Florida Power
A Progress Energy Company

Crystal River Nuclear Plant
Docket No. 50-302
Operating License No. DPR-72

Ref: ITS 5.6.2.17

May 31, 2001
3F0501-05

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

Subject: Crystal River Unit 3 - Technical Specifications Bases Control Program

Dear Sir:

Florida Power Corporation (FPC) hereby submits the changes that were made to the Crystal River Unit 3 (CR-3) Improved Technical Specifications (ITS) Bases as required by ITS 5.6.2.17. The attachments provide revisions to the CR-3 ITS Bases that will update NRC copies of the ITS.

Attachment A provides the instructions for updating the CR-3 ITS. Attachment B provides the ITS and Bases List of Effective Pages. Attachment C provides the replacement pages for the CR-3 ITS Bases.

If you have any questions regarding this submittal, please contact Mr. Sid Powell, Supervisor, Licensing and Regulatory Programs at (352) 563-4883.

Sincerely,

N Powell for SLB

S. L. Bernhoft
Manager Regulatory Affairs

SLB/ff

Attachments:

A. Instructions for Updating the Crystal River Unit 3 ITS and Bases
B. ITS and Bases List of Effective Pages
C. Replacement ITS Bases Pages

xc: NRR Project Manager (w/o Attachment C)
Regional Administrator, Region II (w/o Attachment C)
Senior Resident Inspector (w/o Attachment C)

A001

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72

ATTACHMENT A

INSTRUCTIONS FOR UPDATING THE CRYSTAL RIVER UNIT 3 IMPROVED TECHNICAL SPECIFICATIONS (ITS) AND BASES

INSTRUCTIONS FOR UPDATING
THE CRYSTAL RIVER UNIT 3
IMPROVED TECHNICAL SPECIFICATIONS

5/31/01

Page(s) to be Removed		Page(s) to be Added	
Page(s)	Revision	Pages(s)	Revision
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IMPROVED TECHNICAL SPECIFICATIONS

List of Effective Pages
(Through Amendment 196)

Amendment Nos. 159, 164, 166, 171, 173, 181, 189 and 190 amended the CR-3 Operating License, only, and did not effect changes to the ITS LCOs or Bases.

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FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302/LICENSE NUMBER DPR-72

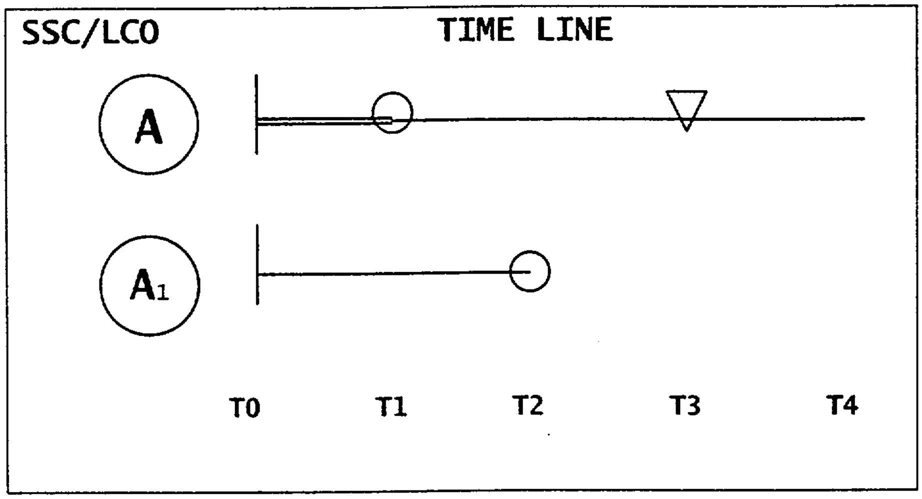
ATTACHMENT C

REPLACEMENT ITS BASES PAGES

BASES

LCO 3.0.6
(continued)

Example 4



When **A1** is declared inoperable then the ACTIONS for that SSC are entered (@T_0). The ACTIONS for **A** are not entered even though that SSC is determined inoperable (no cascading). In the event that **A** becomes inoperable (@T_1) prior to exiting the ACTIONS for **A1** (@T_2), then **A** does not get the full benefit of its own Completion Time (@T_4). Furthermore, **A** is still inoperable from the time that **A1** was initially declared inoperable (@T_0). **A** must be restored to OPERABLE prior to exceeding its Completion Time associated (@T_3).

BASES

LCO 3.0.7

There are certain special tests and operations required to be performed at various times over the life of the unit. These special tests and operations are necessary to demonstrate select unit performance characteristics. PHYSICS TESTS Exceptions LCOs (Specification 3.1.8 and 3.1.9) allow specified TS requirements to be suspended to permit performances of these special tests and operations, which otherwise could not be performed if required to comply with the requirements of these TS. Unless otherwise specified, all other TS requirements remain unchanged. This will ensure all appropriate requirements of the MODE or other specified condition not directly associated with or required to be changed to perform the special test or operation will remain in effect.

Compliance with PHYSICS TESTS Exception LCO is optional. A special operation may be performed either under the provisions of the appropriate PHYSICS TESTS Exception LCO or under the other applicable TS requirements. If it is desired to perform the special operation under the provisions of the PHYSICS TESTS Exception LCO, the requirements of the PHYSICS TESTS Exception LCO shall be followed. The surveillances of the other LCO are not required to be met, unless specified in the PHYSICS TESTS Exception LCO.

B 3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY

BASES

SR 3.0.1 through SR 3.0.4 establish the general requirements applicable to all Specifications and apply at all times, unless otherwise stated.

SR 3.0.1

SR 3.0.1 establishes the requirement that SRs must be met during the MODES or other specified conditions in the Applicability for which the requirements of the LCO apply, unless otherwise specified in the individual SRs. This Specification is to ensure that Surveillances are performed to verify the OPERABILITY of systems and components, and that variables are within specified limits. Failure to meet a Surveillance within the specified Frequency, in accordance with SR 3.0.2, constitutes a failure to meet an LCO.

Systems and components are assumed to be OPERABLE when the associated SRs have been met. Nothing in this Specification, however, is to be construed as implying that systems or components are OPERABLE when:

a. The systems or components are known to be inoperable, although still meeting the SRs; or

b. The requirements of the Surveillance(s) are known not to be met between required Surveillance performances.

Surveillances do not have to be performed when the unit is in a MODE or other specified condition for which the requirements of the associated LCO are not applicable, unless otherwise specified. The SRs associated with a PHYSICS TEST Exception LCO are only applicable when the PHYSICS TEST Exception LCO is used as an allowable exception to the requirements of a Specification.

Surveillances, do not have to be performed on inoperable equipment because the ACTIONS define the remedial measures that apply. SRs have to be met in accordance with SR 3.0.2 prior to returning equipment to OPERABLE status.

Upon completion of maintenance, appropriate post maintenance testing is required to declare equipment OPERABLE. This includes meeting applicable SRs in accordance with SR 3.0.2. Post maintenance testing may not be possible in the current MODE or other specified

(continued)

BASES

SR 3.0.1 (continued)	conditions in the Applicability due to the necessary unit parameters not having been established. In these situations, the equipment may be considered OPERABLE provided testing has been satisfactorily completed to the extent possible and the equipment is not otherwise believed to be incapable of performing its function. This will allow operation to proceed to a MODE or other specified condition where other necessary post maintenance tests can be completed.

SR 3.0.2

SR 3.0.2 establishes the requirements for meeting the specified Frequency for Surveillances and any Required Action with a Completion Time that requires the periodic performance of the Required Action on a "once per..." interval.

SR 3.0.2 permits a 25% extension of the interval specified in the Frequency. This extension facilitates Surveillance scheduling and considers plant operating conditions that may not be suitable for conducting the Surveillance (e.g., transient conditions or other ongoing Surveillance or maintenance activities).

The 25% extension does not significantly degrade the reliability that results from performing the Surveillance at its specified Frequency. This is based on the recognition that the most probable result of any particular Surveillance being performed is the verification of conformance with the SRs. The exceptions to SR 3.0.2 are those Surveillances for which the 25% extension of the interval specified in the Frequency does not apply. These exceptions are stated in the individual Specifications. The requirements of regulations take precedence over the TS. Therefore, when a test interval is specified in the regulations, the test interval cannot be extended by the TS, and the SR include a Note in the Frequency stating, "SR 3.0.2 is not applicable." An example of an exception when the test interval is not specified in the regulations is the NOTE in the Containment Leakage Rate Testing Program, "SR 3.0.2 is not applicable." This exception is provided because the program already includes extension of test interval.

As stated in SR 3.0.2, the 25% extension also does not apply to the initial portion of a periodic Completion Time that requires performance on a "once per..." basis. The

(continued)

BASES

SR 3.0.2 (continued)

25% extension applies to each performance after the initial performance. The initial performance of the Required Action, whether it is a particular Surveillance or some other remedial action, is considered a single action with a single Completion Time. One reason for not allowing the 25% extension to this Completion Time is that such an action usually verifies that no loss of function has occurred by checking the status of redundant or diverse components or accomplishes the function of the inoperable equipment in an alternative manner.

The provisions of SR 3.0.2 are not intended to be used repeatedly merely as an operational convenience to extend Surveillance intervals or periodic Completion Time intervals beyond those specified.

SR 3.0.3

SR 3.0.3 establishes the flexibility to defer declaring affected equipment inoperable or an affected variable outside the specified limits when a Surveillance has not been completed within the specified Frequency. A delay period of up to 24 hours or up to the limit of the specified Frequency, whichever is less, applies from the point in time that it is discovered that the Surveillance has not been performed in accordance with SR 3.0.2, and not at the time that the specified Frequency was not met.

This delay period provides an adequate time limit to complete Surveillances that have been missed. This delay period permits the completion of a Surveillance before complying with Required Actions or other remedial measures that might preclude completion of the Surveillance. The basis for this delay period includes consideration of unit conditions, adequate planning, availability of personnel, the time required to perform the Surveillance, the safety significance of the delay in completing the required Surveillance, and the recognition that the most probable result of any particular Surveillance being performed is the verification of conformance with the SRs.

When a Surveillance with a Frequency based not on time intervals, but upon specified unit conditions or operational situations, is discovered not to have been performed when specified, SR 3.0.3 allows the full delay period of 24 hours to perform the Surveillance.

(continued)

BASES

SR 3.0.3 (continued)

Failure to comply with specified Frequencies for SRs is expected to be an infrequent occurrence. Use of the delay period established by SR 3.0.3 is a flexibility which is not intended to be used as an operational convenience to extend Surveillance intervals.

If a Surveillance is not completed within the allowed delay period, then the equipment is considered inoperable or the variable is considered outside the specified limits and the Completion Times of the Required Actions for the applicable Specification Conditions begin immediately upon expiration of the delay period. If a Surveillance is failed within the delay period, then the equipment is inoperable, or the variable is outside the specified limits and the Completion Times of the Required Actions for the applicable Specification Conditions begin immediately upon the failure of the Surveillance.

Completion of the Surveillance within the delay period allowed by this Specification, or within the Completion Time of the ACTIONS, restores compliance with SR 3.0.1.

SR 3.0.4

SR 3.0.4 establishes the requirement that all applicable SRs must be met before entry into a MODE or other specified condition in the Applicability.

This Specification ensures that system and component OPERABILITY requirements and variable limits are met before entry into MODES or other specified conditions in the Applicability for which these systems and components ensure safe operation of the unit. This Specification applies to changes in MODES or other specified conditions in the Applicability associated with unit shutdown as well as startup. However, in certain circumstances, failing to meet an SR will not result in SR 3.0.4 restricting a MODE change or other specified condition change. When a system, subsystem, train, component, device, or variable is inoperable or outside its specified limits, the associated SR(s) are not required to be performed (per SR 3.0.1). Surveillances do not have to be performed on inoperable equipment. When equipment is inoperable, SR 3.0.4 does not apply to the associated SR(s) since the requirement for the SR(s) to be performed is removed.

(continued)

BASES

SR 3.0.4 (continued)

Therefore, failing to perform the Surveillance(s) within the specified Frequency does not result in an SR 3.0.4 restriction to changing MODES or other specified conditions of the Applicability. However, since the LCO is not met in this instance, LCO 3.0.4 will govern any restrictions that may (or may not) apply to MODE or other specified condition changes.

The provisions of SR 3.0.4 shall not prevent entry into MODES or other specified conditions in the Applicability that are required to comply with ACTIONS.

The precise requirements for performance of SRs are specified such that exceptions to SR 3.0.4 are not necessary. The specific time frames and conditions necessary for meeting the SRs in accordance with the requirements of SR 3.0.4 are specified in the Frequency, in the Surveillance, or both. This allows performance of Surveillances when the prerequisite condition(s) specified in a Surveillance procedure require entry into the MODE or other specified condition in the Applicability of the associated Specification prior to the performance or completion of a Surveillance. A Surveillance that could not be performed until after entering the Specification Applicability would have its Frequency specified such that it is not "due" until the specific conditions needed are met. Alternately, the Surveillance may be stated in the form of a Note, as not required to be performed until a particular event, condition, or time has been reached. The SRs are annotated consistent with the requirements of Section 1.4, Frequency.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

a. Nuclear Overpower - High Setpoint (continued)

when the neutron power reaches the design overpower will limit THERMAL POWER to a maximum value of the design overpower.

Because it serves to limit THERMAL POWER levels the Nuclear Overpower-High Setpoint trip protects against violation of the-DNBR and fuel centerline melt SLs. However, the RCS Variable Low Pressure, and Nuclear Overpower RCS Flow and Measured AXIAL POWER IMBALANCE, provide more direct protection of these Safety Limits. The role of the Nuclear Overpower-High Setpoint trip is to limit reactor THERMAL POWER below the highest power at which the other two trips are known to provide protection.

The Nuclear Overpower-High Setpoint trip also provides transient protection for rapid positive reactivity excursions during power operations. These events include the rod withdrawal accident, the rod ejection accident, and the steam line break accident. By providing a trip during these events, the Nuclear Overpower-High Setpoint trip protects against excessive power levels and also serves to reduce reactor power to prevent violation of the RCS pressure SL.

Rod withdrawal accident analyses cover a large spectrum of reactivity insertion rates (rod worths), including slow and rapid rates of power increase. At high reactivity insertion rates, the Nuclear Overpower-High Setpoint trip provides the primary protection. At low reactivity insertion rates, the high RCS pressure trip provides primary protection. The specified Allowable Value is selected to ensure that a trip occurs before reactor power exceeds the highest point at which the RCS Variable Low Pressure and the Nuclear Overpower RCS Flow and Measured AXIAL POWER IMBALANCE trips are analyzed to provide protection against DNB and fuel centerline melt.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

a. Nuclear Overpower - High Setpoint (continued)

The Allowable Value does not account for harsh environment induced errors, because the trip will actuate prior to degraded environmental conditions being reached.

b. Nuclear Overpower-Low Setpoint

While in shutdown bypass, with the Shutdown Bypass RCS High Pressure trip OPERABLE, the Nuclear Overpower setpoint trip must be administratively reset to ≤ 5% RTP. The low power setpoint, in conjunction with the 1820 psig Shutdown Bypass RCS High Pressure setpoint, ensure the plant is protected from excessive power conditions when other RPS trips are bypassed. The Allowable Value was chosen to be as low as practical and still lie within the range of the power range nuclear instrumentation.

2. RCS High Outlet Temperature

The RCS High Outlet Temperature trip, in conjunction with the RCS Low Pressure and RCS Variable Low Pressure trips, provides protection for the DNBR SL. A trip is initiated whenever RCS hot leg temperature approaches the conditions necessary for DNB. Portions of each RCS High Outlet Temperature trip channel are common with the RCS Variable Low Pressure trip. The RCS High Outlet Temperature trip provides steady state protection for the DNBR SL.

The RCS High Outlet Temperature trip limits the maximum RCS temperature to below the highest value for which DNB protection by the Variable Low Pressure trip is ensured. The Allowable Value is selected to ensure that a trip occurs before hot leg temperatures reach the point beyond which the RCS Low Pressure and Variable Low Pressure trips are analyzed. The

(continued)

BASES

ACTIONS (continued)

C.1

If one or both RCPPMs associated with a single RCP are inoperable, the RCPPM must be placed in the trip condition within 4 hours. Placing one of the RCPPMs for the pump in the tripped condition restores the single failure aspect of the design of the Function. This ACTION also places the RPS Function in a condition where only one additional RCPPM associated with another RCP need indicate a loss of its associated RCP to initiate a reactor trip. Since each RCPPM provides input to all four RPS and EFIC channels, care must be exercised when surveillance testing RCPPM coincident with operation in this Condition. The 4 hour Completion Time is adequate to perform Required Action C.1 and is acceptable based upon engineering judgment.

If a single RCPPM for a single RCP is inoperable and is not tripped, neither the RPS nor the EFIC safety function is lost. The exception to LCO 3.0.2 allowed by LCO 3.0.6 may be applied for the Completion Time. If both RCPPMs for a single RCP are inoperable and neither is tripped, the RCP status safety function associated with the EFIC Instrumentation Improved Technical Specification is lost for all four channels. The exception to LCO 3.0.2 allowed by LCO 3.0.6 must not be applied.

D.1 and D.2

Required Action D.1 directs entry into the appropriate Function-dependent Condition referenced in Table 3.3.1-1. Whenever a Required Action of Condition A or B, and the associated Completion Time are not met, Condition D directs the operator to the Condition containing the appropriate ACTIONS.

E.1.1, E.1.2, and E.2

If the Required Actions and associated Completion Times of Condition C are not met, the plant must be placed in a MODE or condition in which the RCPPM are not required to be OPERABLE. To achieve this status, four reactor coolant pumps must be verified to be in operation and THERMAL POWER must be reduced to less than 2475 MW_{t}, within one hour. The Required Actions are based upon analysis (Ref. 8) which demonstrates that the Nuclear Overpower RCS Flow and Measured AXIAL POWER IMBALANCE RPS Function provides adequate protection of DNBR limits for loss of coolant flow accidents postulated to occur under these conditions. Thus, the RCPPM Function is not required. Similar analysis for three RCP operation was never approved. The allowed Completion Times of one hour are reasonable, based on operating experience, to perform the specified Required Actions.

(continued)

ACTIONS

E.1.1, E.1.2, and E.2 (continued)

If the Required Actions and Associated Completion Times of Condition C are not met, the RCP status signal(s) to EFIC should also be considered inoperable and entry into Condition C of ITS 3.3.11, EFIC System Instrumentation, is required.

As an alternative to Required Action E.1.1 and Required Action E.1.2, Condition F may be entered within one hour. This results in placing the plant in MODE 3 and opening the CRD trip breakers within 6 hours. This is the default Condition in the event the Required Actions for an inoperable RPS RCPPM Function channel cannot be completed in the specified Completion Time. As such, this ACTION is conservative. Again, the allowed Completion Time of one hour is reasonable, based on engineering judgment, to perform the specified Required Action.

F.1 and F.2

If the Required Action and associated Completion Time of Condition A or B are not met and Table 3.3.1-1 directs entry into Condition F, the plant must be placed in a MODE in which the specified RPS trip Functions are not required to be OPERABLE. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and to open all CRD trip breakers without challenging plant systems.

G.1

If the Required Action and associated Completion Time of Condition A or B are not met and Table 3.3.1-1 directs entry into Condition G, the plant must be placed in a MODE in which the specified RPS trip Functions are not required to be OPERABLE. To achieve this status, all CRD trip breakers must be opened. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to open CRD trip breakers without challenging plant systems.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.1.5 (continued)

This Surveillance is modified by two Notes. Note 1 clarifies that neutron detectors and RC flow sensors (tubes) are not required to be tested as part of this Surveillance. In the case of the neutron detectors, there is no adjustment that can be made to the detectors. Furthermore, adjustment of the detectors is unnecessary because they are passive devices with minimal drift. Slow changes in detector sensitivity are compensated for by performing the daily calorimetric calibration and the monthly axial channel calibration. RCS flow detectors are excluded from this SR, but are surveilled as part of SR 3.3.1.6 on a refueling basis. This is based on their inaccessibility during power operations. Note 2 clarifies that the bypass function associated with the test Functions need only be performed once per fuel cycle. This is consistent with the definition of CHANNEL CALIBRATION.

SR 3.3.1.6

The CHANNEL CALIBRATION is a complete check of the instrument channel, including the sensor. The test verifies that the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift to ensure that the instrument channel remains operational between successive tests. The 24 month Frequency is based on the results of comprehensive instrument uncertainty calculations that accommodate 30 months of drift as approved in Amendment 152 (Ref. 9).

A Note to the Surveillance indicates that neutron detectors and RCPPM current and voltage sensors are excluded from CHANNEL CALIBRATION. In the case of the neutron detectors, this Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure a virtually instantaneous response. RCPPM current and voltage sensors are excluded due to the fact no adjustments can be made to these sensors.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.7

This SR verifies individual channel actuation response times are less than or equal to the maximum values assumed in the accident analysis. Individual component response times are not modeled in the analyses. The analyses model the overall, or total, elapsed time from the point at which the parameter exceeds the analytical limit at the sensor to the point of rod insertion. Response time testing acceptance criteria are included in Reference 1.

A Note to the Surveillance indicates that neutron detectors and RCPPM current and voltage sensors and the watt transducer are excluded from RPS RESPONSE TIME testing. This Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure a virtually instantaneous response.

Response time tests are conducted on an 24 month STAGGERED TEST BASIS. This results in testing all four RPS channels every 96 months. The 96 month Frequency is based on operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences.

REFERENCES

1. FSAR, Chapter 7.
2. FSAR, Chapter 14.
3. 10 CFR 50.49.
4. NUREG-0737, November 1979.
5. BAW-1893.
6. NRC SER for BAW-10167, Supplement 2, July 8, 1992.
7. NRC SER for BAW-10167A and Supplement 1, December 5, 1988.
8. Amendment No. 56 to the CR-3 Technical Specifications, dated July 16, 1982.
9. Amendment No. 152 to the CR-3 Technical Specifications dated February 13, 1996.

BASES

APPLICABILITY (continued)

3. Reactor Building Pressure-High Setpoint

The RB Pressure-High automatic actuation function of ESAS shall be OPERABLE in MODES 1, 2 and 3.

Due to the lower energy level of the RCS associated with operation in MODE 4 and the reduced probability of occurrence of a Design Basis Accident (DBA), the automatic RB Pressure-High actuation function of ESAS is not required in MODE 4. The response to any event, given that the reactor is already tripped, will be less severe and allows sufficient time for operator action to provide manual safety system actuation.

In MODES 5 and 6, there is insufficient energy in the primary and secondary systems to raise containment pressure to the RB Pressure-High Setpoint in the event of a line break. Furthermore, there is adequate time for the operator to evaluate plant conditions and manually respond.

4. Reactor Building Pressure-High High Setpoint

The RB Pressure-High High automatic actuation function of ESAS shall be OPERABLE in MODES 1, 2 and 3. In MODES 4, 5 and 6, there is insufficient energy in the primary and secondary systems to raise containment pressure to the RB Pressure-High High Setpoint in the event of a line break. Furthermore, there is adequate time for the operator to evaluate plant conditions and manually respond.

ACTIONS

Required Actions A and B apply to all ESAS instrumentation Parameters listed in Table 3.3.5-1.

A Note has been added to the ACTIONS indicating separate Condition entry is allowed for each Parameter.

A.1

Condition A applies when one instrumentation channel in one or more RCS Pressure Parameters becomes inoperable. If one ESAS channel is inoperable, placing it in a tripped condition leaves the system in a one-out-of-two condition for actuation. Thus, if another channel were to fail, the ESAS instrumentation could still perform its actuation functions. For RCS Pressure-Low, this action is completed when all of the affected bistable trip auxiliary relays and time delay auxiliary relays are tripped. For RCS Pressure-Low Low, this action is completed when all of the affected bistable trip auxiliary relays are tripped. This is normally accomplished by tripping the affected bistable.

The 1 hour Completion Time is based on engineering judgment and is sufficient time to perform the Required Action.

(continued)

BASES

ACTIONS (continued)

B.1

Condition B applies when one required instrumentation channel in one or more RB Pressure Parameters becomes inoperable. If one required channel is inoperable, placing it in a tripped Condition leaves the affected actuation train in one-out-of-one condition for actuation and the other actuation channel in a two-out-of-two condition (making the worst case assumption the third channel in each actuation train is not OPERABLE). In this condition, if another RB Pressure ESAS channel were to fail, the ESAS instrumentation could still perform its actuation function. For RB Pressure Parameters, all affected pressure switch trip auxiliary relays must be tripped to comply with this Required Action. This is normally accomplished by tripping the affected pressure switch test switch.

The 72 hour Completion Time is based on engineering judgment and is sufficient time to perform the Required Action.

C.1, C.2, C.3, and C.4

If Required Actions A.1 or B.1 cannot be met within the associated Completion Time, the plant must be placed in a MODE in which the LCO does not apply. To achieve this status, the plant must be placed in at least MODE 3 within 6 hours and, for the RCS Pressure-Low Parameter, to < 1800 psig, for the RCS Pressure-Low Low Parameter, to < 900 psig, and for the RB Pressure High Parameter and High High Parameter, to MODE 4 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

All ESAS Parameter instrumentation listed in Table 3.3.5-1 are subject to CHANNEL CHECK, CHANNEL FUNCTIONAL TEST, CHANNEL CALIBRATION, and response time testing.

(continued)

BASES (continued)

ACTIONS

A Note has been-added to the ACTIONS indicating that a separate Condition entry is allowed for each Function.

A.1 and A.2

Condition A applies to failures of a single EFW Initiation, Main Steam Line Isolation, or MFW Isolation instrumentation channel. This includes failure of a common instrumentation channel in any combination of the Functions.

With one channel inoperable in one or more EFW Initiation, Main Steam Line Isolation, or MFW Isolation Functions listed in Table 3.3.11-1, the channel(s) must be placed in bypass or trip within 1 hour. This Condition applies to failures that occur in a single channel, e.g., channel A, which when bypassed will remove initiate Functions within the channel from service. Since the RPS and EFIC channels are interlocked, only the corresponding channel in each system may be bypassed at any time. This feature is ensured by an electrical interlock. The Completion Time of 1 hour is adequate to perform Required Action A.1.

Required Action A.2 provides a limit on the period of time an EFIC instrumentation channel is allowed to remain in bypass. While this Condition appears to satisfy system single failure considerations, it was not analyzed as part of the plant's original licensing basis and it is possible this configuration would not satisfy all aspects of IEEE 279 single failure criteria. As a result, the 72 hour Completion Time was added to impose a limit on the period of time the plant is allowed to operate in this Condition. As such, the Completion Time is based on engineering judgment and the IEEE 279 recommendations.

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

Condition B applies to situations where two instrumentation channels for EFW Initiation, Main Steam Line Isolation, or MFW Isolation Functions are inoperable. For example, Condition B applies if channel A and B of the EFW Initiation Function (say, on low OTSG pressure) are inoperable. Condition B does not apply if one channel of different Functions is inoperable in the same protection channel. That condition is addressed by Condition A.

(continued)

BASES

ACTIONS

B.1, B.2, and B.3 (continued)

With two EFW Initiation, Main Steam Line Isolation, or MFW Isolation protection channels inoperable, one channel must be placed in bypass (Required Action B.1). Bypassing another channel is not possible due to system interlocks. Therefore, the second channel must be tripped (Required Action B.2) to prevent a single failure from causing loss of the EFIC Function. The 1 hour Completion Time is adequate to perform the Required Actions and minimizes the period of time the plant is at risk due to this condition.

Required Action B.3 provides a limit on the period of time an EFIC instrumentation channel is allowed to remain in bypass. While this Condition appears to satisfy system single failure considerations, it was not analyzed as part of the plant's original licensing basis and it is possible this configuration would not satisfy all aspects of IEEE 279 single failure criteria. As a result, the 72 hour Completion Time was added to impose a limit on the period of time the plant is allowed to operate in this Condition. As such, the Completion Time is based on engineering judgment and the IEEE 279 recommendations

C.1

With the RCP status signals for one or two RCPs inoperable, placing the affected RCP status signals for each EFIC channel in trip will ensure OPERABILITY of the RCP status Function for the EFIC instrumentation. Required Action C.1 can be performed for the status signals for up to two RCPs and still provide protection against an inadvertent EFIC actuation due to the subsequent generation of an additional actual or spurious RCP trip signal. The 4 hour Completion Time is adequate to perform the Required Actions.

D.1

The EFW Vector Valve Control Function is required to meet the single-failure criterion for both the function of providing EFW on demand and isolating an OTSG when required. These conflicting requirements result in the necessity for two valves in series, in parallel with two valves in series, and a four channel valve command system. Refer to LCO 3.3.14, "Emergency Feedwater Initiation and Control (EFIC) Emergency Feedwater (EFW) -Vector Valve Logic" for a discussion of the logic of the system.

With one EFW Vector Valve Control channel inoperable, the system cannot meet the single-failure criterion and still meet the dual functional criteria described above. This Condition is analogous to having one EFW train inoperable. Therefore, when one vector valve control channel is inoperable, the channel must be restored to OPERABLE status within 72 hours. This Condition and Completion Time combination is consistent with the Completion Time associated with the loss of one train of EFW.

(continued)

BASES

ACTIONS (continued)

E.1, E.2, E.3, F.1, and G.1

If the Required Actions cannot be met within the associated Completion Time, the plant must be placed in a MODE or condition in which the requirement for the particular Function does not apply. This requires the operator to open the CRD trip breakers for Function 1.a, MODE 4 for Function 1.b, reduce power to less than 10% RTP for Function 1.d, and reduce OTSG pressure to less than 750 psig for all other Functions. The allowed Completion Times are reasonable, based on operating experience, to reach the specified conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

A Note indicates that the SRs for each EFIC instrumentation Function are identified in the SRs column of Table 3.3.11-1. All Functions are subject to CHANNEL CHECK, CHANNEL FUNCTIONAL TEST, and CHANNEL CALIBRATION. The SG-Low Level Function is modeled in transient analysis, and is subject to response time testing. Response time testing is also required for Main Steam Line and MFW Isolation. Individual EFIC subgroup relays must also be tested, one at a time, to verify the individual EFIC components will actuate when required. Some components cannot be tested at power since their actuation might lead to reactor trip or equipment damage. These are specifically identified and must be tested when shut down. The various SRs account for individual functional differences and for test frequencies applicable specifically to the Functions listed in Table 3.3.11-1. The operational bypasses associated with each EFIC instrumentation channel are also subject to these SRs to ensure OPERABILITY of the EFIC instrumentation channel when required.

SR 3.3.11.1

Performance of the CHANNEL CHECK once every 12 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.11.1 (continued)

monitoring the same parameter should read approximately the same value. Significant deviations between instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious.

Acceptance criteria are determined by plant staff and are presented in the Surveillance Procedure. The criteria are based on a combination of the channel instrument uncertainties.

The Frequency, about once every shift, is based on operating experience that demonstrates channel failure is unlikely. Thus, performance of the CHANNEL CHECK ensures that undetected overt channel failure is limited to time intervals between subsequent performances of the SR.

SR 3.3.11.2

A CHANNEL FUNCTIONAL TEST verifies the function of the required trip, interlock, and alarm functions of the channel. The Frequency of 31 days is based on operating experience and industry accepted practice.

SR 3.3.11.3

CHANNEL CALIBRATION is a complete check of the instrument channel including the sensor. The test verifies the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channels adjusted to account for instrument drift to ensure that the instrument channel remains operational between successive tests. The 24 month Frequency is based on the results of comprehensive instrument uncertainty calculations that accommodate 30 months of drift as approved in Amendment 152 (Ref. 6).

(continued)

FUNCTION	CHANNEL A	CHANNEL B
15. Steam Generator Water Level (Operating Range)	**OTSG A:** SP-17-LI1 or SP-17-LIR **OTSG B:** SP-21-LI1 or SP-21-LIR	**OTSG A:** SP-18-LI1 **OTSG B:** SP-22-LI1
16. Steam Generator Pressure	**OTSG A:** MS-106-PI1 or MS-106-PIR, **OTSG B:** MS-110-PI1 or MS-110-PIR	**OTSG A:** MS-107-PI1 or MS-107-PIR **OTSG B:** MS-111-PI1 or MS-111-PIR
17. Emergency Feedwater Tank Level	EF-98-LI1	EF-99-LI1
18a. Core Exit Temperature (Thermocouple) — Quadrant WX XY YZ ZW	 IM-5G-TE/IM-6C-TE IM-9E-TE/IM-13G-TE IM-9H-TE/IM-100-TE IM-3L-TE/IM-60-TE	 IM-7F-TE/IM-2G-TE IM-10C-TE/IM-11G-TE IM-10M-TE/IM-13L-TE IM-4N-TE/IM-6L-TE
18b. Core Exit Temperature (Recorder)	RC-171-TR	RC-172-TR
19. Emergency Feedwater Flow	**OTSG A:** EF-25-FI1 **OTSG B:** EF-23-FI1	**OTSG A:** EF-26-FI1 **OTSG B:** EF-24-FI1
20. Low Pressure Injection Flow	DH-1-FI1	DH-1-FI2
21. Degrees of Subcooling	As Displayed on EMCO-38 *Note: Entry into LCO 3.3.17 is required if any of the following Hardware or RECALL Points are Out of Service.* **Hardware** Multiplexers EMCO-17/18/19 Comm. HUBs EMCO-07/20 Computers EMCO-21/40 Monitor EMCO-38 **RECALL Points** RCS Pressure NR RECL-243 RCS Pressure WR RECL-4 T-Hot RECL-17/239	As Displayed on EMCO-39 *Note: Entry into LCO 3.3.17 is required if any of the following Hardware or RECALL Points are Out of Service.* **Hardware** Multiplexers EMCO-26/27/28 Comm. HUBs EMCO-08/29 Computers EMCO-30/41 Monitor EMCO-39 **RECALL Points** RCS Pressure NR RECL-40 RCS Pressure WR RECL-5 T-Hot RECL-18/240
22. Emergency Diesel Generator kW Indication	EGDG-1A Wattmeter SSF-AH Main control board indicator	EGDG-1B Wattmeter SSF-AX Main control board indicator
23. LPI Pump Run Status	ESFA-LX3 (Red Light) or ESFA-HU (ES Light Matrix "A")	ESFB-LX3 (Red Light) or ESFB-HU (ES Light Matrix "B")
24. DHV-42 and DHV-43 Open Position	ESFA-KN3 (Red Light)	ESFB-KN3 (Red Light)
25. HPI Pump Run Status	**HPI Pump 1A:** ESFA-MF7 (Red Light) or ESFA-AH (ES Light Matrix "A") **OR** **HPI Pump 1B:** ESFA-MN7 (Red Light) or ESFA-AJ (ES Light Matrix "A")	**HPI Pump 1C:** ESFB-MF7 (Red Light) or ESFB-AH (ES Light Matrix "B") **OR** **HPI Pump 1B:** ESFB-MV7 (Red Light) or ESFB-AJ (ES Light Matrix "B")
26. RCS Pressure (Low Range)	RC-147-PI1	RC-148-PI1

NOTES: For Function 18a, each quadrant requires at least 2 OPERABLE detectors, one from each channel. OPERABILITY of only one detector for any quadrant constitutes entry into Condition A of LCO 3.3.17. Any quadrant with no OPERABLE detector constitutes entry into Condition C if LCO 3.3.17. Separate Condition entry is allowed for each quadrant.

For Function 25, OPERABILITY of indication is required only for the one ES selected HPI pump in each channel.

(continued)

BASES

LCO (continued)

The following list is a discussion of the specified instrument Functions listed in Table 3.3.17-1.

1. Wide Range Neutron Flux

Two wide-range neutron flux monitors are provided for post-accident reactivity monitoring over the entire range of expected conditions. Each monitor provides indication over the range of 10^{-8} to 100% log rated power covering the source, intermediate, and power ranges. Each monitor utilizes a fission chamber neutron detector to provide redundant main control board indication. A single channel provides recorded information in the control room. The control room indication of neutron flux is considered one of the primary indications used by the operator following an accident. Following an event the neutron flux is monitored for reactivity control. The operator ensures that the reactor trips as necessary and that emergency boration is initiated if required. Since the operator relies upon this indication in order to take specified manual action, the variable is included in this LCO. Therefore, the LCO deals specifically with this portion of the string.

2. Reactor Coolant System (RCS) Hot Leg Temperature

Two wide range resistance temperature detectors (RTD's), one per loop, provide indication of reactor coolant system hot leg temperature (T_H) over the range of 120° to 920°F. Each T_H measurement provides an input to a control room indicator. Channel B is also recorded in the control room. Since the operator relies on the control room indication following an accident, the LCO deals specifically with this portion of the string.

T_H is a Type A variable on which the operator bases manual actions required for event mitigation for which no automatic controls are provided.

Following a steam generator tube rupture, the affected steam generator is to be isolated only after T_H falls below the saturation temperature corresponding to the pressure setpoint of the main steam safety valves. For event monitoring once the RCP's are tripped, T_H is used along with the core exit temperatures and RCS cold leg temperature to measure the temperature rise across the core for verification of core cooling.

(continued)

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.8 Pressurizer

BASES

BACKGROUND

The pressurizer maintains primary system pressure during steady state operation and limits the pressure changes caused by reactor coolant thermal expansion and contraction during normal load transients.

The design features of the pressurizer addressed by this LCO include pressurizer water level and required post-accident heater capability. Other RCS components associated with the pressurizer are addressed elsewhere in the Technical Specifications. Pressurizer safety valves and the power operated relief valve (PORV) are addressed by LCO 3.4.9, "Pressurizer Safety Valves," and LCO 3.4.10, "Pressurizer Power Operated Relief Valve (PORV)," respectively.

The maximum water level limit permits pressure control equipment to function as designed. The limit preserves the steam space during normal operation, thus both sprays and heaters can operate to maintain the design operating pressure. The level limit also prevents filling the pressurizer (water solid) for anticipated design basis transients, thus ensuring that pressure relief devices (PORV or code safety valves) can control pressure by steam relief rather than water relief. If the level limits were exceeded prior to a transient that creates a large pressurizer insurge volume leading to water relief, the maximum RCS pressure might exceed the Safety Limit of 2750 psig (SL 2.1.2) or damage may occur to the PORV or pressurizer code safety valves.

The pressurizer heaters are used to maintain pressure in the RCS so reactor coolant in the loops is subcooled and thus in the preferred state for heat transport to the steam generators (OTSGs). In accordance with NUREG 0578 (Ref. 1), this function must be initiated within 2 hours following loss of offsite power. Consequently, the emphasis of this LCO is to ensure that the redundant circuits from the emergency power sources to the heater MCCs are OPERABLE and that the associated heater capability is adequate to maintain pressure for RCS loop subcooling with an extended loss of offsite power.

(continued)

BASES

BACKGROUND (continued)

A minimum required available capacity of 252 kW is based on total heat loss through the pressurizer insulation and ensures that the RCS can be maintained at hot standby conditions. Inability to control the system pressure and maintain subcooling under conditions of natural circulation flow in the primary system could lead to loss of single phase natural circulation and decreased capability to remove core decay heat.

The 252 kW value is based, in part, on CR-3 pre-operational test data of measured pressurizer heat losses with the RCS at hot standby conditions, a subsequent performance test to validate heat losses, plus some margin for heater and insulation degradation over time. Although 252 kW can be supplied by two full banks of pressurizer heaters, additional heaters can be energized to account for increased heater degradation or pressurizer heat losses, provided no more than 378 kW of heaters is energized from an emergency power source.

Pressurizer heater power supply design provides the capability to supply, from either the offsite power source or either emergency power source (when offsite power is not available), sufficient heater capacity and associated controls. The minimum heater capacity and associated controls are connected to the emergency buses in a manner to provide redundant power supply capability.

APPLICABLE SAFETY ANALYSES

In MODES 1 and 2, the LCO requirement for a steam bubble is reflected implicitly in the accident analyses. All analyses performed from a critical reactor condition assume the existence of a steam bubble and saturated conditions in the pressurizer. In making this assumption, the analyses neglect the small fraction of noncondensible gases normally present.

Safety analyses presented in the FSAR do not take credit for pressurizer heater operation, however, an implicit initial condition assumption of the safety analyses is that the RCS is operating at normal pressure.

Conservative safety analyses assumptions for the loss of main feedwater (LMFW) event indicate that it produces the largest increase of pressurizer level of any moderate frequency event. Thus, this event has been selected to establish the pressurizer water level upper limit. Assuming proper emergency system response, the level limit prevents

(continued)

BASES

APPLICABLE SAFETY ANALYSIS (continued)

water relief through the pressurizer safety valves. Since prevention of water relief is a goal for abnormal transient operation, rather than an acceptance criteria, the value for pressurizer level is nominal and is not adjusted for instrument error. The analysis performed to substantiate the 290" as the upper limit (Ref. 3) assumed the reactor tripped on high RCS pressure (consistent with historical assumptions for this event). Had the anticipatory reactor trip (ART) on loss of both feedwater pumps been modeled, the reactor would have tripped much sooner in the event, terminating the nuclear chain reaction sooner, thereby limiting RCS heatup (and insurge). Thus, there is a margin in the analysis to substantiate the use of the nominal value as an acceptance criteria.

Evaluations performed for the design basis large break loss of coolant accident (LOCA), also assume the maximum level assumed for the LMFW event. The pressurizer level assumed for the LOCA is the partial basis for the volume of reactor coolant released to the containment following the accident. The containment analysis performed using the mass and energy release demonstrated that the maximum resulting containment pressure was within design limits. Parametric evaluations of this analysis indicate the sensitivity to pressurizer volume is small.

The requirement for redundant emergency power supplies is based on NUREG-0578 (Ref. 1). The intent is to allow maintaining the reactor coolant in a subcooled condition with natural circulation for an undefined, but extended, time period after a loss of offsite power.

The maximum pressurizer water level limit satisfies Criterion 2 of the NRC Policy Statement. Although the heaters are not specifically used in accident analysis, the need to maintain subcooling in the long term during loss of offsite power, as indicated in NUREG-0578 (Ref. 1), is the reason for providing a limit on this feature.

LCO

For the pressurizer to be OPERABLE, water level must be maintained ≤ 290 inches and a minimum of 252 kW of pressurizer heaters are to be capable of being powered from each emergency power supply. Limiting the maximum operating water level preserves the steam space for pressure control and ensures the capability to establish and maintain pressure control for steady state operation and to minimize the consequences of potential overpressure transients.

(continued)

BASES

LCO
(continued)

The minimum heater capacity required is sufficient to maintain the system adequately subcooled when accounting for heat losses through the pressurizer insulation and minimal margin for pressurizer steam space leakage. By maintaining the pressure near the operating conditions, a wide margin to subcooling can be obtained in the loops. The capability to provide a minimum of 252 kW of pressurizer heaters from each emergency power supply requires that both an adequate amount of heaters and the circuits that supply power from each of the emergency power supplies to the pressurizer heaters are OPERABLE. The 480 V buses and supply breakers listed in Table B 3.4.8-1 must be available in order to satisfy this LCO.

APPLICABILITY

The need for pressure control is most pertinent when core heat can cause the greatest effect on RCS temperature, resulting in the greatest effect on pressurizer level and RCS pressure control. Thus, the Applicability has been designated for MODES 1 and 2. For additional conservatism, the Applicability is also extended down to include MODE 3.

In MODES 1, 2, and 3, there is the need to maintain the availability of pressurizer heaters capable of being powered from an emergency power supply. In the event of a loss of offsite power, the initial conditions of these MODES give the greatest demand for maintaining the RCS in a hot pressurized condition with loop subcooling for an extended period. For MODE 4, 5, or 6, it is not necessary to control pressure (by heaters) to ensure loop subcooling for heat transfer when the Decay Heat Removal System is in service. Therefore the LCO is not applicable in the MODES.

ACTIONS

A.1

With pressurizer water level in excess of the maximum limit, action must be taken to restore pressurizer level to within the bounds assumed in the analysis. The 1 hour Completion Time is considered reasonable for adjusting makeup and letdown or taking level control to hand and decreasing level to within limit.

B.1

If there is < 252 kW of heaters capable of being powered from each emergency power supply, restoration is required in 72 hours. The Completion Time of 72 hours is reasonable considering the low probability of a loss of offsite power during this period. Pressure control will be maintained during this time using normal non-1E powered heaters.

(continued)

BASES

ACTIONS (continued)

C.1 and C.2

If pressurizer heater capability or water level cannot be restored within the allowed Completion Time, the plant must be placed in a MODE in which the LCO does not apply. To achieve this status, the plant must be placed in MODE 3 within 6 hours and MODE 4 within the following 6 hours. The Completion Times are reasonable, based on operating experience, to reach the specified MODES from full power conditions in an orderly manner and without challenging plant systems.

In the case of water level, reducing THERMAL POWER and RCS Tave will tend to restore level and also reduce the thermal energy of the reactor coolant mass for potential LOCA mass and energy releases.

SURVEILLANCE REQUIREMENTS

SR 3.4.8.1

This SR requires that pressurizer water level be monitored every 12 hours in order to verify operation is maintained below the nominal upper limit. The 12 hour Frequency has been shown by operating experience to be sufficient to regularly assess the level for deviations and trends, and verify that operation is within safety analyses assumptions. Alarms are also available for early detection of abnormal level indications.

SR 3.4.8.2

This SR verifies minimum redundant pressurizer heater capacity is capable of being powered from its associated emergency power supply. (This may be done by testing the power supply output and by performing an electrical check on heater element continuity and resistance.) The Frequency of 24 months is considered adequate to detect heater degradation and has been shown by operating experience to be acceptable.

REFERENCES

1. NUREG-0578, July 1979, "TMI-2 Lessons Learned Task Force Status Report and Short Term Recommendations."
2. NUREG 0737, "Clarification of TMI Action Plan Requirements", November, 1980.
3. B&W Topical Report 51-1200406-00, January 1991.

Table B 3.4.8-1
Pressurizer Heater Emergency Power Source Circuit Components

TYPE	TRAIN A	TRAIN B
480 V Buses	Reactor Aux Bus 3A	Plant Aux Bus 3 Reactor Aux Bus 3B
Breakers	3321 3395 3355	3222 3312 3392 3396 3356
Pressurizer Heater MCC Breakers	Pressurizer Heater MCC 3A	Pressurizer Heater MCC 3B
	1A - Pressurizer Heater Control Transformer A-1 2A - Pressurizer Heater Control Transformer A-2 1C - Pressurizer Heater Group 7 2C - Pressurizer Heater Group 8 3C - Pressurizer Heater Group 9	1A - Pressurizer Heater Control Transformer B-1 1B - Pressurizer Heater Control Transformer B-2 1D - Pressurizer Heater Group 10 2C - Pressurizer Heater Group 11 3C - Pressurizer Heater Group 12 4C - Pressurizer Heater Group 13

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.12.1 (continued)

The RCS water inventory balance must be performed with the reactor at steady state operating conditions and with RCS temperature greater than 400°F. The test must be performed prior to entry into MODE 2 if it has not been performed within the past 72 hours near normal operating pressure. This surveillance is not required to be performed for entry into MODE 4 or MODE 3 or for non-steady state conditions in MODE 3, but must be performed in MODE 3 above 400°F if 12 hours of steady state operation are achieved. If the test is not performed prior to all other requirements for entry into MODE 2 being satisfied, entry into MODE 2 must be delayed until steady state operation is established and the requirements of SR 3.0.4 are satisfied.

Steady state operation is required to perform a meaningful water inventory balance; calculations during maneuvering are not useful. For RCS operational LEAKAGE determination by water inventory balance, steady state is defined as stable RCS pressure, temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and RCP pump seal injection and return flows.

The 72 hour Frequency is reasonable to trend LEAKAGE and recognizes the importance of early leakage detection in the prevention of accidents.

SR 3.4.12.2

This SR provides the means necessary to determine OTSG OPERABILITY in an operational MODE. The requirement to demonstrate OTSG tube integrity in accordance with the Steam Generator Tube Surveillance Program emphasizes the importance of OTSG tube integrity, even though this Surveillance cannot be performed at normal operating conditions.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 30.
2. Regulatory Guide 1.45, May 1973.
3. FSAR, Section 14.2.2.2.
4. FSAR, Section 14.2.2.1.

BASES

ACTIONS (continued)

C.1 and C.2

If the Required Actions of Condition A or B are not met within the associated Completion Time, the plant must be placed in a MODE in which the LCO does not apply. To achieve this status, the plant must be placed in at least MODE 3 within 6 hours and in MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

D.1

With both required monitors inoperable, no Regulatory Guide 1.45 qualified means of monitoring leakage are available, and immediate entry into LCO 3.0.3 is required.

SURVEILLANCE REQUIREMENTS

SR 3.4.14.1

SR 3.4.14.1 requires the performance of a CHANNEL CHECK of the required containment atmosphere radioactivity monitor. The check provides reasonable confidence that each channel is operating properly. The Frequency of 12 hours is based on instrument reliability and is reasonable for detecting off normal conditions.

SR 3.4.14.2

SR 3.4.14.2 requires the performance of a CHANNEL FUNCTIONAL TEST of the required containment atmosphere radioactivity monitor. The test ensures that the monitor can perform its function in the desired manner. The test verifies the alarm setpoint and relative accuracy of the instrument string. The Frequency of 92 days considers instrument reliability and operating experience, and is based on the recommendations of NUREG 1366 (Ref. 4).

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.14.3

This SR requires the performance of a CHANNEL CALIBRATION for the required containment sump monitor instrumentation channel. The calibration verifies the accuracy of the instrument string, including the instruments located inside containment. The Frequency of 24 months is a typical refueling cycle and considers channel reliability. The acceptability of the 24-month frequency for the containment sump monitor CHANNEL CALIBRATION is based on the use of the instrumentation to measure trends or changes in the containment sump level rather than an absolute value of sump level.

SR 3.4.14.4

This SR requires the performance of a CHANNEL CALIBRATION for the required containment atmosphere radioactivity monitor instrumentation channel. The calibration verifies the accuracy of the instrument string. The 18-month frequency for the containment atmosphere radioactivity monitor CHANNEL CALIBRATION has been proven acceptable based on operating experience

REFERENCES

1. 10 CFR 50, Appendix A, GDC 30.
2. Regulatory Guide 1.45.
3. 10 CFR 50, Appendix A, GDC 4.
4. NUREG 1366, December 1992.

BASES

ACTIONS (continued)

containment is a harsh environment with bulk average temperatures typically in excess of 120 F and self-contained breathing apparatus may be required with the reactor at power. In the event something was to happen to the individual who had entered containment, plant personnel would proceed through the most expeditious rescue path in order to get that individual out and provide medical care. Thus, the Note allows entry and exit through the inoperable door for personnel safety reasons when the quickest path to the person happens to be through the inoperable door. The ability to open the OPERABLE door, even if it means the containment boundary is temporarily not intact, is acceptable due to the low probability of an event that could pressurize the containment during the short time in which the OPERABLE door is expected to be open. After each entry and exit the OPERABLE door must be immediately closed. If ALARA conditions permit, entry and exit should be via an OPERABLE air lock.

Note 2 has been added to provide clarification that, for this LCO, separate Condition entry is allowed for each air lock.

In the event the air lock leakage results in exceeding the overall containment leakage rate, Note 3 directs entry into the applicable Conditions and Required Actions of LCO 3.6.1, "Containment."

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

With one air lock door inoperable in one or more containment air locks, the OPERABLE door must be verified closed (Required Action A.1) in each affected containment air lock.

This ensures that a leak tight containment barrier is maintained by the use of an OPERABLE air lock door. This action must be completed within 1 hour. This specified time period is consistent with the ACTIONS of LCO 3.6.1, which requires containment be restored to OPERABLE status within 1 hour.

(continued)

ACTIONS

A.1. A.2 and A.3 (continued)

In addition, the affected air lock penetration must be isolated by locking closed the remaining OPERABLE air lock door within the 24 hour Completion Time. The 24 hour Completion Time is considered reasonable for locking the OPERABLE air lock door, considering the OPERABLE door of the affected air lock is being maintained closed.

Required Action A.3 verifies that an air lock with an inoperable door has been isolated by the use of a locked and closed OPERABLE air lock door. This ensures that an acceptable containment leakage boundary is maintained. The Completion Time of once per 31 days is based on engineering judgment and is considered adequate in view of the low likelihood of a locked door being mispositioned and other administrative controls.

The Required Actions have been modified by two Notes. Note 1 clarifies that only the Required Actions and associated Completion Times of Condition C are required if both doors in the same air lock are inoperable. With both doors in the same air lock inoperable, an OPERABLE door is not available to be closed. Required Actions C.1 and C.2 are the appropriate remedial actions. Note 2 allows use of the air lock for entry and exit for 7 days under administrative controls. Containment entry may be required to perform Technical Specifications (TS) Surveillances and Required Actions, as well as other activities on equipment inside containment that are required by TS or activities on equipment that support TS-required equipment. This Note is not intended to preclude performing other activities (i.e., non-TS-required activities) if the containment was entered, using the inoperable air lock, to perform an allowed activity listed above. This allowance is acceptable due to the low probability of an event that could pressurize the containment during the short time that the OPERABLE door is expected to be open.

(continued)

BASES

LCO (continued)

This LCO provides assurance that the containment isolation valves and purge valves will perform their designated safety functions to control leakage from the containment during accidents.

APPLICABILITY

In MODES 1, 2, 3, and 4, a DBA could cause a release of radioactive material to containment. In MODES 5 and 6, the probability and consequences of these events are reduced due to the pressure and temperature limitations of these MODES. Therefore, the containment isolation valves are not required to be OPERABLE in MODE 5. The requirements for containment isolation valves during MODE 6 are addressed in LCO 3.9.3, "Containment Penetrations."

ACTIONS

The following terms are defined for the purpose of implementing this Specification:

- penetration flowpath: The piping which passes through the RB liner such that a portion of the system inside the RB can communicate with the portion outside the RB. A penetration passes through the imaginary plane established by the RB liner.

- unisolated: The state of a penetration flowpath whereby the operating fluid (liquid or gas) of the system is capable of passing freely through the imaginary plane established by the RB liner.

The ACTIONS are modified by a Note allowing penetration flow paths, except for 48 inch purge valve penetration flow paths, to be unisolated intermittently under administrative controls. These administrative controls consist of stationing a dedicated operator at the valve controls, who is in continuous communication with the control room. In this way, the penetration can be rapidly isolated when a need for containment isolation is indicated. Due to the size of the containment purge line penetration and the fact that those penetrations exhaust directly from the containment atmosphere to the environment, the penetration flow paths containing these valves may not be opened under

(continued)

BASES

ACTIONS (continued)

administrative controls. A single purge valve in a penetration flow path may be opened to effect repairs to an inoperable valve, as allowed by SR 3.6.3.1.

Note 2 has been added to provide clarification that, for this LCO, separate Condition entry is allowed for each penetration flow path.

The ACTIONS are further modified by a Note 3, which ensures appropriate remedial actions are taken, if necessary, if the affected systems are rendered inoperable by an inoperable containment isolation valve.

In the event purge valve leakage results in exceeding the overall containment leakage rate, Note 4 directs entry into the applicable Conditions and Required Actions of LCO 3.6.1.

A.1 and A.2

In the event one containment isolation valve in one or more penetration flow paths is inoperable (except for purge valve leakage not within limit), the affected penetration flow path must be isolated. The method of isolation must include the use of at least one isolation barrier that cannot be adversely affected by a single active failure. Isolation barriers that meet this criterion are a closed and de-activated automatic containment isolation valve, a closed manual valve, a blind flange, and a check valve with flow through the valve secured. For a penetration isolated in accordance with Required Action A.1, the valve used to isolate the penetration should be the closest available one to containment. Required Action A.1 must be completed within the 4 hour Completion Time. The specified time period is reasonable, considering the time required to isolate the penetration and the relative importance of supporting containment OPERABILITY during MODES 1, 2, 3, and 4.

For affected penetration flow paths that cannot be restored to OPERABLE status within the 4 hour Completion Time and that have been isolated in accordance with Required Action A.1, the affected penetration flow paths must be verified to be isolated on a periodic basis. This periodic

(continued)

B 3.6 CONTAINMENT SYSTEMS

B 3.6.4 Containment Pressure

BASES

BACKGROUND

The containment pressure is limited during normal operation to preserve the initial conditions assumed in the accident analyses for a loss of coolant accident (LOCA) or steam line break (SLB). These limits also prevent the containment pressure from exceeding the containment design negative pressure differential with respect to the outside atmosphere in the event of inadvertent actuation of the Reactor Building Spray System.

Containment pressure is a process variable that is monitored and controlled. The containment pressure limits are derived from the input conditions used in the containment functional analyses and the containment structure external pressure analysis. Should operation occur outside these limits coincident with a Design Basis Accident (DBA), post accident pressures could exceed calculated values.

APPLICABLE SAFETY ANALYSES

Containment internal pressure is an initial condition used in the DBA analyses to establish the maximum peak containment internal pressure. The limiting DBAs considered, relative to containment pressure, are the LOCA and SLB. The worst-case LOCA generates larger mass and energy release than the worst-case SLB. Thus, the LOCA event bounds the SLB event from the containment peak pressure standpoint (Ref. 1).

The initial pressure condition used in the containment analysis was 17.7 psia (3.0 psig). This resulted in a maximum peak pressure from a LOCA of 54.2 psig. The LCO limit of 3.0 psig ensures that, in the event of an accident, the design pressure of 55 psig for containment is not exceeded. In addition, the building was designed for an internal pressure equal to 3 psig above external pressure during a tornado. The containment was also designed for a negative internal pressure below external pressure, to withstand the resultant pressure drop from an accidental actuation of the Reactor Building Spray System. The pressure drop has been evaluated for operating within LCO 3.6.4 Containment pressures and the resulting pressure drop due to building spray actuation was found to be acceptable.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Other accident analyses, in particular the cooling effectiveness of the Emergency Core Cooling Systems during the core reflood phase of a LOCA, also utilize the negative pressure limit as an input.

Containment pressure satisfies Criterion 2 of the NRC Policy Statement.

LCO

Maintaining containment pressure less than or equal to the LCO upper pressure limit ensures that, in the event of a DBA, the resultant peak containment accident pressure will remain below the containment design pressure. Maintaining containment pressure greater than or equal to the LCO lower pressure limit ensures that the containment will not exceed the design negative differential pressure following an inadvertent actuation of the Reactor Building Spray System initiated from typical operating conditions.

The numerical limits in the LCO have not been adjusted to account for instrument error.

APPLICABILITY

In MODES 1, 2, 3, and 4, a DBA could cause a release of radioactive material to containment. Since maintaining containment pressure within design basis limits is essential to ensure initial conditions assumed in the accident analysis are maintained, the LCO is applicable in MODES 1, 2, 3, and 4.

In MODES 5 and 6, the probability and consequences of these events are reduced due to the pressure and temperature limitations of these MODES. Therefore, maintaining containment pressure within the limits of the LCO is not required in MODE 5 or 6.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The EFW System is designed to remain functional following the maximum hypothetical earthquake. It will also remain functional following a single failure in addition to any of the above events. No single failure prevents EFW from being supplied to the intact OTSG nor allows EFW to be supplied to the faulted OTSG. Note that in most cases of a main feedwater break or a steam line break, the depressurization of the affected OTSG would cause the automatic initiation of EFW. However, there will be some small break sizes for which automatic detection will not be possible. For these small breaks, the operator will have sufficient time in which to take appropriate action to terminate the event (Ref. 1).

The EFW System satisfies Criterion 3 of the NRC Policy Statement.

LCO

Two independent emergency feedwater pumps and their associated flow paths are required to be OPERABLE. The OPERABILITY of the EFW pumps requires that each be capable of developing its required discharge pressure and flow. Additionally, the OPERABILITY of the turbine driven pump requires that it be capable of being powered from an OPERABLE steam supply through ASV-5. ASV-204 was installed to improve EFW reliability and is not required for OPERABILITY.

The motive power for the turbine driven pump is steam supplied from either OTSG from a main steam header upstream of the main steam isolation valves so that their closure does not isolate the steam supply to the turbine. Both steam supply flow paths through MSV-55 and MSV-56 (Condition A) to the turbine driven pump are required to be OPERABLE. The OPERABILITY of the associated EFW flow paths requires all valves be in their correct positions or be capable of actuating to their correct positions on a valid actuation signal.

The diesel driven EFW pump has a starting air system consisting of a safety-related air receiver that is maintained pressurized by a non-safety-related air compressor. The requirements for the air receiver are covered by Specification 3.7.19. The air is delivered to the diesel engine through DC powered valves. The DC power is provided by the diesel driven EFW pump DC distribution system battery.

(continued)

BASES

LCO (continued)

Inoperability of the EFW System may result in inadequate decay heat removal following a transient or accident during which main feedwater is not available. The resulting RCS heatup and pressure increase can potentially result in significant loss of coolant through the pressurizer code safety valves or the PORV.

APPLICABILITY

In MODES 1, 2, and 3 the EFW System is required to be OPERABLE and to function in the event that main feedwater is lost. In addition, the EFW System is required to supply enough makeup water to replace the secondary side inventory lost as the plant cools to MODE 4 conditions.

In MODES 4, 5 and 6, the OTSG need not be used to cooldown the RCS. Therefore, the EFW System is not required to be OPERABLE in these MODES.

ACTIONS

<u>A.1</u>

With one of the two steam supplies to the turbine driven EFW pump inoperable, action must be taken to restore the steam supply to OPERABLE status within 7 days. Allowing 7 days in this Condition is reasonable, based on the redundant OPERABLE steam supply to the pump and the low probability of an event occurring that would require the inoperable steam supply to the turbine driven EFW pumps.

The 10 day Completion Time for Required Action A.1 establishes a limit on the maximum time allowed for any combination of Conditions to be entered during any continuous failure to meet this LCO. The 10 day Completion Time provides a limitation time allowed in this specified Condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The '<u>AND</u>' connector between 7 days and 10 days dictates that both Completion Times apply simultaneously, and the more restrictive must be met.

(continued)

BASES

ACTIONS (continued)

B.1

If one of the EFW trains is inoperable, action must be taken to restore the train to OPERABLE status within 72 hours. The 72 hour Completion Time is reasonable, based on the redundant capabilities afforded by the EFW System, time needed for repairs, and the low probability of a DBA occurring during this time period. This condition includes the loss of two steam supply lines to the turbine driven EFW pump.

The 10 day Completion Time for Required Action B.1 established a limit on the maximum time allowed for any combination of Conditions to be entered during any continuous failure to meet this LCO. The 10 day Completion Time provides a limitation time allowed in this specified Condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The 'AND' connector between 72 hours and 10 days dictates that both Completion Times apply simultaneously, and the more restrictive must be met.

C.1 and C.2

If Required Action A.1 or Required Action B.1 cannot be completed within the associated Completion Time, the plant must be placed in a MODE in which the LCO does not apply. To achieve this status, the plant must be placed in at least MODE 3 within 6 hours and in MODE 4 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

D.1

With both EFW trains inoperable, the plant is in a seriously degraded condition with no safety related means for conducting a cooldown. In such a condition, plant operation should not be perturbed by a forced action, including a power change, that might result in a trip. For this reason, the Technical Specifications do not mandate a plant shutdown. Rather the ACTIONS allow the plant to dictate the most prudent course of action (including plant shutdown) for the situation. The seriousness of this condition requires that action be initiated immediately to restore at least one EFW train to OPERABLE status.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.5.1

Verifying the correct alignment for manual, power operated, and automatic valves in the EFW water, steam supply flow, diesel starting air and fuel oil paths provides assurance that the proper flow paths exist for EFW operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since those valves are verified to be in the correct position prior to locking, sealing, or securing. These valves include valves in the main flow paths and the first normally closed valve in a branch line. In lieu of the first normally closed valve in the branch line, credit may be taken for verifying valve position of another valve downstream, providing the isolation of the flow path is achieved. Verifying correct valve alignment of valves immediately downstream of an unsecured valve still assures isolation of the flow path. There are several exceptions for valve position verification due to the low potential for these types of valves to be mispositioned. The valve types which are not verified as part of this SR include vent or drain valves, relief valves, instrumentation valves, check valves, sample line valves. A valve that receives an actuation signal is allowed to be in a non-accident position provided the valve will automatically reposition within the proper stroke time. For a power operated valve to be considered "locked, sealed, or otherwise secured", the component must be electrically and physically restrained.

This Surveillance does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position.

The 45 day frequency is based on engineering judgment and is consistent with the frequency established for SR 3.7.5.2. SR 3.7.5.2 requires extensive EFW valve manipulation in order to perform the pump flow rate verification, such that a flow path verification is necessary following each performance.

SR 3.7.5.2

This SR verifies that the EFW pumps develop sufficient discharge pressure to deliver the required flow at the full open pressure of the MSSVs. Because it is undesirable to

(continued)

B 3.7 PLANT SYSTEMS

B 3.7.14 Spent Fuel Pool Boron Concentration

BASES

BACKGROUND

As described in the Bases for LCO 3.7.15, "Spent Fuel Assembly Storage," fuel assemblies are stored in the high-density region of the spent fuel pool storage racks in accordance with criteria based on initial weight-percent enrichment and discharge burnup. Although the water in the spent fuel pool is normally borated to ≥ 2000 ppm, the criteria that limit the storage of a fuel assembly to specific rack locations (criticality analysis) are conservatively developed without taking credit for the boron in the pool water.

APPLICABLE SAFETY ANALYSIS

The acceptance criteria for the fuel storage pool criticality analyses is that a k_{eff} of ≤ 0.95 must be maintained for all postulated events. The storage racks are capable of maintaining this k_{eff} with unborated pool water at a temperature yielding the highest reactivity (assuming the storage restrictions of LCO 3.7.15 are met). Most abnormal storage locations will not result in an increase in the k_{eff} of the racks. However, it is possible to postulate events, such as the mis-loading of an assembly with a burnup and enrichment combination outside the acceptable area in Figure 3.7.15-1 and 3.7.15-2, or dropping an assembly between the pool wall and the fuel racks, which could lead to an increase in reactivity. For such events, credit is taken for the presence of boron in the pool water since the NRC does not require the assumption of two unlikely, independent, concurrent events to ensure protection against a criticality accident (double contingency principle). The reduction in k_{eff}, caused by the boron more than offsets the reactivity addition caused by credible accidents.

The concentration of dissolved boron in the fuel storage pool satisfies Criterion 2 of the NRC Policy Statement.

LCO

The required concentration of dissolved boron in the fuel storage pool of ≥ 1925 ppm preserves the assumption used in the analyses of the potential accident scenarios described above. This concentration of dissolved boron is the minimum required concentration for fuel assembly storage and movement within the fuel storage pool.

(continued)

BASES

APPLICABILITY	This LCO is applicable whenever fuel assemblies are stored in the spent fuel pool, until a complete spent fuel pool verification has been performed following the last movement of fuel assemblies in the spent fuel pool. This LCO does not apply following the verification since the verification would confirm that there are no misloaded fuel assemblies. With no further fuel assembly movement in progress, there is no potential for a misloaded fuel assembly or a dropped fuel assembly and the reactivity of the racks alone is adequate to preserve assumptions of the criticality analysis.

ACTIONS

A.1, A.2.1, and A.2.2

When the concentration of boron in the fuel storage pool is less than required, immediate action must be taken to preclude the occurrence of an accident. This is most efficiently achieved by immediately suspending the movement of fuel assemblies within the pool. This Action does not preclude movement of a fuel assembly to a safe position.

Additionally, action must be initiated immediately to restore pool boron concentration to within the LCO limit or a pool verification performed. Either of these Actions will restore compliance with the LCO or demonstrate the need for the LCO does not currently exist.

The Required Actions are modified by a Note indicating that LCO 3.0.3 does not apply. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operation. Therefore, placing the reactor in a shutdown condition in the event of an inability to suspend movement of fuel assemblies does nothing to compensate for the Required action not met. It is therefore inappropriate to subject the plant to a shutdown transient in this condition. In MODES 5 and 6, LCO 3.0.3 is not applicable.

SURVEILLANCE REQUIREMENTS

SR 3.7.14.1

This SR verifies that the concentration of boron in the fuel storage pool is within the required limit. This is accomplished by sampling representative samples of the pool.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.14.1 (continued)

Operating experience has shown significant differences between boron measured near the top of the pool and that measured elsewhere. As long as this SR is met, the analyzed events are fully bounded. The 7 day Frequency is acceptable because no major replenishment of pool water is expected to take place over this period of time.

REFERENCES

1. Criticality Safety Evaluation of the Pool A Spent Fuel Storage Racks in Crystal River Unit 3 With Fuel of 5.0% Enrichment, S. E. Turner, Holtec Report HI-931111, December 1993.

2. Criticality Safety Analysis of the Westinghouse Spent Fuel Storage Racks in Pool B of Crystal River Unit 3, S. E. Turner, Holtec Report HI-992128, May 1999.

B 3.7 PLANT SYSTEMS

B 3.7.15 Spent Fuel Assembly Storage

BASES

BACKGROUND

This document describes the Bases for the Spent Fuel Assembly Storage which imposes storage requirements upon irradiated and unirradiated fuel assemblies stored in the fuel storage pools containing high density racks. The storage areas, which are part of the Spent Fuel System, governed by this Specification are:

a. Fuel storage pool "A" and
b. Fuel storage pool "B".

In general, the function of the storage racks is to support and protect new and spent fuel from the time it is placed in the storage area until it is shipped offsite.

Spent fuel is stored underwater in either fuel storage pool A or B. Only fuel pool A has the capability to store failed fuel in containers. Spent fuel pool A features high density poison storage racks with a 10 1/2 inch center-to-center distance capable of storing 542 assemblies. Fuel pool A is capable of storing fuel with enrichments up to 5.0 weight percent U-235 (Ref. 1) without exceeding the criticality criteria of Reference 3 providing the fuel has sufficient burnup. New fuel will be placed into pool A only.

Spent fuel pool B also contains high density racks having a 9.11 inch center-to-center distance capable of storing 932 assemblies. Fuel pool B is capable of storing fuel with enrichments up to 5.0 weight percent U-235 (Ref. 2) without exceeding the criticality criteria of Reference 3, providing the fuel has sufficient burnup and required storage configuration. New fuel will not be placed into pool B.

It should be noted that the maximum enrichment limits are actually nominal values. The tolerance of fuel supplied by DOE is ± 0.013 weight percent. Thus, it is possible to have fuel with an initial enrichment slightly in excess of the stated limit. This is accounted for in the criticality analysis and is therefore acceptable.

(continued)

BASES

BACKGROUND (continued)

Both of the spent fuel pools are constructed of reinforced concrete and lined with stainless steel plate. They are located in the fuel handling area of the auxiliary building.

New fuel storage requirements are addressed in Section 4.0, "Design Features".

APPLICABLE SAFETY ANALYSES

The function of the spent fuel storage racks are to support and protect spent fuel assemblies from the time they are placed in the pool until they are shipped offsite. The spent fuel assembly storage LCO was derived from the need to establish limiting conditions on fuel storage to assure sufficient safety margin exists to prevent inadvertent criticality. The spent fuel assemblies are stored entirely underwater in a configuration that has been shown to result in a reactivity of less than or equal to 0.95 under worse case conditions (Ref. 1 and 2). The spent fuel assembly enrichment requirements in this LCO are required to ensure inadvertent criticality does not occur in the spent fuel pool.

Inadvertent criticality within the fuel storage area could result in offsite radiation doses exceeding 10 CFR 100 limits.

The spent fuel assembly storage satisfies Criterion 2 of the NRC Policy Statement.

LCO

Limits on the new and irradiated fuel assembly storage in high density racks were established to ensure the assumptions of the criticality safety analysis of the spent fuel pools is maintained.

Limits on initial fuel enrichment and burnup for both new and for spent fuel stored in pool A have been established. Two limits are defined:

1. Initial fuel enrichment must be less than or equal to 5.0 weight percent U-235, and

(continued)

BASES

LCO (continued)

2. For new, low irradiation, and spent fuel with initial enrichment less than or equal to 5.0 weight percent and greater than or equal to 3.5 weight percent, fuel burnup must be within the limits specified in Figure 3.7.15-1. Figure 3.7.15-1 presents two areas of required fuel assembly burnup as a function of initial enrichment. For fuel with enrichment-burnup combinations in the area above the curve, there are no restrictions on where the fuel can be stored. For fuel with enrichment-burnup combinations below the curve, the fuel must be stored in a one-out-of-two checkerboard configuration with water cells that contain no fuel. The acceptability of storing this fuel in the checkerboard configuration is documented in Reference 6.

Fuel enrichment limits are based on avoiding inadvertent criticality in the spent fuel pool. The CR-3 spent fuel storage system was initially designed to a maximum enrichment of 3.5 weight percent. Enrichments of up to 5.0 weight percent are permissible for storage in spent fuel pool A as long as the fuel burnup is sufficient to limit the worst case reactivity in the storage pool to less than or equal to 0.95. Fuel burnup reduces the reactivity of the fuel due to the accumulation of fission product poisons. Reference 1 documents that the required burnup varies linearly as a function of enrichment with 10500 megawatt days per metric ton uranium (Mwd/mtU) required for fuel with 5.0 weight percent enrichment and 0 burnup required for 3.5 weight percent enriched fuel.

Similar types of restrictions have been established for Pool B.

1. Initial fuel enrichment must be ≤ 5.0 weight percent U-235, and

2. For fuel with initial enrichment ≤ 5.0 weight percent and ≥ 2.0 weight percent, fuel burnup must be within the limits specified in Figure 3.7.15-2.

(continued)

BASES

LCO (continued)

Fuel with burnup-enrichment combinations in the area above the upper curve has no restrictions on where it can be stored. Fuel with burnup-enrichment combinations in the area between the lower and upper curves must be stored in the peripheral cells of the pool. The peripheral cells are those that are adjacent to the walls of the spent fuel pool. Fuel with burnup-enrichment combinations in the area below the lower curve cannot be stored in Pool B, but must be stored in Pool A.

The LCO allows compensatory loading techniques, specified in the FSAR and applicable fuel handling procedures, as an alternative to storing fuel assemblies in accordance with Figures 3.7.15-1 and 3.7.15-2. This is acceptable since these loading patterns assure the same degree of subcriticality within the pool.

APPLICABILITY

In general, limiting fuel enrichment of stored fuel prevents inadvertent criticality in the storage pools. Inadvertent criticality is dependent on whether fuel is stored in the pools and is completely independent of plant MODE.

Therefore, this LCO is applicable whenever any fuel assembly is stored in high density fuel storage locations.

ACTIONS

A.1

Required Action A.1 is modified by a Note indicating LCO 3.0.3 does not apply. Since the design basis accident of concern in this Specification is an inadvertent criticality, and since the possibility or consequences of this event are independent of plant MODE, there is no reason to shutdown the plant if the LCO or Required Actions cannot be met.

When the configuration of fuel assemblies stored in the spent fuel pool is not in accordance with Figure 3.7.15-1 or Figure 3.7.15-2, immediate action must be taken to make the necessary fuel assembly movement(s) to bring the configuration into compliance. The Immediate Completion Time underscores the necessity of restoring spent fuel pool irradiated fuel loading to within the initial assumptions of the criticality analysis.

(continued)

BASES

ACTIONS

A.1 (continued)

The ACTIONS do not specify a time limit for completing movement of the affected fuel assemblies to their correct location. This is not meant to allow an unnecessary delay in resolution, but is a reflection of the fact that the complexity of the corrective actions is unknown.

SURVEILLANCE REQUIREMENTS

SR 3.7.15.1

Verification by administrative means that initial enrichment and burnup of fuel assemblies in accordance with Figure 3.7.15-1 and Figure 3.7.15-2 is required prior to storage of spent fuel in storage pool A or pool B (as applicable). This surveillance ensures that fuel enrichment limits, as specified in the criticality safety analyses (Ref. 1 and 2), are not exceeded. The surveillance Frequency (prior to storage in high density region of the fuel storage pool) is appropriate since the initial fuel enrichment and burnup cannot change after removal from the core.

REFERENCES

1. Criticality Safety Evaluation of the Pool A Spent Fuel Storage Racks in Crystal River Unit 3 with Fuel of 5.0% Enrichment, S. E. Turner, Holtec Report HI 931111, December 1993.

2. Criticality Safety Analysis of the Westinghouse Spent Fuel Storage Racks in Pool B of Crystal River Unit 3, S. E. Turner, Holtec Report HI-992128, May 1999.

3. NUREG 0800, Standard Review Plan, Section 9.1.1 and 9.1.2, Rev. 2, July 1981.

4. 10 CFR 100.

5. CR-3 FSAR, Section 9.6.

6. Criticality Safety Analysis of the Crystal River Unit 3 Pool A for Storage of 5% Enriched Mark B-11 Fuel in Checkerboard Arrangement With Water Holes, S. E. Turner, Holtec Report HI-992285, August 1999.

B 3.7 PLANT SYSTEMS

B 3.7.16 Secondary Specific Activity

BASES

BACKGROUND

Under normal operating conditions, minimal quantities of radioactive contaminants will be present in the secondary coolant due to steam generator tube or tube sheet leakage. Such leakage allows primary coolant activity to enter the steam and power conversion system, where it may be released to the atmosphere via condenser off-gas or Main Steam System leakage.

The secondary coolant is monitored and sampled to detect reactor coolant system leakage into the secondary coolant. Small amounts of leakage would be detected by this monitoring. An abnormally high specific activity is indicative of an increase in the RCS activity level or an increase in primary to secondary system leakage.

During normal operations, secondary activity must be monitored to ensure that the total annual quantity of radioactive iodine released to the atmosphere is within the requirements of 10 CFR 50, Appendix I (Ref. 1). In addition to releases of secondary coolant activity which occur during normal operations, anticipated transients or accidents which result in main steam safety valve (MSSV) or atmospheric dump valves lifting or main steam line rupture will cause direct release of secondary activity to the atmosphere.

While it is important to maintain secondary coolant specific activity within the limit to assure the offsite dose calculations are bounding for all operating conditions, the analysis also provides an early indication of increasing primary to secondary system leakage.

(continued)

BASES

APPLICABLE SAFETY ANALYSIS

The design basis transient and accident analyses presented in FSAR Chapter 14 which evaluate the offsite dose effects of secondary coolant release considered the initial secondary specific activity to be within the limit of this LCO. The acceptance criteria applied to the evaluation of accidental releases of radioactive material to the environment are given in terms of radiation dose received by a member of the general public at the exclusion area boundary for two hours immediately following the postulated release or at the low population zone boundary during the entire period of the radioactive cloud's passage (considered to be 30 days in Ref. 9). The limits established in 10 CFR 100 are a whole body dose of 25 Rem, or a 300 Rem total dose to the thyroid from iodine exposure.

With respect to offsite dose, the limiting accident involving release of secondary coolant activity is the main steam line break (SLB) postulated as a double-ended rupture of one main steam system line between the reactor building and turbine stop valves (Ref. 3 and 4). The SLB is assumed to result in the release of the activity contained in the steam generator inventory, the activity contained in the feedwater added to the steam generator prior to isolation, and the activity added to the steam generator due to RCS leakage during the cooldown period following the steam line break. The curies of secondary (steam generator and feedwater) activity released is small in comparison to that resulting from the postulated reactor coolant leakage following the SLB. The specific activity limit on secondary coolant helps ensure this small fraction compared to primary side releases.

A complete loss of AC power and a steam generator tube rupture (SGTR) are two events that also result in offsite release of secondary coolant activity through the MSSVs and atmospheric dump valves. In the case of a complete loss of AC power, the quantity of secondary coolant released to the atmosphere could be greater than during a SLB. However, the overall offsite dose is considerably lower, since the primary to secondary leakage path will be isolated much earlier following an AC power loss than after a SLB (Ref. 6). The specific activity limit on secondary coolant helps ensure the dose from a loss of AC power will be bounded by a SLB accident.

In the case of a SGTR, the activity released from secondary side pre-break activity is insignificant compared to the activity released from the primary to secondary break flow.

(continued)

B.3.7 PLANT SYSTEMS

B 3.7.19 Diesel Driven EFW (DD-EFW) Pump Fuel Oil, Lube Oil and Starting Air

BASES

BACKGROUND

The DD-EFW Pump is provided with a dedicated fuel oil supply tank. The fuel oil capacity of this tank, which is located in a dedicated compartment in the DD-EFW Pump building, is sufficient for the pump to perform its intended function for a period of 7 days. The fuel oil supply capacity is calculated using 10 CFR 50 Appendix K assumptions to supply EFW flow to one or two steam generators for seven days and enough fuel capacity to cool the RCS to decay heat removal cut-in temperature. Margin for instrument error and fuel needed for normal surveillance is included in the fuel oil tank size calculation. This fuel oil capacity ensures adequate time is available to replenish the onsite supply from outside sources prior to the diesel engine running out of fuel.

Due to the proximity and location of the supply tank to the engine, the fuel oil is directly fed to the engine from the supply tank by the engine fuel pump. The fuel oil tank and piping are located inside the DD-EFW Pump building which is a seismic Class I building, which precludes consideration of the effects of missiles in their design.

For proper operation of the DD-EFW Pump, it is necessary to ensure the proper quality of the fuel oil. CR-3 has a Diesel Fuel Oil (DFO) Testing Program which is an overall effort to ensure the quality of the fuel oil. The program includes purchasing, on-site receipt acceptance testing of new fuel, offsite analysis of new fuel accepted, and periodic testing (both onsite and offsite) of the stored fuel oil. Additionally, the program includes water removal and biocide addition to control bacteriological growth. CR-3 is not committed to Regulatory Guide 1.137 or ANS 59.51 (ANSI N195), however, these standards were utilized as guidance in the development of the DFO Testing Program.

The DD-EFW Pump lube oil subsystem is designed to provide sufficient lubrication to permit proper operation of its associated diesel engine under all loading conditions. The system is required to circulate the lube oil to the diesel

(continued)

BASES

BACKGROUND (continued)

engine working surfaces and to remove excess heat generated by friction during operation. The onsite lube oil storage is sufficient to ensure 7 days of operation. This supply ensures adequate time is available to replenish lube oil from outside sources prior to the system running out of lube oil.

The DD-EFW Pump engine has an air start system with adequate capacity for six successive start attempts on the engine without recharging the air start receivers. A single DD-EFW pump engine start is assured with air receiver pressure > 150 psig.

APPLICABLE SAFETY ANALYSIS

The initial conditions of Design Basis Accident (DBA) and transient analyses in the FSAR, Chapter 6 (Ref. 4) and Chapter 14 (Ref. 5), assume Engineered Safeguard (ES) systems are OPERABLE. The DD-EFW Pump is designed to provide sufficient EFW flow capacity to ensure the availability of necessary emergency feedwater to one or two steam generators. The DD-EFW pump is part of the redundant and diverse EFW system that provide steam generator secondary side cooling water.

Since diesel fuel oil, lube oil, and the air start subsystem support the operation of the DD-EFW pump system, they satisfy Criterion 3 of the NRC Policy Statement.

LCO

A sufficient quantity of stored diesel fuel oil supply is required to be available to ensure the capability to operate the DD-EFW Pump for 7 days. Diesel fuel oil is also required to meet specific quality standards. This EFW train is one of the two, full capacity and diverse sources of emergency feedwater for steam generator secondary side cooling.

A sufficient lube oil supply must be available to ensure the capability to operate the diesel engine for its 7 day fuel capacity (without refueling) rating. Engine lube oil

(continued)

BASES

LCO (continued)

inventory supports the availability of the DD-EFW Pump to fulfill its mission of supplying EFW flow to one or both steam generators. The DD-EFW pump is required to provide emergency feedwater to one or two steam generators under the EFIC flow control scheme for an anticipated operational occurrence (AOO) or a postulated DBA with loss of offsite power.

The starting air system is required to have a minimum capacity for six successive engine start attempts without recharging the air start receivers. As such, the air start compressors are not addressed as a part of this (or any other) LCO.

APPLICABILITY

Emergency feedwater flow is required during a Small Break LOCA or loss of main feedwater in order to cool and depressurize one or both generators which supports the reactor shut down and maintains it in a safe shutdown condition after an AOO or a postulated DBA. Since stored diesel fuel oil, lube oil, and the starting air subsystem support DD-EFW Pump OPERABILITY, these features are required to be within limits whenever the DD-EFW pump is required to be OPERABLE.

ACTIONS

A.1

With total fuel oil volume in the supply tank < 9,480 gallons and > 8,335 gallons, there is enough fuel oil available to operate the DD-EFW pump for 6 days. However, the Condition is restricted to fuel oil level reductions, that maintain at least a combined 6 day supply. In this Condition, a period of 48 hours is allowed prior to declaring the associated DD-EFW Pump inoperable.

The 48 hour Completion Time allows sufficient time for obtaining the requisite replacement volume and performing the analyses required prior to addition of fuel oil to the tank. This period is acceptable based on the remaining capacity (> 6 days), the actions that will be initiated to obtain replenishment, and the low probability of an event occurring during this brief period.

(continued)

BASES

ACTIONS

B.1

With stored lube oil inventory between 178 and 207 gallons, there is not sufficient lube oil to support 7 days continuous operation of the DD-EFW Pump. However, the Condition is restricted to lube oil volume reductions that maintain at least a 6 day supply. In this Condition, a period of 48 hours is considered adequate to restore the required volume prior to declaring the DD-EFW Pump inoperable. The volume of stored lube oil specified does not include the engine lube oil inventory contained in the sump. If the required stored volume cannot be restored, the DD-EFW Pump is declared inoperable.

The 48 hour Completion Time is acceptable based on the remaining capacity (> 6 days), the low rate of usage, the actions that will be initiated to obtain replenishment, and the low probability of an event occurring during this brief period.

C.1

This Condition is entered as a result of a failure to meet the acceptance criterion for DD-EFW Pump fuel oil particulates. Normally, trending of particulate levels allows sufficient time to correct high particulate levels prior to reaching the limit of acceptability. However, poor sample procedures (bottom sampling), contaminated sampling equipment, and errors in laboratory analysis can produce failures that do not follow a trend. Since the presence of particulates does not mean the fuel oil will not burn properly and given that proper engine performance has been recently demonstrated (per SR 3.7.5.2), it is prudent to allow a brief period of time prior to declaring the associated DD-EFW Pump inoperable. The 7 day Completion Time allows for further evaluation, resampling, and re-analysis of the DD-EFW Pump fuel oil.

(continued)

BASES

ACTIONS

D.1

With the new fuel oil properties defined in the Bases for SR 3.7.19.3 (fuel oil surveillance testing) not within the required limits, a period of 30 days is allowed for restoring the stored fuel oil properties prior to declaring the associated DD-EFW Pump inoperable. This period provides sufficient time to test the stored fuel oil to determine that the new fuel oil, when mixed with previously stored fuel oil, remains acceptable, or to restore the stored fuel oil properties. This restoration may involve feed and bleed, filtering, or combinations of these procedures. Even if the DD-EFW Pump start and load was required during this time and the fuel oil properties were outside limits, there is a high likelihood that the DD-EFW Pump would still be capable of performing its intended function.

E.1

EFP-3 is equipped with two redundant banks of starting air receivers and associated components (air start motors, solenoid valves, etc.). Only one of these banks is required for operability.

With starting air receiver pressure < 177 psig, sufficient capacity for six successive DD-EFW Pump start attempts does not exist. However, as long as the receiver pressure is > 150 psig, there is adequate capacity for at least one start attempt, and the DD-EFW Pump can be considered OPERABLE while the air receiver pressure is restored to the required limit.

A period of 48 hours is considered sufficient to complete restoration to the required pressure prior to declaring the DD-EFW Pump inoperable. This period is acceptable based on the remaining air start capacity, the fact that most diesel engine starts are accomplished on the first attempt, and the low probability of an event occurring during this brief period.

F.1

With a Required Action and associated Completion Time not met, with fuel oil, lube oil, or starting air subsystems not within limits for reasons other than addressed by Conditions A through E, the DD-EFW Pump must be immediately declared inoperable. In this case, the ACTION for Specification 3.7.5, is entered.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.19.1

This SR provides verification that there is an adequate inventory of fuel oil in the supply tank to support operation of the DD-EFW pump for 7 days, assuming no offsite power and Appendix K decay heat removal EFW flow requirements. The 7 days is sufficient time to place the plant in a safe shutdown condition and to bring in replenishment fuel from an offsite location.

The 31 day Frequency is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and the likelihood of any large reductions (use or leakage) of fuel oil during this period would be detected.

SR 3.7.19.2

This Surveillance ensures that sufficient lube oil inventory is available to support at least 7 days of operation of DD-EFW Pump assuming Appendix K decay heat removal EFW flow requirements. The 207 gallon requirement is based on DD-EFW Pump lube oil consumption test data. The stored lube oil volume does not include the lube oil contained in the sump.

A 31 day Frequency is adequate to ensure that a sufficient lube oil supply is onsite, since DD-EFW pump starts and run time are closely monitored by the plant staff.

SR 3.7.19.3

The tests listed below are a means of determining whether new fuel oil is of the appropriate grade and has not been contaminated with substances that would have an immediate, detrimental impact on diesel engine performance. If results from these tests are within acceptable limits, the fuel oil may be added to the storage tanks without concern for contaminating the entire volume of fuel oil in the storage tanks. These tests are to be conducted prior to adding the

(continued)

BASES

ACTIONS

A.2 (continued)

If at any time during the existence of Condition A (one offsite circuit inoperable) both 'a' and 'b' above become met, this Completion Time begins to be tracked.

The remaining OPERABLE offsite circuit and EDGs are adequate to supply electrical power to Train A and Train B of the onsite Class 1E distribution system. The 24 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 24 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

A.3

According to the recommendations of Regulatory Guide 1.93 (Ref. 6), operation with one required offsite circuit inoperable should be limited to a period of time not to exceed 72 hours. In this condition, the reliability of the offsite system is degraded, and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the unit safety systems. However, the remaining OPERABLE offsite circuit and EDGs are adequate to supply electrical power to the onsite Class 1E distribution system.

The 72 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

The 6 day Completion Time for Required Action A.3 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failure to meet the LCO. If Condition A is entered while, for instance, an EDG is inoperable and that EDG is subsequently returned to OPERABLE status, LCO 3.8.1 may already have been not met for up to 72 hours. This could lead to a total of 144 hours, since initial failure to meet the LCO, to restore the offsite circuit. At this time, an EDG could again become inoperable, the circuit restored to OPERABLE status, and an

(continued)

BASES

ACTIONS

A.3 (continued)

additional 72 hours (for a total of 9 days) allowed prior to complete restoration of the LCO. The 6 day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently.

As in Required Action A.2, the Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time that the LCO was initially not met, instead of at the time Condition A was entered.

B.1

To ensure a highly reliable power source in the event one EDG is inoperable, it is necessary to verify the availability of the OPERABLE offsite circuits on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action being not met (Condition F). However, if a circuit fails to pass SR 3.8.1.1, it is inoperable. Upon offsite circuit inoperability, additional Conditions and Required Actions must then be entered.

B.2

Required Action B.2 is intended to provide assurance that a loss of offsite power, during the period that a EDG is inoperable, does not result in a complete loss of safety function of critical redundant required features. These features are designed with redundant safety related trains. Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable EDG. Single train systems (from an electrical perspective), such as the turbine driven emergency feedwater pump, are not included.

(continued)

BASES

ACTIONS

B.2 (continued)

The Completion Time for Required Action B.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilties. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. An EDG is inoperable; and

b. A required feature on the other train is inoperable.

If at any time during the existence of this Condition (one EDG inoperable) a required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

Declaring the required features inoperable within four hours from the discovery of items 'a' and 'b' existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the plant to transients associated with shutdown.

In this Condition, the remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to the onsite Class 1E distribution system. Thus, on a component basis, single-failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

(continued)

BASES

ACTIONS

B.3.1 and B.3.2

Required Action B.3.1 provides an option to testing the OPERABLE EDG in order to avoid unnecessary testing. If it can be determined that the cause of the inoperable EDG does not exist on the OPERABLE EDG, SR 3.8.1.2 does not have to be performed. If the cause of inoperability exists on the other EDG, the other EDG would be declared inoperable upon discovery and Condition E of LCO 3.8.1 would be entered. If the common cause failure evaluation is indeterminate (the cause of the initial inoperable EDG cannot be confirmed not exist on the remaining EDG), performance of SR 3.8.1.2 is adequate to provide assurance of continued OPERABILITY of that EDG.

The Completion Time of 24 hours is reasonable to confirm that the OPERABLE EDG is not affected by the same problem as the inoperable EDG and is based on the recommendations of Generic Letter 84-15 (Ref. 7).

B.4

According to the recommendations of Regulatory Guide 1.93 (Ref. 6), operation with one EDG inoperable should be limited to a period not to exceed 72 hours.

In Condition B, the remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to the onsite Class 1E distribution system. The 72 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

The 6 day Completion Time for Required Action B.4 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failure to meet the LCO. Refer to the Bases for Required Action A.3 for additional information on this Completion Time.

(continued)

BASES

LCO (continued)

AC, DC, and AC vital bus electrical power distribution subsystems are considered OPERABLE when the associated buses, load centers, MCCs, and distribution panels are energized to their proper voltages.

In addition, tie breakers between 480 V ES bus 3A and 3B must be open. This prevents an electrical malfunction in any power distribution subsystem from propagating to the redundant subsystem. If this were to occur, it could cause the failure of a redundant subsystem and a loss of essential safety function(s). If any tie breakers are closed, the affected redundant electrical power distribution subsystems are no longer redundant and one train must be considered inoperable. This applies to the onsite, safety related redundant electrical power distribution subsystems. It does not, however, preclude redundant Class 1E 4160 V buses from being powered from the same offsite circuit.

APPLICABILITY

The electrical power distribution subsystems are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients; and

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

Electrical power distribution subsystem requirements for MODES 5 and 6 are addressed in the Bases for LCO 3.8.10, "Distribution Systems-Shutdown."

ACTIONS

A.1

With one AC electrical power distribution subsystem inoperable, the remaining AC electrical power distribution subsystem in the other train is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. However, the overall reliability is reduced because a single failure in the remaining power distribution subsystems could result in the minimum required ES functions not being met. Therefore, the required AC buses, load centers, MCCs, and distribution panels must be restored to OPERABLE status within 8 hours.

(continued)

BASES

ACTIONS

A.1 (continued)

The most severe scenario addressed by Condition A is an entire train without AC power (i.e., no offsite power to the train and the associated EDG inoperable). In this condition, the plant has an increased vulnerability to a complete loss of AC power. It is, therefore, imperative that the operator's attention be focused on minimizing the potential for loss of power to the remaining train by stabilizing the plant, and on restoring power to the affected train. The 8 hour time limit for restoration, prior to requiring a plant shutdown in this Condition is acceptable because of:

a. The potential for decreased safety if the operator's attention is diverted from the evaluations and actions necessary to restore power to the affected train to the actions associated with shutting down the plant within this time limit; and

b. The low probability of an event occurring coincident with a single failure of a redundant component in the train with AC power.

The 16 hour Completion Time for Required Action A.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failure to meet the LCO. If Condition A is entered while, for instance, a DC bus is inoperable and subsequently restored to OPERABLE status, LCO 3.8.9 may already have been not met for up to 2 hours. This could lead to a total of 10 hours, since initial failure of the LCO, to restore the AC distribution system. At this time, a DC circuit could again become inoperable, and AC distribution restored to OPERABLE status. This could continue indefinitely.

The Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time the LCO was initially not met, instead of the time Condition A was entered. The 16 hour Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

(continued)

BASES

ACTIONS

B.1

With one AC vital bus inoperable, the remaining OPERABLE AC vital buses are capable of supporting the minimum safety functions necessary to shut down the unit and maintain it in the safe shutdown condition. Overall reliability is reduced, however, since an additional single failure could result in the minimum required ES functions not being supported. Therefore, the AC vital bus must be restored to OPERABLE status within 8 hours.

Condition B represents a condition in which potentially both the DC source and the associated AC source are nonfunctional. In this situation the plant is significantly more vulnerable to a complete loss of all non-interruptible power. It is, therefore, imperative that the operator's attention focus on stabilizing the plant, minimizing the potential for loss of power to the remaining vital buses and restoring power to the affected vital bus.

The 8 hour limit is more conservative than Completion Times allowed for the vast majority of components that would be without adequate AC vital power. However, there are certain affected features Completion Times of shorter duration. The intent of the Improved Technical Specifications is to remain within this Specification only and not take the ACTIONS for inoperable supported systems. Taking this exception to LCO 3.0.2 for components without adequate vital AC power, that would have the Required Action Completion Times shorter than 8 hours if declared inoperable, is acceptable because of:

a. The potential for decreased safety by requiring a change in unit conditions (i.e., requiring a shutdown) and not allowing stable operations to continue;

b. The potential for decreased safety by requiring entry into numerous applicable Conditions and Required Actions for components without adequate vital AC power and not providing sufficient time for the operators to perform the necessary evaluations and actions for restoring power to the affected train; and

c. The low probability of an event occurring coincident with a single failure of a redundant component.

(continued)

BASES

ACTIONS

B.1 (continued)

The 8 hour Completion Time takes into account the importance of restoring the AC vital bus to OPERABLE status, the redundant capability afforded by the other OPERABLE vital buses, and the low probability of a DBA occurring during this period.

The 16 hour Completion Time for Required Action B.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failure. Refer to the Bases for Required Action A.1 for further discussion of this Completion Time.

C.1

With DC bus(es) in DC electrical power distribution train inoperable, the remaining train is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining DC electrical power distribution train could result in the minimum required ES functions not being met. Therefore, the DC buses must be restored to OPERABLE status within 2 hours.

Condition C represents a condition in which one train is without adequate DC power; potentially both with the battery significantly degraded and the associated charger inoperable. In this situation, the plant is significantly more vulnerable to a complete loss of all DC power. It is, therefore, imperative that the operator's attention focus on stabilizing the plant, minimizing the potential for loss of power to the remaining trains and restoring power to the affected train.

The 2 hour limit is more conservative than Completion Times allowed for the vast majority of components that would be without adequate AC vital power. However, there are certain affected features with Completion Times of shorter duration. The intent of the Improved Technical Specifications is to remain within this Specification only and not take the ACTIONS for inoperable supported systems. Taking this exception to LCO 3.0.2 for components without adequate vital AC power, that would have the Required Action Completion

(continued)

BASES

ACTIONS

C.1 (continued)

Times shorter than 2 hours if declared inoperable, is acceptable because of:

a. The potential for decreased safety by requiring a change in plant conditions (i.e., requiring a shutdown) while allowing stable operations to continue;

b. The potential for decreased safety by requiring entry into numerous applicable Conditions and Required Actions for components without DC power and not providing sufficient time for the operators to perform the necessary evaluations and actions to restore power to the affected train; and

c. The low probability of an event occurring coincident with a single failure of a redundant component.

The 2 hour Completion Time for DC buses is consistent with the recommendations of Regulatory Guide 1.93 (Ref. 3).

The 16 hour Completion Time for Required Action C.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failure to meet the LCO. Refer to the Bases for Required Action A for further discussion of this Completion Time.

D.1 and D.2

If the inoperable distribution subsystem cannot be restored to OPERABLE status within the associated Completion Time, the plant must be placed in a MODE in which the LCO does not apply. To achieve this status, the plant must be placed in at least MODE 3 within 6 hours and in MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required MODES from full power conditions in an orderly manner and without challenging plant systems.

(continued)

BASES

ACTIONS (continued)

E.1

Condition E corresponds to a level of degradation in which redundant safety-related trains have lost power to one or more busses. At this severely degraded level, the plant's ability to respond to an event may be significantly reduced. Therefore, if it is determined that redundant trains of a necessary function are concurrently inoperable, no additional time is justified for continued operation. The plant is required to immediately enter LCO 3.0.3 and begin preparations for a controlled shutdown.

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