item	**Description**	**Reviewer's Note**	**Justification**
5.6.1-2	Annual Radiological Environmental Operating Report format	Applicants may remove brackets and adopt the format of Radiological Assessment Branch Technical Position, Revision 1, November 1979, or propose another format reference acceptable to the NRC	Information required is plant specific
5.6.2-1	Radioactive Effluent Release Report allowance for multiple unit stations to submit a single report and requirements for multiple unit report contents	Applicant to determine if allowance is applicable and remove brackets, or delete statement, as appropriate.	Information required is plant specific
5.6.3-1	CORE OPERATING LIMITS REPORT (COLR) reference to Specification 3.7.4, "Main Turbine Bypass System.	Applicant to determine if alternative LCO making LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)," limits for an inoperable Turbine Bypass System, as specified in the Core Operating Limits Report (COLR) applicable will be incorporated. If incorporated, remove brackets.	Information required is plant specific
5.6.3-2	CORE OPERATING LIMITS REPORT (COLR) additional guidance	Any additional individual specifications that address core operating limits must be referenced and the associated NRC approved methods used to determine the core operating limits must be provided in 5.6.3.b.	COL applicant item provided as placeholder for formatting future flexibility
5.6.5-1	Specification 5.6.5, Post-Accident Monitoring Report	Include Post Accident Monitoring Report if LCO 3.3.3.2, "Post-Accident Monitoring (PAM) Instrumentation" is incorporated. This Generic Technical Specification is provided as a template for potential future design changes.	The ESBWR design does not include any Post-Accident Monitoring Instrumentation that is designated as Type A

Table 16.0-2-H COL - Holder Open Items			RAI Response Only -- Not Included in DCD --
COL Item	**Description**	**Reviewer's Note**	**Justification**
1.1-1	Pressure Temperature Limits Report (PTLR) definition	Remove brackets if COL holder determines that a PTLR will be incorporated in TS 3.4.4 and TS 5.6.4. In lieu of a PTLR, COL holders may insert their plant specific PT curves as figures in TS 3.4.4 and delete the definition of Pressure Temperature Limits Report (PTLR) and TS 5.6.4.	COL holder item provided as placeholder for PTLR incorporation. The plant specific pressure/ temperature limits will be prepared using actual reactor pressure vessel materials properties that will be submitted by the COL holder once the reactor pressure vessel material properties are known, after shipment of the reactor pressure vessel.
3.1.5-1	Minimum and nominal control rod scram accumulator pressure	Provide minimum control rod scram accumulator pressure that supports maximum scram time assumption.	ITAAC 2.2.2-7, #12 will require confirmation scram times and will be the appropriate test to determine the minimum CRD accumulator pressure consistent with the ESBWR design (e.g., shorter core). The hydraulic conditions will provide a balance between meeting the maximum required scram times while at the same time assuring the drive does not insert so fast as to cause stress limits in the drive parts to be exceeded.
3.3.1.1-1	Allowable Values	Provide appropriate allowable values in accordance with Methodology in TS 5.5.11.	Determination of allowable values is dependent on the instrumentation procured and final as-built information.
3.3.1.4-1	Allowable Values	Provide appropriate allowable values in accordance with Methodology in TS 5.5.11.	Determination of allowable values is dependent on the instrumentation procured and final as-built information.
3.3.1.6-1	Minimum SRNM count rate	Provide minimum countrate for SRNM to be considered operable based on manufacturer's recommendation.	Determination of minimum countrate is dependent on the instrumentation procured and final as-built information.
3.3.5.1-1	Allowable Values	Provide appropriate allowable values in accordance with Methodology in TS 5.5.11.	Determination of allowable values is dependent on the instrumentation procured and final as-built information.

Table 16.0-2-H COL - Holder Open Items			RAI Response Only -- Not Included in DCD --
COL Item	**Description**	**Reviewer's Note**	**Justification**
3.3.5.3-1	Allowable Values	Provide appropriate allowable values in accordance with Methodology in TS 5.5.11.	Determination of allowable values is dependent on the instrumentation procured and final as-built information.
3.3.6.1-1	Allowable Values	Provide appropriate allowable values in accordance with Methodology in TS 5.5.11.	Determination of allowable values is dependent on the instrumentation procured and final as-built information.
3.3.6.3-1	Allowable Values	Provide appropriate allowable values in accordance with Methodology in TS 5.5.11.	Determination of allowable values is dependent on the instrumentation procured and final as-built information.
3.3.7.1-1	Allowable Values	Provide appropriate allowable values in accordance with Methodology in TS 5.5.11.	Determination of allowable values is dependent on the instrumentation procured and final as-built information.
3.4.4-1	Reference to Pressure Temperature Limits Report (PTLR)	Remove brackets if COL holder determines that a PTLR will be incorporated. In lieu of a PTLR, COL holders may insert their plant specific PT curves as figures in TS 3.4.4 and replace bracketed references to the PTLR with references to the PT Figures.	COL holder item provided as placeholder for PTLR incorporation. The plant specific pressure/ temperature limits will be prepared using actual reactor pressure vessel materials properties that will be submitted by the COL holder once the reactor pressure vessel material properties are known, after shipment of the reactor pressure vessel.
3.4.4-2	Temperature for applicability of verification that reactor vessel flange and head flange temperatures are within limits	Provide appropriate value in accordance with the plant specific pressure/temperature limits submitted by the COL holder once the reactor pressure vessel material properties are known, after shipment of the reactor pressure vessel	The plant specific pressure/ temperature limits will be prepared using actual reactor pressure vessel materials properties that will be submitted in a Pressure and Temperature Limit Report (PTLR) by the COL holder once the reactor pressure vessel material properties are known, after shipment of the reactor pressure vessel.

Table 16.0-2-H COL - Holder Open Items			RAI Response Only -- Not Included in DCD --
COL Item	**Description**	**Reviewer's Note**	**Justification**
3.4.4-3	Topical report(s) providing the methodology for determining the P/T limits	Provide reference to P/T methodology topical used by the COL holder to prepare the plant specific pressure / temperature limits once the reactor pressure vessel material properties are known, after shipment of the reactor pressure vessel.	The plant specific pressure/ temperature limits will be prepared using actual reactor pressure vessel materials properties that will be submitted by the COL holder once the reactor pressure vessel material properties are known, after shipment of the reactor pressure vessel.
3.5.1-1	Minimum steam pressure recommended by SRV manufacturer for lifting SRVs for testing.	Provide minimum steam pressure recommended by SRV manufacturer for lifting SRVs for testing.	Requires design-specific information from manufacturer dependent on the SRV procured.
3.7.6-2	Allowable Values	Provide appropriate allowable values in accordance with Methodology in TS 5.5.11.	Determination of allowable values is dependent on the instrumentation procured and final as-built information.
3.8.1-1	Acceptance criteria for battery charger testing.	Provide acceptance criteria for battery charger testing consistent with battery size.	Requires design-specific information from battery manufacturer that is dependent on the battery procured.
3.8.1-2	Acceptance criteria for verification that battery is fully charged.	Provide acceptance criteria for verification that battery is fully charged consistent with battery manufacturer recommendations.	Requires design-specific information from battery manufacturer that is dependent on the battery procured.
3.8.1-3	Use of a modified performance test for verification of battery capacity	Provide requirements for use of a modified performance test for verification of battery capacity consistent with battery manufacturer recommendations.	Requires design-specific information from battery manufacturer that is dependent on the battery procured.
3.8.1-4	Battery Cell Parameters	Provide battery cell parameters consistent with manufacturer specifications.	Requires design-specific information from battery manufacturer that is dependent on the battery procured.
3.8.1-5	Battery margin for aging factor and state of charge uncertainty.	Provide battery margin including aging factor and state of charge uncertainty.	Requires design-specific information from battery manufacturer that is dependent on the battery procured.

Table 16.0-2-H
COL - Holder Open Items

COL Item	Description	Reviewer's Note	RAI Response Only -- Not Included in DCD -- Justification
3.8.3-1	Acceptance criteria for verification that battery is fully charged.	Provide acceptance criteria for verification that battery is fully charged consistent with battery manufacturer recommendations.	Requires design-specific information from battery manufacturer that is dependent on the battery procured.
3.8.3-2	Use of a modified performance test for verification of battery capacity	Provide requirements for use of a modified performance test for verification of battery capacity consistent with battery manufacturer recommendations.	Requires design-specific information from battery manufacturer that is dependent on the battery procured.
3.8.3-3	Battery Cell Parameters	Provide battery cell parameters consistent with manufacturer specifications.	Requires design-specific information from battery manufacturer that is dependent on the battery procured.
3.8.3-4	Battery margin for aging factor and state of charge uncertainty.	Provide battery margin including aging factor and state of charge uncertainty.	Requires design-specific information from battery manufacturer that is dependent on the battery procured.
3.9.5-1	Minimum CRD accumulator pressure	Provide minimum CRD accumulator pressure that supports maximum scram time assumption.	ITAAC 2.2.2-7, #12 will require confirmation scram times and is the appropriate test to determine the minimum CRD accumulator pressure consistent with the ESBWR design (e.g., shorter core). The test will be based on a balance between meeting the maximum required scram times while assuring insertion speed does not cause excessive stresses.
5.5.13-1	Ventilation Filter Testing Program (VFTP) requirement for the CRHAVS EFU differential pressure acceptance criteria	Provide specific differential pressure acceptance criteria for installed filter train based on manufacturer's recommendation.	Filter differential pressure acceptance criterion is dependent on the specific filter train procured.

Table 16.0-2-H
COL - Holder Open Items

COL Item	Description	Reviewer's Note	RAI Response Only -- Not Included in DCD -- Justification
5.6.4-1	Reactor Coolant System (RCS) PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR) listing of analytical methods used to determine the RCS pressure and temperature limits	Identify the Topical Report(s) by number and title or identify the NRC Safety Evaluation for a plant specific methodology by NRC letter and date. The PTLR will contain the complete identification for each of the TS referenced Topical Reports used to prepare the PTLR (i.e., report number, title, revision, date, and any supplements). The methodology for the calculation of the P-T limits for NRC approval should include the following provisions: 1. The methodology shall describe how the neutron fluence is calculated (reference new Regulatory Guide when issued). 2. The Reactor Vessel Material Surveillance Program shall comply with Appendix H to 10 CFR 50. The reactor vessel material irradiation surveillance specimen removal schedule shall be provided, along with how the specimen examinations shall be used to update the PTLR curves. 3. The adjusted reference temperature (ART) for each reactor beltline material shall be calculated, accounting for radiation embitterment, in accordance with Regulatory Guide 1.99, Revision 2. 4. The limiting ART shall be incorporated into the calculation of the pressure and temperature limit curves in accordance with NUREG-0800 Standard Review Plan 5.3.2, Pressure-Temperature Limits. 5. The minimum temperature requirements of Appendix G to 10 CFR Part 50 shall be incorporated into the pressure and temperature limit curves. In lieu of a PTLR, COL holders may insert their plant specific PT curves as figures in TS 3.4.4 and delete TS 5.6.4.	COL holder item provided for formatting guidance for PTLR incorporation. The plant specific pressure/ temperature limits will be prepared using actual reactor pressure vessel materials properties that will be submitted by the COL holder once the reactor pressure vessel material properties are known, after shipment of the reactor pressure vessel.

1.1 Definitions

LOGIC SYSTEM FUNCTIONAL TEST	A LOGIC SYSTEM FUNCTIONAL TEST shall be a test of all logic components required for OPERABILITY of a logic circuit, from as close to the sensor as practicable up to, but not including, the actuated device, to verify OPERABILITY. The LOGIC SYSTEM FUNCTIONAL TEST may be performed by means of any series of sequential, overlapping, or total system steps so that the entire logic system is tested.
MINIMUM CRITICAL POWER RATIO (MCPR)	The MCPR shall be the smallest Critical Power Ratio (CPR) that exists in the core for each class of fuel. The CPR is that power in the assembly that is calculated by application of the appropriate correlation(s) to cause some point in the assembly to experience boiling transition, divided by the actual assembly operating power.
MODE	A MODE shall correspond to any one inclusive combination of mode switch position, average reactor coolant temperature, and reactor vessel head closure bolt tensioning specified in Table 1.1-1 with fuel in the reactor vessel.
OPERABLE — OPERABILITY	A system, subsystem, train, division, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, train, division, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s).
[PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR) **COL 16.0-2-H 1.1-1**	The PTLR is the unit specific document that provides the reactor vessel pressure and temperature limits, including heatup and cooldown rates, for the current reactor vessel fluence period. These pressure and temperature limits shall be determined for each fluence period in accordance with Specification 5.6.4.]
RATED THERMAL POWER (RTP)	RTP shall be a total reactor core heat transfer rate to the reactor coolant of 4500 MWt.

3.1 REACTIVITY CONTROL SYSTEMS

3.1.3 Control Rod OPERABILITY

LCO 3.1.3 Each control rod shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

- NOTES -

1. Separate Condition entry is allowed for each control rod.
2. Enter applicable Conditions and Required Actions of LCO 3.7.6, "Selected Control Rod Run-In (SCRRI) and Selected Rod Insertion (SRI) Functions," when inoperable control rods result in inoperability of the SRI function.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One withdrawn control rod stuck.	**- NOTE -** A stuck control rod may be bypassed in the Rod Control & Information System (RC&IS) in accordance with SR 3.3.2.1.7, if required to allow continued operation.	
COL 16.0-1-A 3.1.3-1	[A.1 Verify stuck control rod separation criteria are met. AND]A.[2][1] Disarm the associated control rod drive (CRD).	[Immediately][..] 2 hours
	AND	

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued) COL 16.0-1-A 3.1.3-1	A.[3][2] Perform SR 3.1.3.2 and SR 3.1.3.3 for each withdrawn OPERABLE control rod. AND A.[4][3] Perform SR 3.1.1.1.	24 hours from discovery of Condition A concurrent with THERMAL POWER greater than the low power setpoint (LPSP) 72 hours
B. Two or more withdrawn control rods stuck.	B.1 Be in MODE 3.	12 hours
C. One or more control rods inoperable for reasons other than Condition A or B.	C.1 ---------- **- NOTE -** Inoperable control rods may be bypassed in the RC&IS in accordance with SR 3.3.2.1.7, if required, to allow insertion of inoperable control rod and continued operation. ---------- Fully insert inoperable control rod. AND C.2 Disarm the associated CRD.	 3 hours 4 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.1.3.1	Determine the position of each control rod.	24 hours
SR 3.1.3.2	--- **- NOTE -** Not required to be performed until 7 days after the control rod is withdrawn and THERMAL POWER is greater than the LPSP. --- Insert each fully withdrawn control rod two notches.	7 days
SR 3.1.3.3	--- **- NOTE -** Not required to be performed until 31 days after the control rod is withdrawn and THERMAL POWER is greater than the LPSP. --- Insert each partially withdrawn control rod two notches.	31 days
SR 3.1.3.4 **COL 16.0-1-A 3.1.3-2**	[Verify each control rod scram time from fully withdrawn to [{60}]% rod insertion is ≤ [{ }] seconds][Perform applicable SRs of LCO 3.1.4].	In accordance with SR 3.1.4.1, SR 3.1.4.2, SR 3.1.4.3, and SR 3.1.4.4
SR 3.1.3.5	Verify each control rod does not go to the withdrawn overtravel position.	Prior to declaring control rod OPERABLE after work on control rod or CRD System that could affect coupling

3.1 REACTIVITY CONTROL SYSTEMS

3.1.4 Control Rod Scram Times

LCO 3.1.4

COL 16.0-1-A 3.1.4-1

[a. No more than [{8}] OPERABLE control rods shall be "slow," in accordance with][Each control rod scram time shall be within limits of] Table 3.1.4-1[; and

b. No more than [{2}] OPERABLE control rods that are "slow" shall occupy adjacent locations.][.]

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. [Requirements of the LCO not met.][Control rod scram time not within limits of Table 3.1.4-1.]	A.1 [Be in MODE 3.][Declare affected control rod inoperable.]	[12 hours] [Immediately]

COL 16.0-1-A 3.1.4-1

SURVEILLANCE REQUIREMENTS

- NOTE -

During single or control rod pair scram time Surveillances, the control rod drive (CRD) pumps shall be isolated from the associated scram accumulator.

SURVEILLANCE		FREQUENCY
SR 3.1.4.1	Verify each control rod scram time is within the limits of Table 3.1.4-1 with reactor vessel bottom pressure ≥ 7.481 MPaG (1085 psig).	Prior to exceeding 40% RTP after each reactor shutdown ≥ 120 days

COL 16.0-1-A
3.1.4-1

Table 3.1.4-1 (page 1 of 1)
Control Rod Scram Times

[

- NOTES -

1. OPERABLE control rods with scram times not within the limits of this Table are considered "slow."

2. Enter applicable Conditions and Required Actions of LCO 3.1.3, "Control Rod OPERABILITY," for control rods with scram times > [{ }] seconds to [{60}]% insertion. These control rods are inoperable, in accordance with SR 3.1.3.4, and are not considered "slow."

][ ]

CONTROL ROD PERCENT INSERTION	SCRAM TIME LIMITS[a][b] (seconds)	
	REACTOR VESSEL BOTTOM PRESSURE[c] 7.481 MPaG (1085 psig)	REACTOR VESSEL BOTTOM PRESSURE[c] 8.618 MPaG (1250 psig)
10	{0.34}	{0.37}
40	{0.80}	{0.96}
60	{1.15}	{1.36}
100	{2.23}	{2.95}

(a) Maximum scram time from fully withdrawn position, based on de-energization of scram pilot valve solenoids as time zero.

(b) Scram times as a function of reactor vessel bottom pressure, when < 7.481 MPaG (1085 psig), are within established limits.

(c) For intermediate reactor vessel bottom pressures, the scram time criteria are determined by linear interpolation.

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.1.5.1 COL 16.0-2-H 3.1.5-1	Verify each control rod scram accumulator pressure is ≥ [{12.76 MPaG (1850 psig)}].	7 days

3.1 REACTIVITY CONTROL SYSTEMS

3.1.7 Standby Liquid Control (SLC) System

LCO 3.1.7 Two SLC trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and ~~4~~2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. [Concentration of sodium pentaborate in solution in one or more accumulators is not within limits.	A.1 Restore concentration of sodium pentaborate in solution to within limits in each accumulator.	72 hours]
B. One injection squib valve flow path inoperable in one or two trains.	B.1 Restore injection squib valve flow path(s) to OPERABLE status.	7 days
C. SLC train(s) inoperable for reasons other than Condition A or B.	C.1 Restore SLC System to OPERABLE status.	8 hours
D. Required Action and associated Completion Time not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	12 hours 36 hours

COL 16.0-1-A 3.1.7-1

Table 3.3.1.1-1 (page 1 of 2)
Reactor Protection System Instrumentation

COL 16.0-2-H 3.3.1.1-1	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	CONDITIONS REFERENCED FROM REQUIRED ACTION B.1 ~~or C.1~~	SURVEILLANCE REQUIREMENTS	~~SETTING~~ALLOWABLE ~~BASIS~~VALUE
1.	Neutron Monitor System Input - Startup Range Neutron Monitors	2	~~G~~F	SR 3.3.1.1.2	NA
		6[(a)]	~~H~~G	SR 3.3.1.1.2	NA
2.	Neutron Monitor System Input - Average Power Range Monitors / Oscillation Power Range Monitors	1,2	~~G~~F	SR 3.3.1.1.2	NA
3.	Control Rod Drive Accumulator Charging Water Header Pressure - Low	1,2	~~G~~F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.3	≥ {[~~12.75~~ MPa G (~~1850~~ __psig)]}
		6[(a)]	~~H~~G	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.3	≥ {[~~12.75~~ MPa G (~~1850~~ __psig)}]
4.	Reactor Vessel Steam Dome Pressure - High	1,2	~~G~~F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.3 SR 3.3.1.1.4	≤ [~~7.619~~__ MPa G (~~1105~~__ psig)]
5.	Reactor Vessel Water Level - Low, Level 3	1,2	~~G~~F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.3 SR 3.3.1.1.4	≥ [~~19.78~~__ m (~~778.7~~__ inches)]
6.	Reactor Vessel Water Level - High, Level 8	≥ 25% RTP	~~E~~D	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.3 SR 3.3.1.1.4	≤ [~~21.89~~__ m (~~861.8~~__ inches)]
7.	Main Steam Isolation Valve - Closure (Per Steam Line)	1	~~F~~E	SR 3.3.1.1.2 SR 3.3.1.1.3 SR 3.3.1.1.4	≥ [~~85~~__]% open

(a) With any control rod withdrawn from a core cell containing one or more fuel assemblies.

Table 3.3.1.1-1 (page 2 of 2)
Reactor Protection System Instrumentation

COL 16.0-2-H 3.3.1.1-1	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	CONDITIONS REFERENCED FROM REQUIRED ACTION B.1 ~~or C.1~~	SURVEILLANCE REQUIREMENTS	~~SETTING~~ALLOWABLE ~~BASIS~~VALUE
8.	Drywell Pressure - High	1,2	~~G~~F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.3 SR 3.3.1.1.4	≤ [~~13.8~~__ kPaG (~~2.0~~__ psig)]
9.	Suppression Pool Temperature - High	1,2	~~G~~F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.3 SR 3.3.1.1.4	≤ [~~48.9~~__°C (~~120~~__°F)]
10.	Turbine Stop Valve Closure Trip	≥ {40}% RTP	~~D~~C	SR 3.3.1.1.2 SR 3.3.1.1.3 SR 3.3.1.1.4	≥ [~~85~~__]% open
11.	Turbine Control Valve Fast Closure Trip Oil Pressure - Low	≥ {40}% RTP	~~D~~C	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.3 SR 3.3.1.1.4	≥ ~~{~~[Mpa G (psig)~~}~~]
12.	Main Condenser Pressure - High	1	~~G~~E	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.3 SR 3.3.1.1.4	≤ ~~{~~[MPa G (psig)~~}~~]
13.	Power Generation Bus Loss	1	~~F~~E	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.3 SR 3.3.1.1.4	≥ ~~{~~[~~}~~] V

[
COL 16.0-1-A
3.3.3.2-1

3.3 INSTRUMENTATION

3.3.3.2 Post-Accident Monitoring (PAM) Instrumentation

LCO 3.3.3.2 Two channels of each Type A PAM Instrumentation Function associated with the DC and Uninterruptible AC Electrical Power Distribution Divisions required by LCO 3.8.6, "Distribution Systems - Operating," shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

- NOTE -
Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required Type A PAM Functions with one required channel inoperable.	A.1 Restore required channel to OPERABLE status.	30 days
B. One or more required Type A PAM Functions with two required channels inoperable.	B.1 Restore one required channel to OPERABLE status.	7 days
C. Required Action and associated Completion Time not met.	C.1 Initiate action in accordance with Specification 5.6.5.	Immediately

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. (continued) COL 16.0-1-A 3.7.2-1	B.2	Verify mitigating actions ensure CRHA occupant exposures to radiological[, chemical,] and smoke hazards will not exceed limits.	24 hours
	AND		
	B.3	Restore CRHA boundary to OPERABLE status.	90 days
C. One CRHAVS train inoperable for reasons other than Condition A or B.	C.1	Restore CRHAVS train to OPERABLE status.	7 days
D. Required Action and associated Completion Time of Condition A, B, or C not met in MODE 1, 2, 3, or 4.	D.1	Be in MODE 3.	12 hours
E. Required Action and associated Completion Time of Condition C not met during OPDRVs.	E.1	Place OPERABLE CRHAVS train in isolation mode.	Immediately
	OR		
	E.2	Initiate action to suspend OPDRVs.	Immediately
F. Two CRHAVS trains inoperable in MODE 1, 2, 3, or 4 for reasons other than Condition A or B.	F.1	Be in MODE 3.	12 hours
	AND		
	F.2	Be in MODE 5.	36 hours

3.7 PLANT SYSTEMS

3.7.4 Main Turbine Bypass System

LCO 3.7.4 The Main Turbine Bypass System shall be OPERABLE.

[OR

COL 16.0-1-A 3.7.4-1

LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)," limits for an inoperable Turbine Bypass System, as specified in the Core Operating Limits Report (COLR), are made applicable.]

APPLICABILITY: THERMAL POWER ≥ 25% RTP.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Requirements of the LCO not met.	A.1 Satisfy the requirements of the LCO.	2 hours
B. Required Action and associated Completion Time not met.	B.1 Reduce THERMAL POWER to < 25% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.4.1	Verify one complete cycle of each main turbine bypass valve.	[31 days]
SR 3.7.4.2	Perform a system functional test.	24 months
SR 3.7.4.3	Verify the TURBINE BYPASS SYSTEM RESPONSE TIME is within limits.	24 months

COL 16.0-1-A 3.7.4-2

3.7 PLANT SYSTEMS

3.7.6 Selected Control Rod Run-In (SCRRI) and Selected Rod Insertion (SRI) Functions

LCO 3.7.6 The Selected Control Rod Run-In (SCRRI) and Selected Rod Insertion (SRI) ~~F~~functions~~, as specified in the COLR,~~ shall be OPERABLE.

[OR

COL 16.0-1-A
3.7.6-1

LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)," limits for an inoperable SCRRI and/or SRI ~~F~~function, as specified in the Core Operating Limits Report (COLR), are made applicable.]

APPLICABILITY: THERMAL POWER ≥ 25% RTP.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Requirements of the LCO not met.	A.1	Satisfy the requirements of the LCO.	2 hours
B. Required Action and associated Completion Time not met.	B.1	Reduce THERMAL POWER to < 25% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.6.1	Verify each SCRRI and SRI control rod required in accordance with the COLR is OPERABLE in accordance with the SRs for LCO 3.1.3, "Control Rod OPERABILITY."	According to the SRs for LCO 3.1.3

SURVEILLANCE		FREQUENCY
SR 3.7.6.~~1~~2	Verify correct breaker alignment and indicated power availability for each SCRRI control rod ~~required~~ fine motion control rod drive (FMCRD) required in accordance with the COLR.	7 days
SR 3.7.6.~~2~~3	Perform a system functional test for the SCRRI ~~F~~function.	24 months
SR 3.7.6.~~3~~4	Perform a system functional test for the SRI ~~F~~function.	24 months
SR 3.7.6.~~4~~5	Verify FMCRD electrical insertion rate ~~is within limits for each required FMCRD~~ over the required insertion range for each SCRRI control rod required in accordance with the COLR is within limits.	24 months
SR 3.7.6.~~5~~6	Perform CHANNEL CALIBRATION of ~~each SCRRI/SRI initiation Function required~~loss-of-feedwater-heating instrumentation channels consistent with Specification 5.5.11, "Setpoint Control Program (SCP)." The Allowable Value shall be ≤ [ ]°C ([ ])°F.	24 months

COL 16.0-2-H
3.7.6-2

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One or more DC Sources inoperable on two or more required divisions. OR Required Action and associated Completion Time of Required Action A.2 or A.3, or Condition B not met.	C.1 Be in MODE 3. AND C.2 Be in MODE 5.	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.1.1	Verify each required battery terminal voltage is greater than or equal to the minimum established float voltage.	31 days
SR 3.8.1.2	Verify each required battery charger supplies ≥ rated amps at greater than or equal to the minimum established float voltage for ≥ {[4]} hours.	24 months
COL 16.0-2-H 3.8.1-1	OR Verify each required battery charger can recharge the battery to the fully charged state within 24 hours while supplying the largest combined demands of the various continuous steady state loads, after a battery discharge to the bounding design basis event discharge state.	

	SURVEILLANCE	FREQUENCY
SR 3.8.1.3 COL 16.0-2-H 3.8.1-3	{[---------- - **- NOTE -** The modified performance discharge test in SR 3.8.3.6 may be performed in lieu of SR 3.8.1.3. ---------- }]	24 months
	Verify each required battery capacity is adequate to supply, and maintain in OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test.	
SR 3.8.1.4	Verify the output diode for each required battery charger and safety-related rectifier connected to the Isolation Power Center bus prevents reverse current flow.	24 months

3.8 ELECTRICAL POWER SYSTEMS

3.8.3 Battery Parameters

LCO 3.8.3 Battery parameters shall be within limits.

APPLICABILITY: When associated DC Sources are required to be OPERABLE.

ACTIONS

- NOTE -

Separate Condition entry allowed for each battery.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or two batteries on one required division with one or more battery cells float voltage < {[2.14}] V.	A.1 Perform SR 3.8.1.1. AND	2 hours
COL 16.0-2-H 3.8.3-3	A.2 Perform SR 3.8.3.1. AND	2 hours
	A.3 Restore affected cell voltage ≥ {[2.14}] V.	24 hours
B. SR 3.8.3.1 not met for ~~One or two batteries on~~ one or two batteries on one required division. ~~with float current > {2} amps.~~	B.1 Perform SR 3.8.1.1. AND	2 hours
	B.2 ~~Restore battery float current to ≤ {2} amps~~Verify battery is fully charged.	24 hours
C. One or two batteries on one required division with charger voltage greater than maximum established design limit.	C.1 Restore charger voltage to less than or equal to maximum established design limit.	7 days

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One or two batteries on one required division with battery {room} temperature less than minimum established design limit.	D.1 Restore battery {room} temperature to greater than or equal to minimum established design limit.	12 hours
E. One or more required batteries in redundant required divisions with battery parameters not within limits.	E.1 Restore battery parameters in all but one required division to within limits.	2 hours
F. Required Action and associated Completion Time of Condition A, B, C, D, or E not met. OR	F.1 Declare associated battery inoperable.	Immediately
COL 16.0-2-H 3.8.3-3 Required battery with one or more battery cell float voltage < {[2.14}] V and ~~float current > {2} amps~~SR 3.8.3.1 not met.		

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.3.1	--- **- NOTE -** Not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.1.1. ---	
COL 16.0-2-H 3.8.3-1	Verify each required battery is fully charged as indicated by [stabilized charging current or float current ~~is ≤ {2} amps~~within limits].	31 days
SR 3.8.3.2 COL 16.0-2-H 3.8.3-3	Verify each required battery pilot cell float voltage is ≥ ~~{~~[2.14~~}~~] V.	31 days
SR 3.8.3.3	Verify each required battery terminal voltage is less than or equal to maximum established design limit.	31 days
SR 3.8.3.4	Verify required battery {room} temperature is greater than or equal to minimum established design limit.	31 days
SR 3.8.3.5 COL 16.0-2-H 3.8.3-3	Verify each required battery connected cell float voltage is ≥ ~~{~~[2.14~~}~~] V.	92 days
SR 3.8.3.6 COL 16.0-2-H 3.8.3-4 COL 16.0-2-H 3.8.3-2	Verify each required battery capacity is ≥ ~~{~~[80~~}~~]% of the manufacturer's rating when subjected to a performance discharge test or ~~{~~[a modified performance discharge test~~}~~].	24 months AND 12 months when battery shows degradation or has reached 85% of the expected life

3.9 REFUELING OPERATIONS

3.9.5 Control Rod OPERABILITY - Refueling

LCO 3.9.5 Each withdrawn control rod shall be OPERABLE.

APPLICABILITY: MODE 6.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more withdrawn control rods inoperable.	A.1 Initiate action to fully insert inoperable withdrawn control rods.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.9.5.1	--- **- NOTE -** Not required to be performed until 7 days after any control rod is withdrawn. --- Verify each withdrawn control rod will insert at least two notches.	7 days
SR 3.9.5.2 **COL 16.0-2-H 3.9.5-1**	Verify each withdrawn control rod scram accumulator pressure is ≥ [{12.76 MPaG (1850 psig)}].	7 days

4.0 DESIGN FEATURES

4.1 Site Location

COL 16.0-1-A
4.1-1

~~REVIEWER'S NOTE~~

~~The applicant must provide the plant specific description of plant location.~~

~~]~~

[Description to be provided by the COL applicant.]

4.2 Reactor Core

4.2.1 Fuel Assemblies

The reactor shall contain 1132 fuel assemblies. Each assembly shall consist of a matrix of Zircaloy clad fuel rods with an initial composition of slightly enriched uranium dioxide (UO_2) as fuel material, and water rods. Limited substitutions of zirconium alloy or stainless steel filler rods for fuel rods, in accordance with approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with all safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in non-limiting core regions.

4.2.2 Control Rod Assemblies

The reactor core shall contain 269 cruciform shaped control rod assemblies. The control material shall be boron carbide or a combination of boron carbide and hafnium metal, as approved by the NRC.

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks in the Fuel Building spent fuel storage pool and in the Reactor Building buffer pool deep pit are designed and shall be maintained with:

a. Fuel assemblies having a maximum lattice {k-infinity of {1.35~~1~~} in the normal reactor core configuration at cold conditions};

5.0 ADMINISTRATIVE CONTROLS

5.2 Organization

5.2.1 Onsite and Offsite Organizations

Onsite and offsite organizations shall be established for unit operation and corporate management, respectively. The onsite and offsite organizations shall include the positions for activities affecting safety of the nuclear power plant.

a. Lines of authority, responsibility, and communication shall be defined and established throughout highest management levels, intermediate levels, and all operating organization positions. These relationships shall be documented and updated, as appropriate, in organization charts, functional descriptions of departmental responsibilities and relationships, and job descriptions for key personnel positions, or in equivalent forms of documentation. These requirements including the plant-specific titles of those personnel fulfilling the responsibilities of the positions delineated in these Technical Specifications shall be documented in the FSAR;

b. The plant manager shall be responsible for overall safe operation of the plant and shall have control over those onsite activities necessary for safe operation and maintenance of the plant;

c. A specified corporate officer shall have corporate responsibility for overall plant nuclear safety and shall take any measures needed to ensure acceptable performance of the staff in operating, maintaining, and providing technical support to the plant to ensure nuclear safety; and

d. The individuals who train the operating staff, carry out health physics, or perform quality assurance functions may report to the appropriate onsite manager; however, these individuals shall have sufficient organizational freedom to ensure their independence from operating pressures.

5.2.2 Unit Staff

The unit staff organization shall include the following:

COL 16.0-1-A
5.2.1-1

a. A non-licensed operator shall be assigned to each reactor containing fuel and an additional non-licensed operator shall be assigned for each control room from which a reactor is operating in MODE 1, 2, 3, or 4.

~~[REVIEWER'S NOTE~~
~~Two unit sites with both units shutdown or defueled require a total of three non-licensed operators for the two units.~~
~~]~~

5.0 ADMINISTRATIVE CONTROLS

5.3 Unit Staff Qualifications

~~[REVIEWER'S NOTE~~
~~Minimum qualifications for members of the unit staff shall be specified by use of an overall qualification statement referencing an ANSI Standard acceptable to the NRC staff or by specifying individual position qualifications. Generally, the first method is preferable; however, the second method is adaptable to those unit staffs requiring special qualification statements because of unique organizational structures.~~
~~]~~

5.3.1 Each member of the unit staff shall meet or exceed the minimum qualifications of [Regulatory Guide 1.8, Revision 3, 2000, or more recent revisions, or ANSI Standard acceptable to the NRC staff]. [The staff not covered by Regulatory Guide 1.8 shall meet or exceed the minimum qualifications of Regulations, Regulatory Guides, or ANSI Standards acceptable to NRC staff].

COL 16.0-1-A
5.3.1-1

5.3.2 For the purpose of 10 CFR 55.4, a licensed Senior Reactor Operator (SRO) and a licensed Reactor Operator (RO) are those individuals who, in addition to meeting the requirements of Specification 5.3.1, perform the functions described in 10 CFR 50.54(m).

5.0 ADMINISTRATIVE CONTROLS

5.4 Procedures

[**REVIEWER'S NOTE**

~~The Applicant must provide appropriate guidance documents for procedures in place of the bracketed information.~~

]

5.4.1 Written procedures shall be established, implemented, and maintained covering the following activities:

COL 16.0-1-A
5.4.1-1

a. The applicable procedures recommended in [Regulatory Guide 1.33, Revision 2, Appendix A, February 1978];

b. The emergency operating procedures required to implement the requirements of NUREG-0737 and to NUREG-0737, Supplement 1, as stated in [Generic Letter 82-33];

c. Quality assurance for effluent and environmental monitoring;

d. Fire Protection Program implementation; and

e. All programs specified in Specification 5.5.

5.5 Programs and Manuals

5.5.6 Explosive Gas and[Storage Tank] Radioactivity Monitoring Program

COL 16.0-1-A
5.5.6-1

~~[REVIEWER'S NOTE~~
~~Applicants incorporating unprotected outdoor liquid radioactive waste storage tanks in their design must incorporate the bracketed requirements and surveillance program for unprotected outdoor storage tanks.~~
~~]~~

This program provides controls for potentially explosive gas mixtures contained in the offgas treatment system and for the quantity of radioactivity fed into the offgas treatment system[and the quantity of radioactivity contained in unprotected outdoor liquid storage tanks]. The gaseous radioactivity quantities shall be determined following the methodology in Branch Technical Position (BTP) ETSB 11-5, "Postulated Radioactive Release due to Waste Gas System Leak or Failure". [The liquid radwaste quantities shall be determined in accordance with Standard Review Plan, Section 15.7.3, "Postulated Radioactive Release Due to Tank Failures."]

The program shall include:

a. The limits for concentrations of hydrogen and oxygen in the offgas treatment system and a surveillance program to ensure the limits are maintained. Such limits shall be appropriate to the system's design criteria (i.e., whether or not the system is designed to withstand a hydrogen explosion); and

b. A surveillance program to ensure that the quantity of radioactivity fed into the offgas treatment system is less than the amount that would result in a whole body exposure of ≥ 5 mSv (0.5 rem) to any individual in an unrestricted area, in the event of an uncontrolled release.

[c. A surveillance program to ensure that the quantity of radioactivity contained in all outdoor liquid radwaste tanks that are not surrounded by liners, dikes, or walls, capable of holding the tanks' contents and that do not have tank overflows and surrounding area drains connected to the Liquid Waste Management System is less than the amount that would result in concentrations less than the limits of 10 CFR 20, Appendix B, Table 2, Column 2, at the nearest potable water supply and the nearest surface water supply in an unrestricted area, in the event of an uncontrolled release of the tanks' contents."]

COL 16.0-1-A
5.5.6-1

COL 16.0-1-A
5.5.6-1

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the Explosive Gas and[Storage Tank] Radioactivity Monitoring Program surveillance frequencies.

5.5 Programs and Manuals

2. The visual examination of the steel liner plate inside containment intended to fulfill the requirements of 10 CFR 50, Appendix J, Option B testing shall be performed in accordance with the requirements of and frequency specified by ASME Code Section XI, Subsection IWE, except where relief has been authorized by the NRC.

COL 16.0-1-A
5.5.9-1

~~[REVIEWER'S NOTE~~

~~Applicants are to determine if additional exception(s) to Regulatory Guide 1.163 are applicable and describe the additional exception(s).~~

~~]~~

[3. . .]

5.5.9 Containment Leakage Rate Testing Program (continued)

b. The calculated peak containment internal pressure for the design basis loss of coolant accident, P_a, is 282.9 kPaG (41.1 psig). The containment design pressure is 310 kPaG (45 psig).

c. The maximum allowable containment leakage rate, L_a, at P_a, shall be ~~0.5~~0.4% of containment air weight per day.

d. Leakage rate acceptance criteria are:

1. Containment leakage rate acceptance criterion is ~~{≤ 0.98~~0.975 L_a for leakage from Containment into the Reactor Building and ≤ 0.025 L_a for leakage through the Passive Containment Cooling System (PCCS)~~}~~. 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.

e. The provisions of SR 3.0.3 are applicable to the Containment Leakage Rate Testing Program.

f. Nothing in these Technical Specifications shall be construed to modify the testing Frequencies required by 10 CFR 50, Appendix J.

5.5 Programs and Manuals

~~5.5.11 Setpoint Control Program (SCP) (continued)~~

~~{REVIEWER'S NOTE~~
~~The applicant must identify the Topical Report(s) by number and title or identify the staff Safety Evaluation Report for a plant specific methodology by NRC letter and date. The SCP will contain the complete identification for each of the Technical Specification referenced topical reports used to prepare the LTSPs, AVs, NTSPs (where applicable), and As-Found and As-Left Tolerance Bands included in the SCP (i.e., report number, title, revision, date, and any supplements).~~
~~}~~

~~{1. NEDC-31336P-A, "General Electric Instrument Setpoint Methodology,"}~~

~~c. The SCP shall also establish provisions for:~~

~~1. Evaluation of an instrumentation channel to verify it is functioning as required, before return to service, when the as-found channel setpoint is found conservative with respect to the Allowable Value but outside its predefined As-Found Tolerance Band; and~~

~~2. Resetting an instrumentation channel setpoint to a value that is within the Leave Alone Tolerance Band of the associated NTSP or of a value that is more conservative than the NTSP or, otherwise, declaring the channel to be inoperable.~~

5.5.12 Control Room Habitability Area (CRHA) Boundary Program

A CRHA Boundary Program shall be established and implemented to ensure that CRHA habitability is maintained such that, with an OPERABLE CRHA Heating, Ventilation, and Air Conditioning (HVAC) Subsystem (CRHAVS), CRHA occupants can control the reactor safely under normal conditions and maintain it in a safe condition following a radiological event,{[hazardous chemical release,}] or a smoke challenge. The program shall ensure that adequate radiation protection is provided to permit access and occupancy of the CRHA under design basis accident (DBA) conditions without personnel receiving radiation exposures in excess of 0.05 Sv (5 rem) total effective dose equivalent (TEDE) for the duration of the accident. The program shall include the following elements:

COL 16.0-1-A
5.5.12-1

a. The definition of the CRHA and the CRHA boundary.

b. Requirements for maintaining the CRHA boundary in its design condition including configuration control and preventive maintenance.

5.5 Programs and Manuals

c. Requirements for (i) determining the unfiltered air inleakage past the CRHA boundary into the CRHA in accordance with the testing methods and at the Frequencies specified in Sections C.1 and C.2 of Regulatory Guide 1.197, "Demonstrating Control Room Envelope Integrity at Nuclear Power Reactors," Revision 0, May 2003, and (ii) assessing CRHA habitability at the Frequencies specified in Sections C.1 and C.2 of Regulatory Guide 1.197, Revision 0.

d. Measurement, at designated locations, of the CRHA pressure relative to all external areas adjacent to the CRHA boundary during the pressurization mode of operation by one train of the CRHAVS, operating at the flow rate required by the VFTP, at a Frequency of 24 months on a STAGGERED TEST BASIS. The results shall be trended and used as part of the 24 month assessment of the CRHA boundary.

5.5.12 Control Room Habitability Area (CRHA) Boundary Program (continued)

e. The quantitative limits on unfiltered air inleakage into the CRHA. These limits shall be stated in a manner to allow direct comparison to the unfiltered air inleakage measured by the testing described in paragraph c. The unfiltered air inleakage limit for radiological challenges is the inleakage flow rate assumed in the licensing basis analyses of DBA consequences. {[Unfiltered air inleakage limits for hazardous chemicals must ensure that exposure of CRHA occupants to these hazards will be within the assumptions in the licensing basis.}]

COL 16.0-1-A
5.5.12-1

f. The provisions of SR 3.0.2 are applicable to the Frequencies for assessing CRHA habitability, determining CRHA unfiltered inleakage, and measuring CRHA pressure and assessing the CRHA boundary as required by paragraphs c and d, respectively.

5.5.13 Ventilation Filter Testing Program (VFTP)

A program shall be established to implement the following required testing of Engineered Safety Feature (ESF) filter ventilation systems at the frequencies specified in Regulatory Guide 1.52, Revision 3, and in accordance with Regulatory Guide 1.52, Revision 3 and ASME AG-1-2003.

a. Demonstrate for each of the ESF systems that an inplace test of the high efficiency particulate air (HEPA) filters shows a penetration and system bypass < 0.05% when tested in accordance with Regulatory Guide 1.52, Revision 3 and ASME AG-1-2003 at the system flowrate specified below ± 10%:

ESF Ventilation System	Flowrate
Control Room Habitability Area (CRHA)	200 l/s (424 cfm)

5.5 Programs and Manuals

Heating, Ventilation, and Air Conditioning (HVAC)
Subsystem (CRHAVS) Emergency Filter Unit (EFU)

b. Demonstrate for each of the ESF systems that an inplace test of the carbon adsorber shows a penetration and system bypass < 0.05% when tested in accordance with Regulatory Guide 1.52, Revision 3 and ASME AG-1-2003 at the system flowrate specified below ± 10%:

ESF Ventilation System	Flowrate
CRHAVS EFU	200 l/s (424 cfm)

c. Demonstrate for each of the ESF systems that a laboratory test of a sample of the carbon adsorber, when obtained as described in

5.5.13 Ventilation Filter Testing Program (VFTP) (continued)

Regulatory Guide 1.52, Revision 3, shows the methyl iodide penetration less than the value specified below when tested in accordance with ASTM D3803-1989 at a temperature of 30°C (86°F) and the relative humidity specified below:

ESF Ventilation System	Penetration	RH
CRHAVS EFU	0.5%	{95%}

d. Demonstrate for each of the ESF systems that the pressure drop across the combined HEPA filters, the prefilters, and the carbon adsorbers is less than the value specified below when tested in accordance with {Regulatory Guide 1.52, Revision 3 and ASME AG-1-2003 at the system flowrate specified below ± 10%}:

ESF Ventilation System	Delta P	Flowrate
CRHAVS EFU	{[6.0" w.g.}]	200 l/s (424 cfm)

COL 16.0-2-H
5.5.13-1

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the VFTP test frequencies.

5.0 ADMINISTRATIVE CONTROLS

5.6 Reporting Requirements

The following reports shall be submitted in accordance with 10 CFR 50.4.

5.6.1 Annual Radiological Environmental Operating Report

COL 16.0-1-A 5.6.1-1

[---------- **NOTE** ----------
A single submittal may be made for a multiple unit station. The submittal should combine sections common to all units at the station.
----------]

The Annual Radiological Environmental Operating Report covering the operation of the unit during the previous calendar year shall be submitted by May 15 of each year. The report shall include summaries, interpretations, and analyses of trends of the results of the Radiological Environmental Monitoring Program for the reporting period. The material provided shall be consistent with the objectives outlined in the Offsite Dose Calculation Manual (ODCM), and in 10 CFR 50, Appendix I, Sections IV.B.2, IV.B.3, and IV.C.

COL 16.0-1-A 5.6.1-2

The Annual Radiological Environmental Operating Report shall include the results of analyses of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the table and figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements [in the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979]. In the event that some individual results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted in a supplementary report as soon as possible.

5.6 Reporting Requirements

5.6.2 Radioactive Effluent Release Report

COL 16.0-1-A
5.6.2-1

[---------- **NOTE** ----------
A single submittal may be made for a multiple unit station. The submittal shall combine sections common to all units at the station; however, for units with separate radwaste systems, the submittal shall specify the releases of radioactive material from each unit.
----------]

The Radioactive Effluent Release Report covering the operation of the unit during the previous year shall be submitted prior to May 1 of each year in accordance with 10 CFR 50.36a. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The material provided shall be consistent with the objectives outlined in the ODCM and Process Control Program and in conformance with 10 CFR 50.36a and 10 CFR Part 50, Appendix I, Section IV.B.1.

5.6.3 CORE OPERATING LIMITS REPORT (COLR)

a. Core operating limits shall be established prior to each reload cycle, or prior to any remaining portion of a reload cycle, and shall be documented in the COLR for the following:

1. Specification 3.1.3, "Control Rod OPERABILITY"

~~1~~2. Specification 3.2.1, "LINEAR HEAT GENERATION RATE (LHGR)"

~~2~~3. Specification 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)"

~~3~~4. Specification 3.3.1.4, "Neutron Monitoring System (NMS) Instrumentation," Function 3

5. Specification 3.3.1.5, "Neutron Monitoring System (NMS) Automatic Actuation," Function 3

46.[Specification 3.7.4, "Main Turbine Bypass System"

~~5~~7.] Specification 3.7.6, "Selected Control Rod Run-In (SCRRI) and Selected Rod Insertion (SRI) Functions"

COL 16.0-1-A
5.6.3-1

COL 16.0-1-A
5.6.3-2

[Any additional individual specifications that address core operating limits must be referenced here.]

5.6 Reporting Requirements

5.6.3 CORE OPERATING LIMITS REPORT (COLR) (continued)

d. The COLR, including any midcycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

[5.6.4 Reactor Coolant System (RCS) PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR)

COL 16.0-2-H 5.6.4-1

a. RCS pressure and temperature limits for heatup, cooldown, low temperature operation, criticality, and hydrostatic testing as well as heatup and cooldown rates shall be established and documented in the PTLR for the following:

LCO 3.4.4, "RCS Pressure and Temperature (P/T) Limits."

b. The analytical methods used to determine the RCS pressure and temperature limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

{[Identify the Topical Report(s) by number and title or identify the NRC Safety Evaluation for a plant specific methodology by NRC letter and date. The PTLR will contain the complete identification for each of the TS referenced Topical Reports used to prepare the PTLR (i.e., report number, title, revision, date, and any supplements).}]

c. The PTLR shall be provided to the NRC upon issuance for each reactor vessel fluence period and for any revision or supplement thereto.]

~~{ REVIEWER'S NOTE~~
~~The methodology for the calculation of the P-T limits for NRC approval should include the following provisions:~~

~~1. The methodology shall describe how the neutron fluence is calculated (reference new Regulatory Guide when issued).~~

~~2. The Reactor Vessel Material Surveillance Program shall comply with Appendix H to 10 CFR 50. The reactor vessel material irradiation~~

~~5.6.4 Reactor Coolant System (RCS) PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR) (continued)~~

~~surveillance specimen removal schedule shall be provided, along with how the specimen examinations shall be used to update the PTLR curves.~~

~~3. The adjusted reference temperature (ART) for each reactor beltline material shall be calculated, accounting for radiation embrittlement, in accordance with Regulatory Guide 1.99, Revision 2.~~

5.6 Reporting Requirements

~~4. The limiting ART shall be incorporated into the calculation of the pressure and temperature limit curves in accordance with NUREG-0800 Standard Review Plan 5.3.2, Pressure-Temperature Limits.~~

~~5. The minimum temperature requirements of Appendix G to 10 CFR Part 50 shall be incorporated into the pressure and temperature limit curves.~~ }

[5.6.5 Post-Accident Monitoring Report

COL 16.0-1-A
5.6.5-1

~~[REVIEWER'S NOTE~~
~~Applicants must include Post Accident Monitoring Report if LCO 3.3.3.2, "Post-Accident Monitoring (PAM) Instrumentation is incorporated.~~]

When a Special Report is required by Condition C of LCO 3.3.3.2, "Post Accident Monitoring (PAM) Instrumentation," a report shall be submitted within the following 14 days. The report shall outline the preplanned alternate method of monitoring, the cause of the inoperability, and the plans and schedule for restoring the instrumentation channels of the Function to OPERABLE status.]

BASES

ACTIONS (continued)

SR 3.3.2.1.7 provides additional requirements when control rods are bypassed in the RC&IS to ensure compliance with the RWE analysis.

COL 16.0-1-A
3.1.3-1

[With one withdrawn control rod stuck, the local scram reactivity rate assumptions may not be met if the stuck control rod separation criteria are not met. Therefore, a verification that the separation criteria are met must be performed immediately. [{The separation criteria are not met if: a) the stuck control rod occupies a location adjacent to two "slow" control rods, b) the stuck control rod occupies a location adjacent to one "slow" control rod, and the one "slow" control rod is also adjacent to another "slow" control rod, or c) if the stuck control rod occupies a location adjacent to one "slow" control rod when there is another pair of "slow" control rods adjacent to one another.} The description of "slow" control rods is provided in LCO 3.1.4, "Control Rod Scram Times." In addition, t][T]he associated control rod drive must be disarmed and isolated within 2 hours. The allowed Completion Time of 2 hours is acceptable, considering the reactor can still be shut down, assuming no additional control rods fail to insert, and provides a reasonable amount of time to perform the Required Action in an orderly manner.

The motor drive may be disarmed by bypassing the rod in the RC&IS or disconnecting its power supply. Isolating the control rod from scram prevents damage to the CRD and surrounding fuel assemblies should a scram occur. The control rod can be isolated from scram by isolating it from its associated HCU. Two CRDs sharing an HCU can be individually isolated from scram.

Monitoring of the insertion capability of withdrawn control rods must be performed within 24 hours from discovery of Condition A concurrent with THERMAL POWER greater than the low power setpoint (LPSP) of the RC&IS. SR 3.1.3.2 and SR 3.1.3.3 perform periodic tests of the control rod insertion capability of withdrawn control rods. Testing within 24 hours ensures a generic problem does not exist. This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." The Required Action A.2 Completion Time only begins upon discovery of Condition A concurrent with THERMAL POWER greater than the actual LPSP of the RC&IS, since the notch insertions may not be compatible with the requirements of rod pattern control (LCO 3.1.6) and the RC&IS (LCO 3.3.2.1, "Control Rod Block Instrumentation") when below the actual LPSP. The allowed Completion Time of 24 hours from discovery of Condition A, concurrent with

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.1.3.4

COL 16.0-1-A
3.1.3-2

Verifying the scram time for each control rod [to [{60}]% rod insertion position is less than or equal to [{ }] seconds][ ]provides reasonable assurance that the control rod will insert when required during a DBA or transient, thereby completing its shutdown function. This SR is performed in conjunction with the control rod scram time testing of SR 3.1.4.1, SR 3.1.4.2, SR 3.1.4.3, and SR 3.1.4.4. The CHANNEL FUNCTIONAL TEST in LCO 3.3.1.1, "Reactor Protection System (RPS) Instrumentation," and the LOGIC SYSTEM FUNCTIONAL TEST in LCO 3.3.1.2, "Reactor Protection System (RPS) Actuation," overlaps this Surveillance to provide complete testing of the assumed safety function. The associated Frequencies are acceptable, considering the more frequent testing performed to demonstrate other aspects of control rod OPERABILITY and operating experience, which shows scram times do not significantly change over an operating cycle.

SR 3.1.3.5

Coupling verification is performed to confirm the integrity of the coupling between the control blade and the hollow piston and to ensure the control rod will perform its intended function when necessary. The Surveillance requires verifying that a control rod does not go to the withdrawn overtravel position when it is fully withdrawn. The overtravel position feature provides a positive check on the coupling integrity, since only an uncoupled hollow piston can reach the overtravel position. The verification is required to be performed prior to declaring the control rod OPERABLE after work on the control rod or CRD System that could affect the coupling.

This Frequency is acceptable because of the mechanical integrity of the bayonet coupling design of the FMCRDs. The bayonet coupling can only be engaged/disengaged by performing a 45° rotation of the FMCRD mechanism relative to the control rod. This is normally performed by rotating the FMCRD mechanism 45° from below the vessel with the control rod kept from rotating by the orificed fuel support that has been installed from above. Once the coupling is engaged and the FMCRD middle flange is bolted into place, the 45° rotation required for uncoupling cannot be accomplished unless the associated orificed fuel support is removed (which would allow for the control rod to be rotated from above) or the FMCRD middle flange is unbolted (which would allow for rotation of the FMCRD mechanism from below). Therefore, after FMCRD

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.4 Control Rod Scram Times

BASES

BACKGROUND

The scram function of the Control Rod Drive (CRD) System controls reactivity changes during abnormal operational transients to ensure that specified acceptable fuel design limits are not exceeded (Ref. 1). The control rods are scrammed by positive means, using hydraulic pressure exerted on the CRD piston.

A single hydraulic control unit (HCU) powers the scram action of one or two fine motion control rod drives (FMCRDs). When a scram signal is initiated, control air is vented from the scram valve in each hydraulic control unit (HCU), allowing it to open by spring action. High pressure nitrogen then raises the piston within the HCU accumulator and forces the displaced water through the scram piping to the connected FMCRDS. Inside each FMCRD, the high pressure water lifts the hollow piston off the ball-nut and drives the control rod into the core. A buffer assembly stops the hollow piston at the end of its stroke. Departure from the ball-nut releases spring-loaded latches in the hollow piston that engage slots in the guide tube. These latches support the control rod in the inserted position. The control rod cannot be withdrawn until the ball-nut is driven up and engaged with the hollow piston. Stationary fingers on the ball-nut then cam the latches out of the slots and hold them in the retracted position. A scram action is complete when every FMCRD has reached their fully inserted position.

APPLICABLE SAFETY ANALYSES

The analytical methods and assumptions used in evaluating the control rod scram function are presented in References 2, 3, 4, 5, and 6. The design basis transient and accident analyses assume that all of the control rods scram at a specified insertion rate. The resulting negative scram reactivity forms the basis for the determination of plant thermal limits (e.g., the MCPR). [Other distributions of scram times (e.g., several control rods scramming slower than the average time, with several control rods scramming faster than the average time) can also provide sufficient scram reactivity.][ ]Surveillance of each individual control rod's scram time ensures that the scram reactivity assumed in the design basis transient and accident analyses can be met.

COL 16.0-1-A 3.1.4-1

The scram function of the CRD System protects the Fuel Cladding Integrity Safety Limit (SL) (see Bases for SL 2.1.1, "Reactor Core SLs," and LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)"), and the

BASES

APPLICABLE SAFETY ANALYSES (continued)

1% cladding plastic strain fuel design limit (see Bases for LCO 3.2.1, "LINEAR HEAT GENERATION RATE (LHGR)"), which ensure that no fuel damage will occur if these limits are not exceeded. For reactor pressures above 7.481 MPaG (1085 psig), the scram function is designed to insert negative reactivity at a rate fast enough to prevent the Fuel Cladding Integrity SL being exceeded during the analyzed limiting power transient. For reactor pressures below 7.481 MPaG (1085 psig) the scram function is assumed to function during the Rod Withdrawal Error (RWE) event (Ref. 6) and, therefore, also provides protection against violating fuel damage limits during reactivity insertion accidents (see Bases for LCO 3.1.6, "Rod Pattern Control"). For the reactor vessel overpressure protection analysis, the scram function, along with the Safety/Relief Valves, ensures that the peak vessel pressure is maintained within the applicable ASME Code limits.

Control Rod Scram Times satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

COL 16.0-1-A 3.1.4-1

The scram time limits specified in Table 3.1.4-1 (in the accompanying LCO) are required to ensure that the scram reactivity assumed in the design basis transient and accident analysis is met. [To account for single failure and "slow" scramming control rods, the scram time limits specified in Table 3.1.4-1 are faster than those assumed in the design basis analysis. The scram time limits have a margin to allow up to [{8}] of the control rods to have scram times that exceed the specified limits (i.e., "slow" control rods) assuming a single stuck control rod (as allowed by LCO 3.1.3, "Control Rod OPERABILITY") and an additional control rod or control rod pair failing to scram per the single failure criterion.][ ]The scram time limits are specified as a function of reactor vessel bottom pressure to account for the pressure dependence of the scram times. The scram time limits are specified relative to percent insertion. The scram time limits are specified relative to measurements based on reed switch positions, which provide the control rod position indication. The reed switch closes ("pickup") when the hollow piston passes a specific location and then opens ("dropout") as the hollow piston tube travels upward. Verification of the specified scram times in Table 3.1.4-1 is accomplished through measurement of the "dropout" times.

[{To ensure that local scram reactivity rates are maintained within acceptable limits, no more than two of the allowed "slow" control rods may occupy adjacent locations.

BASES

LCO (continued)

COL 16.0-1-A 3.1.4-1

Table 3.1.4-1 is modified by two Notes, which state control rods with scram times not within the limits of the Table are considered "slow" and that control rods with scram times > [{ }] seconds to [{60}]% insertion are considered inoperable as required by SR 3.1.3.4, and are not considered slow.}][ ]

COL 16.0-1-A 3.1.4-1

This LCO applies only to OPERABLE control rods since inoperable control rods will be inserted and disarmed (LCO 3.1.3).[Slow scramming control rods may be conservatively declared inoperable and not accounted for as "slow" control rods.][ ]

APPLICABILITY

In MODES 1 and 2, a scram is assumed to function during transients and accidents analyzed for these plant conditions. These events are assumed to occur during startup and power operation; therefore, the scram function of the control rods is required during these MODES. In MODES 3, 4, and 5, the control rods are not able to be withdrawn since the reactor mode switch is in shutdown and a control rod block is applied. This provides adequate requirements for control rod scram capability during these conditions. Scram requirements in MODE 6 are contained in LCO 3.9.5, "Control Rod OPERABILITY - Refueling".

ACTIONS

A.1

COL 16.0-1-A 3.1.4-1

When the requirements of this LCO are not met, the rate of negative reactivity insertion during a scram may not be within the assumptions of the safety analyses. [Therefore, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to MODE 3 within 12 hours. The allowed Completion Time of 12 hours is reasonable, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging plant systems.][Therefore, the affected control rod must be declared inoperable, and the Actions of LCO 3.1.3 entered.]

BASES

SURVEILLANCE REQUIREMENTS

All four SRs of this LCO are modified by a Note stating that during a single control rod or control rod pair scram time Surveillance, the CRD pumps shall be isolated from the associated scram accumulator. With the CRD pump isolated (i.e., charging valve closed) the influence of the CRD pump head does not affect the single control rod or control rod pair scram times. During a full core scram, the CRD pump head would be seen by all control rods and would have a negligible effect on the scram insertion times.

SR 3.1.4.1

The scram reactivity used in design basis transient and accident analyses is based on assumed control rod scram time. Measurement of the scram times with reactor vessel bottom pressure ≥ 7.481 MPaG (1085 psig) demonstrates acceptable scram times for the transients analyzed in References 4 and 5.

Scram insertion times increase with increasing reactor pressure because of the competing effects of reactor vessel bottom pressure and stored accumulator energy. Demonstration of adequate scram times at reactor vessel bottom pressure ≥ 7.481 MPaG (1085 psig) helps to ensure that the scram times will be within the specified limits at higher pressures. Limits are specified as a function of reactor pressure to account for the sensitivity of the scram insertion times with pressure and to allow a range of pressures over which scram time testing can be performed. To ensure that scram time testing is performed within a reasonable time following a refueling or after a shutdown greater than 120 days or longer, control rods are required to be tested before exceeding 40% RTP following the shutdown. This Frequency is acceptable considering the additional surveillances performed for control rod OPERABILITY, the frequent verification of adequate accumulator pressure, and the required testing of control rods affected by work on control rods or the CRD System.

SR 3.1.4.2

Additional testing of a sample of control rods is required to verify the continued performance of the scram function during the cycle. A representative sample contains at least 10% of the control rods, the sample remains representative if no more than 7.5% of the control rods in the sample tested are determined to be ["slow."][inoperable.] If more than 7.5% of the sample is declared to be ["slow" per the criteria in][inoperable based on the acceptance criteria in] Table 3.1.4-1, additional control rods are tested until this 7.5% criterion (e.g., 7.5% of the sample size) is satisfied, or until the total number of ["slow"][inoperable] control rods (throughout the core, from all Surveillances) [exceeds the LCO

COL 16.0-1-A
3.1.4-1

limit][results in entering Action D of LCO 3.1.3]. For planned testing, the control rods selected for the sample should be

SURVEILLANCE REQUIREMENTS (continued)

different for each test. Data from inadvertent scrams should be used whenever possible to avoid unnecessary testing at power, even if the control rods with data were previously tested in a sample. The 200 day Frequency is based on operating experience that has shown that control rod scram times do not significantly change over an operating cycle. This Frequency is also reasonable based on the additional Surveillances done on the control rod drives at more frequent intervals in accordance with LCO 3.1.3 and LCO 3.1.5, "Control Rod Scram Accumulators."

SR 3.1.4.3

When work is performed on a control rod or the CRD System that could affect the scram insertion time, testing must be done to demonstrate that each affected control rod retains adequate scram performance over the range of applicable reactor pressures from zero to the maximum permissible pressure. The scram testing must be performed before declaring the control rod OPERABLE. The required scram time testing must demonstrate that the affected control rod is still within acceptable limits. The limits for reactor pressures < 7.481 MPaG (1085 psig) are established based on a high probability of meeting the acceptance criteria at reactor pressures ≥ 7.481 MPaG (1085 psig). Limits for reactor pressures ≥ 7.481 MPaG (1085 psig) are found in Table 3.1.4-1. [If testing demonstrates the affected control rod does not meet these limits, but is within the limit of Table 3.1.4-1, Note 2, the control rod can be declared OPERABLE and "slow."][ ]

COL 16.0-1-A
3.1.4-1

Specific examples of work that could affect the scram times include (but are not limited to) the following: removal of any CRD for maintenance or modification, replacement of a control rod, and maintenance or modification of a scram solenoid pilot valve, scram valve, accumulator isolation valve, or check valves in the piping required for scram.

The Frequency of once prior to declaring the affected control rod OPERABLE is acceptable because of the capability to test the control rods over a range of operating conditions and the more frequent surveillances on other aspects of control rod OPERABILITY.

BASES

ACTIONS (continued)

B.1

With two or more control rod scram accumulators inoperable, the scram function could become severely degraded because the accumulators are the primary source of scram force for the control rods at all reactor pressures. In this event, the associated control rods are declared inoperable and LCO 3.1.3 entered. This would result in requiring the affected control rods to be fully inserted and disarmed, thereby satisfying its intended function in accordance with ACTIONS of LCO 3.1.3.

The allowed Completion Time of 1 hour is considered reasonable~~,~~ based on ~~the ability of the accumulator to still be able to scram the associated control rod(s) and~~ the low probability of a DBA or transient occurring while the affected accumulators are inoperable.

C.1

The reactor mode switch must be immediately placed in the shutdown position if any Required Action and associated Completion Time cannot be met. This ensures that all insertable control rods are inserted and that the reactor is in a condition that does not require the active function (i.e., scram) of the control rods. This Required Action is modified by a Note stating that the Required Action is not applicable if all control rods associated with the inoperable scram accumulators are fully inserted, since the function of the control rods has been performed.

SURVEILLANCE REQUIREMENTS

SR 3.1.5.1

SR 3.1.5.1 requires that the accumulator pressure be checked every 7 days to ensure that adequate accumulator pressure exists to provide sufficient scram force. The primary indicator of accumulator OPERABILITY is the accumulator pressure. A minimum accumulator pressure is specified, below which the capability of the accumulator to perform its intended function becomes degraded and the accumulator is considered inoperable. The minimum accumulator pressure of {[12.76 MPaG (1850 psig)}] is well below the expected pressure of {[14.82 MPaG (2150 psig)}] (Ref. 2).

COL 16.0-2-H
3.1.5-1

BASES

LCO (continued)

injection squib valves and associated piping, valves, and instruments and controls to ensure an OPERABLE flow path.

APPLICABILITY

In MODES 1 and 2, the SLC System is needed for both its shutdown capability and for RPV water makeup and core cooling. In MODES 3, 4 and 5, when the reactor mode switch is in shutdown, control rods can not be withdrawn because a control rod block is applied. Otherwise, LCO 3.10.3, "Control Rod Withdrawal – Shutdown," and LCO 3.10.4, "Control Rod Withdrawal - Cold Shutdown," in conjunction with demonstration of adequate SDM in accordance with LCO 3.1.1, "SHUTDOWN MARGIN," provide adequate controls to ensure the reactor remains subcritical. Therefore, the SLC System is not required to be OPERABLE during these conditions when only a single control rod or control rod pair can be withdrawn.

~~{In MODES 3, 4 and 5, t~~The ECCS function of SLC System is ~~not~~ assumed to be available in MODES 1, 2, 3 and 4 to provide additional inventory for RPV water makeup and core cooling.~~}~~

ACTIONS

[A.1

~~REVIEWER'S NOTE~~

~~Applicant may propose alternatives including examples such as: (i) degradations and appropriate compensatory times for single versus multiple accumulators; (ii) level degradations; (iii) concentration degradations; (iv) pressure degradations. In general, degradations that impact ATWS mitigation capability, but continue to provide cold SDM capability, would be allowed Completion Times on the order of 72 hours. Similarly, degradations that impact single failure assumed post-accident flooding assumptions, but continue to provide adequate flooding support without assuming an additional single failure may propose Completion Times on the order of 7 days.~~

COL 16.0-1-A 3.1.7-1

If the concentration of sodium pentaborate in solution in one or more accumulators is not within limits, the concentration must be restored to within limits in 72 hours. For ATWS mitigation the plant design also includes, alternate rod insertion (ARI), fine motion control rod drive run-in, and a feedwater runback features as described in Reference 3. These additional features provide ATWS mitigation capability when the

BASES

~~"as-found" tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Analytical / Design Limit is maintained. If the as-left instrument setting~~

~~SURVEILLANCE REQUIREMENTS (continued)~~

~~cannot be returned to a setting within the "leave alone" tolerance, then the instrument channel shall be declared inoperable. TS 5.5.11.a requires that the NTSP and the methodology for calculating the "leave alone" and the "as-found" tolerances be in the SCP.~~

SR 3.3.1.1.4

This SR ensures that the individual required channel response times are less than or equal to the maximum values assumed in the accident analysis. The RPS RESPONSE TIME acceptance criteria are included in Reference ~~14~~13.

RPS RESPONSE TIME may be verified by actual response time measurements in any series of sequential, overlapping, or total channel measurements. This test encompasses the sensor channels up through the DTMs and overlaps the testing required by SR 3.3.1.2.~~2~~4 to ensure complete testing of instrument channels and actuation circuitry.

SURVEILLANCE REQUIREMENTS (continued)

COL 16.0-1-A 3.3.1.1-2	[However, some sensors for Functions are allowed to be excluded from specific RPS RESPONSE TIME measurement if the conditions of Reference ~~15~~XX are satisfied. If these conditions are satisfied, sensor response time may be allocated based on either assumed design sensor response time or the manufacturer's stated design response time. When the requirements of Reference ~~15~~XX are not satisfied, sensor response time must be measured. Furthermore, measurement of the instrument loops response times is not required if the conditions of Reference ~~16~~ XX are satisfied.]

RPS RESPONSE TIME tests are conducted on a 24 month STAGGERED TEST BASIS for ~~four~~ three channels. The Frequency of 24 months on a STAGGERED TEST BASIS ensures that the required channels associated with each division are alternately tested. The 24 month test Frequency is consistent with the refueling cycle and ~~has been shown to be acceptable by Reference 13~~ with operating experience that shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent.

BASES

functional testing of control rods, in LCO 3.1.3, overlaps this Surveillance to provide complete testing of the assumed safety function.

The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power ~~and has been shown to be acceptable by Reference 2~~. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.2.~~24~~

This SR ensures that the individual required division response times are less than or equal to the maximum values assumed in the accident analysis. The RPS RESPONSE TIME acceptance criteria are included in Reference 3.

COL 16.0-1-A 3.3.1.2-1

[However, some portions of the RPS actuation circuitry are allowed to be excluded from specific RPS RESPONSE TIME measurement if the conditions of Reference XX are satisfied. Furthermore, measurement of the instrument loops response times is not required if the conditions of Reference XX are satisfied.]

RPS RESPONSE TIME may be verified by actual response time measurements in any series of sequential, overlapping, or total channel measurements. This test encompasses the RPS actuation circuitry that consists of the Divisions of Trip Logic, and the Divisions of Trip Actuators and overlaps the testing required by SR 3.3.1.1.4 to ensure complete testing of instrument channels and actuation circuitry.

RPS RESPONSE TIME tests are conducted on a 24 month STAGGERED TEST BASIS for ~~four~~ three divisions. The Frequency of 24 months on a STAGGERED TEST BASIS ensures that each required division is alternately tested. The 24 month test Frequency is consistent with the refueling cycle and ~~has been found to be acceptable by Reference 2~~ with operating experience that shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent.

REFERENCES 1. Chapter 15.

[
COL 16.0-1-A
3.3.3.2-1

B 3.3 INSTRUMENTATION

B 3.3.3.2 Post-Accident Monitoring (PAM) Instrumentation

BASES

BACKGROUND

The purpose of the Post-Accident Monitoring Instrumentation is to display plant variables that provide information required by the control room operators during accident situations. The OPERABILITY of the accident monitoring instrumentation ensures that there is sufficient information available on selected plant parameters to monitor and assess plant status and behavior following an accident. Consistent with the recommendations in Regulatory Guide 1.97 (Ref. 1), instrumentation is designated as Type A if it is needed to provide the primary information required to permit the control room operating staff to:

- Take specific preplanned manually-controlled actions for which no automatic control is provided and that are required for safety systems to perform their safety-related functions as assumed in the plant accident analysis; and

- Take the specified, preplanned, manually controlled actions for which no automatic control is provided and that are required to mitigate the consequences of an anticipated operational occurrence (AOO).

[**REVIEWER'S NOTE**

~~The ESBWR design does not include any Post-Accident Monitoring Instrumentation that is designated as Type A. This Technical Specification and the associated Administrative Controls 5.6.5, "Post Accident Monitoring Report," are not required to be incorporated in the plant-specific COL Applicant Technical Specifications unless design basis changes result from the evaluation identified in Reference 2. This Generic Technical Specification is provided as a template for potential future design changes.~~

]

APPLICABLE SAFETY ANALYSES

Variables that satisfy the criteria as Type A variables in Regulatory Guide 1.97 (Ref. 1) meet Criterion 3 of 10 CFR 50.36(d)(2)(ii) and are discussed in the LCO section of these Bases. Reference 2 summarizes the analysis that determined the variables or instrumentation required to monitor these variables that meet criteria for designation as Type A in accordance with Reference 1.

BASES

LCO

LCO 3.3.3.2 requires sufficient OPERABLE channels for each Type A Function, identified in Reference 2 and associated with the DC and Uninterruptible AC Electrical Power Distribution Divisions required by LCO 3.8.6, "Distribution Systems – Operating," to ensure no single failure prevents the operators from being presented with the information necessary to determine the status of the unit and to bring the unit to, and maintain it in, a safe condition following that accident. A minimum of two channels allows a CHANNEL CHECK during the post accident phase to confirm the validity of displayed information.

Listed below is a discussion of the specified Type A instrument Functions listed in Reference 2, and applicable to the accompanying LCO.

COL 16.0-1-A
3.3.3.2-1

[REVIEWER'S NOTE
Insert discussions of specified Type A instrument Functions.]

APPLICABILITY

The PAM Instrumentation LCO is applicable in MODES 1 and 2. These Type A variables are related to the diagnosis and preplanned actions required to mitigate Design Basis Accidents (DBAs). The applicable DBAs are assumed to occur in MODES 1 and 2. In MODES 3, 4, 5, and 6, plant conditions are such that the likelihood of an event that would require PAM instrumentation is extremely low; therefore, PAM instrumentation is not required to be OPERABLE in these MODES.

ACTIONS

A Note has been added to the ACTIONS Table. This Note modifies the ACTIONS related to PAM instrumentation channels. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition discovered to be inoperable or not within limits, will not result in separate entry into the Condition. Section 1.3 also specifies that Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable PAM instrumentation channels provide appropriate compensatory measures for separate Functions. As such, the Note allows separate Condition entry for each inoperable Type A PAM Function.

A.1

When one or more required Type A PAM Functions have one required channel that is inoperable, the required inoperable channel must be

B 3.7 PLANT SYSTEMS

B 3.7.2 Control Room Habitability Area (CRHA) Heating, Ventilation, and Air Conditioning (HVAC) Subsystem (CRHAVS)

BASES

BACKGROUND

COL 16.0-1-A
3.7.2-1

The CRHAVS and CRHA boundary provide a protected environment from which occupants can control the unit following an uncontrolled release of radioactivity[, hazardous chemicals,] or smoke.

The safety-related function of the CRHAVS used to control radiation exposure consists of two independent and redundant high efficiency air filtration trains, or Emergency Filtration Units (EFUs), for treatment of outside supply air and a CRHA boundary that limits the inleakage of unfiltered air. Each CRHAVS consists of an EFU fan; an EFU including a medium efficiency filter, a high efficiency particulate air (HEPA) filter, a carbon adsorber section, and a post-filter; and the associated ductwork, valves or dampers, doors, barriers, and instrumentation. Each EFU fan, and EFU associated instrumentation, can be powered from {any one of the DC and Uninterruptible AC Electrical Power Distribution Divisions required by LCO 3.8.6, "Distribution Systems – Operating," and LCO 3.8.7, "Distribution Systems – Shutdown."} Prefilters and HEPA filters remove particulate matter, which may be radioactive. The carbon adsorbers provide a holdup period for gaseous iodine, allowing time for decay.

The CRHA is the area within the confines of the CRHA boundary that contains the spaces that control room occupants inhabit to control the unit during normal and accident conditions. This area encompasses the control room, and may encompass other non-critical areas to which frequent personnel access or continuous occupancy is not necessary in the event of an accident. The CRHA is protected for normal operation, natural events, and accident conditions. The CRHA boundary is the combination of walls, floor, roof, ducting, doors, penetrations and equipment that physically form the CRHA. The OPERABILITY of the CRHA boundary must be maintained to ensure that the inleakage of unfiltered air into the CRHA will not exceed the inleakage assumed in the licensing basis analysis of design basis accident (DBA) consequences to CRHA occupants. The CRHA and its boundary are defined in the Control Room Habitability Area (CRHA) Boundary Program.

In addition to the safety-related standby emergency filtration function, parts of the CRHAVS are operated to maintain the CRHA environment during normal operation, including two redundant nonsafety-related fresh

BASES

APPLICABLE SAFETY ANALYSES (continued)

summarized in Reference 3. No single active or passive failure will cause the loss of outside air ~~from~~ to the CRHA. The CRHAVS provides protection from smoke [and hazardous chemicals] to the CRHA occupants. [The analysis of hazardous chemical releases demonstrates that the toxicity limits are not exceeded in the CRHA following a hazardous chemical release (Ref. 2).] The evaluation of a smoke challenge demonstrates that it will not result in the inability of the CRHA occupants to control the reactor either from the main control room or from the remote shutdown panels (Ref. 2).

COL 16.0-1-A
3.7.2-1

The CRHAVS satisfies Criterion 3 of 10 CFR 50.36(d).

LCO

Two redundant one hundred percent capacity trains of the CRHAVS, each associated with a different division of the DC and Uninterruptible AC Electrical Power Distribution Divisions required by LCO 3.8.6, "Distribution Systems – Operating," and LCO 3.8.7, "Distribution Systems – Shutdown," are required to be OPERABLE to ensure that at least one is available, assuming a single failure disables one train. Total system failure could result in control room personnel receiving radiation exposures in excess of 0.05 Sv (5 rem) TEDE in the event of a DBA. The CRHAVS is considered OPERABLE when the individual components necessary to limit CRHA occupant exposure are OPERABLE in each train. A train is considered OPERABLE when:

a. The EFU fan is OPERABLE; and

b. The EFU HEPA filter and carbon adsorber are not excessively restricting flow and are capable of performing their filtration functions.

In order for the CRHAVS to be considered OPERABLE, the CRHA ductwork and CRHA ventilation dampers for isolation of the CRHA boundary must be OPERABLE, and the CRHA boundary must be maintained, including the integrity of the walls, floors, ceilings, ductwork, and access doors, such that the CRHA occupant dose from a large radioactive release does not exceed the calculated dose in the licensing basis consequence analyses for DBAs, and that CRHA occupants are protected from [hazardous chemicals and] smoke. In addition, the trip breakers for de-energization of the N-DCIS electrical loads inside the CRHA must be OPERABLE.

COL 16.0-1-A
3.7.2-1

BASES

LCO (continued)

The LCO is modified by a Note allowing the CRHA boundary to be opened intermittently under administrative controls. This Note only applies to openings in the CRHA boundary that can be rapidly restored to the design condition, such as doors, hatches, floor plugs, and access panels. For entry and exit through doors, the administrative control of the opening is performed by the person(s) entering or exiting the area. For other openings, these controls consist of stationing a dedicated individual at the opening who is in continuous communication with the operators in the CRHA. This individual will have a method to rapidly close the opening and to restore the CRHA boundary to a condition equivalent to the design condition when a need for CRHA isolation is indicated.

APPLICABILITY

In MODES 1, 2, 3, and 4, the CRHAVS must be OPERABLE to ensure that the CRHA will remain habitable during and following a DBA, since the DBA could lead to a fission product release.

In MODES 5 and 6, the probability and consequences of a DBA are reduced due to the pressure and temperature limitations in these MODES. Therefore, maintaining the CRHAVS OPERABLE is not required in MODES 5 or 6, except during operations with a potential for draining the reactor vessel (OPDRVs), which is a situation under which significant radioactive releases can be postulated.

ACTIONS

A.1

When the average CRHA air temperature is outside the acceptable range during normal operation of the nonsafety-related recirculation AHUs, action is required to restore it to an acceptable range. A Completion Time of 72 hours is permitted based upon the availability of temperature indication in the main control room. It is judged to be a sufficient amount of time allotted to correct the deficiency in the nonsafety-related ventilation system before shutting down.

B.1, B.2, and B.3

COL 16.0-1-A
3.7.2-1

If the unfiltered inleakage of potentially contaminated air past the CRHA boundary can result in CRHA occupant radiological dose greater than the calculated dose of the licensing basis analyses of DBA consequences (allowed to be up to 5 rem TEDE), or inadequate protection of CRHA occupants from [hazardous chemicals or] smoke, the CRHA boundary is

BASES

ACTIONS (continued)

inoperable. Actions must be taken to restore an OPERABLE CRHA boundary within 90 days.

During the period that the CRHA boundary is considered inoperable, action must be initiated to implement mitigating actions to lessen the effect on CRHA occupants from the potential hazards of a radiological]or chemical] event or a challenge from smoke. Actions must be taken within 24 hours to verify that in the event of a DBA, the mitigating actions will ensure that CRHA occupant radiological exposures will not exceed the calculated dose of the licensing basis analyses of DBA consequences, and that CRHA occupants are protected from [hazardous chemicals and] smoke. These mitigating actions (i.e., actions that are taken to offset the consequences of the inoperable CRHA boundary) should be preplanned for implementation upon entry into the condition, regardless of whether entry is intentional or unintentional. The 24 hour Completion Time is reasonable based on the low probability of a DBA occurring during this time period, and the use of mitigating actions. The 90 day Completion Time is reasonable based on the determination that the mitigating actions will ensure protection of CRHA occupants within analyzed limits while limiting the probability that CRHA occupants will have to implement protective measures that may adversely affect their ability to control the reactor and maintain it in a safe shutdown condition in the event of a DBA. In addition, the 90 day Completion Time is a reasonable time to diagnose, plan and possibly repair, and test most problems with the CRHA boundary.

COL 16.0-1-A
3.7.2-1

C.1

With one CRHAVS train inoperable for reasons other than the average CRHA air temperature outside the acceptable range or an inoperable CRHA boundary (i.e., Condition A or B), the inoperable CRHAVS train must be restored to OPERABLE status within 7 days. In this Condition, the remaining OPERABLE CRHAVS train is adequate to perform the CRHA occupant protection function. However, the overall reliability is reduced because a failure in the OPERABLE train could result in loss of CRHAVS function. The 7-day Completion Time is based on the low probability of a DBA occurring during this time period, and that the remaining train can provide the required capabilities.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.2.6

This SR verifies the OPERABILITY of the CRHA boundary by testing for unfiltered air inleakage past the CRHA boundary and into the CRHA. The details of the testing are specified in the Control Room Habitability Area (CRHA) Boundary Program. The CRHA is considered habitable when the radiological dose to CRHA occupants calculated in the licensing basis analyses of DBA consequences is no more than 5 rem TEDE and the CRHA occupants are protected from [hazardous chemicals and] smoke. This SR verifies that the unfiltered air inleakage into the CRHA is no greater than the flow rate assumed in the licensing basis analyses of DBA consequences. When unfiltered air inleakage is greater than the assumed flow rate, Condition B must be entered. Required Action B.3 allows time to restore the CRHA boundary to OPERABLE status provided mitigating actions can ensure that the CRHA remains within the licensing basis habitability limits for the occupants following an accident. Compensatory measures are discussed in Regulatory Guide 1.196, Section C.2.7.3, (Ref. 6) which endorses, with exceptions, NEI 99-03, Section 8.4 and Appendix F (Ref. 7). These compensatory measures may also be used as mitigating actions as required by Required Action B.2. Temporary analytical methods may also be used as compensatory measures to restore OPERABILITY (Ref. 8). Options for restoring the CRHA boundary to OPERABLE status include changing the licensing basis DBA consequence analysis, repairing the CRHA boundary, or a combination of these actions. Depending upon the nature of the problem and the corrective action, a full scope inleakage test may not be necessary to establish that the CRHA boundary has been restored to OPERABLE status.

COL 16.0-1-A 3.7.2-1

REFERENCES

1. Section 6.4.
2. Section 9.4.1.
3. Section 15.4.
4. {NEDO-33201, "ESBWR Design Certification Probabilistic Risk Assessment."}
5. TSTF-IG-05-02, Implementation Guidance For TSTF-423, {Revision 1}, "Technical Specifications End States, NEDC-32988-A," {2007}.

BASES

APPLICABLE SAFETY ANALYSES

The Main Turbine Bypass System is assumed to function during transient events that could result in increase in reactor pressure (i.e., closure of one TCV, generator load rejection with turbine bypass, generator load rejection with a single failure in the turbine bypass system, turbine trip with turbine bypass, turbine trip with a single failure in the turbine bypass system, closure of one MSIV, and feedwater controller failure – maximum demand). Opening of the bypass valves during the pressurization event mitigates the increase in reactor vessel pressure, which affects the MCPR during the event. [An inoperable Main Turbine Bypass System may result in an MCPR penalty.]

COL 16.0-1-A
3.7.4-1

~~REVIEWER'S NOTE~~

~~An MCPR penalty is optional based upon completion of the required analyses to demonstrate that, given the specific inoperabilities that can be postulated and the number of turbine bypass valves (TBVs) affected for each inoperability, sufficient margin exists to operate the unit with an MCPR penalty without exceeding the Fuel Cladding Integrity Safety Limit (FCISL) and the cladding 1% plastic strain limit during the licensing basis events requiring an acceptable operating MCPR limit as an initial condition.~~

~~]~~

The Main Turbine Bypass System satisfies Criterion 3 of 10 CFR 50.36(d)(2)(ii).

LCO

The Main Turbine Bypass System is required to be OPERABLE to limit peak pressure in the main steam lines and maintain reactor pressure within acceptable limits during events that cause rapid pressurization, such that the Fuel Cladding Integrity Safety Limit (FCISL) is not exceeded. [With the Main Turbine Bypass System inoperable, modifications to the MCPR limits (LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)") may be applied to allow continued operation. The MCPR limit for the inoperable Main Turbine Bypass System is specified in the COLR.]

COL 16.0-1-A
3.7.4-1

An OPERABLE Main Turbine Bypass System requires the TBVs to open in response to increasing main steam line pressure or in the fast opening mode, as applicable. This response is within the assumptions of the applicable analyses (Ref. 2).

BASES

APPLICABILITY

The Main Turbine Bypass System is required to be OPERABLE at ≥ 25% RTP to ensure that the FCISL and the cladding 1% plastic strain limit are not violated during transient events such as the generator load rejection with turbine bypass event. As discussed in the Bases for LCO 3.2.2, sufficient margin to these limits exists below 25% RTP. Therefore, these requirements are only necessary when operating at or above this power level.

ACTIONS

A.1

COL 16.0-1-A
3.7.4-1

If the Main Turbine Bypass System is inoperable (one or more TBVs inoperable)[, or the MCPR limits for an inoperable Main Turbine Bypass System, as specified in the COLR, are not applied], the assumptions of the design basis transient analysis may not be met. Under such circumstances, prompt action should be taken to restore the Main Turbine Bypass System to OPERABLE status or adjust the MCPR limits accordingly. The 2-hour Completion Time is reasonable, based on the time to complete the Required Action, and the low probability of an event occurring during this period requiring the Main Turbine Bypass System.

B.1

If Required Action A.1 and associated Completion Time cannot be met, THERMAL POWER must be reduced to < 25% RTP. As discussed in the Applicability section, operation at < 25% RTP results in sufficient margin to the required limits, and the Main Turbine Bypass System is not required to protect fuel integrity during transient events such as the generator load rejection with turbine bypass event. The 4-hour Completion Time is reasonable, based on operating experience, to reach the required unit condition from full power conditions in an orderly manner and without challenging unit systems.

~~SURVEILLANCE REQUIREMENTS~~

~~[REVIEWER'S NOTE~~
~~For SR 3.7.4.1, a Frequency of 31 days shall be specified unless an evaluation is performed and approved by the NRC using sufficient industry, site-specific, or manufacturer's operating experience or reliability studies that justifies extension to a longer Frequency (e.g., 92 days), a Reference to the evaluation and NRC approval is added to these Bases, and a commitment is made to establish appropriate procedural controls governing valve operation that support the extended Frequency.~~
~~]~~

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.4.1

Cycling each TBV through one complete cycle of full travel demonstrates that the valves are mechanically OPERABLE and will function when required. The [31 day Frequency is based on engineering judgment, is consistent with the procedural controls governing valve operation,] and ensures correct valve positions. Therefore, the Frequency is concluded to be acceptable from a reliability standpoint.

COL 16.0-1-A
3.7.4-2

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.4.2

The Main Turbine Bypass System is required to actuate automatically to perform its designed function. This SR demonstrates that with the required system initiation signals, the TBVs will actuate to their required position. The 24-month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and because of the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown the 24-month Frequency, which is based on the refueling cycle, is acceptable from a reliability standpoint.

SR 3.7.4.3

This SR ensures that the TURBINE BYPASS SYSTEM RESPONSE TIME is in compliance with the assumptions of the appropriate safety analysis. The 24-month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and because of the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown the 24-month Frequency, which is based on the refueling cycle, is acceptable from a reliability standpoint.

REFERENCES

1. Section 7.7.5.

2. Section 15.2.2.

BASES

APPLICABLE SAFETY ANALYSES (continued)

[An inoperable SCRRI or SRI function may result in an MCPR penalty.

COL 16.0-1-A
3.7.6-1

~~REVIEWER'S NOTE~~

~~An MCPR penalty is optional based upon completion of the required analyses to demonstrate that, given the specific inoperabilities that can be postulated and the number of selected control rods affected for each inoperability, sufficient margin exists to operate the unit with an MCPR penalty without exceeding the Fuel Cladding Integrity Safety Limit (FCISL) and the cladding 1% plastic strain limit during the licensing basis events requiring an acceptable operating MCPR limit as an initial condition.~~

]

The SCRRI and SRI functions satisfies Criterion 3 of 10 CFR 50.36(d)(2)(ii).

LCO

The SCRRI and SRI functions~~, as specified in the COLR,~~ are required to be OPERABLE to limit decrease in MCPR within acceptable limits during events that cause rapid increase in core reactivity, such that the Fuel Cladding Integrity Safety Limit (FCISL) is not exceeded. [With the SCRRI or SRI functions inoperable, modifications to the MCPR limits (LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)") may be applied to allow continued operation. The MCPR limit for the inoperable SCRRI function and/or SRI function is specified in the COLR.]

COL 16.0-1-A
3.7.6-1

OPERABLE SCRRI and SRI functions require the SCRRI and SRI functions to actuate in response to a loss of feedwater heating, or a turbine trip or load reject, as applicable. This response is within the assumptions of the applicable analyses (Ref. 2). The specific control rods and insertion limits applicable to the SCRRI and SRI functions are specified in the COLR.

APPLICABILITY

The SCRRI and SRI functions are required to be OPERABLE at ≥ 25% RTP to ensure that the FCISL and the cladding 1% plastic strain limit are not violated during transient events such as the loss of feedwater heating event. As discussed in the Bases for LCO 3.2.2, sufficient margin to these limits exists below 25% RTP. Therefore, these requirements are only necessary when operating at or above this power level.

BASES

ACTIONS A.1

If the SCRRI or SRI function is inoperable (including one or more selected control rods inoperable)[, or the MCPR limits for an inoperable SCRRI and/or SRI function, as specified in the COLR, are not applied], the assumptions of the design basis transient analysis may not be met. Under such circumstances, prompt action should be taken to restore the SCRRI and SRI functions to OPERABLE status [or adjust the MCPR limits accordingly]. The 2-hour Completion Time is reasonable, based on the time to complete the Required Action, and the low probability of an event occurring during this period requiring the SCRRI and SRI functions.

COL 16.0-1-A
3.7.6-1

B.1

If Required Action A.1 and associated Completion Time cannot be met, THERMAL POWER must be reduced to < 25% RTP. As discussed in the Applicability section, operation at < 25% RTP results in sufficient margin to the required limits, and the SCRRI and SRI functions are not required to protect fuel integrity during transient events such as the loss of feedwater heating event. The 4-hour Completion Time is reasonable, based on operating experience, to reach the required unit condition from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS SR 3.7.6.1

The control rods assumed to insert, and the final control rod pattern achieved, to accomplish the SCRRI and SRI functions are analyzed for each fuel cycle and are documented in the COLR in accordance with Specification 5.6.3. The Surveillance Requirements of LCO 3.1.3, "Control Rod OPERABILITY," made applicable to the required SCRRI and SRI function control rods are required to establish this LCO is being met.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.6.2

Fine motion control rod drive (FMCRD) electrical insertion capability for the SCRRI function is verified by ensuring that power is available to the selected FMCRDs. The 7 day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because the FMCRD electrical power availability status is displayed in the control room.

BASES

plant safety to ensure that a single failure in one division does not cause a failure in a redundant division. There is no sharing between redundant

BACKGROUND (continued)

divisions such as batteries, battery chargers, or distribution panels. The 250 V batteries for each division are separately housed in a ventilated room apart from their chargers, distribution buses, and ground detection panels. Equipment for each Division of DC distribution is located in an area separated physically from the other divisions. All the components of 250 VDC sources are housed in Seismic Category I structures.

The batteries are sized so that the batteries in any two of the four divisions have sufficient stored capacity, without recharging, to achieve and maintain safe shutdown conditions for 72 hours following any design basis event. The minimum battery terminal voltage at the end of the discharge period is 210 volts (1.75 vpc). {The batteries are sized so that the sum of the required loads does not exceed [80%] of the battery ampere-hour rating, or warranted capacity at end-of-installed-life with 100% design demand.} Batteries are sized for the DC load in accordance with IEEE Standard 485 (Ref. 3) and include margin to compensate for uncertainty in determining the battery state of charge. The battery banks are designed to permit the replacement of individual cells.

COL 16.0-2-H
3.8.1-5

Either the normal or the standby battery charger associated with each battery is capable of recharging its battery from the design minimum charge to fully charged condition within 24 hours while supplying the full load of the associated DC source (Ref. 4).

The battery charger is normally in the float-charge mode supplying the connected loads (when those loads are not being supplied via the 480 VAC rectifier) and the battery cells are receiving adequate current to optimally charge the battery. This assures the internal losses of a battery are overcome and the battery is maintained in a fully charged state.

The charger can be placed at a higher voltage than the float mode for battery equalize and following a battery discharge for more rapid recharge. The battery recharge characteristic accepts current at the current limit of the battery charger (if the discharge was significant, e.g., following a battery service test) until the battery terminal voltage approaches the charger voltage setpoint. Charging current then reduces exponentially during the remainder of the recharge cycle. The 72-hour batteries have recharge efficiencies such that once approximately 105% to 110% of the ampere-hours discharged have been returned, the battery capacity would be restored to the same condition as it was prior to the

ACTIONS (continued)

the charger is not operating in the current-limiting mode, a faulty charger is indicated. A faulty charger that is incapable of maintaining established battery terminal float voltage does not provide assurance that it can revert to and operate properly in the current limit mode that is necessary during the recovery period following a battery discharge event that the DC system is designed to withstand.

If the charger is operating in the current limit mode after 2 hours that is an indication that the battery is partially discharged and its capacity margins will be reduced. The time to return the battery to its fully charged condition in this case is a function of the battery charger capacity, the amount of loads on the associated DC system, the amount of the previous discharge, and the recharge characteristic of the battery. The charge time can be extensive, and there is not adequate assurance that it can be recharged within 12 hours (Required Action A.2).

Required Action A.2 requires that the battery ~~float current~~ be ~~verified as indicating the battery is returned to the~~ fully charged. A fully charged condition is achieved when ~~(i.e., {either three consecutive hourly current readings change~~[charging current has stabilized as indicated by three consecutive hourly current readings changing by < {[0.5}] amps while the battery voltage is being maintained within the limits of SR 3.8.1.1. Alternately, a fully charged condition is achieved when the float current is < [5.0] amps while the battery voltage is being maintained within the limits of SR 3.8.1.1. Either method verifies that a partially discharged battery has been fully recharged.] ~~or the float current is < {2} amps}). This indicates that, if the battery had been discharged as the result of the inoperable battery charger, it has now been fully recharged.~~ If at the expiration of the initial 24 hour period the battery float current is returned to the fully charged condition this indicates there may be additional battery problems and the battery must be declared inoperable.

COL 16.0-2-H
3.8.1-2

Required Action A.3 limits the restoration time for an inoperable battery charger to 72 hours. This action is applicable if an alternate means of restoring battery terminal voltage to greater than or equal to the minimum established float voltage has been used. The 72 hour Completion Time provides a reasonable time to effect restoration of a qualified battery charger to OPERABLE status.

B.1

Condition B represents one or both DC Sources inoperable on one required division for reasons other than Condition A (i.e., one or both batteries inoperable, or the required charger and associated battery

BASES

batteries to perform their intended function. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery and maintain the battery in a fully charged state while supplying the continuous steady state loads of the associated DC subsystem. On float charge, battery cells will receive

SURVEILLANCE REQUIREMENTS (continued)

adequate current to optimally charge the battery. The voltage requirements are based on the nominal design voltage of the battery and

COL 16.0-2-H 3.8.1-4

are consistent with the minimum float voltage established by the battery manufacturer ({[2.23}] Vpc or {[267.6}] V at 25°C (77°F) at the battery terminals). Minimum established float voltages are temperature compensated as a function of battery {room} temperature and are provided in the manufacturer operating manual. This voltage maintains

COL 16.0-2-H 3.8.1-5

the battery {plates} in a condition that supports maintaining the {grid} life {[(expected to be approximately 20 years)}]. The 31 day Frequency is consistent with manufacturer recommendations and IEEE-1188 (Ref. 7).

SR 3.8.1.2

This SR verifies the design capacity of the battery chargers. According to Regulatory Guide 1.32 (Ref. 8), the battery charger supply is recommended to be based on the largest combined demands of the various steady state loads and the charging capacity to restore the battery from the design minimum charge state to the fully charged state, irrespective of the status of the unit during these demand occurrences. The minimum required amperes and duration ensures that these requirements can be satisfied.

COL 16.0-2-H 3.8.1-1

This SR provides two options. One option requires that each battery charger be capable of supplying {[300 or 350}] amps at the minimum established float voltage for {[4}] hours. The ampere requirements are based on the output rating of the chargers. The voltage requirements are based on the charger voltage level after a response to a loss of AC power. The time period is sufficient for the charger temperature to have stabilized and to have been maintained for at least {[2}] hours.

The other option requires that each battery charger be capable of recharging the battery after a service test coincident with supplying the largest combined demands of the various continuous steady state loads (irrespective of the status of the plant during which these demands occur). This level of loading may not normally be available following the battery service test and will need to be supplemented with additional loads. The duration for this test may be longer than the charger sizing

criteria since the battery recharge is affected by float voltage, temperature, and the exponential decay in charging current. The battery is recharged when ~~{either three consecutive hourly current readings change by < {0.5} amps or the float current is < {2} amps}~~the requirements of SR 3.8.3.1 are met.

The Surveillance Frequency is acceptable, given the unit conditions required to perform the test and the other administrative controls existing

SURVEILLANCE REQUIREMENTS (continued)

to ensure adequate charger performance during these 24-month intervals. In addition, this Frequency is intended to be consistent with expected fuel cycle lengths.

SR 3.8.1.3

A battery-service test is a special test of the battery's capability, as found, to satisfy the design requirements (battery duty cycle) of the 250 VDC power system. The discharge rate and test length corresponds to the design duty cycle requirements as specified in Reference 7.

Regulatory Guide 1.129 (Ref. 9) states that the battery-service test should be performed during an outage. The Surveillance Frequency of 24 months is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 8).

COL 16.0-2-H 3.8.1-3

{[A Note to SR 3.8.1.3 allows the once-per-24-month performance of SR 3.8.3.6 in lieu of SR 3.8.1.3. This substitution is acceptable because SR 3.8.3.6 represents a more severe test of battery capacity than SR 3.8.1.3.}]

SR 3.8.1.3

Operability of a DC Source requires that the output diodes for the associated battery chargers and safety-related rectifiers prevent reverse current flow from the DC Source to the associated IPC bus when the IPC bus is de-energized or has degraded voltage. This function is required to prevent degraded conditions on the nonsafety-related AC power system from affecting the safety-related DC power system. This SR is not required for battery chargers and safety-related rectifiers that are not connected to the IPC bus. This SR is also not required for standby battery chargers that are not connected to the 250 VDC bus. The 24 month Frequency is based on engineering judgment.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.3 Battery Parameters

BASES

BACKGROUND

This LCO delineates the limits on battery float current and float voltage, individual cell voltage, battery {room} temperature, and battery capacity for the DC source batteries. A discussion of these batteries and their OPERABILITY requirements is provided in the Bases for LCO 3.8.1, "DC Sources - Operating" and LCO 3.8.2, "DC Sources - Shutdown." In addition to the limitations of this Specification, the Battery Monitoring and Maintenance Program also implements a program specified in Specification 5.5.10 for monitoring various battery parameters that is based on the recommendations of IEEE Standard 1188, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Valve-Regulated Lead-Acid (VRLA) Batteries for Stationary Applications" (Ref. 1).

COL 16.0-2-H 3.8.3-3

The battery cells are constructed with a nominal specific gravity of {1.295}. This specific gravity corresponds to an open circuit battery voltage of approximately {[256.8}] V for {[120}] cell battery (i.e., cell voltage of {[2.139}] volts per cell (Vpc)). The open circuit voltage is the voltage maintained when there is no charging or discharging. Once fully charged with its open circuit voltage ≥ {[2.139}] Vpc, the battery cell will maintain its capacity for {[30}] days without further charging per manufacturer's instructions. However, optimal long-term performance is obtained by maintaining a float voltage {[2.23 to 2.25}] Vpc at 25°C (77°F). This provides adequate over-potential, which {[limits the formation of lead sulfate and self-discharge}]. The nominal float voltage of {[2.24}] Vpc at 25°C (77°F) corresponds to a total float voltage output of {[268.8}] V for a {[120}] cell battery as discussed in Chapter 8 (Ref. 2).

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in Chapter 6 (Ref. 3) and Chapter 15 (Ref. 4) assume that Engineered Safety Feature (ESF) systems are OPERABLE. The DC Sources provide the emergency 250 VDC power to the DC Electrical Power Distribution System, which supplies power through the inverters to the Uninterruptible 120 VAC Power buses. Uninterruptible 120 VAC Power supports Q-DCIS and the control power for safety-related systems.

The OPERABILITY of the DC sources is consistent with the initial assumptions of the accident analyses and is based upon meeting the

BASES

APPLICABLE SAFETY ANALYSES (continued)

design basis of the unit as described in the Bases for LCO 3.8.1, "DC Sources - Operating" and LCO 3.8.2, "DC Sources - Shutdown."

Since battery parameters support the operation of the DC sources, they satisfy Criterion 3 of 10 CFR 50.36(d).

LCO

Battery parameters must remain within acceptable limits to ensure availability of the required DC sources to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated DBA. Battery parameter limits are conservatively established, allowing continued DC source function even with limits not met. Additional preventative maintenance, testing, and monitoring are performed in accordance with Specification 5.5.10, Battery Monitoring and Maintenance Program.

APPLICABILITY

The battery parameters are required solely for the support of the associated DC sources. Therefore, battery parameter limits are only required when the DC sources are required to be OPERABLE. Refer to Applicability discussion in Bases for LCO 3.8.1 and LCO 3.8.2.

ACTIONS

A.1, A.2, and A.3

COL 16.0-2-H
3.8.3-3

With one or more cells in one or more batteries in one required division < {[2.14}] V, the battery cell is degraded. Within 2 hours, verification of the required battery charger OPERABILITY is made by monitoring the battery terminal voltage (SR 3.8.1.1) and of the overall battery state of charge by monitoring the battery float charge current (SR 3.8.3.1). This assures that there is still sufficient battery capacity to perform the intended function. Therefore, the affected battery is not required to be considered inoperable solely as a result of one or more cells in one or more batteries < {[2.14}] V, and continued operation is permitted for a limited period up to 24 hours.

Since the Required Actions only specify "perform," a failure of SR 3.8.1.1 or SR 3.8.3.1 acceptance criteria does not result in this Required Action not met. However, if one of the SRs is failed, the appropriate Condition(s), depending on the cause of the failures, is entered. If SR 3.8.3.1 is failed, then there is not assurance that there is still sufficient battery capacity to perform the intended function and the battery must be declared inoperable immediately.

BASES

ACTIONS (continued)

B.1 and B.2

When SR 3.8.3.1 is not met, it ~~A battery with float > {2} amps~~indicates that a partial discharge of the battery has occurred. This may be due to a temporary loss of a battery charger or possibly due to one or more battery cells in a low voltage condition reflecting some loss of capacity. Within 2 hours, verification of the required battery charger OPERABILITY is made by monitoring the battery terminal voltage. If the terminal voltage is found to be less than the minimum established float voltage there are two possibilities, the battery charger is inoperable or is operating in the current limit mode. LCO 3.8.1, Condition A, addresses charger inoperability. If the charger is operating in the current limit mode after 2 hours that is an indication that the battery has been substantially discharged and likely cannot perform its required design functions. The time to return the battery to its fully charged condition in this case is a function of the battery charger capacity, the amount of loads on the associated DC system, the amount of the previous discharge, and the recharge characteristic of the battery. The charge time can be extensive, and there is not adequate assurance that it can be recharged within 24 hours (Required Action B.2). The battery must therefore be declared inoperable.

COL 16.0-2-H
3.8.3-3

If the float voltage is found not to be satisfactory and there are one or more battery cells with float voltage less than ~~{~~[2.14~~}~~] V, the associated "OR" statement in Condition F is applicable and the battery must be declared inoperable immediately. If float voltage is satisfactory and there are no cells less than ~~{~~[2.14~~}~~] V, there is good assurance that, within 24 hours, the battery will be restored to its fully charged condition (Required Action B.2) from any discharge that might have occurred due to a temporary loss of the battery charger.

COL 16.0-2-H
3.8.3-1

Required Action B.2 requires that the battery be fully charged. A battery is fully charged when [charging current has stabilized as indicated by three consecutive hourly current readings changing by < [0.5] amps while the battery voltage is being maintained within the limits of SR 3.8.1.1. Alternately, a battery is fully charged when the float current is < [5.0] amps while the battery voltage is being maintained within the limits of SR 3.8.1.1. Either method verifies that a partially discharged battery has been fully recharged.]

BASES

A discharged battery with float voltage (the charger setpoint) across its terminals indicates that the battery is on the exponential charging current portion (the second part) of its recharge cycle. The time to return a

ACTIONS (continued)

battery to its fully charged state under this condition is simply a function of the amount of the previous discharge and the recharge characteristic of the battery. Thus, there is good assurance of fully recharging the battery within 24 hours, avoiding a premature shutdown with its own attendant risk.

COL 16.0-2-H
3.8.3-3

If the condition is due to one or more cells in a low voltage condition but still greater than {[2.14}] V and float voltage is found to be satisfactory, this is not indication of a substantially discharged battery and 24 hours is a reasonable time prior to declaring the battery inoperable.

Since Required Action B.1 only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in the Required Action not met. However, if SR 3.8.1.1 is failed, the appropriate Condition(s), depending on the cause of the failure, is entered.

C.1, C.2, and C.3

With one or two batteries on one required division with charger voltage greater than maximum established temperature-compensated design limit, the batteries still retain sufficient capacity to perform the intended function. Therefore, the affected batteries are not required to be considered inoperable solely as a result of exceeding the temperature-compensated design limit. Within 7 days, the maximum established temperature-compensated design limit must be re-established.

At a constant battery voltage the charging current will increase as the temperature of the electrolyte increases. Therefore, cells in a battery at a higher temperature than others indicate a lower cell voltage. Continuous prolonged use at elevated temperatures will reduce the battery life. Based on tracking periods of excessive temperature-compensated terminal voltage, the impact on expected battery life can be monitored.

D.1

With one or two batteries on one required division with battery {room} temperature less than the minimum established design limit, 12 hours is allowed to restore the temperature to within limits. A low temperature results in reduced battery capacity. Since the battery is sized with

BASES

margin, sufficient capacity exists to perform the intended function and the temporary degradation in battery capacity does not require the battery to be considered inoperable solely as a result of {room} temperature not met.

ACTIONS (continued)

E.1

With one or more required batteries in redundant required divisions with battery parameters not within limits, there is not sufficient assurance that battery capacity has not been affected to the degree that the batteries can still perform their required function, given that redundant divisions are involved. With redundant divisions involved, this potential could result in a total loss of function on multiple systems that rely upon the batteries. The longer Completion Times specified for battery parameters on one required division not within limits are therefore not appropriate, and the parameters must be restored to within limits on all but one required division within 2 hours.

F.1

When any battery parameter is outside the allowances of the Required Actions for Condition A, B, C, D, or E, sufficient capacity to supply the maximum expected load requirement is not assured and the corresponding battery must be declared inoperable. Additionally, discovering one battery with one or more battery cells float voltage less than {[2.14}] V and ~~float current greater than {2} amps~~SR 3.8.3.1 not met indicates that the battery capacity may not be sufficient to perform the intended functions. The battery must therefore be declared inoperable immediately.

COL 16.0-2-H
3.8.3-3

SURVEILLANCE REQUIREMENTS

SR 3.8.3.1

This SR verifies that a battery is fully charged as indicated by [stabilized charging current or float current within limits] while the battery is being maintained within the temperature compensated float voltage limits required by SR 3.8.1.1. ~~Verifying battery float current while on float charge is used to determine the state of charge of the battery.~~ Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery and maintain the battery in a charged state. The float current requirements are based on the float current indicative of a charged battery. A fully charged condition exists when [charging current has stabilized as indicated by three consecutive hourly current readings changing by < [0.5] amps while

COL 16.0-2-H
3.8.3-1

BASES

the battery voltage is being maintained within the limits of SR 3.8.1.1. Alternately, a fully charged condition exists when the float current is < [5.0] amps while the battery voltage is being maintained within the limits of SR 3.8.1.1. Either method verifies that a battery is fully charged.] Use of float current to determine the state of charge of the battery is consistent with IEEE-1188 (Ref. 1) and

SURVEILLANCE REQUIREMENTS (continued)

manufacturer recommendations. The 31-day Frequency is consistent with IEEE-1188 (Ref. 1).

This SR is modified by a Note that states the float current requirement is not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.1.1. When this float voltage is not maintained, the Required Actions of LCO 3.8.1, ACTION A, are being taken, which provide the necessary and appropriate verifications of the battery condition. Furthermore, the float current limit of {[2}] amps is established based on the nominal float voltage value and is not directly applicable when this voltage is not maintained.

COL 16.0-2-H
3.8.3-1

SR 3.8.3.2 and SR 3.8.3.5

Optimal long-term battery performance is obtained by maintaining a float voltage within established design limits provided by the battery manufacturer, which corresponds to nominally {[266.8}] V at the battery terminals, or {[2.24}] Vpc at 25°C (77°F). This provides adequate over-potential, which {[limits the formation of lead sulfate and self-discharge, which could eventually render the battery inoperable}]. Float voltages below 2.18 vpc at 25°C (77°F) but greater than {[2.14}] Vpc, are addressed in Specification 5.5.10. SR 3.8.3.2 and SR 3.8.3.5 require verification that the cell float voltages are equal to or greater than the short-term absolute minimum voltage of {[2.14}] Vpc. The Frequency for cell voltage verification every 31 days for pilot cell and 92 days for each connected cell is consistent with manufacturer recommendations. A pilot cell is selected in the series string to reflect the general condition of cells in the battery. The cell selected is the lowest cell voltage in the series string following {each quarterly surveillance}.

COL 16.0-2-H
3.8.3-3

BASES

SR 3.8.3.3

This Surveillance verifies that the temperature-compensated terminal voltage is less than or equal to maximum established temperature compensated design limit. Prolonged use with terminal voltage greater than the maximum established temperature compensated design limit will reduce battery life. Based on tracking periods of excessive temperature-compensated terminal voltage, the impact on expected battery life can be monitored. The Frequency is consistent with manufacturer recommendations.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.3.4

This Surveillance verifies that battery temperature is above the design minimum temperature to assure the battery can provide the required current and voltage to meet the design requirements. Temperatures lower than assumed in battery sizing calculations reduce battery capacity. The Frequency is consistent with manufacturer recommendations.

SR 3.8.3.6

A battery performance discharge test is a test of constant current capacity of a battery, normally done in the as found condition, after having been in service, to detect any change in the capacity determined by the acceptance test. The test is intended to determine overall battery degradation due to age and usage.

COL 16.0-2-H 3.8.3-23

{[Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.3.6; however, only the modified performance discharge test may be used to satisfy the battery service test requirements of SR 3.8.1.3.}]

{[A modified discharge test is a test of the battery capacity and its ability to provide a high rate, short duration load (usually the highest rate of the duty cycle). This will often confirm the battery's ability to meet the critical period of the load duty cycle, in addition to determining its percentage of rated capacity. Initial conditions for the modified performance discharge test should be identical to those specified for a service test.

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It may consist of just two rates; for instance, the one minute rate for the battery or the largest current load of the duty cycle, followed by the test

BASES

rate employed for the performance test, both of which envelope the duty cycle of the service test. Since the ampere-hours removed by a one minute discharge represents a very small portion of the battery capacity, the test rate can be changed to that for the performance test without compromising the results of the performance discharge test. The battery terminal voltage for the modified performance discharge test must remain above the minimum battery terminal voltage specified in the battery service test for the duration of time equal to that of the service test.}]

The acceptance criteria for this Surveillance are consistent with IEEE-1188 (Ref. 1) and IEEE-485 (Ref. 5). These references recommend that the battery be replaced if its capacity is below 80% of the

SURVEILLANCE REQUIREMENTS (continued)

manufacturer's rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements. The battery is sized to meet the assumed duty cycle loads when the battery design capacity reaches this {[80}]% limit.

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3.8.3-4

The Surveillance Frequency for this test is normally 24 months. If the battery shows degradation, or if the battery has reached 85% of its expected life Surveillance Frequency is reduced to 12 months. Degradation is indicated, according to IEEE-1188 (Ref. 1), when the battery capacity drops by more than 10% relative to its capacity on the previous performance test or when it is 90% of the manufacturer's rating. All these Frequencies are consistent with the recommendations in IEEE-1188 (Ref. 1).

REFERENCES

1. IEEE Standard 1188.
2. Chapter 8.
3. Chapter 6.
4. Chapter 15.
5. IEEE Standard 485.

BASES

APPLICABLE SAFETY ANALYSES (continued)

The safety analysis for the control rod removal error during refueling (Ref. 2) evaluates the consequences of control rod withdrawal during refueling. A prompt reactivity excursion during refueling could potentially result in fuel failure with subsequent release of radioactive material to the environment. Control rod scram provides backup protection should a prompt reactivity excursion occur.

Control Rod OPERABILITY - Refueling satisfies Criterion 3 of 10 CFR 50.36(d)(2)(ii).

LCO

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Each withdrawn control rod must be OPERABLE. The withdrawn control rod is considered OPERABLE if the scram accumulator pressure is ≥ [{12.76 MPaG (1850 psig)}] and the control rod is capable of being automatically inserted upon receipt of a scram signal. Inserted control rods have already completed their reactivity control function.

APPLICABILITY

During MODE 6, withdrawn control rods must be OPERABLE to ensure that in a scram the control rods will insert and provide the required negative reactivity to maintain the reactor subcritical.

For MODES 1 and 2, control rod requirements are found in LCO 3.1.3, "Control Rod OPERABILITY," LCO 3.1.4, "Control Rod Scram Times," and LCO 3.1.5, "Control Rod Scram Accumulators." During MODES 3, 4, 5, and 6, control rods are not able to be withdrawn since the reactor mode switch is in shutdown and a control rod block is applied. This provides adequate requirements for control rod OPERABILITY during these conditions.

ACTIONS

A.1

With one or more withdrawn control rods inoperable, action must be immediately initiated to fully insert the inoperable control rods. Inserting the control rod ensures that the shutdown and scram capabilities are not adversely affected. Actions must continue until the inoperable control rod is fully inserted.

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SURVEILLANCE REQUIREMENTS

SR 3.9.5.1 and SR 3.9.5.2

During MODE 6, the OPERABILITY of control rods is primarily required to ensure that a withdrawn control rod will automatically insert if a signal requiring a reactor shutdown occurs. Because no explicit safety analysis exists for automatic shutdown during refueling, the shutdown function is satisfied if the withdrawn control rod is capable of automatic insertion and the associated CRD scram accumulator pressure is ≥ [{12.76 MpaG (1850 psig)}].

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The 7 day Frequency considers equipment reliability, procedural controls over the scram accumulators, and control room alarms and indicating lights, which indicate low accumulator charge pressures.

SR 3.9.5.1 is modified by a Note that allows 7 days after withdrawal of the control rod to perform the Surveillance. This acknowledges that the control rod must first be withdrawn before performance of the Surveillance, and therefore avoids potential conflicts with SR 3.0.1.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 26.

2. Section 15.3.7.