ITS DISCUSSION OF DIFFERENCES

ITS Section 3.3B: Instrumentation - ESAS

Note: The ITS Section 3.3B package addresses the following NUREG-1430 LCOs:
- 3.3.5 ESFAS Instrumentation
- 3.3.6 ESFAS Manual Initiation
- 3.3.7 ESFAS Automatic Actuation Logic

1 NUREG 3.3.5, 3.3.6, & 3.3.7 - The ANO-1 unit specific terminology has been inserted to replace generic usage in NUREG 3.3.5, 3.3.6, and 3.3.7. Specifically, the term "Engineered Safety Feature Actuation System (ESFAS)" has been replaced with the ANO-1 unit specific term "Engineered Safeguards Actuation System (ESAS)." The associated acronyms have also been changed as appropriate. The corresponding Bases have been marked to indicate these changes, however the reference to this discussion is generally made only once per page to conserve space and maintain readability. These changes were made to maintain the usage of terminology consistent with design and licensing basis documentation. This change is consistent with current license basis.

2 NUREG 3.3.5 – Condition B has been revised to specify that this Condition applies when more than one channel is inoperable for each of one or more Parameters. This change was made to maintain requirements consistent with CTS Table 3.5.1-1 Column 5 and Note 1 which provide specific requirements for the inoperability of more than one channel. This change is consistent with current license basis.

Without this addition, entry into the ACTION requirements of ITS LCO 3.0.3 would be required if more than one channel is inoperable for each of one or more Parameters. Entry into the Required Actions of ITS 3.3.5 Condition B rather than the ACTION requirements of LCO 3.0.3 is more appropriate because, specific Required Actions, which result in the unit exiting the Applicability for each ESAS instrumentation Parameter, are provided in ITS 3.3.5. These Required Actions consistently result in the unit exiting the specific Applicability within a specific Completion Time. For example, ITS LCO 3.0.3 ACTION requirements would not provide a specific Completion Time for reducing RCS pressure to less than 1750 psig, in the event more than one channel of the RCS Pressure--Low Setpoint Parameter was inoperable. This change is consistent with TSTF-217, Rev. 1, as revised to reflect plant specific terminology.

3 NUREG 3.3.5 - Response time testing of the Engineered Safeguards Actuation System (ESAS), i.e., NUREG SR 3.3.5.4, is not adopted in ITS. Testing of this type is not required by ANO-1 CTS. Deletion of these Surveillance Requirements maintains consistency with the current ANO-1 licensing basis and neither removes any current requirement nor adds any additional requirement.

4 NUREG 3.3.5 – Table 3.3.5-1 Parameter 2, "Reactor Coolant System Pressure-Low Low Setpoint," and the specific Required Action associated with that Parameter, NUREG 3.3.5 Required Action B.2.2, are not adopted in ITS. The design of the ANO-1 ESAS includes only one low reactor coolant system pressure setpoint. This setpoint is used as an actuation initiator for both High Pressure Injection and Low Pressure Injection Systems. These changes were made to provide requirements appropriate for the ANO-1 unit specific system design. This change is consistent with current license basis.

5 NUREG 3.3.5, 3.3.6, and 3.3.7 - The unit specific design of the ANO-1 ESAS provides for three analog instrument channels for each of the monitored parameters. These three analog instrument channels provide the required input to each of the ten digital actuation logic channels. Contrary to the system design depicted in the requirements of NUREG-1430, these three analog instrument channels provide input to both trains of digital actuation logic channels. This unit specific design difference required the deletion of the phrase "in each ESFAS train" from LCO 3.3.5 as well as appropriate changes to the Bases to designate unit specific digital and analog channel terminology. This change is consistent with current license basis.

6 NUREG 3.3.5 - Specific detail of the equipment actuated by each of the Parameters listed in NUREG Table 3.3.5-1 has been removed. Similar details are included in the appropriate Bases sections and are not specifically pertinent requirements of LCO 3.3.5. Removal of this information represents no actual change in requirements, only a change in presentation of amplifying information. This change is considered editorial.

7 NUREG 3.3.6 & 3.3.7 - The Applicability of ITS 3.3.6 and ITS 3.3.7 has been modified to only include the portions of MODE 3 in which the associated ES equipment is required to be OPERABLE. This change was made to reflect the fact that some ESAS actuated equipment is not required in either MODE 3 or MODE 4. For example, neither CTS nor the proposed ITS requires the RB Spray Additive (sodium hydroxide) system, which is actuated by the ESAS, to be OPERABLE below MODE 2. This change was made to provide Applicabilities for the ESAS requirements which are consistent with the Applicabilities of the actuated equipment. Without this change, the actuating components would be required to be Operable when the components being actuated are not required to be Operable. This change is consistent with the current license basis.

8 NUREG 3.3.7 - The Frequency of ITS SR 3.3.7.1 has been adopted as 31 days. The change to the NUREG-1430 Frequency of 31 days on a STAGGERED TEST BASIS was made to retain testing requirements on a Frequency consistent with the CTS. The CTS requires this testing monthly, which is considered administratively equivalent to the proposed 31 day Frequency. This change is consistent with current license basis.

9 NUREG 3.3.6 and 3.3.7 - The Functions specified in NUREG ITS 3.3.6 have been modified to match the Functions as presented in the CTS and in the ANO-1 SAR. Identification of the digital actuation logic channel numbers which correspond to the Functions stated in the LCO have been provided in the Bases for additional clarity. ITS 3.3.7 has also been modified to include ANO-1 unit specific terminology, e.g., analog instrument channels and digital actuation logic channels. These changes were made to provide requirements consistent with the design of the ANO-1 ESAS and consistent with the specific terminology and names associated with the ANO-1 ESAS. Additional associated Bases changes are also included in B3.3.5, B3.3.6, and B3.3.7. These changes are consistent with current license basis.

10 NUREG Bases 3.3.5, 3.3.6, and 3.3.7 - ANO-1 unit specific terminology and design details have been added to the Bases of ITS 3.3.5, 3.3.6, and 3.3.7. Additionally, information which is not specifically pertinent to the Bases discussion for these specifications and which may be duplicative of information contained in the SAR has been removed. These changes provide unit specific details of system design, maintain usage of terminology consistent with design and licensing basis documentation, e.g., development of trip setpoints and Allowable Values, and reduce duplication of discussion which is not specifically pertinent to the specifications. These changes are consistent with current license basis.

3.3.5-01 The specified Allowable Values are conservative with respect to Instrument Society of American Standard, ISA-S67-04, "Setpoints of Nuclear Safety Related Instrumentation Used in Nuclear Power Plants." Actual in-plant setpoints are equal to or conservative to the specified Allowable Values and include instrument uncertainties where appropriate. A discussion of the instrument uncertainty methodology employed may be found in letter dated May 10, 2000, approving Amendment 207 to the ANO-1 Operating License.

11 NUREG Bases 3.3.5 – SR 3.3.5.1 Bases discussion of the performance of CHANNEL CHECKS on off scale instruments was removed. The instrument channels associated with the ANO-1 ESAS are not expected to be in an off scale condition while performance of this SR is required, therefore this potentially confusing discussion is not adopted. This change is consistent with current license basis.

12 NUREG SR 3.3.5.2 and Bases - The Note allowing a channel to be placed in an inoperable status for the performance of the Channel Functional Test for a limited period of time is not incorporated in the ITS. The ANO-1 design of ESAS does not include a channel bypass for testing. The built-in test facilities permit an electrical trip test of each analog instrument string by the substitution of signals at the buffer amplifiers. When an analog instrument string is placed in test, all associated analog subsystem outputs go to the trip state. This assures that all protective action cannot be defeated by placing analog instrument strings in test. This change is consistent with the current license basis.

13 NUREG Bases 3.3.6 - The Applicable Safety Analyses discussion has been modified to remove the implication that the OPERABILITY of the ESAS Manual Initiation was required to be OPERABLE in all MODES, "at any time." Additionally, reference to the ability to specify the use of the ESAS manual initiation in operating procedures was removed. This ability exists for this and numerous other Functions. However, that fact is not pertinent to this discussion. Furthermore, it implies that specifying other functions in operating procedures might be inappropriate. This change is consistent with current license basis.

14 NUREG Bases - The Criterion statement at the conclusion of the Applicable Safety Analysis section was modified at each occurrence to refer to 10 CFR 50.36 instead of the NRC Policy Statement. This is an editorial change associated with the implementation of the 10 CFR 50.36 rule changes after NUREG-1430, Revision 1 was issued.

The 10 CFR 50.36 Criterion satisfied by the ITS LCOs was modified to preserve consistency with the ANO-1 license basis. The NUREG Criterion specified were modified to be consistent with the analysis assumptions regarding equipment availability and operating condition (i.e., MODE). For ITS 3.3.6, Manual ESAS Initiation is not credited in any ANO-1 safety analysis, therefore, Criterion 4 was identified. This change is consistent with current license basis and 10 CFR 50.36.

15 NUREG Bases 3.3.7 - Unit specific clarification of the use of ITS 3.3.7 Required Actions A.1 and A.2 has been added to the Bases (B3.3.7). These additions have been made to provide additional guidance and clarification on the proper usage of the Required Actions without changing the intent of the ACTIONS.

16 Not used.

3.3.5-03

17 The details surrounding the CHANNEL FUNCTIONAL TEST of the Reactor Building Spray System Logic Channels have been included in the NUREG 1430 Bases SR 3.3.7.1. This information was formerly located in CTS Table 4.1-1 Function 20. The addition of this information has been made to provide acceptable guidance and clarification concerning the testing of this Functional Unit.

CTS

3.3 INSTRUMENTATION

3.3.5 Engineered Safeguards Safety Feature Actuation System (ESFAS) Instrumentation

LCO 3.3.5 Three ESAS analog instrument channels of ESFAS instrumentation for each Parameter in Table 3.3.5-1 shall be OPERABLE in each ESFAS train.

Table 3.5.1-1 ESAS Functional Unit 1a, 1b, 2a, 2b, 3a, 4a, 5a

APPLICABILITY: According to Table 3.3.5-1.

N/A

ACTIONS

NOTE
Separate Condition entry is allowed for each Parameter.

N/A

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Parameters with one analog instrument channel inoperable.	A.1 Place channel in trip.	1 hour
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours
One or more Parameters with more than one analog instrument channel inoperable. OR	AND	
	B.2 NOTE: Only required for RCS Pressure—Low setpoint.	
	Reduce RCS pressure < [1800] 1750 psig. AND	36 hours
		(continued)

Table 3.5.1-1 Note 6

Table 3.5.1-1 Note 1

N/A

CTS

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.2.2 --------NOTE-------- Only required for RCS Pressure—Low Low setpoint. ---------- Reduce RCS pressure < [900] psig. AND	36 hours
	B.2.3 --------NOTE-------- Only required for Reactor Building Pressure High setpoint and High High setpoint. ---------- Be in MODE 5.	36 hours

EDIT

N/A

Table 3.5.1-
Note 5

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.3.5.1 Perform CHANNEL CHECK.	12 hours

(continued)

Table 4.1-1
"Check" Item
15a, b
17a, b
19a
NA

CTS

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.5.2	NOTE When an ESFAS channel is placed in an inoperable status solely for performance of this Surveillance, entry into associated Conditions and Required Actions may be delayed for up to 8 hours, provided the remaining two channels of ESFAS instrumentation are OPERABLE or tripped. Perform CHANNEL FUNCTIONAL TEST.	31 days
SR 3.3.5.3	Perform CHANNEL CALIBRATION.	[18] months
SR 3.3.5.4	Verify ESFAS RESPONSE TIME within limits.	[18] months on a STAGGERED TEST BASIS

(1)

N/A

(12)

Table 4.1-1 "Test" Items 15a,b 17a,b 19a, 21a

→ Table 4.1-1 "Calibrate" Items 15a,b 17a,b 19a,21

(3)

CTS

Table 3.3.5-1 (page 1 of 1)
Engineered Safety Feature Actuation System Instrumentation

PARAMETER	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	ALLOWABLE VALUE
1. Reactor Coolant System Pressure – Low Setpoint (HPI Actuation, RB Isolation, RB Cooling, EDG Start)	≥ [1600] psig	≥ [1600] psig
2. Reactor Coolant System Pressure – Low Low Setpoint (HPI Actuation, LPI Actuation, RB Isolation, RB Cooling)	≥ [900] psig	≥ [400] psig
2. Reactor Building (RB) Pressure – High Setpoint (HPI Actuation, LPI Actuation, RB Isolation, RB Cooling)	1,2,3,4	≤ [5] psig
3. RB Pressure – High High Setpoint (RB Spray Actuation)	1,2,3,4	≤ [30] psig

1750
1585
18.7 psia
44.7 psia

Table 3.5.1-1 ESAS Function 1a, 2a
3.5.3
NA
Table 3.5.1-1 ESAS Function 1b, 2b, 3a
3.5.3
NA
edit
3.5.3
NA
Table 3.5.1-1 ESAS Function 4a, 5a

CTS

3.3 INSTRUMENTATION

3.3.6 Engineered Safeguards Actuation System (ESFAS) Manual Initiation

LCO 3.3.6 Two manual initiation channels of each one of the ESFAS Functions below shall be OPERABLE:

a. High Pressure Injection (channels 1 and 2);
b. Low Pressure Injection (channels 3 and 4);
c. Reactor Building (RB) Cooling (channels 5 and 6);
d. RB Spray (channels 7 and 8); and
e. RB Isolation; and
f. Control Room Isolation.]
e. Spray Additive (channels 9 and 10).

Table 3.5.1-1 Functional Units
1.C
2.C
3.b
4.b
5.b

APPLICABILITY: MODES 1, 2, and 3, MODE 4 when associated engineered safeguards equipment is required to be OPERABLE.

MODES 3 and 4

N/A edit

ACTIONS

NOTE
Separate Condition entry is allowed for each Function.

N/A

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more ESFAS Functions with one channel inoperable.	A.1 Restore channel to OPERABLE status.	72 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND	6 hours (continued)

N/A

Table 3.5.1-1 Note 1

(1)

CTS

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.2 Be in MODE 5.	36 hours

Table 3.5.1-1 Note 5

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.3.6.1 Perform CHANNEL FUNCTIONAL TEST.	~~[18]~~ months

Table 4.1-1 Item 43a

3.3 INSTRUMENTATION

3.3.7 Engineered Safety Feature Actuation System (ESFAS) Automatic Actuation Logic

LCO 3.3.7 All the ESFAS automatic actuation logic matrices shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3, MODE 4 when associated engineered safeguard equipment is required to be OPERABLE.

ACTIONS

NOTE
Separate Condition entry is allowed for each automatic actuation logic matrix.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more automatic actuation logic matrices inoperable.	A.1 Place associated component(s) in engineered safeguard configuration.	1 hour
	OR	
	A.2 Declare the associated component(s) inoperable.	1 hour

(9) CTS

(1)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.7.1	Perform digital actuation logic CHANNEL FUNCTIONAL TEST.	31 days on a STAGGERED TEST BASIS (5) (9) (8) Table 4.1-1 Items 14, 16, 18, 20, 43b

B 3.3 INSTRUMENTATION

B 3.3.5 Engineered Safeguards Actuation System (ESFAS) Instrumentation

BASES

BACKGROUND

The ESFAS initiates necessary safety systems, based on the values of selected unit Parameters, to protect against violating core design limits and ~~reactor coolant pressure boundary and~~ to mitigate accidents.

ESFAS actuates the following systems:

- High pressure injection (HPI) Actuation;
- Low pressure injection (LPI) Actuation;
- Reactor building (RB) Cooling;
- RB Spray;
- RB Isolation; and
- Emergency diesel generator (EDG) Start.

ESFAS also provides a signal to the Emergency Feedwater Isolation and Control (EFIC) System. This signal initiates emergency feedwater (EFW) when HPI is initiated.

The ESFAS operates in a distributed manner to initiate the appropriate systems. The ESFAS does this by determining the need for actuation in each of three channels monitoring each actuation Parameter. Once the need for actuation is determined, the condition is transmitted to automatic actuation logics which perform the two-out-of-three logic to determine the actuation of each end device. Each end device has its own automatic actuation logic, although all automatic actuation logics take their signals from the same point in each channel for each Parameter.

Three Four Parameters are used for actuation:

- Low Reactor Coolant System (RCS) Pressure;
- ~~Low~~ Low RCS ~~Pressure~~;
- High RB Pressure; and

Reactor Building (RB)

(continued)

analog instrument

digital

channels

edit

BASES

BACKGROUND (continued)

- High High RB Pressure.

LCO 3.3.5 covers only the instrumentation channels that measure these Parameters. These channels include the intervening equipment necessary to produce actuation before the measured process Parameter exceeds the limits assumed by the accident analysis. This includes sensors, bistable devices, operational bypass circuitry, block timers, and output relays. LCO 3.3.6, "Engineered Safety Feature Actuation System (ESFAS) Manual Initiation," and LCO 3.3.7, "Engineered Safety Feature Actuation System (ESFAS) Automatic Actuation Logic," provide requirements on the manual initiation and automatic actuation logic Functions.

The ESFAS consists of three protection channels. Each channel provides input to logics that initiate equipment with a two-out-of-three logic on each component. Each protection channel includes bistable inputs from one instrumentation channel of Low RB Pressure, Low Low RCS Pressure, High RB Pressure, and High High RB Pressure. Automatic actuation logics combine the three protection channel trips in each train to actuate the individual Engineered Safety Feature (ESF) components needed to initiate each ESF System. Figure [ ], FSAR, Chapter [7] (Ref. 1), illustrates how instrumentation channel trips combine to cause protection channel trips.

The RCS pressure sensors are common to both trains. Isolation is provided via separate bistables for each train. Separate RB pressure sensors are used for the high and high high pressure Functions in each train, and separate sensors are used for each train.

The following matrix identifies the measurement channels and the Function actuated by each Parameter.

(continued)

<INSERT B3.3-46A>

The ESAS monitors three parameters via analog instrument channels. Each analog instrument channel provides input to the appropriate digital actuation logic channels that initiate equipment with a two-out-of-three coincidence logic on each digital channel. Each digital actuation logic channel includes bistable inputs from all three analog instrument channels of one parameter, i.e., either Low RCS Pressure, High RB Pressure, or High High RB Pressure. The digital actuation logic combines the analog instrument channel trips to actuate the individual Engineered Safeguards (ES) components needed to initiate each ES System. Figure 7.6, SAR, Chapter 7 (Ref. 1), also illustrates how analog instrument channel trips combine to cause digital actuation logic channel trips.

<INSERT B3.3-46B>

The ESAS is divided into five Functions actuated by ten digital actuation logic channels.

The ESAS High Pressure Injection (HPI) Function is actuated by ESAS digital actuation logic channels 1 and 2 and includes the following system actuations: HPI, a subset of RB isolation valves, diesel generators (DGs), and ES electrical alignment. Digital actuation logic channels 1 and 2 are actuated by two-out-of-three RCS Pressure—Low analog instrument channels, or two-out-of-three RB Pressure—High analog instrument channels.

The ESAS Low Pressure Injection (LPI) Function is actuated by ESAS digital actuation logic channels 3 and 4 and includes the following system actuations: LPI, a subset of RB isolation valves, and emergency feedwater (EFW) through an ESAS signal provided to the Emergency Feedwater Initiation and Control (EFIC) Instrumentation System. Digital actuation logic channels 3 and 4 are actuated by two-out-of-three RCS Pressure—Low analog instrument channels, or two-out-of-three RB Pressure—High analog instrument channels.

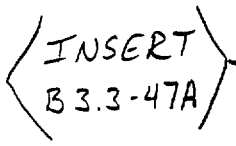
The ESAS RB Cooling Function is actuated by ESAS digital actuation logic channels 5 and 6 and includes the following system actuations: RB cooling, a subset of RB isolation valves, and RB penetration room ventilation system. Digital actuation logic channels 5 and 6 are actuated by two-out-of-three RB Pressure—High analog instrument channels.

The ESAS RB Spray Function is actuated by ESAS digital actuation logic channels 7 and 8 and includes the following system actuations: RB spray. Digital actuation logic channels 7 and 8 are actuated by two-out-of-three RB Pressure—High High analog instrument channels.

The ESAS Spray Additive Function is actuated by ESAS digital actuation logic channels 9 and 10 and includes the following system actuations: spray additive. Digital actuation logic channels 9 and 10 are actuated by two-out-of-three RB Pressure—High High analog instrument channels.

BASES

BACKGROUND
(continued)



PARAMETER	LOW RCS PRESSURE	LOW LOW RCS PRESSURE	HIGH RB PRESSURE	HIGH HIGH RB PRESSURE
HPI	X	X	X	
LPI		X		X
RB Cooling	X	X	X	(b)
RB Spray	(b)			
RB Isolation(a)	X	X	X	
EDG Start	X	X	X	
Control Room Isolation			X	

(a) Only isolates systems not required for RB or RCS heat removal.

(b) Actuates on High High RB Pressure coincident with HPI actuation.

Engineered safeguards bus undervoltage will also sequence on the HPI loads started by the HPI block timers. However, HPI will not occur unless the ESFAS HPI signal is also present. LCO 3.3.8, "Emergency Diesel Generator (EDG) Loss of Power Start (LOPS)," contains the requirements for the undervoltage channels.

The ESF equipment is divided between the two redundant actuation trains A and B. The division of the equipment between the two actuation trains is based on the equipment redundancy and function and is accomplished in such a manner that the failure of one of the actuation channels and the related safeguards equipment will not inhibit the overall ESF functions. Where a motor operated or a solenoid operated valve is driven by either of two matrices, one is from actuation channel A and one from actuation channel B. Redundant ESF pumps are controlled from separate and independent actuation channels.

The actuation of ESF equipment is also available by manual actuation switches located on the control room console.

(continued)

<INSERT B3.3-47A>

ESAS Digital Actuation Logic Channels	Actuated Systems	Parameter		
		RCS Press. Low	RB Press. High	RB Press. High High
1 and 2	Subset of RB Isolation, ES Electrical Alignment, HPI, and DG Start.	X	X	
3 and 4	Subset of RB isolation, LPI, and EFIC EFW.	X	X	
5 and 6	Subset of RB Isolation, RB Cooling, and Penetration Room Vent.		X	
7 and 8	RB Spray			X
9 and 10	Spray Additive			X

BASES

BACKGROUND (continued)

The ESFAS, in conjunction with the actuated equipment, provides protective functions necessary to mitigate Design Basis Accidents (DBAs), specifically the loss of coolant accident (LOCA) and steam line break (SLB) events. The ESFAS relies on the OPERABILITY of the automatic actuation logic for each component to perform the actuation of the selected systems of LCO 3.3.7.

Engineered Safety Feature Actuation System Bypasses

No provisions are made for maintenance bypass of ESFAS instrumentation channels. Operational bypass of certain channels is necessary to allow accident recovery actions to continue and, for some channels, to allow reactor shutdown without spurious ESFAS actuation.

The ESFAS RCS pressure instrumentation channels include permissive bistables that allow manual bypass when reactor pressure is below the point at which the low and low low pressure trips are required to be OPERABLE. Once permissive conditions are sensed, the RCS pressure trips may be manually bypassed. Bypasses are automatically removed when bypass permissive conditions are exceeded.

INSERT B 3.3-48A

Each High RB Pressure channel may be manually bypassed after the other two channels in the Parameter have tripped. The manual bypass allows operators to take manual control of ESF Functions after initiation to allow recovery actions. The bypass may be manually removed and is automatically removed when RB pressure returns to below the trip setpoint.

Reactor Coolant System Pressure

The RCS pressure is monitored by three independent pressure transmitters located in the RB. These transmitters are separate from the transmitters that feed the Reactor Protection System (RPS). Each of the pressure signals generated by these transmitters is monitored by four bistables to provide two trip signals, at 1500 psig and 500 psig, and two bypass permissive signals, at 1700 psig and 900 psig. (a)

≥ 1585

≤ 1750

The outputs of the three bistables associated with the low RCS pressure 1500 psig trip drive relays in two sets

low RCS pressure trip

(continued)

<INSERT B3.3-48A>

3.3.5-02

Failure of the automatic bypass removal feature or the inability to bypass the RCS pressure function when below 1750 psig does not constitute channel inoperability. However, a channel that remains bypassed when pressure is raised above 1750 psig will be considered inoperable and appropriate conditions will be entered. This bypass provides an operational provision only outside the Applicability for this Parameter, and provides no safety function. The automatic bypass removal feature is verified during the monthly CHANNEL FUNCTIONAL TEST.

BASES

BACKGROUND

Reactor Coolant System Pressure (continued)

(actuation channels A and B) of identical and independent channels. These two sets of HPI channels each use three logic channels used in two-out-of-three coincidence networks for HPI Actuation. The outputs of the three bistables associated with the Low Low RCS Pressure [500 psig] trip drive relays in two sets (actuation channels A and B) of identical and independent channels. These two sets of LPI channels each use three logic channels used in two-out-of-three coincidence networks for LPI Actuation. The outputs of the three Low Low RCS Pressure bistables also trip the drive relays in the corresponding HPI Actuation channel as previously described.

INSERT B3.3-49A

Reactor Building Pressure

RB pressure inputs to the ESFAS are provided by 12 pressure switches. Six pressure switches are used for the High RB Pressure Parameter, and six pressure switches are used for the High High Pressure Parameter.

INSERT B 3.3-49B

The output contacts of six High RB Pressure switches are used in two sets of identical and independent actuation trains. These two trains each use three logic channels. The outputs of these channels are used in two-out-of-three coincidence networks. The output contacts of the six RB pressure switches also trip the drive relays in the corresponding HPI and LPI Actuation channels as previously described.

The output contacts of six High High RB Pressure switches are used in two sets of identical and independent actuation trains. These two trains each use three logic channels (RB4, RB5, and RB6). The outputs of these channels are used in two-out-of-three coincident networks for RB Spray Actuation. Each high high pressure train actuates one RB Spray train when the High High RB signal and the HPI signal are coincident in that train.

Trip Setpoints and Allowable Values

Trip setpoints are the nominal value at which the bistables are set. Any bistable is considered to be properly adjusted

(continued)

INSERT B3.3-49A

Each analog instrument channel can be tested online to verify that the signal and trip setpoint are within the specified allowance requirements of approved calibration procedures. The built-in test facilities permit an electrical trip test of each analog instrument string by the substitution of signals at the buffer amplifiers. When an analog instrument string is placed in test, all associated analog subsystem outputs go to the trip state. This assures that all protective action cannot be defeated by placing analog instrument strings in test.

<INSERT B3.3-49B>

The RB pressure is monitored by three independent pressure transmitters located inside the RB. These transmitters are separate from the transmitters that feed the Reactor Protection System (RPS). Each of the pressure signals generated by these transmitters is monitored by two bistables to provide trip signals. The outputs of the bistables, associated with the RB Pressure—High and RB Pressure—High High trips, drive relays in two sets of identical and independent digital instrument channels. These two sets of channels each use two-out-of-three coincidence digital logic for automatic actuation.

Each analog channel can be tested online to verify that the signal and trip setpoint are within the specified allowance requirements of approved calibration procedures. The built-in test facilities permit an electrical trip test of each analog instrument string by the substitution of signals at the buffer amplifiers. When an analog instrument string is placed in test, all associated analog subsystem outputs go to the trip state. This assures that all protective action cannot be defeated by placing analog instrument strings in test.

BASES

BACKGROUND

Trip Setpoints and Allowable Values (continued)

when the "as left" value is within the band for CHANNEL CALIBRATION accuracy (i.e., ± [rack calibration + comparator setting accuracy]).

The trip setpoints used in the bistables are based on the analytical limits stated in Figure [ ], FSAR, Chapter [7] (Ref. 1). The selection of these trip setpoints is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment induced errors for those ESFAS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 2), the Allowable Values specified in Table 3.3.5-1 in the accompanying LCO are conservatively adjusted with respect to the analytical limits. A detailed description of the methodology used to calculate the trip setpoints, including their explicit uncertainties, is provided in the "Unit Specific Setpoint Methodology" (Ref. 3). The actual nominal trip setpoint entered into the bistable is more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a CHANNEL FUNCTIONAL TEST. One example of such a change in measurement error is drift during the surveillance interval. A channel is inoperable if its actual trip setpoint is not within its required Allowable Value.

Setpoints, in accordance with the Allowable Values, ensure that the consequences of DBAs will be acceptable, providing the unit is operated from within the LCOs at the onset of the DBA and the equipment functions as designed.

Each channel can be tested online to verify that the setpoint accuracy is within the specified allowance requirements of Reference 3. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated.

The Allowable Values listed in Table 3.3.5-1 are based on the methodology described in FSAR, Chapter [14] (Ref. 4), which incorporates all of the known uncertainties applicable for each channel. The magnitudes of these uncertainties are

(10)

(continued)

BASES

BACKGROUND

Trip Setpoints and Allowable Values (continued)

factored into the determination of each trip setpoint. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

[Reviewer's Note: The ESFAS LCOs in the BWOG Standard Technical Specifications are based on a system representative of the Crystal River Unit 3 design.] As discussed earlier, this arrangement involves measurement channels shared among all actuation functions, with separate actuation logic channels for each actuated component. In this arrangement, multiple components are affected by each instrumentation channel failure, but a single automatic actuation logic failure affects only one component. The organization of BWOG STS ESFAS LCOs reflects the described logic arrangement by identifying instrumentation requirements on an instrumentation channel rather than on a protective function basis. This greatly simplifies delineation of ESFAS LCOs. Furthermore, the LCO requirements on instrumentation channels, automatic actuation logics, and manual initiation are specified separately to reflect the different impact each has on ESFAS OPERABILITY.

APPLICABLE SAFETY ANALYSES

The following ESFAS Functions have been assumed within the accident analyses.

High Pressure Injection

The ESFAS actuation of HPI has been assumed for core cooling in the LOCA analysis and is credited with boron addition in the SLB analysis.

Low Pressure Injection

The ESFAS actuation of LPI has been assumed for large break LOCAs.

(continued)

BASES

The MSLB analysis also credits ESAS actuation of RB Cooling and RB Spray.

APPLICABLE SAFETY ANALYSES (continued)

Reactor Building Spray, Reactor Building Cooling, and Reactor Building Isolation

The ESFAS actuation of the RB coolers and RB Spray have been credited in RB analysis for LOCAs, both for RB performance and equipment environmental qualification pressure and temperature envelope definition. Accident dose calculations have credited RB Isolation and RB Spray.

RB Penetration Room Ventilation,

Emergency Diesel Generator Start Power

The ESFAS initiated EDG Start has been assumed in the LOCA analysis to ensure that emergency power is available throughout the limiting LOCA scenarios.

and ES electrical equipment alignment have been included in the design

(Ref. 2)

The small and large break LOCA analyses assume a conservative 35 second delay time for the actuation of HPI and LPI (in FSAR, Chapter [ ]) (Ref.). This delay time includes allowances for EDG starting, EDG loading, Emergency Core Cooling Systems (ECCS) pump starts, and valve openings. Similarly, the RB Cooling, RB Isolation, and RB Spray have been analyzed with delays appropriate for the entire system analyzed. Typical values used in the analysis are 35 seconds for RB Cooling, 60 seconds for RB Isolation, and 56 seconds for RB Spray.

alignment

Accident analyses rely on automatic ESFAS actuation for protection of the core temperature and containment pressure limits and for limiting off site dose levels following an accident. These include LOCA, SLB, and feedwater line break other events that result in RCS inventory reduction or severe loss of RCS cooling.

INSERT B3.3-52A

The ESFAS channels satisfy Criterion 3 of the NRC Policy Statement.

LCO

The LCO requires three channels of ESFAS analog instrument channels for each Parameter in Table 3.3.5-1 to be OPERABLE for each ESFAS train. Failure of any instrument renders the affected channel(s) inoperable and reduces the reliability of the affected Functions.

analog instrument

(continued)

<INSERT B3.3-52A>

The ESAS instrumentation satisfies Criterion 3 of 10 CFR 50.36 (Ref. 3) for operation in MODE 1. There are no specific safety analyses for operation in MODES 2, 3 and 4. However, industry operating experience has identified the ESAS instrumentation as significant to public health and safety during these operating conditions. Therefore, the ESAS instrumentation satisfies Criterion 4 of 10 CFR 50.36 for operation in MODES 2, 3 and 4.

Provided

BASES

LCO (continued)

Only the Allowable Value is specified for each ESFAS Function in the LCO. Nominal trip setpoints are specified in the unit specific setpoint calculations. The nominal trip setpoints are selected to ensure the setpoints measured by CHANNEL FUNCTIONAL TESTS do not exceed the Allowable Value if the bistable is performing as required. Operation with a trip setpoint less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable provided that operation and testing are consistent with the assumptions of the unit specific setpoint calculations. Each Allowable Value specified is more conservative than the analytical limit assumed in the safety analysis to account for instrument uncertainties appropriate to the trip Parameter. These uncertainties are defined in the "Unit Specific Setpoint Methodology" (Ref. 3).

The Allowable Values for bypass removal functions are stated in the Applicable MODES or Other Specified Condition column of Table 3.3.5-1.

Three ESFAS instrumentation channels shall be OPERABLE in each ESFAS train to ensure that a single failure in one channel will not result in loss of the ability to automatically actuate the required safety systems.

The bases for the LCO on ESFAS Parameters include the following.

Reactor Coolant System Pressure

Three channels each of RCS Pressure—Low and RCS Pressure—Low Low are required OPERABLE in each train. Each channel includes a sensor, trip bistable, bypass bistable, bypass relays, output relays, and block timers. The analog portion of each pressure channel is common to both trains of both RCS Pressure Parameters. Therefore, failure of one analog channel renders one channel of the low pressure and low low pressure Functions in each train inoperable. The bistable portions of the channels are Function and train specific. Therefore, a bistable failure renders only one Function in one train inoperable. Failure of a bypass bistable or bypass circuitry, such that a trip channel cannot be bypassed, does not render the channel inoperable. Output relays and block timer relays are train specific but may be shared among Parameters. Therefore, output or block

<INSERT B3.3-53A>

(continued)

<INSERT B3.3-53A>

since the channel is still capable of performing its safety function, i.e., this is not a safety related bypass function.

BASES

LCO

Reactor Coolant System Pressure (continued)

timer relay failure renders all affected functions in one train inoperable. (5)

1. Reactor Coolant System Pressure—Low Setpoint

The RCS Pressure—Low Setpoint is based on HPI actuation for small break LOCAs. The setpoint ensures that the HPI will be actuated at a pressure greater than or equal to the value assumed in accident analyses plus the instrument uncertainties. The maximum value assumed for the setpoint of the RCS Pressure—Low trip of HPI in safety analyses is 1480 psig. The setpoint for the low RCS and Allowable Value of ≥ [1600] psig for the low pressure parameter is selected to ensure actuation occurs when actual RCS pressure is above 1480 psig. The RCS Pressure instrumentation must function while subject to the severe environment created by a LOCA. Therefore, the trip setpoint Allowable Value accounts for severe environment induced errors. (10)

<INSERT B 3.3-54A>

To ensure the RCS Pressure—Low trip is not bypassed when required to be OPERABLE by the safety analysis, each channel's bypass removal bistable must be set with an Allowable Value of ≤ [1800] psig. The bypass removal does not need to function for accidents initiated from RCS Pressures below the bypass removal setpoint. Therefore, the bypass removal setpoint Allowable Value need not account for severe environment induced errors.

2. Reactor Coolant System Pressure—Low Low Setpoint

The RCS Pressure—Low Low Setpoint LPI actuation occurs in sufficient time to ensure LPI flow prior to the emptying of the core flood tanks during a large break LOCA. The Allowable Value of ≥ [400] psig ensures sufficient overlap of the core flood tank flow and the LPI flow to keep the reactor vessel downcomer full during a large break LOCA. The RCS Pressure instrumentation must function while subject to the severe environment created by a LOCA. Therefore, the trip setpoint Allowable Value accounts for severe environment induced errors. (4)

(continued)

<INSERT B3.3-54A>

The trip setpoints are the nominal values at which the bistables are set. For the RCS Pressure—Low, the limiting safety analysis assumes the HPI, LPI, EFIC EFW, ES electrical alignment, and two subsets of RB isolation actuate at ≥ 1520 psig (≥ 1535 psia). The Allowable Value of ≥ 1585 psig includes considerations for instrumentation error and an allowance for margin. Allowances for instrument drift and additional margin are included in the trip setpoint.

Guidance used to calculate the uncertainties associated with the trip setpoints is provided in Instrument Loop Error Analysis and Setpoint Methodology Manual, Design Guide, IDG-001 (Ref. 4). The explicit uncertainties associated with each setpoint are addressed in the individual design calculations or calibration procedures. Setpoints in accordance with the Allowable Value in conjunction with the LCOs and administrative controls ensure that the consequences of DBAs will be acceptable, providing the unit is operated from within the LCOs at the onset of the DBA and the equipment functions as analyzed. An analog instrument channel is inoperable if its actual trip setpoint is not within its required Allowable Value.

BASES

LCO

2. Reactor Coolant System Pressure—Low Low Setpoint (continued)

To ensure the RCS Pressure—Low Low trip is not bypassed when assumed OPERABLE by the safety analysis, each channel's bypass removal bistable must be set with an Allowable Value of ≤ [900] psig. The bypass removal does not need to function for accidents initiated by RCS Pressure below the bypass removal setpoint. Therefore, the bypass removal setpoint Allowable Value need not account for severe environment induced errors.

(4)

Reactor Building Pressure

and RB Pressure—High High

Three channels each of RCS Pressure—Low and RB Pressure—High are required to be OPERABLE in each train. Each channel includes a pressure switch, bypass relays, and output relays. The high pressure channels also include block timers. Each pressure switch is Function and train specific, so there are 12 pressure switches total. Therefore, a pressure switch renders only one Function in one train inoperable. Output relays and block timer relays are train specific but may be shared among Parameters. Therefore, output or block timer relay failure renders all affected Functions in one train inoperable.

(5)

<INSERT B3.3-55A>

The RB Pressure switches may be subjected to high radiation conditions during the accidents that they are intended to mitigate. The sensor portion of the switches is also exposed to the steam environment present in the RB following a LOCA or high energy line break. Therefore, the trip setpoint Allowable Value accounts for measurement errors induced by these environments.

I. Reactor Building Pressure—High Setpoint

The RB Pressure—High Setpoint Allowable Value ≤ [5] psig was selected to be low enough to detect a rise in RB Pressure that would occur due to a small break LOCA, thus ensuring that the RB high pressure actuation of the safety systems will occur for a wide spectrum of break sizes. The trip setpoint also causes the RB coolers to shift to emergency mode to prevent damage to the cooler fans due to the increase

(10)

(continued)

<INSERT B3.3-55A>

The trip setpoints are the nominal values at which the bistables are set. Credit is taken in the safety analyses for RB Pressure—High trip for the actuation of selected systems. The safety analyses for reactor building performance and equipment environmental qualification (pressure and temperature envelope definition) conservatively assume the RB cooling is not initiated until well beyond the expected actual automatic actuation time frame. Therefore, no additional consideration of the instrumentation uncertainties is warranted.

Credit is taken in the safety analyses for RB Pressure—High High trip for the actuation of selected systems. The safety analyses for reactor building performance and equipment environmental qualification (pressure and temperature envelope definition) conservatively assumes the RB spray is not initiated until well beyond the expected actual automatic actuation time frame. Therefore, no additional consideration of the instrumentation uncertainties is warranted.

Therefore, the bistable is considered to be properly adjusted when the "as left" value is consistent with the identified Allowable Value, i.e., for this parameter the trip setpoint and the Allowable Value are the same. Guidance used to calculate the uncertainties associated with the trip setpoints is provided in Instrument Loop Error Analysis and Setpoint Methodology Manual, Design Guide, IDG-001 (Ref. 4). Setpoints in accordance with the Allowable Value ensure that the consequences of DBAs will be acceptable, providing the unit is operated from within the LCOs at the onset of the DBA and the equipment functions as analyzed. An analog instrument channel is inoperable if its actual trip setpoint is not within its required Allowable Value.

BASES

LCO

1. Reactor Building Pressure—High Setpoint (continued)

in the density of the air steam mixture present in the containment following a LOCA.

2. Reactor Building Pressure—High High Setpoint

The RB Pressure—High High Setpoint Allowable Value ≤ [30] psig was chosen to be high enough to avoid actuation during an SLB, but also low enough to ensure a timely actuation during a large break LOCA.

APPLICABILITY Three channels of ESFAS instrumentation for each Parameter listed next shall be OPERABLE in each ESFAS train.

1. Reactor Coolant System Pressure—Low Setpoint

The RCS Pressure—Low Setpoint actuation Parameter shall be OPERABLE during operation above 1800 psig. This requirement ensures the capability to automatically actuate safety systems and components during conditions indicative of a LOCA or secondary unit overcooling. Below 1800 psig, the low RCS Pressure actuation Parameter can be bypassed to avoid actuation during normal unit cooldowns when safety systems actuations are not required.

The allowance for the bypass is consistent with the transition of the unit to a lower energy state, providing greater margins to safety limits. The unit 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 actuations. This is even more appropriate during unit heatups when the primary system and core energy content is low, prior to power operation.

In MODES 5 and 6, there is adequate time for the operator to evaluate unit conditions and respond by manually starting individual systems, pumps, and other equipment to mitigate the consequences of an abnormal condition or accident. Plant pressure and temperature

(continued)

BASES

APPLICABILITY 1. Reactor Coolant System Pressure—Low Setpoint (continued)

are very low, and many ESF components are administratively locked out or otherwise prevented from actuating to prevent inadvertent overpressurization of unit systems.

2. Reactor Coolant System Pressure—Low Low Setpoint

The RCS Pressure—Low Low Setpoint actuation Parameter shall be OPERABLE during operation above [900] psig. This requirement ensures the capability to automatically actuate safety systems and components during conditions indicative of a LOCA or secondary unit overcooling. Below [900] psig, the low low RCS Pressure actuation Parameter can be bypassed to avoid actuation during normal unit cooldowns when safety system actuations are not required.

The allowance for the bypass is consistent with the transition of the unit to a lower energy state, providing greater margins to safety limits. The unit 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 actuations. This is even more appropriate during unit heatups when the primary system and core energy content is low, prior to power operation.

In MODES 5 and 6, there is adequate time for the operator to evaluate unit conditions and respond by manually starting individual systems, pumps, and other equipment to mitigate the consequences of an abnormal condition or accident. Plant pressure and temperature are very low, and many ESF components are administratively locked out or otherwise prevented from actuating to prevent inadvertent overpressurization of unit systems.

(continued)

BASES

APPLICABILITY (continued)

Reactor Building Pressure—High and Reactor Building Pressure—High High Setpoints

The RB Pressure—High and RB Pressure—High High actuation Functions of ESFAS shall be OPERABLE in MODES 1, 2, 3, and 4 when the potential for a HELB exists. In MODES 5 and 6, the unit conditions are such that there is insufficient energy in the primary and secondary systems to raise the containment pressure to either the RB Pressure—High or RB Pressure—High High Setpoints. Furthermore, in MODES 5 and 6, there is adequate time for the operator to evaluate unit conditions and respond by manually starting individual systems, pumps, and other equipment to mitigate the consequences of an abnormal condition or accident. Plant pressure and temperature are very low and many ESF components are administratively locked out or otherwise prevented from actuating to prevent inadvertent overpressurization of unit systems.

ACTIONS

Required Actions A and B apply to the ESFAS 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.

If an analog instrument channel's trip setpoint is found nonconservative with respect to the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or ESFAS bistable is found inoperable, then all affected functions provided by that channel should be declared inoperable and the unit must enter the Conditions for the particular protection Parameter affected.

When the number of inoperable channels in a trip Parameter exceeds those specified, then the unit is outside the safety analysis. Therefore, LCO 3.0.3 shall be immediately entered if applicable in the current MODE of operation.

(continued)

BASES

ACTIONS (continued)

A.1

Condition A applies when one channel becomes inoperable in one or more Parameters. If one ESFAS 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 ESFAS instrumentation could still perform its actuation functions. This action is completed when all of the affected output relays and block timers are tripped. This can normally be accomplished by tripping the affected bistables or tripping the individual output relays and block timers. [At this unit, the specific output relays associated with each ESFAS instrumentation channel are listed in the following document;]

The 1 hour Completion Time is sufficient time to perform the Required Action.

B.1, B.2.1, B.2.2, and B.2.3

<INSERT B3.3-59A>

Condition B applies when Required Action A.1 is not met within the required Completion Time. If Required Action A.1 cannot be met within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and, for the RCS Pressure—Low Setpoint, to < [1800] psig, for the RCS Pressure—Low Low Setpoint, to < [900] psig, and for the RB Pressure High Setpoint and High High Setpoint, to MODE 5 within 36 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 unit systems.

SURVEILLANCE REQUIREMENTS

The ESFAS Parameters listed in Table 3.3.5-1 are subject to CHANNEL CHECK, CHANNEL FUNCTIONAL TEST, CHANNEL CALIBRATION, and response time testing. The operational bypasses associated with each ESFAS instrumentation channel are also subject to these SRs to ensure OPERABILITY of the ESFAS instrumentation channel.

(continued)

<INSERT B3.3-59A>

Condition B applies when Required Action A.1 and its associated Completion Time are not met, or when one or more parameters have more than one analog instrument channel inoperable. If Condition B applies, the unit must be brought to a condition in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours. Additionally, for the RCS Pressure—Low parameter, the unit must be brought to < 1750 psig within 36 hours, and for the RB Pressure—High and High High parameters, the unit must be brought to MODE 5 within 36 hours.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.5.1

provides reasonable assurance for prompt identification of

Performance of the CHANNEL CHECK every 12 hours ~~ensures that~~ a gross failure of instrumentation ~~has not occurred~~. A CHANNEL CHECK is normally 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 monitoring the same parameter should read approximately the same value. Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; therefore, it is key in verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

edit

factors including

Agreement criteria are determined by the unit staff, based on a combination of ~~the~~ channel instrument uncertainties ~~including isolation, indication, and readability~~. If a channel is outside the criteria, it may be an indication that the transmitter or the signal processing equipment has drifted outside its limit. If the channels are normally off scale during times when surveillance is required, the CHANNEL CHECK will only verify that they are off scale in the same direction. Off scale low current loop channels are verified to be reading at the bottom of the range and not failed downscale.

10

11

The Frequency ~~about once every shift~~ is based on operating experience that demonstrates channel failure is rare. Since the probability of two random failures in redundant channels in any 12 hour period is extremely low, the CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. The CHANNEL CHECK supplements less formal, but more frequent, checks of channel ~~operability~~ during normal operational use of the displays associated with the LCO's required channels.

edit

potentially

edit

OPERABILITY

SR 3.3.5.2

A Note defines a channel as being OPERABLE for up to 8 hours while bypassed for Surveillance testing provided the remaining two ESFAS channels are OPERABLE or tripped. The Note allows channel bypass for testing without defining it

12

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.5.2 (continued)

as inoperable, although during this time period it cannot initiate ESFAS. This allowance is based on the inability to perform the Surveillance in the time permitted by the Required Actions. Eight hours is the average time required to perform the Surveillance. It is not acceptable to routinely remove channels from service for more than 8 hours to perform required Surveillance testing.

A CHANNEL FUNCTIONAL TEST is performed on each required ESFAS channel to ensure the entire channel will perform the intended functions. Any setpoint adjustment shall be consistent with the assumptions of the current unit specific setpoint analysis. calculations.

The Frequency of 31 days is based on unit operating experience, with regard to channel OPERABILITY and drift, which demonstrates that failure of more than one channel of a given function in any 31 day interval is a rare event. The RCS low pressure automatic bypass removal feature is verified during its CHANNEL FUNCTIONAL TEST

SR 3.3.5.3

CHANNEL CALIBRATION is a complete check of the instrument channel, including the sensor. The test verifies that the channel responds to a 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. CHANNEL CALIBRATION shall find that measurement errors and bistable setpoint errors are within the assumptions of the unit specific setpoint analysis. CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the unit specific setpoint analysis.

This Frequency is justified by the assumption of an [18] month calibration interval to determine the magnitude of equipment drift in the setpoint analysis. calculations.

SR 3.3.5.4

SR 3.3.5.4 ensures that the ESFAS actuation channel response times are less than or equal to the maximum times assumed in the accident analysis. The response time values are the

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.5.4 (continued)

maximum values assumed in the safety analyses. Individual component response times are not modeled in the analyses. Response time testing acceptance criteria for this unit are included in Reference 1. The analyses model the overall or total elapsed time from the point at which the parameter exceeds the actuation setpoint value at the sensor to the point at which the end device is actuated. Thus, this SR encompasses the automatic actuation logic components covered by LCO 3.3.7 and the operation of the mechanical ESF components.

Response time tests are conducted on an [18] month STAGGERED TEST BASIS. Testing of the final actuation devices, which make up the bulk of the response time, is included in the testing of each channel. Therefore, staggered testing results in response time verification of these devices every [18] months. The 18 month test frequency is based on unit 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. 10 CFR 50.36.
3. "Unit Specific Setpoint Methodology."
4. FSAR, Chapter [14] and Chapter 34

edit

Instrument Loop Error Analysis and Setpoint Methodology Manual, Design Guide, IDG-001.

B 3.3 INSTRUMENTATION

B 3.3.6 Engineered Safeguards Actuation System (ESFAS) Manual Initiation

BASES

BACKGROUND

The ESFAS manual initiation capability allows the operator to actuate ESFAS Functions from the main control room in the absence of any other initiation condition. Manually actuated Functions include High Pressure Injection, Low Pressure Injection, Reactor Building (RB) Cooling, RB Spray, RB Isolation, and Control Room Isolation. This ESFAS manual initiation capability is provided in the event the operator determines that an ESFAS Function is needed and has not been automatically actuated. Furthermore, the ESFAS manual initiation capability allows operators to rapidly initiate Engineered Safeguards (ES) Functions if the trend of unit parameters indicates that ESF actuation will be needed.

LCO 3.3.6 covers only the system level manual initiation of these Functions. LCO 3.3.5, "Engineered Safeguards Actuation System (ESFAS) Instrumentation," and LCO 3.3.7, "Engineered Safeguards Actuation System (ESFAS) Automatic Actuation Logic," provide requirements on the portions of the ESFAS that automatically initiate the Functions described earlier.

The ESFAS manual initiation Function relies on the OPERABILITY of the automatic actuation logic (LCO 3.3.7) for each component to perform the actuation of the systems. A manual trip push button is provided on the ESF panel of the control room console for each of the levels of protection for each actuation. Operation of the push button energizes relays whose contacts perform a logical "OR" function with the matrices of the automatic actuation, except for the matrices which are part of the ESF buses loading sequence. Manual actuation of the ESF buses loading sequence is made by de-energizing the timed output relays. The power supply for the manual trip relays is taken from the station batteries. Different batteries are used for the two actuations.

The ESFAS manual initiation channel is defined as the instrumentation between the console switch and the automatic actuation logic, which actuates the end devices. Other means of manual initiation, such as controls for individual ESF devices, may be available in the control room and other

(continued)

BASES

BACKGROUND (continued)

unit locations. These alternative means are not required by this LCO, nor may they be credited to fulfill the requirements of this LCO.

APPLICABLE SAFETY ANALYSES

The ESFAS, in conjunction with the actuated equipment, provides protective functions necessary to mitigate Design Basis Accidents, specifically, the loss of coolant accident (LOCA), and steam line break events.

The ESFAS manual initiation ensures that the control room operator can rapidly initiate ESF Functions at any time. The manual initiation trip Function is required as a backup to automatic trip functions and allows operators to initiate ESFAS whenever any parameter is rapidly trending toward its trip setpoint. Furthermore, the ESFAS manual initiation may be specified in operating procedures for verification that ESF systems are running.

The ESFAS manual initiation functions satisfy Criterion 3 of the NRC Policy Statement.

<INSERT B 3.3-64A>

LCO

Two ESFAS manual initiation channels of each ESFAS Function shall be OPERABLE whenever conditions exist that could require ESF protection of the reactor or RB. Two OPERABLE channels ensure that no single random failure will prevent system level manual initiation of any ESFAS Function. The ESFAS manual initiation Function allows the operator to initiate protective action prior to automatic initiation or in the event the automatic initiation does not occur.

<INSERT B 3.3-64B>

APPLICABILITY

The ESFAS manual initiation Functions shall be OPERABLE in MODES 1, 2, and 3, and in MODES 3, and 4 when the associated ES engineered safeguard equipment is required to be OPERABLE. The manual initiation channels are required because ESF Functions are designed to provide protection in these MODES. In MODES 5 and 6, ESFAS initiates systems that are either reconfigured or disabled for shutdown cooling operation while in decay heat removal. Accidents in these MODES are slow to develop and would be mitigated by manual operation of individual components. Adequate time is available to evaluate unit conditions and

(continued)

<INSERT B3.3-64A>

Operating experience has shown the ESAS manual initiation function to be significant to public health and safety, and therefore satisfy Criterion 4 of 10 CFR 50.36 (Ref. 1).

<INSERT B3.3-64B>

The ESAS is divided into five Functions actuated by ten manual initiation channels as indicated in the following table:

Function	Associated Channels
High Pressure Injection	1 & 2
Low Pressure Injection	3 & 4
RB Cooling	5 & 6
RB Spray	7 & 8
Spray Additive	9 & 10

The ESAS High Pressure Injection (HPI) Function is actuated by ESAS Manual Initiation channels 1 and 2 and includes the following system actuations: HPI, a subset of reactor building (RB) isolation valves, diesel generators, and ES electrical alignment.

The ESAS Low Pressure Injection (LPI) Function is actuated by ESAS Manual Initiation channels 3 and 4 and includes the following system actuations: LPI, a subset of RB isolation valves, and emergency feedwater (EFW) through an ESAS signal provided to the Emergency Feedwater Isolation and Control (EFIC) System.

The ESAS RB Cooling Function is actuated by ESAS Manual Initiation channels 5 and 6 and includes the following system actuations: RB cooling, a subset of RB isolation valves, and RB penetration room ventilation system.

The ESAS RB Spray Function is actuated by ESAS Manual Initiation channels 7 and 8 and includes the following system actuations: RB spray.

The ESAS Spray Additive Function is actuated by ESAS Manual Initiation channels 9 and 10 and includes the following system actuations: spray additive.

BASES

APPLICABILITY (continued)

to respond by manually operating the ESF components, if required.

ACTIONS

A Note has been added to the ACTIONS indicating separate Condition entry is allowed for each ESFAS manual initiation Function.

A.1

Condition A applies when one manual initiation channel of one or more ESFAS Functions becomes inoperable. Required Action A.1 must be taken to restore the channel to OPERABLE status within the next 72 hours. The Completion Time of 72 hours is based on unit operating experience and administrative controls, which provide alternative means of ESFAS Function initiation via individual component controls. The 72 hour Completion Time is consistent with the allowed outage time for the safety systems actuated by ESFAS.

B.1 and B.2

Required Action B.1 and Required Action B.2 apply if Required Action A.1 cannot be met within the required Completion Time. If Required Action A.1 cannot be met within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to 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 unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.3.6.1

This SR requires the performance of a CHANNEL FUNCTIONAL TEST of the ESFAS manual initiation. This test verifies that the initiating circuitry is OPERABLE and will actuate the end device (i.e., pump, valves, etc.). The [18] month Frequency is based on the need to perform this Surveillance

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.6.1 (continued)

under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. This Frequency is demonstrated to be sufficient, based on operating experience, which shows these components usually pass the Surveillance when performed on the [18] month Frequency.

REFERENCES

None. 1. 10 CFR 50.36.

edit

B 3.3 INSTRUMENTATION

B 3.3.7 Engineered Safeguards Safety Feature Actuation System (ESFAS) Automatic Actuation Logic

BASES

BACKGROUND

<INSERT B3.3-67A>

The automatic actuation logic channels of ESFAS are defined as the logic between the buffers of the sensing channels and the controllers that actuate ESFAS equipment. Each of the components actuated by the ESFAS Functions has an associated automatic actuation logic matrix. If two-out-of-three ESFAS instrumentation channels indicate a trip, or system level manual initiation occurs, the automatic actuation logic is activated and the associated component is actuated. The purpose of requiring OPERABILITY of the ESFAS automatic actuation logic is to ensure that the Functions of the ESFAS can be automatically initiated in the event of an accident. Automatic actuation of some Functions is necessary to prevent the unit from exceeding the Emergency Core Cooling Systems (ECCS) limits in 10 CFR 50.46 (Ref. 1). It should be noted that OPERABLE automatic actuation logic channels alone will not ensure that each Function can be activated; the instrumentation channels and actuated equipment associated with each Function must also be OPERABLE to ensure that the Functions can be automatically initiated during an accident.

LCO 3.3.7 covers only the automatic actuation logic that initiates these Functions. LCO 3.3.5, "Engineered Safeguards Feature Actuation System (ESFAS) Instrumentation," and LCO 3.3.6, "Engineered Safety Feature Actuation System (ESFAS) Manual Initiation," provide requirements on the instrumentation and manual initiation channels that input to the automatic actuation logic.

The ESFAS, in conjunction with the actuated equipment, provides protective functions necessary to mitigate Design Basis Accidents (DBAs), specifically, the loss of coolant accident (LOCA) and steam line break (SLB) events. The ESFAS relies on the OPERABILITY of the automatic actuation logic for each component to perform the actuation of the selected systems.

The small and large break LOCA analyses assume a conservative 35 second delay time for the actuation of high pressure injection (HPI) and low pressure injection (LPI) in

(continued)

<INSERT B3.3-67A>

The digital actuation logic channels of ESAS are defined as the instrumentation between, but not including, the buffers of the analog instrument channels and the unit controls that actuate ESAS equipment. Each of the components actuated by the ESAS Functions is associated with one or more digital actuation logic channels. If two-out-of-three ESAS analog instrument channels indicate a trip, or if channel level manual initiation occurs, the digital actuation logic channel is activated and the associated equipment is actuated.

BASES

BACKGROUND (continued)

BAW-10103A, Rev. 3 (Ref. 2). This delay time includes allowances for emergency diesel generator (EDG) starts, EDG loading, ECCS pump starts, and valve openings. Similarly, the reactor building (RB) Cooling, RB Isolation, and RB Spray have been analyzed with delays appropriate for the entire system.

Typical values used in the analyses are 35 seconds for RB Cooling, 60 seconds for RB Isolation, and 58 seconds for RB Spray.

The ESFAS automatic initiation of Engineered Safeguards (ESF) Functions to mitigate accident conditions is assumed in the DBA analysis and is required to ensure that consequences of analyzed events do not exceed the accident analysis predictions. Automatically actuated features include HPI, LPI, RB Cooling, RB Spray, and RB Isolation.

The ESFAS LCOs in the BWOG Standard Technical Specifications (STS) are based on a system representative of the Crystal River Unit 3 design. As discussed earlier, this arrangement involves measurement channels shared among all actuation functions, with separate actuation logic channels for each actuated component. In this arrangement, multiple ESF components are affected by a measurement channel failure, but a single automatic actuation logic failure affects only one component. The organization of BWOG STS ESFAS LCOs reflect the described logic arrangement by linking actions for automatic actuation logic failures directly to the actions for the affected ESF component. The overall philosophy is that if an automatic actuation logic fails, the affected component is put into its engineered safeguard configuration. This action eliminates the need for the automatic actuation logic. If the affected component cannot be placed in its engineered safeguard configuration, actions are taken to address the inoperability of the supported system component. This greatly simplifies delineation of ESFAS LCOs. Furthermore, the LCO requirements on instrumentation channels, automatic actuation logics, and manual initiation are specified separately to reflect the different impact each has on ESFAS OPERABILITY.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES

Accident analyses rely on automatic ESFAS actuation for protection of the core and RB and for limiting off site dose levels following an accident. These include LOCA, SLB, and feedwater line break events that result in Reactor Coolant System (RCS) inventory reduction or severe loss of RCS cooling. The automatic actuation logic is an integral part of the ESFAS.

INSERT B3.3-69A

The ESFAS automatic actuation logics satisfy Criterion 3 of the NRC Policy Statement.

LCO

The automatic actuation logic matrix for each component actuated by the ESFAS is required to be OPERABLE whenever conditions exist that could require ESF protection of the reactor or the RB. This ensures automatic initiation of the ESF required to mitigate the consequences of accidents.

INSERT B3.3-69B

APPLICABILITY

The automatic actuation logic Function shall be OPERABLE in MODES 1, 2, and 3, and in MODE 4 when the associated engineered safeguard equipment is required to be OPERABLE, because ESF Functions are designed to provide protection in these MODES. Automatic actuation in MODE 5 or 6 is not required because the systems initiated by the ESFAS are either reconfigured or disabled for shutdown cooling operation. Accidents in these MODES are slow to develop and would be mitigated by manual operation of individual components. Adequate time is available to evaluate unit conditions and respond by manually operating the ESF components, if required.

ACTIONS

A Note has been added to the ACTIONS indicating separate Condition entry is allowed for each ESFAS, automatic actuation logic matrix channel.

A.1 and A.2

When one or more automatic actuation logic matrices are inoperable, the associated component(s) can be placed in their engineered safeguard configuration. Required Action A.1 is

(continued)

<INSERT B3.3-69A>

The ESAS actuation logic satisfies Criterion 3 of 10 CFR 50.36 (Ref. 3) for operation in MODE 1. There are no specific safety analyses for operation in MODES 2, 3 and 4. However, industry operating experience has identified the ESAS actuation logic as significant to public health and safety during these operating conditions. Therefore, the ESAS actuation logic satisfies Criterion 4 of 10 CFR 50.36 for operation in MODES 2, 3 and 4.

<INSERT B3.3-69B>

The ESAS is divided into five Functions actuated by ten digital actuation logic channels as indicated in the following table:

Function	Associated Channels
High Pressure Injection	1 & 2
Low Pressure Injection	3 & 4
RB Cooling	5 & 6
RB Spray	7 & 8
Spray Additive	9 & 10

The ESAS HPI Function is actuated by ESAS digital actuation logic channels 1 and 2 and includes the following system actuations: HPI, a subset of RB isolation valves, DGs, and ES electrical alignment. Digital actuation logic channels 1 and 2 are actuated by two-out-of-three RCS Pressure—Low analog instrument channels, or two-out-of-three RB Pressure-High analog instrument channels.

The ESAS LPI Function is actuated by ESAS digital actuation logic channels 3 and 4 and includes the following system actuations: LPI, a subset of RB isolation valves, and EFW through an ESAS signal provided to EFIC. Digital actuation logic channels 3 and 4 are actuated by two-out-of-three RCS Pressure—Low analog instrument channels, or two-out-of-three RB Pressure—High analog instrument channels.

The ESAS RB Isolation and Cooling Function is actuated by ESAS digital actuation logic channels 5 and 6 and includes the following system actuations: RB cooling, a subset of RB isolation valves, and RB penetration room ventilation system. Digital actuation logic channels 5 and 6 are actuated by two-out-of-three RB Pressure—High analog instrument channels.

The ESAS RB Spray Function is actuated by ESAS digital actuation logic channels 7 and 8 and includes the following system actuations: RB spray. Digital actuation logic channels 7 and 8 are actuated by two-out-of-three RB Pressure—High High analog instrument channels.

The ESAS Spray Additive Function is actuated by ESAS digital actuation logic channels 9 and 10 and includes the following system actuations: spray additive. Digital actuation logic channels 9 and 10 are actuated by two-out-of-three RB Pressure—High High analog instrument channels.

BASES

ACTIONS

A.1 and A.2 (continued)

equivalent to the ~~automatic~~ digital channel actuation logic performing its safety function ahead of time. In some cases, placing the component in its ~~engineered safeguard~~ ES configuration would violate unit safety or operational considerations. In these cases, the component status should not be changed, but the supported system component must be declared inoperable. Conditions which would preclude the placing of a component in its ~~engineered safeguard~~ configuration include, but are not limited to, violation of system separation, activation of fluid systems that could lead to thermal shock, or isolation of fluid systems that are normally functioning. The Completion Time of 1 hour is based on operating experience and reflects the urgency associated with the inoperability of a safety system component.

and actuation of components which would not return to their actuated condition upon restoration of electrical power.

Required Action A.2 requires entry into the Required Actions of the affected supported systems, since the true effect of ~~automatic~~ digital channel actuation logic failure is inoperability of the supported system. The Completion Time of 1 hour is based on operating experience and reflects the urgency associated with the inoperability of a safety system component.

A combination of Required Actions A.1 and A.2 may be used for different components associated with an inoperable ESAS digital actuation logic channel.

SURVEILLANCE REQUIREMENTS

SR 3.3.7.1

SR 3.3.7.1 is the performance of a CHANNEL FUNCTIONAL TEST ~~on a 31 day STAGGERED TEST BASIS~~. The test demonstrates that ~~every automatic~~ each digital channel actuation logic ~~associated with one of the two safety system trains~~ successfully performs the two-out-of-three logic combinations ~~every 31 days. All automatic actuation logics are thus retested every 62 days~~. The test simulates the required one-out-of-three inputs to the logic circuit and verifies the successful operation of the ~~automatic~~ digital actuation logic. The Frequency is based on operating experience that demonstrates the rarity of more than one channel failing within the same 31 day interval.

~~Automatic actuation logic response time testing is incorporated into the response time testing required by LCO 3.3.5.~~

The CHANNEL FUNCTIONAL TEST performed for the Reactor Building Spray System Logic Channels shall include testing of the associated spray pump, spray valves, and chemical additive logic channels.

RAI 3.3.5-02

(continued)

(1)
(9)

BASES (continued)

REFERENCES

1. 10 CFR 50.46.

2. ~~BAW-10103A, Rev. 3, July 1977.~~

3. 10CFR 50.36.

EDIT

3.3 INSTRUMENTATION

3.3.11 Emergency Feedwater Initiation and Control (EFIC) System Instrumentation

LCO 3.3.11 The EFIC System instrumentation channels for each Function in Table 3.3.11-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.11-1.

ACTIONS

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

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more Emergency Feedwater (EFW) Initiation or Main Steam Line Isolation Functions listed in Table 3.3.11-1 with one channel inoperable.	A.1	Place channel(s) in bypass or trip.	1 hour
B. One or more EFW Initiation or Main Steam Line Isolation Functions listed in Table 3.3.11-1 with two channels inoperable.	B.1	Place one channel in bypass.	1 hour
	AND		
	B.2	Place second channel in trip.	1 hour
C. One EFW Vector Valve Control channel inoperable.	C.1	Restore channel to OPERABLE status.	72 hours
D. Required Action and associated Completion Time not met for Function 1.b.	D.1	Be in MODE 3.	6 hours
	AND		
	D.2	Be in MODE 4.	12 hours

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time not met for Functions 1.a or 1.d.	E.1 Reduce THERMAL POWER to ≤ 10% RTP.	6 hours
F. Required Action and associated Completion Time not met for Functions 1.c, 2, or 3.	F.1 Be in MODE 3. AND F.2 Reduce steam generator pressure to < 750 psig.	6 hours 12 hours

SURVEILLANCE REQUIREMENTS

----------NOTE----------
Refer to Table 3.3.11-1 to determine which SRs shall be performed for each EFIC Function.

SURVEILLANCE		FREQUENCY
SR 3.3.11.1	Perform CHANNEL CHECK.	12 hours
SR 3.3.11.2	Perform CHANNEL FUNCTIONAL TEST.	31 days
SR 3.3.11.3	Perform CHANNEL CALIBRATION.	18 months

Table 3.3.11-1 (page 1 of 1)
Emergency Feedwater Initiation and Control System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUES
1. EFW Initiation				
a. Loss of MFW Pumps (Control Oil Pressure)	≥ 10% RTP	4	SR 3.3.11.1 SR 3.3.11.2 SR 3.3.11.3	≥ 55.5 psig
b. SG Level - Low	1,2,3	4 per SG	SR 3.3.11.1 SR 3.3.11.2 SR 3.3.11.3	≥ 11.1 inches
c. SG Pressure - Low	1,2,3[(a)]	4 per SG	SR 3.3.11.1 SR 3.3.11.2 SR 3.3.11.3	≥ 584.2 psig
d. RCP Status	≥ 10% RTP	4	SR 3.3.11.1 SR 3.3.11.2	NA
2. EFW Vector Valve Control				
a. SG Pressure - Low	1,2,3[(a)]	4 per SG	SR 3.3.11.1 SR 3.3.11.2 SR 3.3.11.3	≥ 584.2 psig
b. SG Differential Pressure - High	1,2,3[(a)]	4	SR 3.3.11.1 SR 3.3.11.2 SR 3.3.11.3	≤ 150 psid
3. Main Steam Line Isolation				
a. SG Pressure - Low	1,2,3[(a)(b)]	4 per SG	SR 3.3.11.1 SR 3.3.11.2 SR 3.3.11.3	≥ 584.2 psig

(a) When SG pressure ≥ 750 psig.

(b) Except when all associated valves are closed and deactivated.

3.3 INSTRUMENTATION

3.3.12 Emergency Feedwater Initiation and Control (EFIC) Manual Initiation

LCO 3.3.12 Two manual initiation switches per actuation train for each of the following EFIC Functions shall be OPERABLE:

a. Steam generator (SG) A Main Steam Line Isolation;

b. SG B Main Steam Line Isolation; and

c. Emergency Feedwater (EFW) Initiation.

APPLICABILITY: When associated EFIC Function is required to be OPERABLE.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more EFIC Function(s) with one required manual initiation switch inoperable in one actuation train.	A.1 Place affected trip bus in the affected train for the associated EFIC Function(s) in trip.	72 hours
B. One or more EFIC Function(s) with both required manual initiation switches inoperable in a single actuation train.	B.1 Restore one manual initiation switch for each of the affected EFIC Function(s) to OPERABLE status.	72 hours
C. One or more EFIC Function(s) with one or both required manual initiation switches inoperable in both actuation trains.	C.1 Restore one actuation train for the associated EFIC Function(s) to OPERABLE status.	1 hour

CONDITION	REQUIRED ACTION		COMPLETION TIME
D. Required Action and associated Completion Time not met for EFW Initiation Function.	D.1	Be in MODE 3.	6 hours
	AND		
	D.2	Be in MODE 4.	12 hours
E. Required Action and associated Completion Time not met for Main Steam Line Isolation Function.	E.1	Be in MODE 3.	6 hours
	AND		
	E.2.1	Reduce steam generator pressure to < 750 psig.	12 hours
	OR		
	E.2.2	Close and deactivate all associated valves.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.12.1	Perform CHANNEL FUNCTIONAL TEST.	31 days

3.3 INSTRUMENTATION

3.3.13 Emergency Feedwater Initiation and Control (EFIC) Logic

LCO 3.3.13 Trains A and B of each Logic Function shown below shall be OPERABLE:

a. Main Steam Line Isolation; and

b. Emergency Feedwater (EFW) Initiation.

APPLICABILITY: When associated EFIC Function is required to be OPERABLE.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more train A Functions inoperable with all train B Functions OPERABLE; or one or more train B Functions inoperable with all train A Functions OPERABLE.	A.1 Restore affected train to OPERABLE status.	72 hours
B. Required Action and associated Completion Time not met for EFW Initiation Function.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	6 hours 12 hours
C. Required Action and associated Completion Time not met for Main Steam Line Isolation Function.	C.1 Be in MODE 3. AND C.2.1 Reduce steam generator pressure to < 750 psig. OR C.2.2 Close and deactivate all associated valves.	6 hours 12 hours 12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.13.1	Perform CHANNEL FUNCTIONAL TEST.	31 days

3.3 INSTRUMENTATION

3.3.14 Emergency Feedwater Initiation and Control (EFIC) Vector Logic

LCO 3.3.14 Four channels of the EFIC vector logic shall be OPERABLE.

APPLICABILITY: MODES 1 and 2,
MODE 3 when steam generator pressure is $\geq$ 750 psig.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One vector logic channel inoperable.	A.1	Restore channel to OPERABLE status.	72 hours
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Reduce steam generator pressure to < 750 psig.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.14.1	Perform a CHANNEL FUNCTIONAL TEST.	31 days

B 3.3 INSTRUMENTATION

B 3.3.11 Emergency Feedwater Initiation and Control (EFIC) Instrumentation

BASES

BACKGROUND

The EFIC System instrumentation is designed to protect against the consequences of a simultaneous blowdown of both steam generators. Steam generator (SG) isolation is actuated to protect the core during an overcooling condition upon a main steam or feedwater line rupture. The Emergency Feedwater (EFW) System is actuated to protect the core during an overheating condition upon a loss of main feedwater or a loss of primary side forced circulation (loss of all four reactor coolant pumps). In addition, EFIC controls the EFW flow rate to the SG(s) to control SG level and minimize overcooling. EFIC also selects the appropriate SG(s) under conditions of steam line break or main feedwater or emergency feedwater line break downstream of the last check valve, and provides for isolation of the main steam and main feedwater lines of a depressurized steam generator. The EFIC Functions that are supported and the parameters that are needed for each of these Functions are described next.

The EFIC instrumentation contains devices and circuitry that generate the following signals when monitored variables reach levels that are indicative of conditions requiring protective actions.

a. EFW Initiation;

b. EFW Vector Valve Control; and

c. Main Steam Line Isolation.

EFW is initiated to restore a source of cooling water to the secondary system when conditions indicate that the normal source of feedwater is insufficient to continue heat removal. The two indications used for this are the loss of both MFW pumps and a low level in the steam generator (SG). Also, EFW is initiated when action is being taken to isolate the MFW from the SG during conditions of uncontrolled depressurizations. This is done by initiating EFW when steam pressure reaches the low SG pressure setpoint. Also, EFW is initiated when the primary system experiences a total loss of forced circulation. This initiation, on the loss of all reactor coolant pumps (RCPs), ensures the EFW is available to raise SG levels to promote natural circulation cooling.

The EFIC System initiates EFW when an Engineered Safeguards Actuation System (ESAS) signal is initiated on low RCS pressure or high reactor building pressure (ESAS Channels 3 and 4) in order to support heat removal following Emergency Core Cooling System (ECCS) actuation. This is a digital signal provided by the ESAS Automatic Actuation Logic. Refer to the Bases for LCO 3.3.5, "Engineered

Safeguards Actuation System (ESAS) Instrumentation," and LCO 3.3.7, "Engineered Safeguards Actuation System (ESAS) Automatic Actuation Logic," for additional discussion.

The EFIC System also initiates EFW on loss of main feedwater flow as part of the Diverse Reactor Overpressure Protection System (DROPS) which is the system provided for ANO-1 to comply with requirements to reduce risk from an anticipated transient without scram (ATWS). The DROPS consists of the Diverse Scram System (DSS) and the ATWS Mitigation System Actuation Circuitry (AMSAC) . EFW initiation for ATWS prevention and mitigation is not required by this Specification.

The EFIC System also isolates main steam and MFW to an SG that has experienced an uncontrolled depressurization. With the uncontrolled depressurization, the heat sink temperature control is lost and the heat removal rate cannot be controlled. The main steam and MFW are isolated to an SG when the steam pressure reaches a low setpoint below the normal operating point of the secondary system.

EFW initiation also enables EFIC vector logic which performs an EFW control function to preclude the delivery of fluid to a depressurized SG, thereby avoiding an uncontrolled cooling condition as long as the other SG remains pressurized. When both of the SGs are depressurized, the EFIC vector logic provides EFW flow to both SGs until a significant pressure difference between the two SGs is developed, thereby ensuring that core cooling is maintained.

Trip Setpoints and Allowable Values

The trip setpoints are the values at which the bistables are set. Any bistable is considered to be properly adjusted when the "as left" value is within the band for CHANNEL CALIBRATION accuracy.

The trip setpoints used in the bistables are based on the analytical limits stated in SAR, Chapters 7 and 14 (Refs. 2 and 3). The selection of these trip setpoints is such that adequate protection is provided when appropriate sensor and processing time delays are taken into account. The Allowable Values are conservatively adjusted with respect to the analytical limits to allow for calibration tolerances, instrumentation uncertainties, instrument drift, and environmental errors as required.

Guidance used to calculate the uncertainties associated with the trip setpoints is provided in Instrument Loop Error Analysis and Setpoint Methodology Manual Design Guide, IDG-001 (Ref. 4). The explicit uncertainties are addressed in the design calculations as required. The trip setpoint entered into the bistable may be more conservative than that specified by the Allowable Value to account for changes in instrument error detectable by a CHANNEL FUNCTIONAL TEST. A channel is inoperable if its as-found trip setpoint is not within its required Allowable Value.

Setpoints in accordance with the Allowable Value in conjunction with the LCOs and administrative controls ensure that the consequences of Design Basis Accidents (DBAs) are acceptable, providing the unit is operated from within the LCOs at the onset of the DBA, and that the equipment functions as analyzed.

Each channel can be tested on line to verify that the trip setpoint is within the specified allowance requirements. Once a designated channel is taken out of service for testing, a simulated signal can be injected in place of the field instrument signal. The process equipment for the channel in test can then be tested, verified, and calibrated.

Actuation Logic

SAR, Section 7.1.4 (Ref. 2), describes the EFIC EFW Initiation logic operation.

Each EFIC train actuates on a one-out-of-two taken twice combination of trip signals from the instrumentation channels. Each EFIC channel can issue an initiate command, but an EFIC actuation will take place only if at least two channels issue initiate commands. For the EFW Initiation and Main Steam Line Isolation functions, the one-out-of-two taken twice logic combinations are transposed between trains so that failure of two channels prevents actuation of, at most, one train.

More detailed descriptions of the EFIC instrumentation are provided below.

1. EFW Initiation

   Figure 10-2, Sheet 4, SAR, Chapter 10 (Ref. 5), illustrates each channel of the EFIC EFW Initiation Function. The individual instrumentation channels that serve EFIC EFW Initiation Function are discussed next.

   a. Loss of MFW Pumps (Control Oil Pressure)

      Loss of both MFW Pumps is one of the six parameters within the EFIC System that automatically initiates EFW. The MFW Pump status instrumentation, and associated bypasses, are internal to the Reactor Protection System (RPS). For RPS, loss of MFW Pumps is detected by MFW Pump turbine control oil pressure. Each RPS channel receives MFW Pump status information from one of four pressure switches per pump. If both switches in a single channel trip (one from each pump), the associated RPS channel trips. Each RPS channel provides a contact input into its associated EFIC channel representative of both MFW Pumps tripped. At least two EFIC channels in trip are required for EFW Initiation. This Function is automatically bypassed when THERMAL POWER is < 10% RTP and the bypass is automatically removed when THERMAL POWER is ≥ 10% RTP. The bypass functions occur internal to the RPS, i.e., prior to input to the EFIC System. This parameter value (i.e., 10% RTP) is a nominal value consistent with the requirements of LCO 3.3.1, "RPS Instrumentation."

Loss of both MFW Pumps was chosen as an EFW automatic initiating parameter because it is a direct and immediate indicator of loss of MFW.

b. SG Level – Low

Four EFIC dedicated low range level transmitters per SG are used to generate the signals used for detection for low level conditions for EFW actuation. There is one transmitter for each of the four channels A, B, C, and D. At least two channels are required to initiate EFW. SG Level - Low was chosen as an EFW automatic initiating parameter because it indicates that the normal feedwater source may be insufficient to meet the heat removal requirements.

Signals from channels A and B are also used to control SG level at approximately 31 inches when one or more RCPs are operating. This parameter is referenced to the top of the lower tube sheet.

c. SG Pressure – Low

Four transmitters per SG (one transmitter per channel) provide the EFIC System with channels A through D of SG Pressure - Low. These are the same transmitters used by the Main Steam Line Isolation Function. When the SG pressure at the transmitter drops below the bistable Allowable Value of 584.2 psig on a given channel, an EFW Initiation signal is sent to the automatic actuation logic. At least two channels are required to initiate EFW and main steam line isolation. The Allowable Value of $\geq$ 584.2 psig includes consideration for instrumentation error and an allowance for margin. Allowances for instrument drift and additional margin are included in the trip setpoint. The low pressure Function may be manually bypassed when either SG is less than 750 psig. If both SG pressure inputs exceed 750 psig, the EFIC channel bypass is automatically removed. The low pressure operational bypass allows for normal cooldown without EFIC actuation. The parameter value (i.e., 750 psig) is a nominal value. Should the channel remain bypassed above 750 psig, the channel is considered inoperable and appropriate conditions are entered. Failure of the automatic bypass removal feature alone or the inability to bypass a channel when below 750 psig does not constitute channel inoperability. The automatic bypass removal feature is verified during the monthly CHANNEL FUNCTIONAL TEST.

SG Pressure - Low is a primary indication and actuation signal for a steam line break or feedwater line break (non-design basis transient). For a small break, which does not depressurize the SG or takes a long time to depressurize the SG, automatic actuation is not required. The operator has time to diagnose the problem and take the appropriate actions.

d. RCP Status

A loss of power to all four RCPs is an indication of a pending loss of forced flow in the Reactor Coolant System. These signals are input into the four channels of EFIC.

When at least two channels issue initiate commands based on loss of all RCPs, the EFIC System will automatically actuate EFW and control the level at approximately 312 inches in the SG. This higher level provides a thermal center in the SG at a higher elevation than that of the reactor to enhance natural circulation of the reactor coolant. This parameter is referenced to the top of the lower tube sheet.

To allow heatup and cooldown operations without actuation, a bypass permissive of 10% RTP is used. The 10% bypass permissive was chosen because it was an available, qualified Class 1E signal at the time the EFIC System was designed. When the first RCP is started, the "loss of four RCPs" initiation signal may be manually reset. If the bypass is not manually reset, it will be automatically reset when the unit reaches 10% power. Should the channel remain bypassed when ≥ 10% RTP, the channel is considered inoperable and appropriate conditions are entered. Failure of the automatic bypass removal feature alone or the inability to bypass a channel when below 10% RTP does not constitute channel inoperability. The automatic bypass removal feature is verified during the monthly CHANNEL FUNCTIONAL TEST.

During cooldown, the bypass may be inserted at any time the power has been reduced below 10% RTP. However, for most operating conditions, this trip function remains active until after the Decay Heat Removal System has been initiated and the system is ready for the last RCP to be tripped. This trip function must be bypassed prior to stopping the last RCP. This parameter value (i.e., 10% RTP) is a nominal value consistent with the requirements of LCO 3.3.1, "RPS Instrumentation."

e. ESAS

The EFIC System initiates EFW when an ESAS signal is initiated on low RCS pressure or high reactor building pressure (ESAS Channels 3 and 4) in order to support heat removal following ECCS actuation. This is a digital signal provided by the ESAS Automatic Actuation Logic. Refer to the Bases for LCO 3.3.5, "Engineered Safeguards Actuation System (ESAS) Instrumentation," and LCO 3.3.7, "Engineered Safeguards Actuation System (ESAS) Automatic Actuation Logic," for additional discussion.

f. DROPS

The EFIC System also initiates EFW on loss of main feedwater flow as part of the DROPS which is the system provided for ANO-1 to comply with requirements to reduce risk from an ATWS. The DROPS consists of the Diverse Scram System (DSS) and the ATWS Mitigation System Actuation Circuitry (AMSAC) . EFW initiation for ATWS prevention and mitigation is not required by this Specification.

2. EFW Vector Valve Control

Figure 10-2, Sheet 4, SAR, Chapter 10 (Ref. 5), illustrates the EFIC EFW Vector Valve Control inputs to the EFIC Vector Logic (See Bases for LCO 3.3.14, "EFIC Vector Logic"). The function of the EFW vector logic is to determine whether EFW should not be fed to one or the other SG once enabled by the EFW Initiation Function. This is to preclude the continued addition of EFW to a depressurized SG and, thus, to minimize the overcooling effects.

Each set of vector logic receives SG pressure information from bistables located in the input logic of the same EFIC channel. The pressure information received is:

a. SG A pressure less than 584.2 psig;

b. SG B pressure less than 584.2 psig;

c. SG A pressure 100 psid greater than SG B pressure; and

d. SG B pressure 100 psid greater than SG A pressure.

The Allowable Value of $\geq$ 584.2 psig includes consideration for instrumentation error and an allowance for margin. Allowances for instrument drift and additional margin are included in the trip setpoint. The 100 psid value is considered to be a nominal value.

The vector logic outputs are in a neutral state until enabled by the train A or B trip logics. When enabled, the vector logic can issue close commands to the EFW control valves and open or closed commands to the EFW isolation valves per the selected channel assignments. The level control module provides input to the flow controllers which control the position of the EFW control valves.

Each vector logic may isolate EFW to one SG or the other, never both.

The valve open or close commands are determined by the relative values of SG pressures as discussed in the Bases for LCO 3.3.14.

3. Main Steam Line Isolation

SAR, Section 7.1.4 (Ref. 2) describes one channel of the EFIC Main Steam Line Isolation logic. Four pressure transmitters (one transmitter per channel) per SG provide EFIC with channels A through D logic of SG pressure. The channels are as described for EFW Initiation mentioned earlier.

Bypass

One of the four initiation channels can be put into "maintenance bypass." Bypassing one initiation channel isolates that channel's signal to the functions fed from initiation channel but does not bypass the trip logic within the actuation train. An interlock feature prevents bypassing more than one channel at a time. In addition, since the EFIC System receives signals from the RPS, the maintenance bypass from the RPS is interlocked with the EFIC System. If one channel of the RPS is in maintenance bypass, only the corresponding channel of the EFIC may be bypassed (e.g., channel A, RPS, and channel A, EFIC). This ensures that only the corresponding channels of the EFIC and RPS are placed in maintenance bypass at the same time.

EFIC channel maintenance bypass does not bypass EFW Initiation from ESAS. The EFIC EFW initiation from ESAS is, however, bypassed when its associated ESAS channel is bypassed.

The operational bypass provisions were discussed as part of the individual Functions described earlier.

The EFIC System is designed to perform its intended EFW Initiation and Main Steam Line Isolation function with one channel in maintenance bypass (in effect, inoperable) concurrent with a postulated single failure in any one of the remaining channels. This is in compliance with IEEE-279-1971 (Ref. 6).

APPLICABLE SAFETY ANALYSES

1. EFW Initiation

Although loss of both MFW pumps is a direct and immediate indicator of loss of MFW, other scenarios such as valve closures could potentially cause loss of feedwater. As part of the post-TMI review, a loss of main feedwater was analyzed (Ref. 3). The EFIC System response for a loss of MFW conservatively assumes the actuation of EFW on low SG level. If the loss of feedwater is due to loss of MFW pumps, EFW will be actuated earlier than it would on low SG level, which will increase the SG heat transfer capability and will lessen the severity of the transient.

The basis for initiation of the EFW systems is a loss of MFW. For this analysis, SG Level - Low is the most conservative parameter from which to automatically initiate EFW since this yields the least SG inventory available for heat removal.

SG Level - Low would be an indicator of any event involving a loss of SG secondary side inventory heat removal capability.

SG Pressure - Low is a primary indication and provides an actuation signal for a SLB. In the SLB analyses, SAR Section 14.2.2.1 (Ref. 3), EFIC initiation occurs; however, no EFW flow occurred because level did not reach the SG Level - Low setpoint.

Loss of four RCPs is a primary indicator of the need for emergency feedwater (EFW) for the loss of electric power analysis, SAR Section 14.1.2.8 (Ref. 3).

The SAR SBLOCA analyses, SAR Section 14.2.2.5 (Ref. 3), assume initiation of EFW based on concurrent loss of offsite power and the resultant loss of four RCPs. Initiation of EFW would also occur when an ESAS signal is generated on low RCS pressure or high reactor building pressure (ESAS Channels 3 or 4) in order to support heat removal following ECCS actuation, however, these are considered backup initiation responses.

2. EFW Vector Valve Control

   The SAR SLB analyses, SAR Section 14.2.2.1 (Ref. 3), consider isolation of the affected SG as a function automatically performed by the EFIC System. The EFIC Vector Logic utilizes the EFW Vector Valve Control Functions (i.e., SG Pressure - Low and SG Differential Pressure - High) to determine which steam generator is associated with the rupture and provide appropriate isolation.

3. Main Steam Line Isolation

   The SAR SLB analyses, SAR Section 14.2.2.1 (Ref. 3), assume actuation of the Main Steam Line Isolation on SG Pressure - Low, initiating closure of the main steam isolation valves and the main feedwater isolation valves. The steam generator in the steam loop associated with the rupture blows dry after feedwater isolation. EFW flow is available to the unaffected steam generator to preserve the availability of an RCS heat sink.

In MODE 1, the EFIC System satisfies Criterion 3 of 10 CFR 50.36 (Ref. 7). In MODES 2 and 3, the EFIC System satisfies Criterion 4 of 10 CFR 50.36 since there are no specific safety analyses that credit the EFIC system for operation at less than full rated power.

LCO

All instrumentation performing an EFIC System Function in Table 3.3.11-1 shall be OPERABLE. Failure of any instrument renders the affected channel(s) inoperable.

Four channels are required OPERABLE for all EFIC Functions. Each EFIC instrumentation channel is considered to include the sensors and measurement

channels for each Function, the operational bypass switches, and permissives. Failures that disable the capability to place a channel in operational bypass, but which do not disable the trip Function, do not render the protection channel inoperable.

EFIC initiation function values for the bypass removal functions are specified in terms of applicability limits (i.e., identified in the Applicable MODES or Other Specified Conditions column of Table 3.3.11-1) for the associated trip Function. Trip setpoints are specified in the setpoint calculations or calibration procedures. The trip setpoints are selected to ensure the setpoints measured by CHANNEL FUNCTIONAL TESTS do not exceed the Allowable Value if the bistable is performing as required. Guidance used to calculate the uncertainties associated with the trip setpoints is provided in Reference 4.

The Bases for the LCO requirements of each specific EFIC Function are discussed next.

Loss of MFW Pumps

Four EFIC channels for Loss of MFW Pumps shall be OPERABLE. This ensures that upon the loss of both MFW pumps, EFW will be automatically initiated. This Function is provided as a direct digital input from the RPS and includes a bypass enable and removal function.

SG Level – Low

Four EFIC dedicated low range level transmitters per SG shall be OPERABLE with an SG Level - Low actuation Allowable Value of $\geq$ 11.1 inches, to generate the signals used for detection for low level conditions for EFW Initiation. This parameter is referenced to the top of the lower tube sheet and includes consideration for instrumentation error and an allowance for margin. Allowances for instrument drift and additional margin are included in the trip setpoint. There is one transmitter for each of the four channels A, B, C, and D. The signals are also used after EFW is actuated to control level at approximately 31 inches when one or more RCPs are in operation. In the determination of the low level setpoint, it is desired to place the setpoint as low as possible, considering instrument errors, to give the maximum operational margin between the integrated control system setpoint and the EFW Initiation setpoint. This will minimize spurious or unwanted initiation of EFW. Credit is only taken for low level actuation for those transients which do not involve a degraded environment. Therefore, normal environment errors only are used for determining the SG Level - Low level setpoint. This parameter is referenced to the top of the lower tube sheet.

SG Pressure - Low

Four EFIC channels per SG shall be OPERABLE with an SG low pressure actuation Allowable Value of $\geq$ 584.2 psig. The setpoint is chosen to avoid actuation under transient conditions not requiring secondary system isolation, preferring to maintain

a steaming path to the condenser, if possible. Small break LOCA analyses have indicated minimum secondary system pressures of greater than the above setpoint. The SG Pressure - Low Function includes a bypass enable and removal function. The bypass removal value is chosen to allow sufficient operating margin for the operator to bypass when cooling down. The above Allowable Value (i.e., 584.2 psig) includes consideration for instrumentation error and an allowance for margin. Allowances for instrument drift and additional margin are included in the trip setpoint.

SG Differential Pressure - High

Four EFIC channels for SG differential pressure shall be OPERABLE. This Function ensures that automatic EFW isolation to a depressurized SG occurs. The MSLB analysis assumes the depressurized SG is isolated when a differential pressure of 150 psid is detected. The in-plant setpoint is conservatively chosen to protect the MSLB assumptions.

RCP Status

Four EFIC channels for RCP status shall be OPERABLE. This ensures that upon the loss of four RCPs, EFW will be automatically initiated with the EFW control level automatically raised to approximately 312 inches, providing a higher SG level for establishing and maintaining natural circulation conditions. No setpoint is specified since the status indication as used by EFIC is binary in nature. The RCP Status Function includes a bypass enable and removal function from the RPS. The above parameter value (i.e., 312 inches) does contain an allowance for instrument error. This parameter is referenced to the top of the lower tube sheet.

APPLICABILITY

The EFIC System instrumentation Functions shall be OPERABLE in accordance with Table 3.3.11-1. Each Function has its own requirements that are conservative with respect to the specific accidents and conditions for which it is designed to mitigate the consequences. The parameter values provided as part of the Applicability do contain an allowance for instrument error.

The initiation of EFW on the Loss of MFW Pumps shall only be required when the unit is $\geq$ 10% RTP. Below 10% RTP, the EFW Initiation on low SG level will mitigate primary system overheating.

EFW Initiation on low SG level shall be OPERABLE in MODES 1, 2, and 3 which are conditions during which the SG is required for heat removal.

To avoid automatic actuation of the EFW pumps during normal heatup and cooldown transients, the low SG pressure Function can be bypassed at or below a secondary pressure of 750 psig during MODE 3 operation.

The EFW System Initiation on loss of all RCPs Function shall be operable at ≥ 10% RTP. It is possible to bypass the Function below 10% RTP; however, for most cases, the Function is kept in service until the unit is placed on the Decay Heat Removal System. To prevent inadvertent actuation of the EFW pumps, it must be bypassed prior to stopping the last RCP.

The Main Steam Line Isolation and EFW Vector Valve Control Functions shall be OPERABLE in MODES 1 and 2, and MODE 3 with SG pressure ≥ 750 psig because the SG inventory can contribute significantly to the reactor building peak pressure with a secondary side break. Both the normal feedwater and the EFW must be able to be isolated on each SG to limit overcooling of the primary and to limit mass and energy releases to the reactor building. Once the SG pressures have decreased below 750 psig the energy level is low and the secondary side feedwater flow rate is low or nonexistent. Also, the primary system temperatures are typically too low to allow the SGs to effectively remove energy, or are sufficiently low to allow for operator action. Therefore, EFIC instrumentation is not required to be OPERABLE.

ACTIONS

If a channel's trip setpoint is found nonconservative with respect to the Allowable Value, or any of the transmitter, signal processing electronics, or EFIC channel cabinet modules are found inoperable, then all affected Functions provided by that channel must be declared inoperable and the unit must enter the Conditions for the particular protection Function affected.

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

A.1

Condition A applies to failures of a single EFW Initiation or Main Steam Line 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 or Main Steam Line 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. If testing of another channel in either the EFIC or RPS is required, the EFIC channel must be placed in trip to allow the other channel to be bypassed. With the channel in trip, the resultant logic is one-out-of-two. The Completion Time of 1 hour is adequate to perform Required Action A.1.

B.1 and B.2

Condition B applies to a situation where two instrumentation channels of the same protection functions of EFW Initiation or Main Steam Line Isolation instrumentation are inoperable. For example, Condition B applies if channel A and B of the EFW Initiation Function are inoperable.

With two EFW Initiation or Main Steam Line Isolation protection channels inoperable, one channel must be placed in bypass (Required Action B.1). Bypassing one of the remaining OPERABLE channels 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 Completion Times of 1 hour are adequate to perform the Required Actions.

C.1

The function of the EFW Vector Valve Control is to meet the single-failure criterion while being able to provide EFW on demand and isolate an SG 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) Vector Logic."

With one EFW Vector Valve Control channel inoperable, the system cannot meet the single-failure criterion and still meet the dual functional criteria described earlier. 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 (Required Action C.1) within 72 hours, which is consistent with the Completion Time associated with the loss of one train of EFW.

D.1, D.2, E.1, F.1, F.2

If the Required Actions and associated Completion Times are not met, the unit must be placed in a MODE or condition in which the requirement does not apply. This is done by placing the unit in a nonapplicable MODE for the particular Function. The nonapplicable MODE is less than 10% RTP for Functions 1.a and 1.d, MODE 4 for Function 1.b, and MODE 3 with SG pressure less than 750 psig for all other Functions. In addition, for Function 3.a, once the unit is in MODE 3, a nonapplicable condition may be achieved by closing and deactivating the valves associated with the Main Steam Line Isolation Function. 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 unit 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. 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 unit 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.

SR 3.3.11.1

Performance of the CHANNEL CHECK once every 12 hours provides reasonable assurance for prompt identification of a gross failure of instrumentation.
A CHANNEL CHECK is normally 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 monitoring the same parameter should read approximately the same value. Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; therefore, it is key in verifying that the instrumentation continues to operate properly between each CHANNEL FUNCTIONAL TEST and CHANNEL CALIBRATION.

Agreement criteria are determined by the unit staff, based on a combination of factors including channel instrument uncertainties. If a channel is outside the criteria, it may be an indication that the transmitter or the signal processing equipment has drifted outside its limit. If the channels are within the criteria, it is an indication that the channels are OPERABLE. If the channels are normally off scale during times when surveillance is required, the CHANNEL CHECK will only verify that they are off scale in the same direction. Off scale low current loop channels are verified, where practical, to be reading at the bottom of the range and not failed downscale.

The Frequency is based on operating experience that demonstrates channel failure is rare. Since the probability of two random failures in redundant channels in any 12 hour period is extremely low, the CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. The CHANNEL CHECK supplements less formal, but more frequent, checks of channel OPERABILITY during normal operational use of the displays associated with the LCO required channels.

SR 3.3.11.2

A CHANNEL FUNCTIONAL TEST verifies the function of the automatic bypass removal feature, required trip, interlock, and alarm functions of the channel.

Setpoints for trip functions must be found within the Allowable Value. (Note that the values for the bypass removal functions are identified in the Applicable MODES or Other Specified Condition column of Table 3.3.11-1 as limits on applicability for the trip Functions.) Any setpoint adjustment shall be consistent with the assumptions of the current setpoint analysis.

The Frequency of 31 days is based on unit operating experience with regard to channel OPERABILITY and drift, which demonstrates that failure of more than one channel of a given function in any 31 day interval is a rare event.

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. CHANNEL CALIBRATION shall find that measurement errors and bistable setpoint errors are within the assumptions of the setpoint analysis. CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the setpoint analysis.

The Frequency is based on the assumption of at least an 18 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

REFERENCES

1. 10 CFR 50.62.
2. SAR, Chapter 7.
3. SAR, Chapter 14.
4. Instrument Loop Error Analysis and Setpoint Methodology Manual, Design Guide, IDG-001.
5. SAR, Chapter 10, Figure 10-2, Sheet 4.
6. IEEE-279-1971, April 1972.
7. 10 CFR 50.36.

B 3.3 INSTRUMENTATION

B 3.3.12 Emergency Feedwater Initiation and Control (EFIC) Manual Initiation

BASES

BACKGROUND

The EFIC manual initiation capability provides the operator with the capability to actuate EFIC Functions from the control room in the absence of any other initiation condition. Manually actuated Functions include Main Steam Line Isolation for steam generator (SG) A, Main Steam Line Isolation for SG B, and Emergency Feedwater (EFW) Actuation. These Functions are provided in the event the operator determines that an EFIC Function is needed prior to automatic actuation or in the event that EFIC does not automatically actuate when required. These are backup Functions to those performed automatically by EFIC.

The manual actuation of these functions may be performed from the Remote Switch Matrix, located on the main control boards, or from the manual actuation trip switches located on the EFIC control cabinets in the control room. The required manual actuation logic within each train consists of two manual switches (one for Trip Bus 1 and one for Trip Bus 2). When one manual trip switch is depressed, a half trip occurs. When both manual trip switches are depressed, a full trip of the train actuation occurs for that particular Function. The Remote Switch Matrix and the EFIC control cabinet trip switches perform parallel functions and, therefore, any combination of switches depressed within a train that energizes both Trip Bus 1 and Trip Bus 2 for a given Function will result in an actuation of that Function. The use of two manual trip switches for each train of actuation logic allows testing without actuating the end devices and also reduces the possibility of accidental manual actuations.

The EFIC manual initiation circuitry satisfies the manual initiation and single-failure criterion requirements of IEEE-279-1971 (Ref. 1).

APPLICABLE SAFETY ANALYSES

EFIC Functions credited in the safety analysis are automatic. However, the manual initiation Functions are required by design as backups to the automatic initiation Functions and allow operators to actuate EFW or Main Steam Line Isolation whenever these Functions are needed. Furthermore, the manual initiation of EFW and Main Steam Line Isolation may be specified in unit operating procedures.

The EFIC manual initiation functions satisfy Criterion 4 of 10 CFR 50.36 (Ref. 2).

LCO

Instrumentation on the main control board performing an EFIC manual initiation Function shall be OPERABLE.

Two manual initiation switches per actuation train (Train A and Train B) of each Function (A and B Main Steam Line Isolation, and EFW Actuation) are required to be OPERABLE. This requirement may be satisfied by the manual trip switches located on the Remote Switch Matrix on the main control board, by the trip switches located on the EFIC control cabinets, or by any combination of switches located on the Remote Switch Matrix and the EFIC control cabinets such that Trip Bus 1 and Trip Bus 2 are available for each EFIC Function in each of the two EFIC trains.

APPLICABILITY

The EFIC System Manual Initiation Function shall be OPERABLE when the associated EFIC Instrumentation Main Steam Line Isolation or EFW Initiation Function is required to be OPERABLE in accordance with Table 3.3.11-1. Each Function, i.e., Main Steam Line Isolation and EFW Initiation, has its own requirements that are based on the specific accidents and conditions for which it is designed to mitigate the consequences. See Bases for LCO 3.3.11, "EFIC Instrumentation," for additional discussion of each Function.

ACTIONS

A Note has been added to the ACTIONS indicating that separate Condition entry is allowed for each EFIC manual initiation Function.

A.1

With one required manual initiation switch of one or more EFIC Function(s) inoperable in one train, the trip bus for the associated EFIC Function(s) must be placed in the tripped condition within 72 hours. With the trip bus in the tripped condition, the single-failure criterion is met. Failure to perform Required Action A.1 could allow a single failure of another switch to prevent manual actuation of at least one of the two trains. The Completion Time allotted to trip the trip bus allows the operator to take all the appropriate actions for the failed manual initiation switch and still ensure that the risk involved in operating with the failed manual initiation switch is acceptable.

B.1

With both required manual initiation switches of one or more EFIC Function(s) inoperable in one train, one manual initiation switch must be restored to OPERABLE status within 72 hours. The effect for both required switches being

inoperable simultaneously is the same as for the associated EFIC components for a single train being inoperable. Therefore, the 72-hour Completion Time is appropriate since it is consistent with the Completion Times of the associated system train. The trip bus associated with the remaining inoperable manual initiation switch must be placed in the tripped condition within 72 hours (Required Action A.1). With the affected trip bus in the tripped condition, the single failure criterion is met. The Completion Time allotted to restore a trip bus or place the trip bus in the tripped condition allows the operator to take all appropriate actions for the failed manual initiation switches and still ensure that the risk involved in operating with the failed manual initiation switches is acceptable.

C.1

With one or both required manual initiation switches of one or more EFIC Function(s) inoperable in both actuation trains, one actuation train for each Function must be restored to OPERABLE status within 1 hour. With the train restored, the second train must be placed in the appropriate condition within 72 hours per Required Action A.1 or B.1, as applicable. Compliance with these actions ensures the single-failure criterion is met. The Completion Time allotted to restore the train allows the operator to take all the appropriate actions for the failed train and still ensures that the risk involved in operating with the failed train is acceptable.

D.1 and D.2

If the Required Action and the associated Completion Time is not met for any EFW Initiation Function, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 4 within 12 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 unit systems.

E.1, E.2.1, and E.2.2

If the Required Actions and associated Completion Times are not met for the Main Steam Line Isolation Function, the unit must be placed in a MODE or condition in which the requirement does not apply. This is initiated by placing the unit in MODE 3 within 6 hours and, either reducing SG pressure to less than 750 psig, or closing and deactivating all associated valves, i.e., the valves which EFIC would close if it were to actuate while OPERABLE . 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 unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.3.12.1

This SR requires the performance of a CHANNEL FUNCTIONAL TEST to ensure that the trains can perform their intended functions. However, for Main Steam Line Isolation and EFW Initiation, the test need not include actuation of the end device. This is due to the risk of a unit transient caused by the closure of valves associated with Main Steam Line Isolation or EFW Initiation during testing at power. The Frequency of 31 days is based on operating experience with regard to channel OPERABILITY that demonstrates the rarity of more than one train failing within the same 31 day interval.

REFERENCES

1. IEEE-279-1971, April 1972.

2. 10 CFR 50.36.

B 3.3 INSTRUMENTATION

B 3.3.13 Emergency Feedwater Initiation and Control (EFIC) Logic

BASES

BACKGROUND

Main Steam Line Isolation

The four emergency feedwater initiation and control (EFIC) channels sensing a steam generator (SG) low outlet pressure condition input their initiate commands to the trip logic modules. SAR, Section 7.1.4 (Ref. 1), describes the Main Steam Line Isolation Logics. The trip logic modules are identified as being part of the "A" and "B" trains and are physically located in the "A" and "B" EFIC channel cabinets. Train "A" actuation logic initiates when instrumentation channel "A" or "B" initiates and channel "C" or "D" initiates, which in simplified logic is:

Train "A" actuation = (A and C) or (A and D) or (B and C) or (B and D)

Train "B" actuation logic initiates when instrumentation channel "A" or "C" initiates and channel "B" or "D" initiates, which in simplified logic is:

Train "B" actuation = (A and B) or (A and D) or (C and B) or (C and D)

Each of the two Functions (SG A Main Steam Line Isolation, and SG B Main Steam Line Isolation) has a train "A" and a train "B" of automatic actuation logic.

Both trains "A" and "B" of the SG A Main Steam Line Isolation automatic actuation logic send closure signals to the SG A Main Steam Isolation valve.

SG B Main Steam Line Isolation automatic actuation logics respond similarly for the SG B valve.

Train "A" of the SG A Main Steam Line Isolation automatic actuation logic sends closure signals to the SG A MFW isolation valves. Similarly, Train "B" of the SG B Main Steam Line Isolation automatic actuation logic sends closure signals to the SG B MFW isolation valves.

Emergency Feedwater (EFW Initiation)

The four EFIC instrumentation channels for each of the parameters being sensed input their initiate commands to the trip logic modules. SAR, Section 7.1.4 (Ref. 1), describes the EFW initiation logic. These trip logic modules are identified as being part of the "A" and "B" trains and are physically located in the "A" and "B" EFIC channel cabinets.

EFW Initiation functions use the same actuation logic combinations as Main Steam Line Isolation. EFW initiation also occurs on Engineered Safeguards Actuation System (ESAS) actuation and on Diverse Reactor Overpressure Protection System (DROPS) actuation.

EFIC automatically initiates the EFW System when any of the following conditions exist:

a. All four reactor coolant pumps are tripped;

b. Both MFW pumps are tripped and reactor power is > 10% RTP;

c. Low level in either SG;

d. Low pressure in either SG;

e. Actuation of ESAS channels 3 or 4; or

f. Actuation of DROPS channels 1 or 2.

Vector Valve Enable Logic

The EFIC System is also responsible for sending open or close signals to the EFW control and isolation valves. SAR Section 7.1.4 (Ref. 1), describes the EFIC vector logic. The vector logic outputs are in a neutral state (neither commanding open nor close) until an enable signal is received from either train "A" or "B" of EFW Initiation. The EFIC Logic monitors the channel A and B EFW Initiation logics. When an EFW Initiation occurs, the vector logic is enabled to generate open or close signals to the EFW isolation valves and close signals to the EFW control valves depending on the relative values of SG pressures. The level control module provides input to the flow controllers which control the position of the EFW control valves.

APPLICABLE SAFETY ANALYSES

The Applicable Safety Analysis discussion for the Main Steam Line Isolation and EFW Initiation Functions is discussed in the Bases for LCO 3.3.11, "EFIC Instrumentation."

LCO

Two trains each of Main Steam Line Isolation and EFW Initiation logics shall be OPERABLE. There are only two trains of automatic actuation logic per Function. Therefore, violation of this LCO could result in a complete loss of the automatic Function assuming a single failure of the other train.

To be considered OPERABLE, the Main Steam Line Isolation logic must send closure signals to the associated SG main steam and MFW isolation valves when the appropriate combinations of instrument channels indicate low SG pressure.

To be considered OPERABLE, the EFW Initiation logic must send initiation signals to the EFW System when the appropriate combinations of instrument channels indicate any of the following conditions exist:

a. All four reactor coolant pumps are tripped;

b. Both MFW pumps are tripped and reactor power is > 10% RTP;

c. Low level in either SG;

d. Low pressure in either SG; or

e. Actuation of ESAS channel 3 or 4.

APPLICABILITY

The EFIC Logic shall be OPERABLE when the associated EFIC Instrumentation Main Steam Line Isolation or EFW Initiation Function is required to be OPERABLE in accordance with Table 3.3.11-1. Each Function, i.e., Main Steam Line Isolation and EFW Initiation, has its own requirements that are based on the specific accidents and conditions for which it is designed to mitigate the consequences. See Bases for LCO 3.3.11, "EFIC Instrumentation," for additional discussion of each Function.

ACTIONS

If a train is found inoperable, then all affected logic Functions provided by that train must be declared inoperable and the appropriate Condition entered for the particular protection function affected.

For this LCO, a Note has been added to the ACTIONS indicating that separate Condition entry is allowed for each EFIC logic Function.

A.1

Condition A applies when one or more EFIC logic Functions in a single train are inoperable (i.e., train A could be inoperable for both EFIC logic Functions and Condition A would still be applicable) with all Functions in the other train OPERABLE. This Condition is equivalent to failure of one EFW and Main Steam Line Isolation train.

With one automatic actuation logic train of one or more EFIC Functions inoperable, the associated EFIC train must be restored to OPERABLE status. Since there are only two automatic actuation logic trains per EFIC Function, the condition of one train inoperable is analogous to having one train of a two train Engineered Safeguards (ES) System inoperable. The system safety function can be accomplished; however, a single failure cannot be taken. Therefore, the failed train(s) must be restored to OPERABLE status to re-establish the system's single-failure tolerance.

Condition A can be thought of as equivalent to failure of a single train of a two train safety system (e.g., the safety function can be accomplished, but a single failure cannot be taken). Thus, the Completion Time of 72 hours has been chosen to be consistent with Completion Times for restoring one inoperable ESF System train.

The EFIC System has not been analyzed for failure of both trains of the same Function. Consequently, any combination of failures in both trains A and B is not covered by Condition A and must be addressed by entry into LCO 3.0.3.

B.1 and B.2

If Required Action A.1 and its associated Completion Time is not met for the EFW Initiation Function, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 4 within 12 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 unit systems.

C.1, C.2.1, and C.2.2

If the Required Actions and associated Completion Times are not met for the Main Steam Line Isolation Function, the unit must be placed in a MODE or condition in which the requirement does not apply. This is initiated by placing the unit in MODE 3 within 6 hours and, either reducing SG pressure to less than 750 psig, or closing and deactivating all associated valves, i.e., the valves which EFIC would close if it were to actuate while OPERABLE. 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 unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.3.13.1

This SR requires the performance of a CHANNEL FUNCTIONAL TEST to ensure that the trains can perform their intended functions. This test verifies Main Steam Line Isolation and EFW Initiation automatic actuation logics are functional. This test

simulates the required inputs to the logic circuit and verifies successful operation of the automatic actuation logic. The test need not include actuation of the end device. This is due to the risk of a unit transient caused by the closure of valves associated with Main Steam Line Isolation or actuation of EFW during testing at power. The Frequency of 31 days is based on operating experience with regard to channel OPERABILITY, which has demonstrated the rarity of more than one channel failing within the same 31 day interval.

REFERENCES

1. SAR, Chapter 7.

B 3.3 INSTRUMENTATION

B 3.3.14 Emergency Feedwater Initiation and Control (EFIC) Vector Logic

BASES

BACKGROUND

The function of the EFIC vector logic is to determine whether EFW should not be fed to one or the other steam generator. This is to preclude the continued addition of EFW to a depressurized steam generator (SG) and, thus, minimize the overcooling effects. Each vector logic may isolate EFW to one SG or the other, never both.

There are four sets of vector logic; one in each channel of EFIC. Each set of vector logic receives SG pressure information from bistables located in the input logic of the same EFIC channel. The pressure information received is:

a. SG "A" pressure less than 600 psig;

b. SG "B" pressure less than 600 psig;

c. SG "A" pressure 100 psid greater than SG "B" pressure; and

d. SG "B" pressure 100 psid greater than SG "A" pressure.

These values (i.e., 600 psig and 100 psid) do contain an allowance for instrument error.

Each vector logic also receives an enable signal from both EFIC train A and train B when EFW is actuated.

The vector logic develops signals for open and close control of SG "A" and "B" EFW valves.

The vector logic outputs are in a neutral state with the valves fully open until enabled by the EFW Initiation (train A or B) trip logics. When enabled, the vector logic can issue close commands to the EFW control valves and open or close commands to the EFW isolation valves per the selected channel assignments.

The valve open/close commands are determined by the relative values of steam generator pressures as follows:

	SG VALVES	
PRESSURE STATUS	"A"	"B"
If SG "A" & SG "B" > 600 psig	Open	Open
If SG "A" > 600 psig & SG "B" < 600 psig	Open	Close
If SG "A" < 600 psig & SG "B" > 600 psig	Close	Open
If SG "A" & SG "B" < 600 psig AND		
• SG "A" & SG "B" within 100 psid	Open	Open
• SG "A" 100 psid > SG "B"	Open	Close
• SG "B" 100 psid > SG "A"	Close	Open

APPLICABLE SAFETY ANALYSES

The Applicable Safety Analysis discussion for the EFIC Vector Logic is discussed in the Bases for LCO 3.3.11, "EFIC Instrumentation."

LCO

Four channels of the EFIC vector logic module are required to be OPERABLE. The necessity for four channels is discussed in the BASES for ACTIONS. The 600 psig and 100 psid setpoints were chosen as discussed in Specification B 3.3.11, "EFIC Instrumentation." The feed only good generator verification study assumed a differential pressure vector value of 150 psid. A 100 psid setpoint conservatively assumes a 50 psi (25 psi per pressure channel) margin for instrument error. Failure to meet this LCO results in not being able to meet the single-failure criterion. These values (i.e., 600 psig and 100 psid) do contain an allowance for instrument error.

APPLICABILITY

The EFIC Vector Logic shall be OPERABLE when the associated EFIC Instrumentation EFW Vector Valve Control Function is required to be OPERABLE in accordance with Table 3.3.11-1. The EFW Vector Valve Control Function is required to be OPERABLE in MODES 1 and 2, and in MODE 3 with SG pressure $\geq$ 750 psig because the SG inventory can contribute significantly to the reactor

building peak pressure with a secondary side break. Both the normal feedwater and the EFW must be able to be isolated on each SG to limit overcooling of the primary and to limit mass and energy releases to the reactor building. Once the SG pressures have decreased below 750 psig, the energy level is low and the secondary side feedwater flow rate is low or nonexistent. Also, the primary system temperatures are typically too low to allow the SGs to effectively remove energy, or are sufficiently low to allow for operator action. Therefore, EFIC Vector Logic is not required to be OPERABLE in MODE 3 below 750 psig nor in MODES 4, 5, and 6.

ACTIONS

A.1

The function of the EFW control/isolation valves and the EFIC vector logic is to meet the single-failure criterion while maintaining the capability to:

a. Provide EFW on demand; and

b. Isolate an SG 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.

With one channel inoperable, the system cannot meet the single-failure criterion and still meet the dual functional criteria previously described. Therefore, when one vector valve logic channel is inoperable, the channel must be restored to OPERABLE status within 72 hours. This is analogous to having one EFW train inoperable; wherein a 72 hour Completion Time is provided by the Required Actions of LCO 3.7.5, "EFW System." As such, the Completion Time of 72 hours is based on engineering judgment.

B.1 and B.2

If Required Action A.1 cannot be met within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and SG pressure must be reduced to < 750 psig 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 unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.3.14.1

SR 3.3.14.1 is the performance of a CHANNEL FUNCTIONAL TEST every 31 days. This test demonstrates that the EFIC vector logic performs its function as desired. The Frequency is based on operating experience with respect to channel OPERABILITY that demonstrates the rarity of more than one channel failing within the same 31 day interval.

REFERENCES

None.

CTS DISCUSSION OF CHANGES

ITS Section 3.3C: Instrumentation - EFIC

Note: ITS Section 3.3C package includes the following ITS:

ITS 3.3.11 Emergency Feedwater Initiation and Control (EFIC) System Instrumentation

ITS 3.3.12 EFIC Manual Initiation

ITS 3.3.13 EFIC Logic

ITS 3.3.14 EFIC-Emergency Feedwater (EFW)-Vector Valve Logic

which address the corresponding NUREG-1430 RSTS.

ADMINISTRATIVE

A1 The designated change represents a non-technical, non-intent change to the Arkansas Nuclear One, Unit 1 Current Technical Specifications (CTS) made to make the ANO-1 Improved Technical Specifications (ITS) consistent with the B&W Standard Technical Specification (RSTS), NUREG-1430, Revision 1. This change does not alter the requirements of the CTS or RSTS. Examples of this type of change include: wording preference; convention adoption; editorial, numbering and formatting changes; and hierarchy structure.

A2 The ANO-1 CTS Bases will be administratively deleted in their entirety in favor of the NUREG-1430 Bases. The CTS Bases will be reviewed for technical content that will be identified for retention in the ITS Bases.

A3 CTS 3.5.1.1 and 3.5.1.2 represent information on the proper action when the number of channels is less than required by CTS Table 3.5.1-1. For example, CTS 3.5.1.1 does not clearly specify that the number of channels identified in Table 3.5.1-1, Column 1, are required to be OPERABLE, but CTS 3.5.1.2 provides directions when channels are inoperable. Similarly, CTS Specifications 4.1.a, and 4.1.b contain information on the proper application of CTS Table 4.1-1. These Specifications and the format of the referenced Tables are replaced with the appropriate ITS requirements. The CTS markup for these Specifications and Tables does not attempt to depict all of the changes required to adopt the ITS format. Rather, the appropriate specific Discussion of Change (DOC) is indicated along with the appropriate CTS versus ITS cross reference. Therefore, this change in format is considered administrative.

A4 Surveillance frequencies in CTS Table 4.1-1 have been replaced with those from NUREG-1430. The CTS and corresponding ITS Frequencies are as follows:

CTS	ITS
S - Each shift	12 hours
W - Weekly	7 days
M - Monthly	31 days
D - Daily	24 hours
T/W - Twice per week	96 hours
Q - Quarterly	92 days
P - Prior to each startup if not done previous week	Not Used
B/M - Every 2 months	Not Used
R - Once every 18 months	18 months
PC - Prior to going Critical if not done within previous 31 days	Not Used
NA - Not Applicable	Not Used
SA - SA Twice per Year	184 days

(Note: Not all Frequencies listed above are applicable to this package.)

A5 The Notes which allow for separate entry into the ACTIONS of ITS 3.3.11, ITS 3.3.12, and ITS 3.3.13, and the Note for ITS 3.3.11 which indicates that ITS Table 3.3.11-1 identifies the applicable SRs, have been adopted. These additions have been made to provide requirements in a format consistent with NUREG-1430. The addition of these Notes maintains allowances consistent with the use and application of the requirements of the corresponding portions of CTS Table 3.5.1-1. This change represents a change in presentation format only with no addition or deletion of requirements.

3.3.12-01 A6 Not Used.

A7 The term Minimum Degree of Redundancy as presented in CTS, i.e., Table 3.5.1-1 Column 4, will not be retained in ITS. Omission of this term is not considered to result in any changes in requirements since the intent of this column is consistent with application of Table 3.5.1-1 Column 3, "Minimum Channels Operable," which is retained (although the format is changed per DOC A3). Removal of this term and its usage from the CTS does not represent any actual change in requirements, only a change in presentation.

A8 CTS 3.5.1.15.a and 3.5.1.16 are revised to specifically identify that the Applicability for ITS Table 3.3.11-1, Functions 1.c and 3.a includes MODES 1 and 2, and MODE 3 when steam generator pressure is ≥ 750 psig (per ITS Table Note (a)). These are considered to be equivalent since the CTS identifies the "minimum operability conditions" as when the main steam pressure exceeds (or is greater than) 750 psig, and the steam pressure of 750 psig is normally achieved and exceeded in MODE 3. This is a change in format only and is therefore an administrative change.

A9 The "exceeds" and "greater than" requirements for EFIC instrumentation channel Applicability in CTS 3.5.1.15 and 3.5.1.16, have been revised to "≥" in the associated Applicability identified in ITS Table 3.3.11-1. These are considered to be essentially equivalent since the parameter can be greater than the identified limit, but be so close as to be imperceptible. This change is consistent with NUREG-1430.

A10 The EFIC instrumentation channels testing requirements of CTS Table 4.1-1, items 56.d and 56.e have not been included in ITS. This change is considered administrative in nature because this equipment has never been installed in the plant. These Surveillance Requirements were included based on an early design of EFIC during implementation of NUREG-0737; however, during NRC review, the design was revised to omit these functions. This change makes the EFIC requirements consistent with the final unit design.

A11 CTS Table 3.5.1-1, EFIC Functional Units 1.b, 1.c, 1.d, 1.e, 2.b, and 3.b, have been replaced by ITS LCO 3.3.11, Table 3.3.11-1, Functions 1.a, 1.b, 1.c, 1.d, and 3.a. The adoption of ITS LCO 3.3.11 represents a change in format, however it does not change the application of the requirements found in CTS as they relate to the EFIC (except as discussed in other applicable DOCs). This change is consistent with NUREG-1430.

3.3.13-01 A12 Not Used.

A13 CTS 3.5.1.15 identifies three EFIC Functions with the phrase "which are bypassed at cold shutdown conditions." Since the Applicability for these Functions does not include cold shutdown conditions, this is unnecessary descriptive information which is not included in ITS. Omitting this information does not change the applicable requirements, nor their application. Therefore, this change is considered administrative. This change is consistent with NUREG-1430.

3.3.11-04 A14 Not Used

A15 Not Used.

A16 Not Used.

A17 CTS 4.1.c is omitted since it duplicates requirements provided in the regulations, i.e., 10 CFR 50, Appendix B, criteria XI, XVI, & XVII. Such duplication is unnecessary and results in additional administrative burden to revise the duplicate TS when these regulations are revised. Since removal of the duplication results in no actual change in the requirements, this is considered an administrative change. Further, changes to the requirements are controlled by the NRC. This change is consistent with NUREG-1430.

TECHNICAL CHANGE -- MORE RESTRICTIVE

M1 CTS Table 3.5.1-1 Note 1 provides action requirements in the event any Functional unit of the EFIC System is inoperable. CTS Table 3.5.1-1, Note 1 currently requires that the unit be placed in hot shutdown (ITS MODE 3) within 12 hours if any of the EFIC Functional units are inoperable. ITS 3.3.11 will include Condition A to also require the inoperable channel to be placed in trip or bypassed within one hour. Since this Required Action is not in CTS, this change is more restrictive than CTS. This action is appropriate since the Required Action either bypasses and removes the channel from the logic and allows the remaining channels to function as designed, or places the channel in trip and reduces the logic such that one additional channel in trip will initiate EFIC. Either of these actions will allow EFIC to initiate EFW when required, therefore, these conditions are acceptable for short periods of operation to allow restoration of the channel without cycling the unit through an unnecessary shutdown and subsequent startup. This change is consistent with NUREG-1430.

In addition, for the EFW Initiation and MSL Isolation Functions (ITS Table 3.3.11-1 Functions 1 and 3), ITS 3.3.11 will include Condition B for two channels inoperable. This Condition will require one inoperable channel to be placed in bypass and the second inoperable channel placed in trip within one hour. Since this Required Action is not in CTS, this change is more restrictive than CTS. This action is appropriate since the Required Action bypasses one channel and removes it from the logic and allows the remaining channels to function as designed, with the second channel already in trip such that one additional channel in trip will initiate EFIC. These actions will allow EFIC to initiate EFW when required, therefore, these conditions are acceptable for short periods of operation to allow restoration of the channel without cycling the unit through an unnecessary shutdown and subsequent startup. This change is consistent with NUREG-1430.

M2 Specific Applicability is included for ITS Table 3.3.11-1, Function 1.b and LCO 3.3.11 is revised to include associated Required Action D.2. CTS Table 3.5.1-1, Note 1 currently requires that the unit be placed in hot shutdown (ITS MODE 3) within 12 hours if the steam generator low level Function of EFIC is inoperable. This would imply an Applicability of MODES 1 and 2 since no further actions are required. Therefore, the proposed ITS Applicability of MODES 1, 2, and 3 is more restrictive than CTS. Additionally, ITS will include Required Action B.2 to exit the revised Applicability by requiring the unit to be in MODE 4 within 12 hours. This is also more restrictive. These additional applicable MODES and Required Actions are appropriate since EFIC is necessary in MODE 3 to provide additional assurance sufficient cooling water is provided to the steam generators in a timely manner. Further, this Applicability is necessary to support the OPERABILITY of the actuated EFW components. This change is consistent with NUREG-1430.

M3 An LCO, including the number of required channels, and specific Applicability are included for ITS Table 3.3.11-1, Functions 2.a and 2.b, "EFW Vector Valve Control," with Note (a), and ITS LCO 3.3.11 is revised to include associated Required Actions C.1, F.1, and F.2.1. CTS Table 4.1-1, Item 56, currently requires only Surveillances for this equipment with no associated LCO, Applicability, or Actions identified. These ITS restrictions are appropriate to provide additional assurance that the specified EFW vector valve logic will function when required. This more restrictive change eliminates a potential source of confusion, and is consistent with NUREG-1430.

M4 The CTS markup shows a specific Applicability is included for ITS Table 3.3.11-1, Function 3.a (per Note b), and ITS LCO 3.3.11 is revised to include associated Required Action F.2. CTS Table 3.5.1-1 currently requires only that the unit be placed in MODE 3 if this Function is inoperable. ITS will further require that the steam generator pressure be lowered below 750 psig. These ITS restrictions are appropriate to provide additional assurance that the specified EFIC initiation logic is not required. This more restrictive change eliminates a potential area of unit operation where the system might be desired but not available. This change is consistent with NUREG-1430.

3.3.11-02

M5 CTS Table 3.5.1-1, Note 1 currently requires that the unit be placed in hot shutdown, i.e., subcritical, within 12 hours if any EFIC Functional unit is inoperable. The ITS includes appropriate Required Actions to be subcritical (ITS MODE 3) within 6 hours. These are ITS 3.3.11 Required Actions D.1 and F.1, ITS 3.3.12 Required Actions C.1 and D.1, and ITS 3.3.13 Required Actions B.1 and C.1. This is more restrictive; however, it allows sufficient time to reach the required conditions from full power in an orderly manner and without challenging unit systems. This change is consistent with NUREG-1430.

M6 Specific Applicability is included for ITS 3.3.12 and CTS Table 3.5.1-1, Note 1, is revised to include associated ITS Required Actions C.2, D.2.1, and D.2.2. CTS Table 3.5.1-1, Note 1 currently requires that the unit be placed in hot shutdown (ITS MODE 3) within 12 hours if the manual initiation Function of EFIC is inoperable. This would imply an Applicability of MODES 1 and 2 since no further actions are required. Therefore, the proposed ITS Applicability of MODES 1, 2, and 3 is more restrictive than CTS. Additionally, ITS will include Required Action C.2 to exit the revised Applicability by requiring the unit to be in MODE 4 within 12 hours. This is also more restrictive. These additional applicable MODES and Required Actions are appropriate since EFIC is necessary in MODE 3 to provide additional assurance sufficient cooling water is provided to the steam generators in a timely manner. This change is consistent with NUREG-1430.

M7 LCO 3.3.13.a with specific Applicability, specific Applicability for LCO 3.3.13.b, along with associated Required Actions for each (except Required Action C.1 which is from CTS 3.5.1-1, Note 1), and associated SR 3.3.13.1 for each, are included in ITS. CTS requires only the specific initiation channels without identifying specific controls for the EFIC main steam line isolation logic. These ITS restrictions, and the associated Surveillance Requirement, are appropriate to provide additional assurance that the specified EFIC logic trains will function when required. This more restrictive change eliminates a potential source of confusion, and is generally consistent with NUREG-1430 requirements for these functions.

M8 ITS LCO 3.3.14, with Applicability, associated Required Actions A.1 and B.2, and associated SR 3.3.14.1 are incorporated. CTS requires only SRs for the specific channels of EFW valve commands without identifying specific controls for the EFIC EFW vector valve logic. These ITS restrictions are appropriate to provide additional assurance that the specified EFIC logic will function when required. This more restrictive change eliminates a potential source of confusion, and is consistent with NUREG-1430.

M9 A specific Required Action (F.2.1) is included for ITS Table 3.3.11-1, Function 1.c. CTS Table 3.5.1-1, Note 1, currently requires only that the unit be placed in MODE 3 if this Function is inoperable. ITS will further require that the steam generator pressure be lowered below 750 psig. This ITS restriction is appropriate to provide additional assurance that the specified EFIC initiation logic is not required. This more restrictive change eliminates a potential area of unit operation where the system might be desired but not available. This change is consistent with NUREG-1430.

3.3.11-03

M10 CTS Table 3.5.1-1 Emergency Feedwater Initiation and Control System functions does not include an Allowable Values column. This column, along with applicable values, is included in the current NUREG Table 3.3.11-1 and accordingly in the ITS. The addition of these values place additional restrictions on unit operation that were not included in the CTS table. Therefore, this change is considered more restrictive. This change is consistent with NUREG-1430.

TECHNICAL CHANGE -- LESS RESTRICTIVE

L1 NUREG-1430 3.3.12 Required Actions A.1 and B.1 have been adopted in the ITS. This change establishes Condition A with a 72 hour Completion Time during which the unit may continue operation, with one or more EFIC Function(s) having one or both manual initiation switches inoperable in one actuation train, prior to entering an ACTION which results in the unit being required to be placed in MODE 3. This change also establishes Condition B with a 1 hour Completion Time during which the unit may continue operation, with one or more EFIC Function(s) having one or both manual initiation switches inoperable in both actuation trains, prior to entering an ACTION which results in the unit entering MODE 3. This change has been made to provide an opportunity to repair the inoperable components prior to requiring an unnecessary shutdown and subsequent startup of the unit. This allowance is acceptable since the manual initiation of EFIC is not credited in the safety analysis, and provides a backup ability to initiate EFW only. Additionally, this change is consistent with NUREG-1430.

L2 CTS Table 3.5.1-1, Note 1 currently requires that the unit be placed in hot shutdown, i.e., subcritical, within 12 hours if either of the EFIC Functional units for EFW initiation on loss of main feedwater pumps (CTS Function 1.d, ITS Function 1.a) or reactor coolant pump status (CTS Function 1.e, ITS Function 1.d) are inoperable. ITS 3.3.11 includes Required Action E.1 to require only that THERMAL POWER be reduced to $\leq$ 10% RTP. This removes the unit from the Applicability of the requirement for both CTS and ITS. However, since the CTS required that the unit be placed in hot shutdown (equivalent to ITS MODE 3) even though the equipment was only required above 10% RTP, the ITS is considered less restrictive than CTS. This change is consistent with NUREG-1430 general application for Required Actions.

L3 CTS Table 3.5.1-1, Note 6 currently provides for reduction of the minimum number of operable channels to 2 provided that the system is reduced to 1 out of 2 coincidence by tripping the remaining channel. NUREG 3.3.11 Required Action B.2 also allows continued operation if one of the two inoperable channels is placed in trip within one hour. ITS 3.3.11 also includes Required Action B.2. The CTS does not include an allowed outage time prior to placing the channel in trip as required, however, the NUREG and ITS both provide a Completion Time of 1 hour to accomplish the Required Action. This is less restrictive than CTS, but appropriate since some time is necessary when the condition is identified (rather than preplanned), and the one hour is sufficient to accomplish the Required Action. This change is also consistent with NUREG-1430.

3.3.13-01
3.3.14-01

L4 CTS Table 3.5.1-1, EFIC Functional Unit 1.f has been replaced by ITS LCO 3.3.13.b (see DOC M7). ITS LCO 3.3.14 is also adopted to govern EFIC vector logic requirements (see DOC M8). The adoption of ITS LCO 3.3.13.b and 3.3.14 represents a change in format and provides a 72-hour Completion Time for inoperable logics within a given train, where CTS Functional Unit 1.f had only a one hour Completion Time. The 72-hour Completion time allotted by Action A.1 of the aforementioned ITS items is applicable to inoperabilities that affect a single train only. 72 hours is acceptable since a single logic or vector logic train being degraded is, at the extreme, equivalent to one EFW train being out of service. Since an EFW train is provided a 72-hour Completion Time for associated restorative actions, the logic that actuates that train may conservatively be out of service for the same length of time. This change is consistent with NUREG-1430.

LESS RESTRICTIVE -- ADMINISTRATIVE DELETION OF REQUIREMENTS

LA1 This information has been moved to the Bases. This information provides details of design or process which are not directly pertinent to the actual requirement, i.e., Definition, Limiting Condition for Operation or Surveillance Requirement, but rather describe an acceptable method of compliance. Since these details are not necessary to adequately describe the actual regulatory requirement, they can be moved to a licensee controlled document without a significant impact on safety. Placing these details in controlled documents provides adequate assurance that they will be maintained. The Bases will be controlled by the Bases Control Process in Chapter 5 of the proposed Technical Specifications. This change is consistent with NUREG-1430.

CTS Location	New Location
3.5.1.11	Bases 3.3.11, BACKGROUND
Table 3.5.1-1 Column 1	Bases 3.3.11, BACKGROUND
Table 3.5.1-1 Column 2	Bases 3.3.11, BACKGROUND
Table 3.5.1-1 Note 15	Bases 3.3.11, BACKGROUND
Table 3.5.1-1 Note 19	Bases 3.3.11, BACKGROUND

3.3.11
3.3.12
3.3.13

3.5 INSTRUMENTATION SYSTEMS

3.5.1 Operational Safety Instrumentation

Applicability

Applies to unit instrumentation and control systems.

A1

Objectives

To delineate the conditions of the unit instrumentation and safety circuits necessary to assure reactor safety.

Specifications

A3

3.5.1.1 Startup and operation are not permitted unless the requirements Table 3.5.1-1, columns 3 and 4 are met.

3.5.1.2 In the event the number of protection channels operable falls be the limit given under Table 3.5.1-1, Columns 3 and 4, operation shall be limited as specified in Column 5.

3.5.1.3 For on-line testing or in the event of a protection instrument c channel failure, a key operated channel bypass switch associatec with each reactor protection channel may be used to lock the channel trip relay in the untripped state as indicated by a ligr Only one channel shall be locked in the untripped state or contain inoperable functions in the untripped state at any one time. In the event more than one protection channel contains inoperable functions in the untripped state, or a protection channel or function becomes inoperable concurrent with another protection channel locked in the untripped state, within 1 hour implement the actions required by Table 3.5.1-1 Note 6. Only or channel bypass key shall be accessible for use in the control r While operating with an inoperable function unbypassed in the untripped state, the remaining RPS key operated channel bypass switches shall be tagged to prevent their operation.

3.5.1.4 The key operated shutdown bypass switch associated with each rea protection channel shall not be used during reactor power operat except during channel testing.

R TRM

3.5.1.5 During startup when the intermediate range instruments come on scale, the overlap between the intermediate range and the source range instrumentation shall not be less than one decade. If the overlap is less than one decade, the flux level shall be maintai in the source range until the one decade overlap is achieved.

3.5.1.6 In the event that one of the trip devices in either of the sour supplying power to the control rod drive mechanisms fails in the untripped state, the power supplied to the rod drive mechanisms through the failed trip device shall be manually removed within minutes following detection. The condition will be corrected a the remaining trip devices shall be tested within eight hours following detection. If the condition is not corrected and the remaining trip devices are not tested within the eight-hour per the reactor shall be placed in the hot shutdown condition withi additional four hours.

LATER (3.3A, 3.3B, 3.3D, 3.4B)

LATER (3.3A)

LATER (3.3A)

LATER

LATER

LATER

3.5.1.7 The Decay Heat Removal System isolation valve closure setpoints shall be equal to or less than 340 psig for one valve and equal to or less than 400 psig for the second valve in the suction line. The relief valve setting for the DHR system shall be equal to or less than 450 psig. — LATER

<LATER> (3.4B)

3.5.1.8 The degraded voltage monitoring relay settings shall be as follows: — LATER

<LATER> (3.3D)

a. The 4.16 KV emergency bus undervoltage relay setpoints shall be >3115 VAC but <3177 VAC.

b. The 460 V emergency bus undervoltage relay setpoints shall be >423 VAC but <431 VAC with a time delay setpoint of 8 seconds ±1 second.

3.5.1.9 The following Reactor Trip circuitry shall be operable as indicated: — LATER

<LATER> (3.3A)

1. Reactor trip upon loss of Main Feedwater shall be operable (as determined by Specification 4.1.a and item 35 of Table 4.1-1) at greater than 5% reactor power. (May be bypassed up to 10% reactor power.)

2. Reactor trip upon Turbine Trip shall be operable (as determined by Specification 4.1.a and item 41 of Table 4.1-1) at greater than 5% reactor power. (May be bypassed up to 45% reactor power.)

3. If the requirements of Specifications 3.5.1.9.1 or 3.5.1.9.2 cannot be met, restore the inoperable trip within 12 hours or bring the plant to a hot shutdown condition.

3.5.1.10 ~~Deleted~~ — A1

3.5.1.11 ~~For~~ on-line testing of the Emergency Feedwater Initiation and Control (EFIC) system channels during power operation only one channel shall be locked into "maintenance bypass" at any one time. If one channel of the NI/RPS is in maintenance bypass, only the corresponding channel of EFIC may be bypassed. — LA1 Bases

<LATER> (3.3D)

3.5.1.12 The Containment High Range Radiation Monitoring Instrumentation shall be operable with a minimum measurement range from 1 to 10^7 R/hr. — LATER

<LATER> (3.3D)

3.5.1.13 Two control room ventilation radiation monitoring channels shall be operable whenever the reactor coolant system is above the cold shutdown condition or during handling of irradiated fuel. — LATER

<LATER> (3.3D)

3.5.1.14 The Main Steam Line Radiation Monitoring Instrumentation shall be operable with a minimum measurement range from 10^{-1} to 10^{4} mR/hr, whenever the reactor is above the cold shutdown condition. — LATER

Table 3.3.11-1

3.5.1.15 Initiate functions of the EFIC system ~~which are bypassed at cold shutdown conditions~~ shall have the following minimum operability conditions: — A13

#1.c Appl w/ Note (a) — a. "low steam generator pressure" initiate shall be operable ~~when~~ the main steam pressure ~~exceeds~~ $\geq$ 750 psig. — A8

#1.d Appl — b. "loss of 4 RC pumps" initiate shall be operable when neutron flux ~~exceeds~~ $\geq$ 10% power. — A9

#1.a Appl — c. "main feedwater pumps tripped" initiate shall be operable when neutron flux ~~exceeds~~ $\geq$ 10% power.

#3.a Appl w/ Note (a)

3.5.1.16 The automatic steam generator isolation system within EFIC shall be operable ~~when main steam pressure is greater than~~ $\geq$ 750 psig. — †LATER — A8

†<LATER> (3.7)

<Add 3.3.11 RA F.2.1 for Table 3.3.11-1, Function 1.c> — M9

<Add Appl. for Table 3.3.11-1, Function 1.b> — M2

<Add 3.3.11 RA D.2 for Table 3.3.11-1, Function 1.b>

<Add LCO and Appl for Table 3.3.11-1, Functions 2.a and 2.b, + Table Note (a)> — M3

<Add 3.3.11 RA C.1, F.1 & F.2.1 for Table 3.3.11-1, Functions 2.a and 2.b>

<Add Table 3.3.11-1, Function 3.a, Note (b)> — M4

<Add 3.3.11 RA F.2.1 & F.2.2 w/ Note for Table 3.3.11-1, Function 3.a>

3.3.11
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A2

Bases

Every reasonable effort will be made to maintain all safety instrumentation in operation. A startup is not permitted unless the requirements of Table 3.5.1-1, Columns 3 and 4, are met.

Operation at rated power is permitted as long as the systems have at least the redundancy requirements of Column 4 (Table 3.5.1-1). This is in agreement with redundancy and single failure criteria of IEEE 279 as described in FSAR, Section 7.

There are four reactor protection channels. Normal trip logic is two-out-of-four. Required trip logic for the power range instrumentation channels is two-out-of-three. Minimum trip logic on other instrumentation channels is one-out-of-two.

The four reactor protection channels were provided with key operated bypass switches to allow on-line testing or maintenance on only one channel at a time during power operation. Each channel is provided with alarm and lights to indicate when that channel is bypassed. There will be one reactor protection system channel bypass switch key permitted in the control room. Upon the discovery of inoperable functions in any one reactor protection channel, the effect of the failure on the reactor protection syst and other interconnected systems is evaluated. The affected reactor protect channel may be placed in channel bypass, remain in operation in a degraded condition, or placed in the tripped condition as determined by operating conditions and management judgment. This action allows placing the plant in the safest condition possible considering the extent of the failure, plant conditions, and guidance from plant management. Should the failure in the reactor protection channel prohibit the proper operation of another system, the appropriate actions for the affected system are implemented. Administra controls are established to preclude placing a reactor protection channel i channel bypass when any other reactor protection channel contains an inopera function in the untripped state.

Each reactor protection channel key operated shutdown bypass switch is provided with alarm and lights to indicate when the shutdown bypass switch is being used.

R
TRM

The source range and intermediate range nuclear flux instrumentation scales overlap by one decade. This decade overlap will be achieved at 10^{-10} amps o the intermediate range scale.

A2

The ESAS employs three independent and identical analog channels, which supply trip signals to two independent, identical digital subsystems. In order to actuate the safeguards systems, two out of three analog channels must trip. This will cause both digital subsystems to trip. Tripping of either digital subsystem will actuate all safeguards systems associated with that digital subsystem.

Because only one digital subsystem is necessary to actuate the safeguards systems and these systems are capable of tripping even when they are being tested, a single failure in a digital subsystem cannot prevent protective action.

3.3.11
3.3.12
3.3.13

A2

Removal of a module required for protection from a RPS channel will cause that channel to trip, unless that channel has been bypassed, so that only one channel of the other three must trip to cause a reactor trip. Thus, sufficient redundancy has been built into the system to cover this situation.

Removal of a module required for protective action from an analog ESAS channel will cause that channel to trip, so that only one of the other two must trip to actuate the safeguards systems. Removal of a module required for protective action from a digital ESAS subsystem will not cause that subsystem to trip. The fact that a module has been removed will be continuously annunciated to the operator. The redundant digital subsystem is still sufficient to indicate complete ESAS action.

The testing schemes of the RPS, the ESAS, and the EFIC enables complete system testing while the reactor is operating. Each channel is capable of being tested independently so that operation of individual channels may be evaluated.

The EFIC is designed to allow testing during power operation. One channel may be placed in key locked "maintenance bypass" prior to testing. This will bypass only one channel of EFW initiate logic. An interlock feature prevents bypassing more than one channel at a time. In addition, since the EFIC receives signals from the NI/RPS, the maintenance bypass from the NI/RPS is interlocked with the EFIC. If one channel of the NI/RPS is in maintenance bypass, only the corresponding channel of EFIC may be bypassed. Prior to placing a channel of EFIC in maintenance bypass, any NI/RPS channel containing inoperable functions in the untripped state is evaluated for its effect on EFIC. Only the EFIC channel corresponding to the NI/RPS channel containing the inoperable function may be placed in maintenance bypass unless it can be shown that the failure in the NI/RPS channel has no effect on EFIC actuation, actions are taken to ensure EFIC actuation when required, or the appropriate actions of Table 3.5.1-1 are implemented. The EFIC can be teste from its input terminals to the actuated device controllers. A test of the EFIC trip logic will actuate one of two relays in the controllers. Activati of both relays is required in order to actuate the controllers. The two relays are tested individually to prevent automatic actuation of the compone The EFIC trip logic is two (one-out-of-two).

Reactor trips on loss of all main feedwater and on turbine trips will sense the start of a loss of OTSG heat sink and actuate earlier than other trip signals. This early actuation will provide a lower peak RC pressure during the initial over pressurization following a loss of feedwater or turbine trip event. The LOFW trip may be bypassed up to 10% to allow sufficient margin for bringing the MFW pumps into use at approximately 7%. The Turbine Trip may be bypassed up to 45% based on BAW-1893, "Basis for Raising Arming Threshold for Anticipatory Reactor Trip on Turbine Trip," October 1985 and the NRC Safety Evaluation Report for BAW-1893 issued from Mr. D. M. Crutchfield to Mr. J. H. Taylor via letter dated April 25, 1986.

The Automatic Closure and Isolation System (ACI) is designed to close the Decay Heat Removal System (DHRS) return line isolation valves when the Reactor Coolant System (RCS) pressure exceeds a selected fraction of the DHRS design pressure or when core flooding system isolation valves are opened. The ACI is designed to permit manual operation of the DHRS return line isolation valves when permissive conditions exist. In addition, the ACI is designed to disallow manual operation of the valves when permissive conditions do not exist.

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3.3.13

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Power is normally supplied to the control rod drive mechanisms from two separate parallel 480 volt sources. Redundant trip devices are employed in each of these sources. If any one of these trip devices fails in the untripped state, on-line repairs to the failed device, when practical, will be made and the remaining trip devices will be tested. Four hours is ample time to test the remaining trip devices and, in many cases, make on-line repairs.

The Degraded Voltage Monitoring relay settings are based on the short term starting voltage protection as well as long term running voltage protection. The 4.16 KV undervoltage relay setpoints are based on the allowable starting voltage plus maximum system voltage drops to the motor terminals, which allows approximately 78% of motor rated voltage at the motor terminals. The 460V undervoltage relay setpoint is based on long term motor voltage requirements plus the maximum feeder voltage drop allowance resulting in a 92% setting of motor rated voltage.

The OPERABILITY of the accident monitoring instrumentation ensures that sufficient information is available on selected plant parameters to monitor and assess these variables during and following an accident. This capability is consistent with the recommendation of Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant Conditions During and Following an Accident," December 1975 and NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short-Term Recommendations."

The subcooled margin monitors (SMM), and core-exit thermocouples (CET), Reactor Vessel Level Monitoring System (RVLMS) and Hot Leg Level Measurement System (HLLMS) are a result of the Inadequate Core Cooling (ICC) instrumentation required by Item II.F.2 NUREG-0737. The function of the ICC instrumentation is to increase the ability of the plant operators to diagnose the approach to and recovery from ICC. Additionally, they aid in tracking reactor coolant inventory. These instruments are included in the Technical Specifications at the request of NRC Generic Letter 83-37 and are not required by the accident analysis, nor to bring the plant to cold shutdown conditions. The Reactor Vessel Level Monitor is provided as a means of indicating level in the reactor vessel during accident conditions. The channel operability of the RVLMS is defined as a minimum of three sensors in the upper plenum region and two sensors in the dome region operable. When Reactor Coolant Pumps are running, all except the dome sensors are interlocked to read "invalid" due to flow induced variables that may offset the sensor outputs. The channel operability of the HLLMS is defined as a minimum of one wide range and any two of the narrow range transmitters in the same channel operable. If the equipment is inaccessible due to health and industrial safety concerns (for example, high radiation area, low oxygen content of the containment atmosphere) or due to physical location of the fault (for example, probe failure in the reactor vessel), then operation may continue until the next scheduled refueling outage and a report filed.

3.3.11
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3.3.13

The principal function of the Control Room Isolation-High Radiation is to provide an enclosed environment from which the unit can be operated following an uncontrolled release of radioactivity. Due to the unique arrangement of the shared control room envelope, one control room isolation channel receives a high radiation signal from the ANO-1 control room ventilation intake duct monitor and the redundant channel receives a high radiation signal from the ANO-2 control room ventilation intake duct monitor. With no channel of the control room radiation monitoring system operable, the CREVS must be placed in a condition that does not require the isolation to occur (i.e., one operable train of CREVS is placed in the emergency recirculation mode of operation). Reactor operation may continue indefinitely in this state.

To support loss of main feedwater analyses, steam line/feedwater line break analyses, SBLOCA analyses, and NUREG-0737 requirements, the EFIC system is designed to automatically initiate EFW when:

1. all four RC pumps are tripped
2. both main feedwater pumps are tripped
3. the level of either steam generator is low
4. either steam generator pressure is low
5. ESAS ECCS actuation (high RB pressure or low RCS pressure)

(A2)

The EFIC system is also designed to isolate the affected steam generator on a steam line/feedwater line break and supply EFW to the intact generator according to the following logic:

- If both SG's are above 600 psig, supply EFW to both SG's.
- If one SG is below 600 psig, supply EFW to the other SG.
- If both SG's are below 600 psig, but the pressure difference between the two SG's exceeds 100 psig, supply EFW only to the SG with the higher pressure.
- If both SG's are below 600 psig and the pressure difference is less than 100 psig, supply EFW to both SG's.

At cold shutdown conditions all EFIC initiate and isolate functions are bypassed except low steam generator level initiate. The bypassed functions will be automatically reset at the values or plant conditions identified in Specification 3.5.1.15. "Loss of 4 RC pumps" initiate and "low steam generator pressure" initiate are the only shutdown bypasses to be manually initiated during cooldown. If reset is not done manually, they will automatically reset. Main feedwater pump trip bypass is automatically removed above 10% power.

REFERENCE

FSAR, Section 7.1

Table 3.5.1-1 Instrumentation Limiting Conditions for Operation (Note 6)

REACTOR PROTECTION SYSTEM Functional Unit	1 No. of channels	2 No. of channels for system trip	3 Min. operable channels	4 Min. degree of redundancy	5 Operator action if conditions of column 3 or 4 cannot be met
1. Manual pushbutton	1	1	1	0	Note 1
2. Power range instrument channel	4	2	3(Note 4)	1(Note 4)	Note 1
3. Intermediate range instrument channels	2	Note 7	1	0	Notes 1, 2
4. Source range instrument channels	2	Note 7	1	0	Notes 1, 2, 3
5. Reactor coolant temperature instrument channels	4	2	2	1	Note 1
6. Pressure-temperature instrument channels	4	2	2	1	Note 1
7. Flux/imbalance/flow instrument channels	4	2	2	1	Note 1
8. Reactor coolant pressure					
a. High reactor coolant pressure instrument channels	4	2	2	1	Note 1
b. Low reactor coolant pressure instrument channels	4	2	2	1	Note 1
9. Power/number of pumps instrument channels	4	2	2	1	Note 1
10. High reactor building pressure channels	4	2	2	1	Note 1

(LATER) (3.3A)

A1

LATER

Add 3.3.11 ACTIONS Note
Add 3.3.12 ACTIONS Note
Add 3.3.13 ACTIONS Note
Add 3.3.11 SR Note

A5 LA1 Bases A3 A7

Table 3.5.1-1 (Cont'd

ENGINEERED SAFEGUARDS ACTUATION SYSTEM
(Cont'd)

Functional Unit	1 No. of channels	2 No. of channels for system trip	3 Min. operable channels	4 Min. degree of redundancy	5 Operator action if conditions of column 3 or 4 cannot be met
4. Reactor building spray pumps (Note 8)					
a. Reactor building 30 psig instrument channel	3	2	3 (Note 6)	1	Notes 1, 5
b. Manual trip pushbutton	2	1	2	1	Notes 1, 5
5. Reactor building spray valves (Note 8)					
a. Reactor building 30 psig instrument channel	3	2	3 (Note 6)	1	Notes 1, 5
b. Manual trip pushbutton	2	1	2	1	Notes 1, 5

<LATER (3.3B)> — LATER

EMERGENCY FEEDWATER INITIATION AND CONTROL SYSTEM

1. EFW Initiation					
a. Manual	2	1	2	1	Note 1

LA1 Bases A3 A7

3.3.12 LCO #C

L1

<Add 3.3.12 RA A.1, B.1, & C.1>

M6

<Add 3.3.12 Appl. & RA D.2, E.2.1 & E.2.2>

3.3.11
3.3.12
3.3.13

Amendment No. 01

15a

RAI 3.3.12-01

Amendment No. 91

EMERGENCY FEEDWATER INITIATION AND CONTROL SYSTEM (Cont'd)

Table 3.5.1-1 (Cont'd)

Functional Unit		1 No. of channels	2 No. of channels for system trip	3 Min. operable channels	4 Min. degree of redundancy	5 Operator action if conditions of column 3 or 4 cannot be met
T3.3.11-1 #1.b	b. Low Level SG A or B	4/SG	2/SG	2/SG	1	Note 1
#1.c	c. Low Pressure, SG A or B	4/SG	2/SG	2/SG	1	Note 1, 19
#LATER (2,3D)						
#1.a	d. Loss of Both MFW Pumps and PWR > 10%	4	2	2	1	Note 1
#1.d	e. Loss of 4 RC Pumps	4	2	2	1	Note 1, 15
3.3.13 45b LCO#b	f. ESAS Actuation Logic Tripped	2	1	2	1	Note 1
	2. SG-A Main Steam Line Isolation					
3.3.12 LCO#a	a. Manual	2	1	2	1	Note 1
T3.3.11-1, #3.a	b. Low SG A Pressure	4	2	2	1	Note 1, 19
	3. SG-B Main Steam Line Isolation					
3.3.12 LCO#b	a. Manual	2	1	2	1	Note 1
T3.3.11-1, #3.a	b. Low SG B Pressure	4	2	2	1	Note 1, 19

LA1 Bases
A3
A7
A11 & LATER
A11
L4
L1
L1
A11
A11
M10
M7
M8
L4

<Add Table 3.3.11-1 Allowable Values Column>

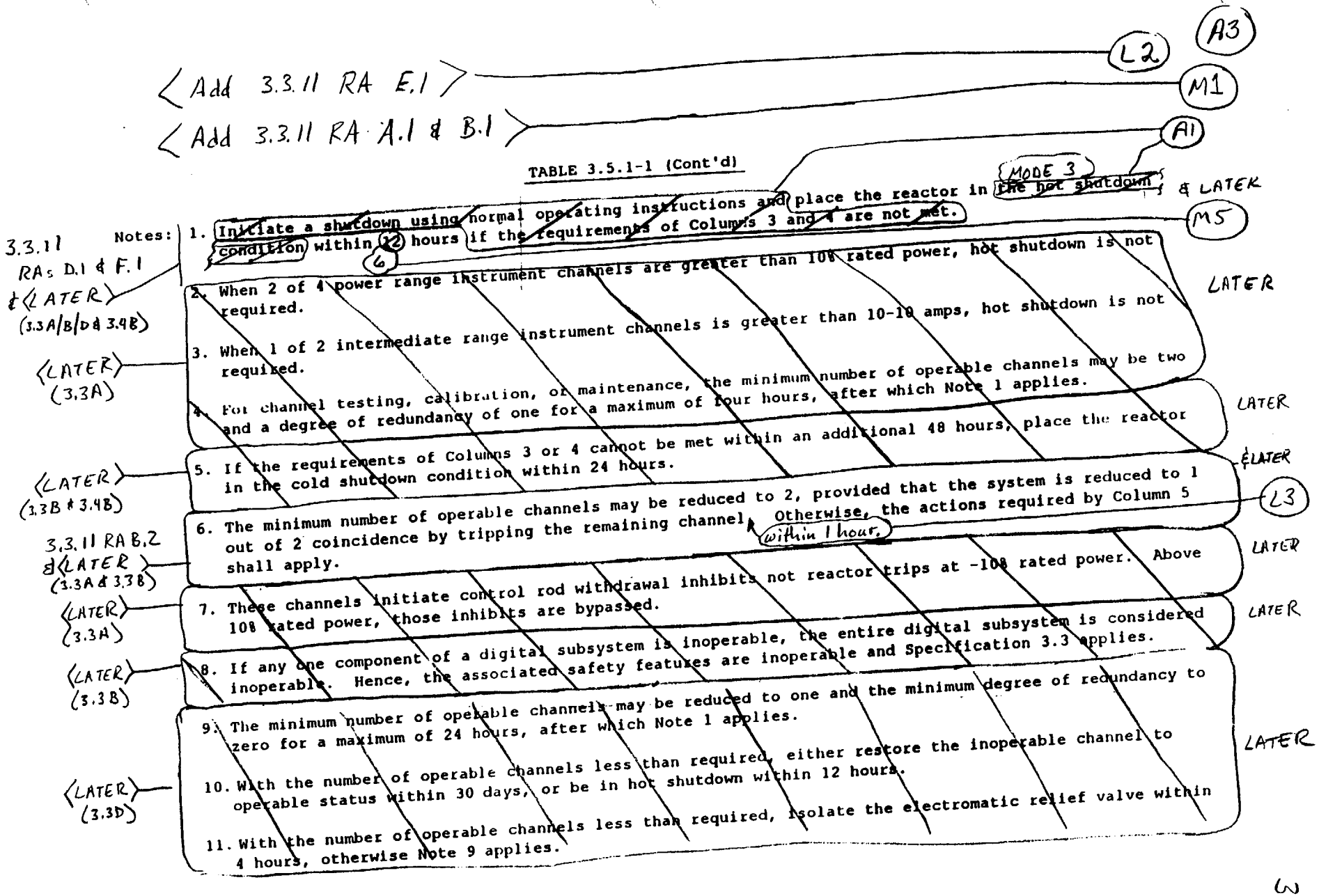
<Add 3.3.13 LCO#a with Appl., Cond. A, RAs C.2.1 & C.2.2, and SR 3.3.13.1>

<Add 3.3.13 LCO#b Appl., RAs A.1 & B.2, and SR 3.3.13.1>

<Add ITS 3.3.14>

RAI 3.3.11-01 RAI 3.3.12-01 RAI 3.3.13-01

3.3.11 3.3.12 3.3.13 3.3.14


Add 3.3.11 RA E.1
L2
A3
Add 3.3.11 RA A.1 & B.1
M1
A1
TABLE 3.5.1-1 (Cont'd)
MODE 3
& LATER
M5
3.3.11 RAs D.1 & F.1 & LATER (3.3A/B/D & 3.4B)
Notes:
1. Initiate a shutdown using normal operating instructions and place the reactor in the hot shutdown condition within 12 6 hours if the requirements of Columns 3 and 4 are not met.
2. When 2 of 4 power range instrument channels are greater than 10% rated power, hot shutdown is not required.
LATER
(LATER (3.3A)
3. When 1 of 2 intermediate range instrument channels is greater than 10-10 amps, hot shutdown is not required.
4. For channel testing, calibration, or maintenance, the minimum number of operable channels may be two and a degree of redundancy of one for a maximum of four hours, after which Note 1 applies.
LATER
(LATER (3.3B & 3.4B)
5. If the requirements of Columns 3 or 4 cannot be met within an additional 48 hours, place the reactor in the cold shutdown condition within 24 hours.
LATER
L3
3.3.11 RA B.2 & (LATER (3.3A & 3.3B)
6. The minimum number of operable channels may be reduced to 2, provided that the system is reduced to 1 out of 2 coincidence by tripping the remaining channel within 1 hour. Otherwise, the actions required by Column 5 shall apply.
LATER
(LATER (3.3A)
7. These channels initiate control rod withdrawal inhibits not reactor trips at -10% rated power. Above 10% rated power, those inhibits are bypassed.
LATER
(LATER (3.3B)
8. If any one component of a digital subsystem is inoperable, the entire digital subsystem is considered inoperable. Hence, the associated safety features are inoperable and Specification 3.3 applies.
(LATER (3.3D)
9. The minimum number of operable channels may be reduced to one and the minimum degree of redundancy to zero for a maximum of 24 hours, after which Note 1 applies.
10. With the number of operable channels less than required, either restore the inoperable channel to operable status within 30 days, or be in hot shutdown within 12 hours.
11. With the number of operable channels less than required, isolate the electromatic relief valve within 4 hours, otherwise Note 9 applies.
LATER
W.W.11

RAI 3.3.12-01

3.3.12 RAs D.1 & E.1 (LATER) (3.3A/B/D & 3.4B)

TABLE 3.5.1-1 (Cont'd)

Notes:

1. Initiate a shutdown using normal operating instructions and place the reactor in the hot shutdown condition within 12 hours if the requirements of Columns 3 and 4 are not met. (A1) (A3) (MODE 3) (6) (M5) & LATER

2. When 2 of 4 power range instrument channels are greater than 10% rated power, hot shutdown is not required.

3. When 1 of 2 intermediate range instrument channels is greater than 10-10 amps, hot shutdown is not required.

4. For channel testing, calibration, or maintenance, the minimum number of operable channels may be two and a degree of redundancy of one for a maximum of four hours, after which Note 1 applies.

5. If the requirements of Columns 3 or 4 cannot be met within an additional 48 hours, place the reactor in the cold shutdown condition within 24 hours.

Addressed on Page 45e-1

6. The minimum number of operable channels may be reduced to 2, provided that the system is reduced to 1 out of 2 coincidence by tripping the remaining channel. Otherwise, the actions required by Column 5 shall apply.

7. These channels initiate control rod withdrawal inhibits not reactor trips at -10% rated power. Above 10% rated power, those inhibits are bypassed.

8. If any one component of a digital subsystem is inoperable, the entire digital subsystem is considered inoperable. Hence, the associated safety features are inoperable and Specification 3.3 applies.

9. The minimum number of operable channels may be reduced to one and the minimum degree of redundancy to zero for a maximum of 24 hours, after which Note 1 applies.

10. With the number of operable channels less than required, either restore the inoperable channel to operable status within 30 days, or be in hot shutdown within 12 hours.

11. With the number of operable channels less than required, isolate the electromatic relief valve within 4 hours, otherwise Note 9 applies.

3.3.12

TABLE 3.5.1-1 (Cont'd)

Notes:

1. Initiate a shutdown using normal operating instructions and place the reactor in the hot shutdown condition within 12 hours if the requirements of Columns 3 and 4 are not met.
2. When 2 of 4 power range instrument channels are greater than 10% rated power, hot shutdown is not required.
3. When 1 of 2 intermediate range instrument channels is greater than 10-10 amps, hot shutdown is not required.
4. For channel testing, calibration, or maintenance, the minimum number of operable channels may be two and a degree of redundancy of one for a maximum of four hours, after which Note 1 applies.
5. If the requirements of Columns 3 or 4 cannot be met within an additional 48 hours, place the reactor in the cold shutdown condition within 24 hours.
6. The minimum number of operable channels may be reduced to 2, provided that the system is reduced to 1 out of 2 coincidence by tripping the remaining channel. Otherwise, the actions required by Column 5 shall apply.
7. These channels initiate control rod withdrawal inhibits not reactor trips at -10% rated power. Above 10% rated power, those inhibits are bypassed.
8. If any one component of a digital subsystem is inoperable, the entire digital subsystem is considered inoperable. Hence, the associated safety features are inoperable and Specification 3.3 applies.
9. The minimum number of operable channels may be reduced to one and the minimum degree of redundancy to zero for a maximum of 24 hours, after which Note 1 applies.
10. With the number of operable channels less than required, either restore the inoperable channel to operable status within 30 days, or be in hot shutdown within 12 hours.
11. With the number of operable channels less than required, isolate the electromatic relief valve within 4 hours, otherwise Note 9 applies.

3.3.13 RAB.1&C.1 *(LATER) (3.3A/B/D & 3.4B)

Addressed on Page 45e-1

A3 A1 MODE 3 & LATER M5 6

(A3)

TABLE 3.5.1-1 (Cont'd)

<LATER> (3.3D)

12. With the number of operable channels less than required, either return the indicator to operable status within 24 hours, or verify the block valve closed and power removed within an additional 24 hours. If the block valve cannot be verified closed within the additional 24 hours, de-energize the electromatic relief valve power supply within the following 12 hours. — LATER

<LATER> (3.3D)

13. Channels may be bypassed for not greater than 30 seconds during reactor coolant pump starts. If the automatic bypass circuit or its alarm circuit is inoperable, the undervoltage protection shall be restored within 1 hour, otherwise, Note 14 applies. — LATER

<LATER> (3.3D, 3.8)

14. With the number of channels less than required, restore the inoperable channels to operable status within 72 hours or be in HOT SHUTDOWN within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. — LATER

<LATER> (3.3A)

15. This trip function may be bypassed at up to 10% reactor power. — (LA1) Bases

<LATER> (3.3A)

16. This trip function may be bypassed at up to 45% reactor power. — LATER — LATER

<LATER> (3.3D)

17. With no channel operable, within 1 hour initiate and maintain operation of the control room emergency ventilation system in the recirculation mode of operation.

18. With one channel inoperable, restore the inoperable channel to operable status within 7 days or within the next 6 hours initiate and maintain operation of the control room emergency ventilation system in the recirculation mode of operation. — LATER

19. This function may be bypassed below 750 psig OTSG pressure. Bypass is automatically removed when pressure exceeds 750 psig. — (LA1) Bases

<LATER> (3.3D)

20. With one channel inoperable, (1) either restore the inoperable channel to operable status within 7 days, or (2) prepare and submit a Special Report to the Commission pursuant to Specification 6.12.5 within 30 days following the event, outlining the action taken, the cause of the inoperability, and the plans and schedule for restoring the system to operable status. With both channels inoperable, initiate alternate methods of monitoring the containment radiation level within 72 hours in addition to the actions described above.

21. With one channel inoperable, restore the inoperable channel to operable status within 30 days or be in hot shutdown within 72 hours unless containment entry is required. If containment entry is required, the inoperable channel must be restored by the next refueling outage. If both channels are inoperable, restore the inoperable channels within 30 days or be in HOT SHUTDOWN within 12 hours. — LATER

3.3-11

3.3.11
3.3.12
3.3.13

SURVEILLANCE REQUIREMENTS (Continued)

4.0.5 (Continued)

b. Surveillance intervals specified in Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda for the inservice inspection and testing activities required by the ASME Boiler and Pressure Vessel Code and applicable Addenda shall be applicable as follows in these Technical Specifications:

ASME Boiler and Pressure Vessel Code and applicable Addenda terminology for inservice inspection and testing activities	Required frequencies for performing inservice inspection and testing activities
Weekly	At least once per 7 days
Monthly	At least once per 31 days
Quarterly or every 3 months	At least once per 92 days
Semiannually or every 6 months	At least once per 184 days
Yearly or annually	At least once per 366 days

c. The provisions of Specification 4.0.2 are applicable to the above required frequencies for performing inservice inspection and testing activities.

d. Performance of the above inservice inspection and testing activities shall be in addition to other specified Surveillance Requirements.

e. Nothing in the ASME Boiler and Pressure Vessel Code shall be construed to supersede the requiremetns of any Technical Specification.

4.1 OPERATIONAL SAFETY ITEMS

Applicability

Applies to items directly related to safety limits and limiting conditions for operation.

Objective

To specify the minimum frequency and type of surveillance to be applied to unit equipment and conditions.

Specification

a. The minimum frequency and type of surveillance required for reactor protective system and engineered safeguards system instrumentation when the reactor is critical shall be as stated in Table 4.1-1.

3.3.11
3.3.12
3.3.13

OPERATIONAL SAFETY ITEMS (continued) — A1

4.1 (Continued)

b. Equipment and sampling test shall be performed as detailed in Table 4.1-2 and 4.1-3. — A3 & LATER & (R) TRM

c. Discrepancies noted during surveillance testing will be corrected and recorded. — A17 & LATER

d. A power distribution map shall be made to verify the expected power distribution at periodic intervals at least every 10 effective full power days using the incore instrumentation detector system. — LATER

<LATER> (3.3A, 3.3B, 3.3D)

<LATER> (3.2)

BASES — A2

4.0.1 through 4.0.5 Establish the general requirements applicable to Surveillance Requirements. These requirements are based on the Surveillance Requirements stated in the Code of Federal Regulations, 10CFR 50.36(c)(3):

"Surveillance Requirements are requirements relating to test, calibration, or inspection to ensure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions of operation will be met."

4.0.1 Establishes the requirement that surveillances must be performed during the operational modes or other conditions for which the requirements of the Limiting Conditions for Operation apply unless otherwise stated in an individual Surveillance Requirement. The purpose of this specification is to ensure that surveillances are performed to verify the operational status of systems and components and that parameters are within specified limits to ensure safe operation of the facility when the plant is in a mode or other specified condition for which the associated Limiting Conditions for Operation are applicable. Surveillance Requirements do not have to be performed when the facility is in an operational mode for which the requirements of the associated Limiting Condition for Operation do not apply unless otherwise specified.

3.3.11
3.3.12
3.3.13

BASES (continued)

Under the terms of this specification, the more restrictive requirements of the Technical Specifications take precedence over the ASME Boiler and Pressure Vessel Code and applicable Addenda. The requirements of Specification 4.0.4 to perform surveillance activities before entry into an operational mode or other specified condition takes precedence over the ASME Boiler and Pressure Vessel Code provision which allows pumps and valves to be tested up to one week after return to normal operation. The Technical Specification definition of OPERABLE does not allow a grace period before a component, that is not capable of performing its specified function, is declared inoperable and takes precedence over the ASME Boiler and Pressure Vessel Code provision which allows a valve to be incapable of performing its specified function for up to 24 hours before being declared inoperable.

A2

4.1 Bases

Check

Failures such as blown instrument fuses, defective indicators, faulted amplifiers which result in "upscale" or "downscale" indication can be easily recognized by simple observation of the functioning of an instrument or system. Furthermore, such failures are, in many cases, revealed by alarm or annunciator Action. Comparison of output and/or state of independent channels measuring the same variable supplements this type of built-in surveillance. Based on experience in operation of both conventional and nuclear plant systems, when the plant is in operation, the minimum checking frequency stated is deemed adequate for reactor system instrumentation.

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TRM

Calibration

Calibration shall be performed to assure the presentation and acquisition of accurate information. The nuclear flux (power range) channels shall be calibrated at least twice weekly (during steady state operating conditions) against a heat balance standard to compensate for instrumentation drift. During nonsteady state operation, the nuclear flux channels shall be calibrated daily to compensate for instrumentation drift and changing rod patterns and core physics parameters.

A2

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3.3.12
3.3.13

Other channels are subject only to "drift" errors induced within the instrumentation itself and, consequently, can tolerate longer intervals between calibrations. Process system instrumentation errors induced by drift can be expected to remain within acceptable tolerances if recalibration is performed once every 18 months.

Substantial calibration shifts within a channel (essentially a channel failure) will be revealed during routine checking and testing procedures.

Thus, minimum calibration frequencies for the nuclear flux (power range) channels, and once every 18 months for the process system channels is considered acceptable.

Testing

A2

On-line testing of reactor protective channel and EFIC channels is required once every 4 weeks on a rotational or staggered basis. The rotation scheme is designed to reduce the probability of an undetected failure existing within the system and to minimize the likelihood of the same systematic test errors being introduced into each redundant channel.

All reactor protective channels will be tested before startup if the individual channel rotational frequency has been discontinued or if outage activities could potentially have affected the operability of one or more channels. A rotation will then be established to test the first Channel one week after startup, the second Channel two weeks after startup, the third Channel three weeks after startup, and the fourth Channel four weeks after startup.

The established reactor protective system instrumentation and EFIC test cycle is continued with one channel's instrumentation tested each week. Upon detection of a failure that prevents trip action, all instrumentation associated with the protective channels will be tested after which the rotational test cycle is started again. If actuation of a safety channel occurs, assurance will be required that actuation was within the limiting safety system setting.

The protective channels coincidence logic and control rod drive trip breakers are trip tested every quarter. The trip test checks all logic combinations and is to be performed on a rotational basis. The logic and breakers of the four protective channels shall be trip tested prior to startup and their individual channels trip tested on a cyclic basis. Discovery of a failure requires the testing of all channel logic and breakers, after which the trip test cycle is started again.

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The equipment testing and system sampling frequencies specified in Table 4.1-2 and Table 4.1-3 are considered adequate to maintain the status of the equipment and systems to assure safe operation.

AZ & R TRM

REFERENCE

FSAR Section 7.1.2.3.4

(A3)

Table 4.1-1 (Cont.)

Channel Description	Check	Test	Calibrate	Remarks
47. RCS Subcooling Margin Monitor	D	NA	R	LATER
48. Electromatic Relief Valve Flow Monitor	D	NA	R	
49. Electromatic Relief Block Valve Position Indicator	D	NA	R	
50. Pressurizer Safety Valve Flow Monitor	D	NA	R	
51. Pressurizer Water Level Indicator	D	NA	R	(A1)
52. Deleted				
53. EFW Initiation				
a. Manual	NA	M - SR 3.3.12.1	NA	
b. SG Low Level, SGA or B	S	M	R	& LATER
c. Low Pressure SGA or B	S	M	R	
d. Loss of both MFW Pumps and PWR > 10%	S	M	R	

<LATER> (3.3 D)

3.3.12 Table 3.3.11-1 #1.b #1.c #1.a

& <LATER> (3.3 D)

SR 3.3.11.1 SR 3.3.11.2 SR 3.3.11.3

RAI 3.3.11-04

T3.3.11-1

Table 4.1-1 (Cont.)

	Channel Description	Check	Test	Calibrate	Remarks
#1.d	e. Loss of 4 RC pumps	S-SR 3.3.11.1	M-SR 3.3.11.2	NA	
3.3.13	f. ESAS automatic logic tripped	NA	M-SR 3.3.13.1	NA	
	54. SGA main steam line isolation				
3.3.12	a. Manual	NA	M-SR 3.3.12.1	NA	
T3.3.11-1 #3a	b. SGA pressure low	S-SR 3.3.11.1	M-SR 3.3.11.2	R-SR 3.3.11.3	
	55. SGB main steam line isolation				
3.3.12	a. Manual	NA	M-SR 3.3.12.1	NA	
T3.3.11-1 #3a	b. SGB pressure low	S-SR 3.3.11.1	M-SR 3.3.11.2	R-SR 3.3.11.3	
	56. EFW valve commands (Vector)				
T3.3.11-1 #2.a	a. SG A pressure low	S	M	R	
#2.a	b. SG B pressure low	S	M	R	
#2.b	c. SG pressure difference SG A pressure> SG B pressure	S	M	R	
#2.b	SG B pressure> SG A pressure	S	M	R	
		SR 3.3.11.1	SR 3.3.11.2	SR 3.3.11.3	

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A3

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3.3.12
3.3.13

(A3)

Table 4.1-1 (Cont.)

Channel Description	Check	Test	Calibrate	Remarks
d. SG A High Range Level High-high	S	M	R	(A10)
e. SG B High Range Level High-high	S	M	R	(A10)
<LATER> (3,3D) 57. Containment High Range Radiation Monitors	D	M	R	LATER
58. Containment Pressure-High	M	NA	R	LATER
59. Containment Water Level-Wide Range	M	NA	R	LATER
<LATER> (3,4B) 60. Low Temperature Overpressure Protection Alarm Logic	NA	R	R	LATER
<LATER> (3,3D) 61. Core-exit Thermocouples	M	NA	R	LATER
<LATER> (3,3A) 62. Electronic (SCR) Trip Relays	NA	Q	NA	LATER
<LATER> (3,3D) 63 RVLMS	M	NA	R	LATER
64 HLLMS	M	NA	R	LATER

NOTE:

S - Each Shift
W - Weekly
M - Monthly
D - Daily

T/W - Twice per Week
Q - Quarterly
P - Prior to each startup if not done previous week
B/M - Every 2 months

R - Once every 18 months
PC - Prior to going Critical if not done within previous 31 days
NA - Not Applicable
SA - SA Twice per Year

(A4) + LATER + (R) TRM

+ <LATER> (3,3A 3,3B 3,3D 3,4B)

3,3,11
3,3,12
3,3,13

NO SIGNIFICANT HAZARDS CONSIDERATIONS
GENERIC EVALUATIONS

"R" - Relocation of requirements:

Relocating requirements which do not meet the Technical Specification selection criteria to documents with an established control program allows the Technical Specifications to be reserved only for those conditions or limitations upon reactor operation which are necessary to adequately limit the possibility of an abnormal situation or event giving rise to an immediate threat to the public health and safety, thereby focusing the scope of Technical Specifications.

Therefore, requirements which do not meet the Technical Specification selection criteria in 10 CFR 50.36 have been relocated to other controlled license basis documents. This regulation addresses the scope and purpose of Technical Specifications. In doing so, it establishes a specific set of objective criteria for determining which regulatory requirements and operating restrictions should be included in Technical Specifications. These criteria are as follows:

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

Criterion 2: A process variable that is an initial condition of a design basis accident (DBA) or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Criterion 3: A structure, system or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission barrier.

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

The application of these criteria is provided in the "Application of Selection Criteria to the ANO-1 Technical Specifications." Requirements which met the criteria have been included in the proposed improved Technical Specifications. Entergy Operations proposes to remove the requirements which do not meet the criteria from the Technical Specifications and relocate the requirements to a suitable owner controlled document. The requirements in the relocated Specifications will not be affected by this Technical Specification change. Entergy Operations will initially continue to perform the required operation and maintenance to assure that the requirements are satisfied. Relocating specific requirements for systems or variables will have no impact on the system's operability or the variable's maintenance, as applicable.

NO SIGNIFICANT HAZARDS CONSIDERATIONS
GENERIC EVALUATIONS

License basis document control mechanisms, such as 10 CFR 50.59, 10 CFR 50.54(a)(3), and ITS Section 5, "Administrative Controls," will be utilized for the relocated Specifications as they will be placed in other controlled license basis documents. This would allow Entergy Operations to make changes to these requirements, without NRC approval, as allowed by the applicable regulatory requirements. These controls are considered adequate for assuring structures, systems and components in the relocated Specifications are maintained operable and variables in the relocated Specifications are maintained within limits.

Entergy Operations has evaluated this proposed Technical Specification change and has determined that it involves no significant hazards consideration. This determination has been performed in accordance with the criteria set forth in 10 CFR 50.92(c) as indicated below:

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

   The proposed change relocates requirements and surveillances for structures, systems, components or variables which did not meet the criteria for inclusion in Technical Specifications as identified in the Application of Selection Criteria to the ANO-1 Technical Specifications. The affected structures, systems, components or variables are not assumed to be initiators of analyzed events and are not assumed to mitigate accident or transient events. The requirements and surveillances for these affected structures, systems, components or variables will be relocated from the Technical Specifications to an appropriate administratively controlled license basis document and maintained pursuant to the applicable regulatory requirements. Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

   The proposed change does not necessitate a physical alteration of the plant (no new or different type of equipment will be installed) or change in parameters governing normal plant operation. The proposed change will not impose any different requirements and adequate control of information will be maintained. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. **Does this change involve a significant reduction in a margin of safety?**

   The proposed change will not reduce a margin of safety because it has no impact on any safety analysis assumptions. In addition, the affected requirement will be relocated to an owner controlled license basis document for which future changes will be evaluated pursuant to the requirements of the applicable regulatory requirements. Therefore, this change does not involve a significant reduction in a margin of safety.

NO SIGNIFICANT HAZARDS CONSIDERATIONS
GENERIC EVALUATIONS

"A" - Administrative changes to requirements:

Reformatting and rewording the remaining requirements in accordance with the style of the improved Babcock & Wilcox Standard Technical Specifications in NUREG-1430 will make the Technical Specifications more readily understandable to plant operators and other users. Application of the format and style will also assure consistency is achieved between specifications. As a result, the reformatting and rewording of the Technical Specifications has been performed to make them more readily understandable by plant operators and other users. During this reformatting and rewording process, no technical changes (either actual or interpretational) to the Technical Specifications were made unless they were identified and justified.

Entergy Operations has evaluated this proposed Technical Specification change and has determined that it involves no significant hazards consideration. This determination has been performed in accordance with the criteria set forth in 10 CFR 50.92(c) as indicated below:

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

   The proposed change involves reformatting and rewording of the existing Technical Specifications. The reformatting and rewording process involves no technical changes to existing requirements. As such, this change is administrative in nature and does not impact initiators of analyzed events or assumed mitigation of accident or transient events. Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

   The proposed change does not necessitate a physical alteration of the plant (no new or different type of equipment will be installed) or changes in parameters governing normal plant operation. The proposed change will not impose any different requirements. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. **Does this change involve a significant reduction in a margin of safety?**

   The proposed change will not significantly reduce the margin of safety because it has no impact on any safety analysis assumptions. This change is administrative in nature. As such, there is no technical change to the requirements and therefore, there is no significant reduction in the margin of safety.

NO SIGNIFICANT HAZARDS CONSIDERATIONS
GENERIC EVALUATIONS

"LA" - Less restrictive, Administrative deletion of requirements:

Portions of some Specifications provide information that is descriptive in nature regarding the equipment, system(s), actions or surveillances. This information is proposed to be deleted from the specification and relocated to other license basis documents which are under licensee control. These documents include the TS Bases, Safety Analysis Report (SAR), Technical Requirements Manual, and Programs and Manuals identified in ITS Section 5, "Administrative Controls." The removal of descriptive information is permissible, because the documents containing the relocated information will be controlled through the applicable process provided by the regulatory requirements, e.g., 10 CFR 50.59, 10 CFR 50.54(a)(3), and ITS Section 5, "Administrative Controls." This will not impact the actual requirements but may provide some flexibility in how the requirement is conducted. Therefore, the descriptive information that has been moved continues to be maintained in an appropriately controlled manner.

Entergy Operations has evaluated this proposed Technical Specification change and has determined that it involves no significant hazards consideration. This determination has been performed in accordance with the criteria set forth in 10 CFR 50.92(c) as indicated below:

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

   The proposed change relocates requirements from the Technical Specifications to other license basis documents which are under licensee control. The documents containing the relocated requirements will be maintained using the provisions of applicable regulatory requirements. Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

   The proposed change does not necessitate a physical alteration of the plant (no new or different type of equipment will be installed) or changes in parameters governing normal plant operation. The proposed change will not impose any different requirements and adequate control of the information will be maintained. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

The proposed change will not reduce a margin of safety because it has no impact on any safety analysis assumptions. In addition, the requirements to be transposed from the Technical Specifications to other license basis documents, which are under licensee control, are the same as the existing Technical Specifications. The documents containing the relocated requirements will be maintained using the provisions of applicable regulatory requirements. Therefore, this change does not involve a significant reduction in a margin of safety.

"M" - More restrictive changes to requirements:

The ANO-1 Technical Specifications are proposed to be modified in some areas to impose more stringent requirements than previously identified. These more restrictive modifications are being imposed to be consistent with the improved Babcock & Wilcox Standard Technical Specifications. Such changes have been made after ensuring the previously evaluated safety analysis was not affected. Also, other more restrictive technical changes have been made to achieve consistency, correct discrepancies, and remove ambiguities from the specification.

The modification of the ANO-1 Technical Specifications and the changes made to achieve consistency within the specifications have been performed in a manner such that the most stringent requirements are imposed, except in cases which are individually evaluated.

Entergy Operations has evaluated this proposed Technical Specification change and has determined that it involves no significant hazards consideration. This determination has been performed in accordance with the criteria set forth in 10 CFR 50.92(c) as quoted below:

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

   The proposed change provides more stringent requirements for the ANO-1 Technical Specifications. These more stringent requirements are not assumed to be initiators of analyzed events and will not alter assumptions relative to mitigation of accident or transient events. The change has been confirmed to ensure no previously evaluated accident has been adversely affected. The more stringent requirements are imposed to ensure process variables, structures, systems and components are maintained consistent with the safety analyses and licensing basis. Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

   The proposed change does not necessitate a physical alteration of the plant (no new or different type of equipment will be installed) or changes in parameters governing normal plant operation. The proposed change does impose different requirements. However, these changes do not impact the safety analysis and licensing basis. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated for ANO-1.

3. Does this change involve a significant reduction in a margin of safety?

The imposition of more stringent requirements prevents a reduction in the margin of plant safety by:

a) Increasing the analytical or safety limit,
b) Increasing the scope of the specification to include additional plant equipment,
c) Increasing the applicability of the specification,
d) Providing additional actions,
e) Decreasing restoration times,
f) Imposing new surveillances, or
g) Decreasing surveillance intervals.

The change is consistent with the safety analysis and licensing basis. Therefore, this change does not involve a reduction in a margin of safety.

NO SIGNIFICANT HAZARDS CONSIDERATIONS STATEMENTS

ITS Section 3.3C: Instrumentation - EFIC

Entergy Operations has evaluated these proposed Technical Specification changes and has determined that they involve no significant hazards consideration. This determination has been performed in accordance with the criteria set forth in 10CFR 50.92(c) as indicated below:

3.3C L1

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

This change establishes a 72 hour Completion Time during which the unit may continue operation with one or more Emergency Feedwater Initiation and Control System (EFIC) Function(s) having one or both manual initiation switches inoperable in one actuation channel prior to requiring a unit shutdown. This change also establishes a 1 hour Completion Time during which the unit may continue operation with one or more EFIC Function(s) having one or both manual initiation switches inoperable in both actuation channels prior to requiring a unit shutdown. This change provides an opportunity to repair the inoperable components prior to requiring a shutdown/startup cycle of the unit. This allowance is acceptable since the manual initiation of EFIC is not credited in the safety analysis, but provides a backup function only. The addition of this allowed condition with a short Completion Time does not result in any hardware changes. The allowed condition also does not significantly increase the probability of occurrence for initiation of any analyzed event since the function of the equipment does not change (and therefore any initiation scenarios are not changed) and the proposed Completion Time is short (and therefore limits the impact on probability). Also, including this allowed condition provides additional opportunity to restore compliance with the requirements and avoid the increased potential for a transient during the shutdown process. Further, the allowed condition does not significantly increase the consequences of an accident because manual initiation of EFIC is not considered in the assumed response of the equipment in performing its specified mitigation functions.

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

The proposed change does not necessitate a physical alteration of the plant (no new or different type of equipment will be installed) or changes in parameters governing normal plant operation. The proposed change will still ensure prompt restoration of compliance with the limiting condition for operation, or prompt and appropriate compensatory actions are taken. Additionally, the proposed change will still ensure proper surveillances are required for all equipment considered in the safety analysis. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3.3C L1 (continued)

3. Does this change involve a significant reduction in a margin of safety?

Prompt and appropriate Required Actions have been determined based on the safety analysis functions to be maintained. The allowed condition has been determined appropriate based on a combination of the time required to perform the action, the relative importance of the function or parameter to be restored, and engineering judgment. Therefore, this new allowed condition does not involve a significant reduction in the margin of safety.

3.3C L2

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

The change in the Required Action does not result in any hardware changes. The change also does not significantly increase the probability of occurrence for initiation of any analyzed event since the function of the equipment, or limit for the parameter, does not change (and therefore any initiation scenarios are not changed). The change provides consistency between the Required Actions and Applicable conditions for the LCO. The change of Required Actions does not significantly increase the consequences of an accident because the change does not affect the assumed response of the equipment in performing its specified mitigation functions, or change the response of the core parameters, from that resulting from the original analysis. Further, the subject area pertaining to this change is not credited in the accident analysis.

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

The proposed change does not necessitate a physical alteration of the plant (no new or different type of equipment will be installed) or changes in parameters governing normal plant operation. The proposed change will still ensure prompt restoration of compliance with the limiting condition for operation, or prompt and appropriate compensatory actions are taken, for unit conditions during which analysis assumes the equipment to function. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

Prompt and appropriate Required Actions have been determined based on the safety analysis functions to be maintained. The Required Actions are revised to be consistent with the Applicability for the equipment. Therefore, the change does not involve a significant reduction in the margin of safety.

3.3C L3

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

This change establishes a 1 hour Completion Time during which the unit may continue operation with one or more Emergency Feedwater Water (EFW) Initiation or Main Steam Line Isolation Function(s) having two channels inoperable prior to placing one of the inoperable channels in trip. This change provides an opportunity to repair the inoperable components prior to requiring a shutdown/startup cycle of the unit. This allowance is acceptable since the Emergency Feedwater Initiation and Control (EFIC) Functions are not considered as initiators of any previously analyzed event. Therefore, the allowed condition does not significantly increase the probability of occurrence for initiation of any analyzed event since the function of the equipment does not change (and therefore any initiation scenarios are not changed) and the proposed Completion Time is short (and therefore limits the impact on probability). Also, including this allowed condition provides additional opportunity to restore compliance with the requirements and avoid the increased potential for a transient during the shutdown process. Further, the allowed condition does not significantly increase the consequences of an accident because the Required Action continues to restore the EFIC Function to provide the same response as previously considered.

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

The proposed change does not necessitate a physical alteration of the plant (no new or different type of equipment will be installed) or changes in parameters governing normal plant operation. The proposed change will still ensure prompt restoration of compliance with the limiting condition for operation, or prompt and appropriate compensatory actions are taken. Additionally, the proposed change will still ensure proper surveillances are required for all equipment considered in the safety analysis. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

Prompt and appropriate Required Actions have been determined based on the safety analysis functions to be maintained. The allowed condition has been determined appropriate based on a combination of the time required to perform the action, the relative importance of the function or parameter to be restored, and engineering judgment. Therefore, this new allowed condition does not involve a significant reduction in the margin of safety.

3.3.13-01
3.3.14-01

3.3C L4

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

The changes establishes a 72 hour Completion Time during which the unit may continue operation with Emergency Feedwater Initiation and Control (EFIC) Logic and Vector Logic Function(s) in a single actuation train inoperable prior to requiring a unit shutdown. The changes provide an opportunity to repair the inoperable components prior to requiring a shutdown/startup cycle of the unit. This allowance is acceptable since inoperability of EFIC logic(s) within a single train effects only one train of Emergency Feedwater (EFW). 72 hours is provided to restore EFW components when one train of EFW is degraded or out of service. Therefore, it is acceptable to provide the same restoration period for EFIC logic or vector logic inoperabilities that solely impact a single train of EFW. The addition of this allowed condition with a short Completion Time does not result in any hardware changes. The allowed condition also does not significantly increase the probability of occurrence for initiation of any analyzed event since the function of the equipment does not change (and therefore any initiation scenarios are not changed) and the proposed Completion Time is short (and therefore limits the impact on probability). Also, including this allowed condition provides additional opportunity to restore compliance with the requirements and avoid the increased potential for a transient during the shutdown process. Finally, the allowed condition does not significantly increase the consequences of an accident because single train EFIC logic and vector logic inoperabilities is equivalent to that of a single EFW train inoperability. Therefore, these changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

The proposed changes do not necessitate a physical alteration of the plant (no new or different type of equipment will be installed) or changes in parameters governing normal plant operation. The proposed changes will still ensure prompt restoration of compliance with the limiting condition for operation, or prompt and appropriate compensatory actions are taken. Additionally, the proposed changes will still ensure proper surveillances are required for all equipment considered in the safety analysis. Therefore, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

Prompt and appropriate Required Actions have been determined based on the safety analysis functions to be maintained. The allowed condition has been determined appropriate based on a combination of the time required to perform the action, the relative importance of the function or parameter to be restored, and engineering judgment. Therefore, the proposed changes do not involve a significant reduction in the margin of safety.