NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

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October 4, 1990

Docket No. 50-423
A08949

Re: IE Inspection Report
#50-423/90-80

Mr. T. T. Martin
Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Reference: (1) R. [illegible] Gallo letter to E. J. Mroczka, Inspection No. 50[illegible]/90-80, dated August 7, 1990.

Dear Mr. Martin:

Millstone Nuclear Power Station, Unit No. 3
Response to Comments Identified in
Inspection Report 50-423/90-80

In a letter dated August 7, 1990 [Reference (1)], the NRC transmitted the results of their team inspection of the emergency operating procedures conducted at Millstone Unit No. 3 from April 16 to April 25, 1990. In Attachment 3 to its letter, the Staff summarized opportunities for improvement relative to the emergency operating procedures. The Staff requested that Northeast Nuclear Energy Company (NNECO) respond to the comments identified in Attachment 3 to Reference (1) within 60 days of receipt of Reference (1), by identifying actions taken or planned. NNECO's response to the comments identified in Attachment 3 to Reference (1) is provided in Attachment I.

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Your team should be complimented on this thorough and professional inspection. My staff was impressed with the team's technical knowledge and their ability to balance substantial and minor discrepancies. If there are any questions, you may contact my staff directly.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

FOR: E. J. Mroczka
Senior Vice President

BY: [signature]
C. F. Sears
Vice President

cc: U.S. Nuclear Regulatory Commission, Document Control Desk
D. H. Jaffe, NRC Project Manager, Millstone Unit No. 3
W. J. Raymond, Senior Resident Inspector, Millstone Unit Nos. 1, 2, and 3

Mr. R. M. Gallo, Chief, Operations Branch
Division of Reactor Safety

Docket No. 50-423
A08949

Attachment I

Response to the Comments
Identified in Attachment 3 tc
Inspection Report 50-423/90-80

October 1990

Attachment I

Response to the Comments Identified in Attachment 3 to Inspection Report 50-423/90-80

In mid 1989, NNECO initiated a comprehensive Emergency Operating Procedures (EOP) upgrade program commencing with self-audits using industry trends and results from NRC audits at other plants. A Westinghouse "EOP Review and Assessment," audit, performed in early 1990, provided an independent review of the Emergency Operating Procedures program. Millstone Unit No. 3 personnel, and additional staff used to support the upgrade program effort, are reviewing and revising all EOP network procedures incorporating comments and recommendations from the previous audits. The current upgrade project is scheduled for completion in December 1991.

The Millstone Unit No. 3 Operations Department, Unit No. 3 Plant Engineering, and Corporate Safety Analysis Branch are providing the multi-discipline support required for this effort. A dedicated EOP Technical Reviewer is incorporating comments, recommendations, and feedback generated by the review process. An EOP Procedure Editor reformats the new revisions and ensures consistency and strict adherence to the Millstone Unit No. 3 EOP Writer's Guide. In addition, the Human Factors Group has reviewed and provided valuable input for the current revision of the EOP Writer's Guide. They supplied advice regarding format and presentation of style criteria following a review of the initial EOPs modified during the upgrade process.

The NRC Staff conducted a special, announced team inspection of the Millstone Unit No. 3 EOPs from April 16 to April 25, 1990. The purpose of the inspection was to determine if the EOPs used at Millstone Unit No. 3 were technically correct; if their specified actions could be physically accomplished using the existing equipment, controls and instrumentation; and if the available procedures had the usability necessary to provide the operators with an effective operating tool. The overall assessment, by the NRC inspection team, is that the program for the development and maintenance of symptom-based EOPs at Millstone Unit No. 3 is adequate. The Staff did provide comments relative to the EOPs and requested that NNECO respond to the comments within 60 days of receipt of the inspection report.

Specific responses to the comments identified in the inspection report follow:

1. Item #90-80-01:

   Following review and revision of the EOPs, correct deviation document errors and more fully document deviation justifications.

RESPONSE:

As an integral part of the review and upgrade process, each step in the existing Step Deviation Document will be evaluated and, as required, the justifications for the differences between the EOPs and Emergency Response Guidelines (ERG) strengthened to ensure they provide adequate support for the variations.

The administrative procedures which define and control the Step Deviation Documentation have been revised to include specific guidance for the generation and maintenance of the documentation.

2. Item #90-80-02:

Identify labeling versus EOP procedure discrepancies. Evaluate and identify actions to resolve discrepancies.

RESPONSE:

Specific issues which appeared to cause confusion during discussions between the operators and the NRC inspection team, will be rectified by using consistent steps, improved component names, and/or component identification numbers. In general, the common noun names of components used in the EOP network are very familiar to the operators and have not caused confusion during performance of the procedures.

Throughout the EOP network, where confusion may occur when an infrequently used component is referenced, it will be provided with its identification number, and in specific cases its Control Room location, to aid the operator in making the correct selection. The Nuclear Training Department has committed to be especially sensitive during operator training sessions (particularly Licensed Operator Initial Training) to take note of items in the EOP network which may cause confusion as a result of labeling or component nomenclature, and to provide prompt feedback of these issues to the EOP Coordinator.

3. Item #90-80-03

Review deficiencies identified during NRC walkdowns.

RESPONSE:

Each deficiency identified during the NRC walkdowns has had a preliminary evaluation for its generic implications. Each item was either placed in a file with the respective procedure(s) awaiting the upgrade and revision process or determined not to be applicable as a result of other changes made. By the conclusion of the current upgrade and revision process, all of the deficiencies will have been dispositioned.

4. Item #90-80-04:

Further evaluate improved system for control and revision of EOPs.

Response:

NNECO is developing an enhanced word processing/database system which will be used to meet the specific and multi-facet requirements of the EOP network. When the enhanced system is fully implemented, "pen and ink" changes will be limited to those required to immediately address safety significant issues. Further, any hand-written changes that are required shall be promptly incorporated into the procedure by a new revision.

BASES

LCO (continued)

multiple ESFAS functions if a matrix power supply or vital instrument bus fails. This will result in opening the two contacts in each ARC actuation logic, leaving the actuation logic for both trains in one out of two logic.

If one set of initiation logic contacts has been opened in response to a single initiation logic channel failure, the affected set of contacts may be closed for up to one hour for surveillance testing on the OPERABLE initiation logic channels.

In this case the redundant set of initiation logic contacts will provide protection if a trip should be required. It is unlikely that a trip will be required during the surveillance testing, coincident with a failure of the remaining series initiation relay contacts.

c. Actuation logic

Actuation logic consists of all circuitry housed within the ARC used to initiate the ESF actuation, and interconnecting wiring to the initiation relay contacts mounted in the PPS cabinet. With one actuation logic channel inoperable, automatic actuation of one train of ESF may be inhibited. The remaining train provides adequate protection in the event of DBAs, but the single failure criterion may be violated. For this reason operation in this condition is restricted.

6. MSIS

a. Manual Actuation

The LCO on manual actuation ensures the proper amount of reliability and redundancy is maintained in the manual ESFAS actuation circuitry to ensure the operator has manual ESFAS initiation capability.

Each channel consists of two adjacent pushbuttons and the interconnecting wiring to the PPS cabinet. Depressing either set will initiate the SIAS function. The "2 sets of 2" pushbutton strategy was selected to maintain the single failure

(continued)

BASES

LCO (continued)

criteria (IEEE Std 279-1971), and to ensure that inadvertent depressing of one button would not cause an unnecessary ESFAS initiation.

b. Initiation Logic

Each of the four Initiation Logic channels opens contacts affecting the actuation logic in both ARCs if any of the six coincidence matrices deenergize their associated matrix relays. They thus perform a logical OR function. Each initiation logic channel has its own power supply, and is independent of the others three channels. Although each of the four initiation logic channels within an ESFAS function uses separate power supplies, the initiation logic for the different ESFAS functions share power supplies. Thus failure of a power supply may force entry into the Condition specified for each of the affected ESFAS functions.

An initiation logic channel includes the matrix relay through to the initiation relay contacts. It is possible for two initiation logic channels affecting the same trip leg to deenergize in multiple ESFAS functions if a matrix power supply or vital instrument bus fails. This will result in opening the two contacts in each ARC actuation logic, leaving the actuation logic for both trains in one out of two logic.

If one set of initiation logic contacts has been opened in response to a single initiation logic channel failure, the affected set of contacts may be closed for up to one hour for surveillance testing on the OPERABLE initiation logic channels. In this case the redundant set of initiation logic contacts will provide protection if a trip should be required. It is unlikely that a trip will be required during the surveillance testing, coincident with a failure of the remaining series initiation relay contacts.

(continued)

BASES

LCO
(continued)

c. Actuation logic

Actuation logic consists of all circuitry housed within the ARC used to initiate the ESF actuation, and interconnecting wiring to the initiation relay contacts mounted in the PPS cabinet. With one actuation logic channel inoperable, automatic actuation of one train of ESF may be inhibited. The remaining train provides adequate protection in the event of DBAs, but the single failure criterion may be violated. For this reason operation in this condition is restricted.

7. AFAS 1 and AFAS 2

AFAS 1 is initiated to Steam Generator 1 by either a low steam generator level coincident with no low pressure trip present on steam generator # 1, or by a low steam generator level coincident with a differential pressure between the two generators with the higher pressure in Steam Generator 1. EFAS 2 is similarly configured to feed steam generator 2.

The following LCO description applies to either EFAS signal.

a. Manual Actuation

The LCO on manual actuation ensures the proper amount of reliability and redundancy is maintained in the manual ESFAS actuation circuitry to ensure the operator has manual ESFAS initiation capability.

Each channel consists of two adjacent pushbuttons and the interconnecting wiring to the PPS cabinet. Depressing either set will initiate the EFAS function. The "2 sets of 2" pushbutton strategy was selected to maintain the single failure criteria (IEEE Std 279-1971), and to ensure that inadvertent depressing of one button would not cause an unnecessary EFAS initiation.

(continued)

LCO (continued)

b. Initiation Logic

Each of the four Initiation Logic channels opens contacts affecting the actuation logic in both ARCs if any of the six coincidence matrices deenergize their associated matrix relays. They thus perform a logical OR function. Each initiation logic channel has its own power supply, and is independent of the others three channels. Although each of the four initiation logic channels within an ESFAS function uses separate power supplies, the initiation logic for the different ESFAS functions share power supplies. Thus failure of a power supply may force entry into the Condition specified for each of the affected ESFAS functions.

An initiation logic channel includes the matrix relay through to the initiation relay contacts. It is possible for two initiation logic channels affecting the same trip leg to deenergize in multiple ESFAS functions if a matrix power supply or vital instrument bus fails. This will result in opening the two contacts in each ARC actuation logic, leaving the actuation logic for both trains in one out of two logic.

If one set of initiation logic contacts has been opened in response to a single initiation logic channel failure, the affected set of contacts may be closed for up to one hour for surveillance testing on the OPERABLE initiation logic channels. In this case the redundant set of initiation logic contacts will provide protection if a trip should be required. It is unlikely that a trip will be required during the surveillance testing, coincident with a failure of the remaining series initiation relay contacts.

If a single matrix power supply or vital bus failure has deenergized two initiation logic channels, the same trip leg in both ARCs will open, placing the actuation logic in one out of two logic in both trains.

(continued)

BASES

LCO

c. Actuation Logic

Actuation logic consists of all circuitry housed within the ARC used to initiate the ESF actuation, and interconnecting wiring to the initiation relay contacts mounted in the PPS cabinet. With one actuation logic channel inoperable, automatic actuation of one train of ESF may be inhibited. The remaining train provides adequate protection in the event of DBAs, but the single failure criterion may be violated. For this reason operation in this condition is restricted.

For the purposes of this specification opening contacts in one of the two trip legs to comply with matrix logic or initiation logic failures does not render the actuation logic inoperable. The basis for the Actions required under Condition G is further discussed under ACTIONS.

APPLICABILITY

1. Automatic ESFAS Actuation

In MODES 1, 2 and 3 there is sufficient energy in the primary and secondary systems to warrant automatic ESF system responses to:

- Close the Main Steam Isolation valves (MSIVs) to preclude a positive reactivity addition.
- Actuate Emergency Feedwater to preclude the loss of the steam generators as a heat sink (in the event the normal feedwater system is not available).
- Actuate ESF systems to prevent or limit the release of fission product radioactivity to the environment by not exceeding the containment design pressure, and to mitigate the effects of the accident.
- Actuate ESF systems to ensure sufficient borated inventory to permit adequate core cooling and reactivity control during a design basis LOCA or MSLB accident.

ESF functions to which automatic actuation in these MODES apply follow:

(continued)

BASES

APPLICABILITY (continued)

1. Safety Injection Actuation - SIAS
2. Containment Isolation - CIAS
3. Containment Cooling - CCAS
5. Containment Spray Actuation - CSAS
6. Main Steam Line Isolation - MSIS
7. Emergency Feedwater - EFAS

In MODES 4, 5, and 6 these functions are not required because adequate time is available to evaluate plant conditions and respond by manually operating the ESF components if required.

An automatic RAS (Function 4) is required in MODES 1 through 4 to ensure availability of water in the event of manual or automatic actuation of required ESF systems in these MODES.

2. Manual ESFAS Actuation

Manual ESFAS capability must be maintained in all MODES in which automatic capability is required, as a backup to automatic actuation.

SIAS, CIAS, and CCAS are also required in MODE 4 even though automatic actuation is not required. In this MODE adequate time is available to manually actuate required components in the event of a DBA, but because of the large number of components actuated on a SIAS and CIAS, actuation is simplified by the use of the manual actuation pushbuttons.

In MODES 5 and 6, the entire Engineered Safety Features system is 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.

(continued)

BASES

APPLICABILITY (continued)

3. Initiation and Actuation Logic

Initiation and actuation logic must be OPERABLE in all MODES in which either a manual or automatic actuation are required, because the initiation and actuation logic are common to both of these methods of actuation.

ACTIONS

In the event a channel's trip setpoint is found non-conservative 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 must be declared inoperable and the unit must enter the Condition statement for the particular protection function affected. If the number of inoperable channels for a particular protection function than the number of inoperable channels addressed by the Condition statements, then the plant no longer meets the assumptions of the safety analyses. The plant must be placed in a MODE where the function is no longer required to be OPERABLE as per LCO 3.0.3.

If a protection channel of a given process variable becomes inoperable, the goal shall be to return the inoperable channel to service as soon as practical, but no later than prior to return to MODE 2 following entry into MODE 5. This approach to bypass/trip in four channel protection systems is consistent with the applicable criteria of IEEE Standard 279.

Condition A

Condition A applies to one manual actuation or initiation logic channel inoperable of CSAS, MSIS, or EFAS. It is identical to Condition E for the other ESFAS functions except for the shutdown track invoked, which is consistent with function applicability requirements.

The channel must be restored to OPERABLE status within 48 hours. This provides the operator time to take appropriate actions and still assure that any risk involved in operating with a failed channel is acceptable. It is also consistent with the completion times for matrix and actuation logic.

Failure of a single initiation logic channel may open one contact affecting both actuation logic channels. For the purposes of this specification, the actuation logic is not inoperable. This prevents the need to enter LCO 3.0.3 in the event of an initiation logic channel failure.

(continued)

ACTIONS (continued)

The Actions differ from those involving one RPS manual channel inoperable, because in the case of the RPS, opening RTCBs can be easily performed and verified. Opening an initiation relay contact is more difficult to verify, and subsequent shorting of the contact is always possible.

Condition A applies with one actuation logic channel inoperable in order to restore the redundancy requirements of GDC 21.

Condition B

Condition B applies to the failure of both initiation logic channels affecting the same trip leg for CSAS, MSIS, or EFAS. It is identical to Condition F for the other ESFAS functions except for the shutdown track invoked, which is consistent with function applicability requirements. In this case, the actuation logic channels are not inoperable, since they are in one out of two logic, and capable of performing as required. This prevents the need to enter LCO 3.0.3 in the event of a matrix or vital bus power failure.

Both initiation logic channels in the same trip leg will deenergize if a matrix power supply or vital instrument bus is lost. This will open the actuation logic contacts, satisfying the required ACTION to open at least one set of contacts in the affected trip leg. Indefinite operation in this condition is prohibited because of the difficulty of assuring the contacts remain open under all conditions. The 48 hours to restore the channel to OPERABLE status provides the operator time to take appropriate actions and still assure that any risk involved in operating with a failed channel is acceptable. It is also consistent with the completion times for matrix logic failure, which is the most likely cause of two initiation logic channel failures.

Of greater concern is the failure of the Initiation circuit in a non-trip condition, e.g., due to two Initiation relay failures. There is no single failure mode which can cause multiple initiation circuit failures in this manner. With one failed, there is still the redundant contact in the trip leg of each actuation logic. With both failed in a non-trip condition, the ESFAS function is lost. To prevent this, immediate opening of at least one contact in the affected trip leg is required. If the required contact has not opened, as indicated by annunciation or trip leg current lamps, manual actuation of the affected trip leg contacts may be attempted.

(continued)

BASES

ACTIONS (continued)

Caution must be exercised, since depressing the wrong ESFAS pushbuttons may result in an ESFAS actuation.

Condition C

Condition C applies to CSAS, MSIS, or EFAS actuation logic. It is identical to Condition G for the other ESFAS functions except for the shutdown track invoked, which is consistent with function applicability requirements.

The channel must be restored to OPERABLE status within 48 hours. This provides the operator time to take appropriate actions and still assure that any risk involved in operating with a failed channel is acceptable. It is also consistent with the completion times for matrix, manual actuation, and initiation logic.

Failure of a single initiation logic channel, matrix channel power supply or vital instrument bus may open one or both contacts in the same trip leg in both actuation logic channels. For the purposes of this specification, the actuation logic is not inoperable. This prevents the need to enter LCO 3.0.3 in the event of a vital bus, matrix, or initiation channel failure.

Condition D

If the required actions and associated Completion Times of Conditions A, B, or C cannot be met the reactor must be brought to a MODE where the action statements do not apply. The six hours allowed by Condition D to bring the plant to MODE 4 is adequate to shutdown the plant in a controlled manner, while avoiding challenging plant systems.

Condition E

Condition E is identical to Condition A, except for the shutdown track invoked. It applies to one initiation logic manual actuation channel inoperable for those ESFAS functions which must be OPERABLE in MODES 1 through 4. The shutdown track imposed by Condition H requires entry into MODE 5, where the LCO does not apply.

(continued)

BASES

ACTIONS (continued)

Condition F

Condition F is identical to Condition B except for the shutdown track invoked. It applies to two initiation logic channels inoperable those ESFAS functions which must be OPERABLE in MODES 1 through 4. The shutdown track imposed by Condition H requires entry into MODE 5, where the LCO does not apply.

Condition F applies because opening at least one of the two contacts in the affected trip leg removes the need for the channel, since its function has been performed. This leaves the actuation logic for both trains in a one out of two configuration which meets the redundancy requirements of GDC 21. If the required ACTIONS and associated Completion Times are not met, Condition H is entered, placing the plant in MODE 3, where the LCO does not apply.

Condition G

Condition G is identical to Condition C, except for the shutdown track invoked. It applies to one actuation logic channel inoperable for those ESFAS functions which must be OPERABLE in MODES 1 through 4. The shutdown track imposed by Condition H requires entry into MODE 5, where the LCO does not apply.

Condition G applies with one actuation logic channel inoperable in order to restore the redundancy requirements of GDC 21.

Condition H

Condition H is entered when the required actions and associated completion times of Conditions E, F, or G are not met.

The plant must be brought to a MODE where the action statements do not apply. The six hours allowed by Condition H to bring the plant to MODE 3 and 30 additional hours to reach MODE 5 is adequate to shutdown the plant in a controlled manner, while avoiding challenging plant systems.

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.6.1

A CHANNEL FUNCTIONAL TEST on each ESFAS logic channel is performed every 92 days to ensure the entire channel will perform its intended function when needed. It is not necessary to perform this test more often because operating experience has shown that the instrumentation stays quite reliable within that time frame. It is not desirable to perform this test more often because there is always the possibility of receiving a spurious reactor trip during the test (due to a spurious signal on one of the other channels, or some other problem).

SR 3.3.6.2

Proper operation of the individual subgroup relays is verified by deenergizing these relays one at a time using an ARC-mounted test circuit. Proper operation of each component actuated by the individual relays is thus verified without the need to actuate the entire ESFAS function.

The 184-day surveillance interval is based on engineering judgment that individual relay problems can be detected in this timeframe. Considering the large number of similar relays in the ARC, and the similarity in their use, a large test sample can be assembled to verify the validity of this interval.

Table 3.3.6-1, derived from Updated FSAR Table 7.3-19, lists those relays exempt from testing at power, with an explanation of the reason for each exception. Relays not tested at power must be tested in accordance with the Note to verify Operability.

SR 3.3.6.3

Surveillance Requirement 3.3.6.3 is a CHANNEL FUNCTIONAL TEST similar to SR 3.3.6.1 except 3.3.6.3 is only applicable to bypass functions. Since the Pressurizer Pressure - Low bypass is identical for both the RPS and ESFAS, this is the same surveillance performed for the RPS.

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BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.6.4

Every 18 months, or approximately every refueling, a CHANNEL FUNCTIONAL TEST is performed on the manual ESFAS actuation circuitry.

This test verifies that the trip pushbuttons are capable of deenergizing the initiation relays, opening contacts in the actuation logic as designed. The 18 month frequency is adequate considering the simplicity of the circuitry, and the absence of any drift concern.

SR 3.3.6.5

This Surveillance Requirement ensures that the Engineered Safety Features response times are verified to be less than or equal to the values given in [document], which are the maximum values assumed in the Safety Analysis. Response Times are conducted on an 18 month STAGGERED TEST BASIS. This results in the interval between successive tests of a given channel of n times 18 months, where n is the number of channels in the function. The 18 month intervals are based on engineering judgment and plant operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences. Response Times cannot be determined at power, since equipment operation is required. The test may be performed in one measurement or in overlapping segments, with verification that all components are tested.

REFERENCES

1. Updated FSAR Chapter 7.3, "Engineered Safety Features Systems."
2. Code of Federal Regulations, Title 10, Part 50 "Domestic Licensing of Production and Utilization Facilities."
3. Regulatory Guide 1.75.
4. IEEE Standard 279-1971, Criteria for Protective Systems for Nuclear Power Plants.

(continued)

BASES

REFERENCES (continued)

5. Updated FSAR Chapter 15, "Accident Analysis."

6. CEN 112 S, "Plant Protection System Selection of Trip Setpoint Values."

7. NRC Interim Policy Statement, 52 FR 3788, "Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987."

Additional References

8. ISA-S67.04-1988 "Setpoints for Nuclear Safety Related Instrumentation."

9. NRC Generic Letter No. 83-27, Surveillance Intervals for Standard Technical Specifications.

10. IEEE Standard 338-1971, Trial Use Criteria for Periodic Testing of Nuclear Power Generating Stations.

## B 3.3 INSTRUMENTATION

### LCO B 3.3.7 Emergency Diesel Generator (EDG) Loss of Voltage Start (LOVS)

BASES

BACKGROUND

The EDGs provide a source of emergency power which is available when offsite power is either unavailable or is insufficiently stable to allow safe plant operation. Undervoltage protection will generate a LOVS in the event a loss of voltage occurs in the switchyard. There are two LOVS, one for each 4160 volt vital bus.

Four undervoltage relays with inverse time characteristics are provided on each 4160 volt Class 1E instrument bus for the purpose of detecting a degraded grid condition or a loss of bus voltage. The relays are combined in a two out of four logic to generate a LOVS if the voltage is below 75% for a short time or below 90% for a long time. The LOVS initiated actions are described in Updated FSAR section 8.3 (Ref. 1). The undervoltage protection scheme has been designed to protect the plant from spurious trips caused by the offsite power source. This is made possible by the inverse voltage-time characteristics of the relays used. A complete loss of offsite power will result in approximately a one second delay in LOVS actuation. The EDG starts and is available to accept loads within a 10 second time interval on SIAS or LOVS. Emergency power is established within the maximum time delay assumed for each event analyzed in the Accident Analysis of Updated FSAR Chapter 15 (Ref 2).

This protection scheme is designed consistent with the recommendations of IEEE 279-1971 (Ref. 3).

APPLICABLE SAFETY ANALYSES

Design Basis Definition

The LOVS is required for the ESFAS to function in any accident with a loss of offsite power. Its design basis is that of the ESFAS. The LOVS is designed to assure that the following operational criteria are met:

- o The associated actuation will occur when the parameter monitored by each channel reaches or exceeds its setpoint and the specific coincidence logic is satisfied;
- o Separation and redundancy is maintained to permit a channel to be out of service for testing or maintenance while still maintaining redundancy within the ESFAS instrumentation network.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The required channels of LOVS, in conjunction with the Engineered Safety Features Systems powered from the EDGs, provide plant protection in the event of any of the analyzed accidents in the Updated FSAR Chapter 15 in which a loss of offsite power is assumed.

The delay times assumed in the Safety Analysis for the ESF equipment include the 10 second EDG Start delay, and the appropriate sequencing delay, if applicable. The response of the EDG to a loss of power must be demonstrated to fall within this analysis response time. The response times for ESFAS-actuated equipment in LCO 3.3.2 includes the appropriate EDG loading and sequencing delay.

The EDG LOVS is part of the primary success path which actuates to mitigate a MODE 1 or MODE 2 DBA, that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. As such, the EDG LOVS channels satisfy the requirements of Selection Criteria 3 of the NRC Interim Policy Statement (Ref. 4).

LCO

The LCO on the LOVS requires that all four channels of the LOVS instrumentation must be OPERABLE. This ensures automatic actuation of the Safety Systems associated with the ESFAS whenever the associated EDG is required to be OPERABLE to ensure the automatic start of the EDG is available when needed.

Violation of this LCO could result in the delay of safety systems initiation when required. This could lead to the violation of the Safety Limits during certain AOOs, or unacceptable consequences during accidents. During the loss of offsite power, which is an AOO, the EDG powers the motor driven Auxiliary Feedwater Pumps. Failure of these pumps to start would leave only the one Turbine driven pump, and an increased potential for a loss of decay heat removal through the secondary system.

APPLICABILITY

The EDG LOV actuation function is required whenever the required EDG must be OPERABLE, so it can perform its function on a loss of power to the vital bus to supply Engineered Safety Features Functions.

(continued)

ACTIONS

Condition A

Condition A applies if one of the four LOVS sensing channels is inoperable for one or more EDGs. This action restores the system to a one out of three or two out of three logic for a limited amount of time, which meets the redundancy and testability requirements of GDC 21.

A.1

The affected EDG(s) must be declared inoperable unless the affected channel is either bypassed or tripped, in accordance with Action A.3. If it is not possible to enter A.3 within the required Completion Time, Action A.2 must be entered for the affected EDG(s). However, once Action A.3 has been complied with, even though the one hour completion time has been exceeded, the affected EDG(s) may be declared OPERABLE, unless otherwise inoperable.

Prior to declaring the EDGs OPERABLE, it is not necessary to perform any surveillances associated with EDG inoperability, since the inoperability only applies to the EDG LOV response.

A.2

If the channel cannot be restored to OPERABLE status, Action A.2 requires that the channel shall be either bypassed or tripped within 1 hour. Otherwise the affected EDG must be declared inoperable in accordance with Action A.1. Placing this channel in either condition ensures the logic is in a known configuration. In trip, the LOV logic is one out of three. In bypass, the LOV logic is two out of three. The latter configuration is preferred, since no additional failure will either cause or prevent a LOV actuation. In trip, one additional failure will cause a LOV signal on the bus. This will unnecessarily deenergize the bus and cause the EDG to start and close onto the dead bus.

If this Action cannot be complied with within the required completion time, the EDG must be declared inoperable, in accordance with Action A.1. If, after the required completion time has been exceeded, the required action of tripping or bypassing the inoperable channel is completed, the EDG may be declared OPERABLE, and the remainder of Action A.2 complied with. The one hour allowed to perform Action A.2 is adequate to perform the task.

(continued)

BASES

ACTIONS (continued)

Once A.2.1 has been complied with, A.2.2 allows 48 hours to repair the inoperable channel for those plants not meeting RG 1.75 on this function. This time should be adequate for most repairs, considering the relative accessibility of the sensors.

Plants meeting RG 1.75 need not restore the channel to OPERABLE until prior to the entry into MODE 2 following the next entry into MODE 5, and need not comply with Action A.3, since true four channel separation is assured. Plants not meeting RG 1.75 on this function cannot credit true four channel separation, since there is the extremely remote possibility that a common mode failure will occur in two of the remaining OPERABLE channels.

If the channel cannot be restored to OPERABLE, it must be tripped, in accordance with Action A.2.2 for those plants not meeting RG 1.75 on this function.

Action A.2 and A.3 apply to those plants not meeting RG 1.75. A.2 requires placing the channel in trip after 48 hours. This places the plant in one out of three logic.

Allowing for the extremely remote possibility of a common mode failure in the other OPERABLE channels, the function is in at least one out of two logic.

Action A.2.2 requires restoring the channel prior to the next CHANNEL FUNCTIONAL TEST. This should allow ample time to repair most failures, while ensuring the function is protected from common mode failures.

Condition B

B.1

If two channels are inoperable for one or two EDGs, the affected EDG(s) must be declared inoperable unless one affected channel is bypassed and the other is tripped, in accordance with Action B.2.1. If it is not possible to perform B.2.1 within the required completion time, Action B.1 must be entered for the affected EDG(s). However, once Action B.2.1 has been complied with, even though the one hour completion time has been exceeded, the affected EDG(s) may be declared OPERABLE, unless otherwise inoperable. Prior to declaring the EDGs OPERABLE, it is not necessary to perform any surveillances associated with EDG inoperability, since the inoperability only applies to the EDG LOV response.

(continued)

PROPOSED

BASES

ACTIONS (continued)

B.2

Action B.2.1 requires that one channel be bypassed and the other tripped within one hour. This places the function in one out of two logic. Otherwise the affected EDG must be declared inoperable in accordance with Action B.1. The one hour allowed to perform Action B.2.1 is adequate to perform the task.

Once B.2.1 has been complied with, B.3.2 allows 48 hours to repair the inoperable channel for those plants not meeting RG 1.75 on this function. This time should be adequate for most repairs, considering the relative accessibility of the sensors.

Plants meeting RG 1.75 need not restore the channel to OPERABLE until prior to the entry into MODE 2 following the next entry into MODE 5 since true four channel separation is assured. Plants not meeting RG 1.75 on this function cannot credit true four channel separation, since there is the extremely remote possibility that a common mode failure will occur in both of the remaining OPERABLE channels.

Condition C

Condition C applies if the required actions and associated completion times are not met, or if more than two of the channels are inoperable on either or both vital buses. Declaring the associated EDG(s) inoperable forces entry into LCO 3.8.1, "AC Sources, Operating, or LCO 3.8.2, AC Sources, Shutdown" maintaining the plant in a safe condition, while providing additional time to repair the inoperable channels.

SURVEILLANCE REQUIREMENTS

SR 3.3.7.1

Surveillance Requirement 3.3.7.1 is the performance of a CHANNEL CHECK on each required voltage sensing channel indicator. A CHANNEL CHECK is simply the comparison of the indicated parameter, bus voltage, from the four channels. It is based upon the assumption that the four channels indicated in the control room should be reading approximately the same. This SR is only appropriate if the bus voltage sensors share the same potential transformers as the undervoltage relays used in the LOVS function. Agreement is determined by the plant staff and should be based on a combination of the channel instrument uncertainties, including control isolation, indication, and readability. If a channel is outside of the match criteria, it may be an indication that

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.7.1 (continued)

the transmitter or the signal processing equipment have drifted outside of their limit. If the channels are within the match criteria, it is a reasonable assumption that the channels are within specification. The surveillance frequency of 12 hours is based on industry accepted practice with regard to channel OPERABILITY and drift.

SR 3.3.7.2

A CHANNEL FUNCTIONAL TEST is performed every 92 days to ensure the entire channel will perform its intended function when needed. It is not necessary to perform this test more often because operating experience has shown that the instrumentation stays quite reliable within that time frame. It is not desirable to perform this test more often because there is always the possibility of receiving a spurious LOVS actuation, which will strip the vital bus of its offsite power sources prior to placing the EDG on the bus. The unnecessary cycling of this system is undesirable.

SR 3.3.7.3

Surveillance Requirement 3.3.7.3 is the performance of a CHANNEL CALIBRATION every 18 months. The CHANNEL CALIBRATION verifies the accuracy of each component within the instrument string. This calibration includes calibration of the detectors, and demonstrates that the equipment falls within the specified operating characteristics defined by the manufacturer. The setpoints as well as the response to a loss of voltage and a degraded voltage condition shall be tested. The degraded voltage test shall include a single point verification that the trip occurs within the required delay time, as shown in Figure 3.3.7-1. The frequency is based on industry accepted practice.

REFERENCES

1. Updated FSAR, Chapter 8.3, "Onsite Power Systems."

2. Updated FSAR, Chapter 15, "Accident Analysis."

3. IEEE Standard 279-1971, Criteria for Protective Systems for Nuclear Power Plants.

4. NRC Interim Policy Statement, 52 FR 3788, "Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987."

(continued)

BASES

REFERENCES (continued)

Additional References

5. 10 CFR 50, Appendix A, General Design Criteria for Nuclear Power Plants.

6. GDC 22, Protection System Independence.

7. GDC 24, Separation of Protection and Control Systems.

## B 3.3 INSTRUMENTATION

## B 3.3.8 Containment Purge Isolation Signal (CPIS) - Operating

BASES

BACKGROUND

This LCO encompasses CPIS, which is a plant-specific instrumentation channel that performs an actuation function required for plant protection, but is not otherwise included in the Engineered Safety Features Actuation System (ESFAS) LCO (3.3.5) or Loss of Voltage Emergency Diesel Generator Start LCO (3.3.7). Individual plants shall include the CPIS function and LCO requirements which are in the current Technical Specifications, unless they are relocated in accordance with the NRC Interim Policy Statement. (Ref. 1)

The CPIS provides protection from radioactive contamination in the Containment in the event a fuel assembly should be severely damaged during handling.

The CPIS will detect any abnormal amounts of radioactive material in the Containment and will initiate Purge Valve closure to limit the release of radioactivity to the environment. Both the mini-purge and large volume purge supply and exhaust valves are closed on a CPIS, when a high radiation in Containment is detected.

The CPIS includes two independent, redundant subsystems, including actuation trains. Each train employs four sensors, each one detecting one of the following:

- o Gaseous
- o Airborne Particulate
- o Iodine
- o Gamma (area)

If any one of these sensors exceeds the bistable trip setpoint, the CPIS train will be actuated (one out of four logic).

Each train actuates a separate series valve in the Containment Purge supply and return lines. Either train controls sufficient equipment to perform the Isolation function. These valves are also isolated on a SIAS and CIAS.

(continued)

BASES

APPLICABLE SAFETY ANALYSES

The CPIS is required to isolate the Containment Purge Valves in the event of the Fuel Handling Accident in Containment, as described in Updated FSAR Section 15.7. The CPIS ensures the consequences of a dropped fuel assembly in the Containment are not as severe as a dropped assembly in the Fuel Handling Building.

LCO

The LCO on CPIS actuation ensures each of the following requirements is met:

1. The function is initiated when necessary.
2. The required coincidence logic is maintained.
3. Sufficient redundancy is maintained to permit a channel to be out of service for testing or maintenance.

The Allowable Values specified, in conjunction with the LCO on equipment operability ensure that the functions will perform as required when called upon.

Only the Allowable Values are specified for each Trip Function in the LCO. Operation with a trip setpoint less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable provided that the difference between the nominal trip setpoint and the Allowable Value is equal to or less than the drift allowance assumed for each trip in the transient and accident analyses. Each Allowable

Value specified is more conservative than the Analytical Limit assumed in the Transient and Accident Analysis in order to account for instrument uncertainties appropriate to the trip function. These uncertainties are defined in the Plant Specific Setpoint Methodology.

The basis for the LCO on this function is:

a. Airborne Radiation

The LCO on the four airborne radiation channels requires that only one train of each be OPERABLE, since they are redundant to each other, and the CPIS function can be manually initiated, either using the manual pushbuttons, the individual component controls, or the manual SIAS or CIAS function.

(continued)

BASES

LCO (continued)

b. Actuation Logic and area radiation

The actuation logic must be OPERABLE in all MODES in which the automatic or manual actuation channels are required, since the actuation logic is required for these actuations to occur.

APPLICABILITY

In MODES 1, 2, 3 and 4, the mini purge valves may be open. In these MODES it is necessary to assure the valves will shut in the event of a primary leak in containment.

In MODE 5, the ESFAS is largely disabled, since the probability of an accident is greatly diminished, and there is time to close the valves if required. Accordingly, the FHIS is not required. In MODE 6, there is the possibility of a fuel handling accident, requiring the FHIS. MODE 6 CPIS requirements are covered in LCO 3.3.9.

ACTIONS

In the event a channel's trip setpoint is found non-conservative with respect to the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected functions provided by that channel must be declared inoperable and the unit must enter the Condition statement for the particular protection function affected. If the number of inoperable channels for a particular protection function is less than the number of inoperable channels addressed by the Condition statements, then the plant no longer meets the assumptions of the safety analyses. The plant must be placed in a MODE or other condition where the function is no longer required to be OPERABLE.

If a channel of a given process variable becomes inoperable, the goal shall be to return the inoperable channel to service as soon as practical, but no later than prior to return to MODE 2 following entry into MODE 5. This approach to bypass/trip in four channel protection systems is consistent with the applicable criteria of IEEE Standard 279.

Condition A

Closing the Containment Purge valves eliminates the need for the CPIS. The completion time is consistent with that of other containment isolation valves.

(continued)

BASES

ACTIONS (continued)

Condition A is applicable with the actuation logic or area radiation channels inoperable because closing the valves performs the CPIS function.

Condition B

Condition B applies to the gaseous and particulate channels. In MODES 1 through 4 these channels are used in leakage detection. They are not actually required for the CPIS function since they are redundant with the area monitors, and the purge valves will close on a manual or automatic SIAS in the event of a LOCA.

SURVEILLANCE REQUIREMENTS

SR 3.3.8.1

Surveillance Requirement 3.3.8.1 is the performance of a CHANNEL CHECK on each containment gaseous and area radiation monitor channel. A CHANNEL CHECK is the comparison of the indicated parameter values for each of the functions. It is based on the assumption that the redundant channels indicated in the control room area should be reading approximately the same. Agreement is determined by the plant staff based on a combination of the channel instrument uncertainties, including isolation, indication, and readability. If a channel is outside the match criteria, it may be an indication that the transmitter or the signal processing equipment have drifted outside their limit. If the channels are within the match criteria, it is an indication that the channels are OPERABLE. The surveillance interval, about once every shift, is based on the engineering judgment that the probability of more than one channel randomly failing within the same 12 hour interval is extremely low. Thus, SR 3.3.8.1 ensures that an undetected loss of function is extremely unlikely, and that loss of redundancy will be identified in no less than 12 hours.

SR 3.3.8.2

SR 3.3.8.2 is the performance of a channel check on the particulate and radiation channels used in the CPIS. It differs only in the Surveillance Interval, which is weekly. These channels use the filter to trap the particulate prior to the air sample being pumped to the gaseous activity chamber. This technique results in an integration of total particulate activity until the filter assemblies are replaced. The low levels of activity expected, and the redundancy of these channels with the gaseous channels, make more frequent monitoring unnecessary.

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.8.3

A CHANNEL FUNCTIONAL TEST on each containment radiation monitor channel is performed every 31 days to ensure the entire channel will perform its intended function when needed. It is not necessary to perform this test more often because operating experience has shown that the instrumentation stays quite reliable within that time frame. This surveillance can be performed on the individual sensor channels without actuating the train by using test bypass switches.

SR 3.3.8.4

Proper operation of the individual subgroup relays is verified by deenergizing these relays during the CHANNEL FUNCTIONAL TEST of the actuation logic every 18 months. This will actuate the function, operating all associated equipment. Proper operation of the equipment actuated by each train is thus verified. The surveillance interval is based on engineering judgment that the actuation logic will remain reliable in this timeframe.

SR 3.3.8.5

A CHANNEL CALIBRATION on each containment radiation monitor channel is performed every 18 months, or approximately every refueling. The 18 month assumption, plus a 25% allowance for late surveillance, is made in the determination of the magnitude of equipment drift in the setpoint analysis. This test is a complete check of the channel from detector through to the actuated equipment. The CHANNEL CALIBRATION shall find that measurement errors and bistable setpoint errors are within the assumptions of the plant-specific setpoint analysis. Completion of this test results in the channel being properly adjusted and expected to remain within the as found tolerance assumed by the setpoint analysis until the next scheduled surveillance.

SR 3.3.8.6

This Surveillance Requirement ensures that the Engineered Safety Features response times are verified to be less than or equal to the values given in [document], which are the maximum values assumed in the Safety Analysis. Response Times are conducted on an 18 month STAGGERED TEST BASIS.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.8.6 (continued)

This results in the interval between successive tests of a given channel of n times 18 months, where n is the number of channels in the function. The 18 month intervals are based on engineering judgment and plant operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences. Response Times cannot be determined at power, since equipment operation is required. The test may be performed in one measurement or in overlapping segments, with verification that all components are tested.

REFERENCES

1. NRC Interim Policy Statement, 52 FR 3788, "Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987."

2. Updated FSAR Chapter 6.2, "Containment Systems."

3. Updated FSAR Chapter 7.3, "Engineered Safety Features Systems."

4. Updated FSAR Chapter 9.0, "Auxiliary Systems."

5. Updated FSAR Chapter 15, "Accident Analysis."

# B 3.3 INSTRUMENTATION

## B 3.3.9 Containment Purge Isolation Signal (CPIS) - Refueling

### BASES

BACKGROUND

This LCO encompasses CPIS Actuation, which is a plant-specific instrumentation channel that performs an actuation function required for plant protection, but is not otherwise included in the Engineered Safety Features Actuation System (ESFAS) LCO (3.3.5) or Loss of Voltage Emergency Diesel Generator Start LCO (3.3.6). This is a non-Nuclear Steam Supply System (non-NSSS) ESFAS function which, because of differences in purpose, design, and operating requirements, is not included in LCOs 3.3.5 and 3.3.6. Details of this LCO are for illustration only. Individual plants shall include those functions and LCO requirements which are in the current Technical Specifications, unless they are relocated in accordance with the NRC Interim Policy Statement (Ref. 1).

These systems are addressed in the Updated FSAR Section 6.2 (Ref. 2), and 7.3 (Ref. 3). A brief description of each follows:

The CPIS provides protection from radioactive contamination in the Containment in the event a fuel assembly should be severely damaged during handling.

The CPIS will detect any abnormal amounts of radioactive material in the Containment and will initiate Purge Valve closure to limit the release of radioactivity to the environment. Both the mini-purge and large volume purge supply and exhaust valves are closed on a CPIS, when a high radiation in Containment is detected.

The CPIS includes two independent, redundant subsystems, including actuation trains. Each train employs four sensors, each one detecting one of the following:

- o Gaseous
- o Airborne Particulate
- o Iodine
- o Gamma (area)

(continued)

BASES

BACKGROUND (continued)

If any one of these sensors exceeds the bistable trip setpoint, the CPIS train will be actuated (one out of four logic).

Each train actuates a separate series valve in the Containment Purge supply and return lines. Either train controls sufficient equipment to perform the Isolation function. These valves are also isolated on a SIAS and CIAS.

APPLICABLE SAFETY ANALYSES

The CPIS is required to isolate the Containment Purge Valves in the event of the Fuel Handling Accident in Containment, as described in Updated FSAR Section 15.7. The CPIS ensures the consequences of a dropped fuel assembly in the Containment are not as severe as a dropped assembly in the Fuel Handling Building.

LCO

The LCO on each ESFAS function ensures each of the following requirements is met:

1. The function is initiated when necessary.

2. The required coincidence logic is maintained.

3. Sufficient redundancy is maintained to permit a channel to be out of service for testing or maintenance.

The Allowable Values specified, in conjunction with the LCO on equipment operability ensure that the functions will perform as required when called upon.

Only the Allowable Values are specified for each Trip Function in the LCO. Operation with a trip setpoint less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable provided that the difference between the nominal trip setpoint and the Allowable Value is equal to or less than the drift allowance assumed for each trip in the transient and accident analyses. Each Allowable Value specified is more conservative than the Analytical Limit assumed in the Transient and Accident Analysis in order to account for instrument uncertainties appropriate to the trip function. These uncertainties are defined in the Plant Specific Setpoint Methodology.

(continued)

BASES

LCO (continued)

The LCO requires one CPIS train to be OPERABLE with radiation monitor setpoints:

- Containment Gaseous Monitor ≤ 2K background
- Containment Particulate Monitor ≤ 2X background
- Containment Iodine Monitor ≤ 2X background
- Containment Area Gamma Monitor ≤ 2X background

Airborne radiation channels require that only one train of each be OPERABLE, since they are redundant to each other, and the CPIS function can be manually initiated, either using the manual pushbuttons, the individual component controls, or the manual SIAS or CIAS function.

APPLICABILITY

In MODES 1, 2, 3 and 4, the mini purge valves may be open. In these MODES it is necessary to assure the valves will shut in the event of a primary leak in containment. This is covered in LCO 3.3.8.

In MODE 5, the ESFAS is largely disabled, since the probability of an accident is greatly diminished, and there is time to close the valves if required. Accordingly, the FHIS is not required. In MODE 6, there is the possibility of a fuel handling accident, requiring the FHIS.

ACTIONS

In the event a channel's trip setpoint is found non-conservative with respect to the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected functions provided by that channel must be declared inoperable and the unit must enter the Condition statement for the particular protection function affected. If the number of inoperable channels for a particular protection function is less than the number of inoperable channels addressed by the Condition statements, then the plant no longer meets the assumptions of the safety analyses. The plant must be placed in a MODE or other condition where the function is no longer required to be OPERABLE.

(continued)

ACTIONS (continued)

If a channel of a given process variable becomes inoperable, the goal shall be to return the inoperable channel to service as soon as practical, but no later than prior to return to MODE 2 following entry into MODE 5. This approach to bypass/trip in four channel protection systems is consistent with the applicable criteria of IEEE Standard 279.

Condition A

Condition A applies to the inoperability of any one or more of the following affecting both trains of CPIS in MODE 6:

- o containment radiation
- o actuation logic

It also applies to the actuation logic and the Containment Area monitors in MODES 1 through 4, this is addressed in LCO 3.3.8. The trip setpoint in MODE 6 differs from that in MODES 1 through 4 so that a fuel handling accident can be detected in the lower background radiation expected in this MODE.

Closing the Containment Purge valves eliminates the need for the CPIS. The completion time is consistent with that of other containment isolation valves.

SURVEILLANCE REQUIREMENTS

SR 3.3.9.1

Surveillance Requirement 3.3.9.1 is the performance of a CHANNEL CHECK on each containment gaseous and area radiation monitor channel. A CHANNEL CHECK is the comparison of the indicated parameter values for each of the functions. It is based on the assumption that the redundant channels indicated in the control room area should be reading approximately the same. Agreement is determined by the plant staff based on a combination of the channel instrument uncertainties, including isolation, indication, and readability. If a channel is outside the match criteria, it may be an indication that the transmitter or the signal processing equipment have drifted outside their limit. If the channels are within the match criteria, it is an indication that the channels are OPERABLE. The surveillance interval, about once every shift, is based on the engineering judgment that the

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.9.1 (continued)

probability of more than one channel randomly failing within the same 12 hour interval is extremely low. Thus, SR 3.3.9.1 ensures that an undetected loss of function is extremely unlikely, and that loss of redundancy will be identified in no less than 12 hours.

SR 3.3.9.2

SR 3.3.9.2 is the performance of a channel check on the particulate and iodine channels used in the CPIS. It differs only in the Surveillance Interval, which is weekly. These channels use the filter to trap the particulate and iodine activity prior to the air sample being pumped to the gaseous activity chamber. This technique results in an integration of total particulate and iodine activity until the filter assemblies are replaced. The low levels of activity expected, and the redundancy of these channels with the gaseous channels, make more frequent monitoring unnecessary.

SR 3.3.9.3

A CHANNEL FUNCTIONAL TEST on each containment radiation monitor channel is performed every 31 days to ensure the entire channel will perform its intended function when needed. It is not necessary to perform this test more often because operating experience has shown that the instrumentation stays quite reliable within that time frame. This surveillance can be performed on the individual sensor channels without actuating the train by using test bypass switches.

SR 3.3.9.4

Proper operation of the individual subgroup relays is verified by deenergizing these relays during the CHANNEL FUNCTIONAL TEST of the CPIS manual and actuation logic every 18 months. This will actuate the function, operating all associated equipment. Proper operation of the equipment actuated by each train is thus verified. The surveillance interval is based on engineering judgment that the actuation logic will remain reliable in this timeframe.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.9.5

A CHANNEL CALIBRATION is performed every 18 months, or approximately every refueling. The 18 month assumption, plus a 25% allowance for late surveillance, is made in the determination of the magnitude of equipment drift in the setpoint analysis. This test is a complete check of the channel from detector through to the actuated equipment. The CHANNEL CALIBRATION shall find that measurement errors and bistable setpoint errors are within the assumptions of the plant-specific setpoint analysis. Completion of this test results in the channel being properly adjusted and expected to remain within the as found tolerance assumed by the setpoint analysis until the next scheduled surveillance.

SR 3.3.9.6

This Surveillance Requirement ensures that the Engineered Safety Features response times are verified to be less than or equal to the values given in [document], which are the maximum values assumed in the Safety Analysis. Response Times are conducted on an 18 month STAGGERED TEST BASIS.

This results in the interval between successive tests of a given channel of n times 18 months, where n is the number of channels in the function. The 18 month intervals are based on engineering judgment and plant operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences. Response Times cannot be determined at power, since equipment operation is required. The test may be performed in one measurement or in overlapping segments, with verification that all components are tested.

REFERENCES

1. NRC Interim Policy Statement, 52 FR 3788, "Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987."

2. Updated FSAR Chapter 6.2, "Containment Systems."

3. Updated FSAR Chapter 7.3, "Engineered Safety Features Systems."

4. Updated FSAR Chapter 9.0, "Auxiliary Systems."

5. Updated FSAR Chapter 15, "Accident Analysis."

# B 3.3 INSTRUMENTATION

## B 3.3.10 Control Room Isolation Signal (CRIS)

BASES

BACKGROUND

This LCO encompasses CRIS actuation, which is a plant-specific instrumentation channel that performs an actuation function required for plant protection, but is not otherwise included in the Engineered Safety Features Actuation System (ESFAS) LCO (3.3.5) or Loss of Voltage Emergency Diesel Generator Start LCO (3.3.6). This is a non-Nuclear Steam Supply System (non-NSSS) ESFAS function which, because of differences in purpose, design, and operating requirements, is not included in LCOs 3.3.5 and 3.3.6. Details of this LCO are for illustration only. Individual plants shall include those functions and LCO requirements which are in the current Technical Specifications, unless they are relocated in accordance with the NRC Interim Policy Statement (Ref. 1).

The CRIS terminates the supply of outside air to the Control Room and initiates actuation of the emergency filtration system to minimize operator radiation exposure. The CRIS includes two independent, redundant subsystems, including actuation trains. Each train employs two sensors. One sensor detects Gaseous activity. The other detects Particulate and Iodine activity. If the bistable monitoring either sensor indicates an unsafe condition, that train will be actuated (one out of two logic). The two trains actuate separate equipment. Actuating either train will perform the intended function. Control Room Isolation also occurs on a SIAS.

APPLICABLE SAFETY ANALYSES

The CRIS, in conjunction with the control room emergency ventilation and air conditioning system, maintains the control room atmosphere within conditions suitable for prolonged occupancy throughout the duration of any one of the accidents discussed in the Updated FSAR chapter 15 (Ref. 5). The radiation exposure of Control Room personnel, through the duration of any one of the postulated accidents discussed in Chapter 15, does not exceed the limits set by 10 CFR 50, Appendix A (Ref. 6), General Design Criteria 19.

(continued)

BASES

LCO

The LCO on each ESFAS function ensures each of the following requirements is met:

1. The function is initiated when necessary.

2. The required coincidence logic is maintained.

3. Sufficient redundancy is maintained to permit a channel to be out of service for testing or maintenance.

The Allowable Values specified, in conjunction with the LCO on equipment operability ensure that the functions will perform as required when called upon.

Only the Allowable Values are specified for each Trip Function in the LCO. Operation with a trip setpoint less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable provided that the difference between the nominal trip setpoint and the Allowable Value is equal to or less than the drift allowance assumed for each trip in the transient and accident analyses. Each Allowable Value specified is more conservative than the Analytical Limit assumed in the Transient and Accident Analysis in order to account for instrument uncertainties appropriate to the trip function. These uncertainties are defined in the Plant Specific Setpoint Methodology.

The LCO on CRIS requires that one of the two channels be OPERABLE. If both trains become inoperable, the Control Room Ventilation System must be placed in the emergency MODE of operation, eliminating the need for the function. This can be readily accomplished manually. The CRIS ensures Control Room habitability in all MODES.

APPLICABILITY

The CRIS ensures control room habitability in all MODES.

ACTIONS

In the event a channel's trip setpoint is found non-conservative with respect to the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected functions provided by that channel must be declared inoperable and the unit must enter the Condition statement for the particular protection function affected. If the number of inoperable channels for a particular protection function is less than the number of inoperable channels addressed by the Condition

(continued)

BASES

ACTIONS (continued)

statements, then the plant no longer meets the assumptions of the safety analyses. The plant must be placed in a MODE or other condition where the function is no longer required to be OPERABLE.

If a channel of a given process variable becomes inoperable, the goal shall be to return the inoperable channel to service as soon as practical, but no later than prior to return to MODE 2 following entry into MODE 5. This approach to bypass/trip in four channel protection systems is consistent with the applicable criteria of IEEE Standard 279.

Condition A

Condition A applies to one or more CRIS trains being inoperable. Performing the required action eliminates the need for the CRIS function. The one hour completion time is adequate to perform this function, while minimizing risk to Control Room personnel, considering the low probability of accidents requiring CRIS, and the diverse means of initiating this function on a CIAS and SIAS.

LCOs 3.0.3 is not applicable because the CRIS is applicable in all MODES, and the actions perform its required function without impacting plant operation.

SURVEILLANCE REQUIREMENTS

SR 3.3.10.1

Surveillance Requirement 3.3.10.1 is the performance of a CHANNEL CHECK on each control room radiation monitor channel. A CHANNEL CHECK is the comparison of the indicated parameter values for each of the functions. It is based on the assumption that the redundant channels indicated in the control room area should be reading approximately the same. Agreement is determined by the plant staff based on a combination of the channel instrument uncertainties, including isolation, indication, and readability. If a channel is outside the match criteria, it may be an indication that the transmitter or the signal processing equipment have drifted outside their limit. If the channels are within the match criteria, it is an indication that the channels are OPERABLE. The surveillance interval, about once every shift, is based on the engineering judgment that the probability of more than one channel randomly failing within the same 12 hour interval is extremely low. Thus, SR 3.3.10.1 ensures that an undetected loss of function is extremely unlikely, and that loss of redundancy will be identified in no less than 12 hours.

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.10.2

A CHANNEL FUNCTIONAL TEST is performed every 31 days to ensure the entire channel will perform its intended function when needed. It is not necessary to perform this test more often because operating experience has shown that the instrumentation stays quite reliable within that time frame. This surveillance can be performed on the individual sensor channels without actuating the train by using test bypass switches.

SR 3.3.10.3

Proper operation of the individual subgroup relays is verified by deenergizing these relays during the CHANNEL FUNCTIONAL TEST on each CRIS manual and actuation logic every 18 months. This will actuate the function, operating all associated equipment. Proper operation of the equipment actuated by each train is thus verified. The surveillance interval is based on engineering judgment that the actuation logic will remain reliable in this timeframe.

SR 3.3.10.4

A CHANNEL CALIBRATION on each control room radiation monitor channel is performed every 18 months, or approximately every refueling. The 18 month assumption, plus a 25% allowance for late surveillance, is made in the determination of the magnitude of equipment drift in the setpoint analysis. This test is a complete check of the channel from detector through to the actuated equipment. The CHANNEL CALIBRATION shall find that measurement errors and bistable setpoint errors are within the assumptions of the plant-specific setpoint analysis. Completion of this test results in the channel being properly adjusted and expected to remain within the as found tolerance assumed by the setpoint analysis until the next scheduled surveillance.

SR 3.3.10.5

This Surveillance Requirement ensures that the Engineered Safety Features response times are verified to be less than or equal to the values given in [document], which are the maximum values assumed in the Safety Analysis. Response Times are conducted on an 18 month STAGGERED TEST BASIS.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.10.5 (continued)

This results in the interval between successive tests of a given channel of n times 18 months, where n is the number of channels in the function. The 18 month intervals are based on engineering judgment and plant operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences. Response Times cannot be determined at power, since equipment operation is required. The test may be performed in one measurement or in overlapping segments, with verification that all components are tested.

REFERENCES

1. NRC Interim Policy Statement, 52 FR 3788, "Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987."

2. Updated FSAR Chapter 6.2, "Containment Systems."

3. Updated FSAR Chapter 7.3, "Engineered Safety Features Systems."

4. Updated FSAR Chapter 9.0, "Auxiliary Systems."

5. Updated FSAR Chapter 15, "Accident Analysis."

## B 3.3 INSTRUMENTATION

## B 3.3.11 Fuel Handling Isolation Signal (FHIS)

BASES

| | |
|---|---|
| BACKGROUND | This LCO encompasses FHIS actuation which is a plant-specific instrumentation channel that performs an actuation function required for plant protection, but is not otherwise included in the Engineered Safety Features Actuation System (ESFAS) LCO (3.3.5) or Loss of Voltage Emergency Diesel Generator Start LCO (3.3.6). This is a non-Nuclear Steam Supply System (non-NSSS) ESFAS function which, because of differences in purpose, design, and operating requirements, is not included in LCOs 3.3.5 and 3.3.6. Details of this LCO are for illustration only. Individual plants shall include those functions and LCO requirements which are in the current Technical Specifications, unless they are relocated in accordance with the NRC Interim Policy Statement (Ref. 1).<br><br>The FHIS provides protection from radioactive contamination in the spent fuel pool area, in the event that a spent fuel element should be severely damaged during handling.<br><br>The FHIS will detect radioactivity from fission products in the fuel, and will initiate appropriate actions so the release to the environment is limited. Updated FSAR section 9.4 (Ref.4) provides more detail.<br><br>The FHIS includes two independent, redundant subsystems, including actuation trains. Each train employs two sensors. One sensor detects Gaseous activity. The other detects Particulate and Iodine activity. If the bistable monitoring either sensor indicates an unsafe condition, that train will be actuated (one out of two logic). The two trains actuate separate equipment. Actuating either train will perform the |
| APPLICABLE SAFETY ANALYSES | The FHIS is required to isolate the normal Fuel Handling Building Ventilation System and automatically initiate the recirculation and filtration systems in the event of the Fuel Handling Accident in the Fuel Handling Building, as described in Updated FSAR Section 15.7. The FHIS helps assure acceptable consequences for the dropping of a spent fuel bundle breaching up to 60 fuel pins. |

(continued)

BASES

LCO

The FHIS LCO function ensures each of the following requirements is met:

1. The function is initiated when necessary.

2. The required coincidence logic is maintained.

3. Sufficient redundancy is maintained to permit a channel to be out of service for testing or maintenance.

The Allowable Values specified, in conjunction with the LCO on equipment operability ensure that the functions will perform as required when called upon.

Only the Allowable Values are specified for each Trip Function in the LCO. Operation with a trip setpoint less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable provided that the difference between the nominal trip setpoint and the Allowable Value is equal to or less than the drift allowance assumed for each trip in the transient and accident analyses. Each Allowable Value specified is more conservative than the Analytical Limit assumed in the Transient and Accident Analysis in order to account for instrument uncertainties appropriate to the trip function. These uncertainties are defined in the Plant Specific Setpoint Methodology.

The LCO on FHIS assures one of the two channels is available if required. If the channel fails, the actions of LCO 3.9.15 must be followed. LCO 3.9.15 addresses the Fuel Handling Building Post Accident Cleanup System.

APPLICABILITY

The FHIS must be OPERABLE when there is irradiated fuel in the Storage Pool, since the FHIS isolates the fuel handling area in the event of a fuel handling accident in any MODE or other condition.

ACTIONS

In the event a channel's trip setpoint is found non-conservative with respect to the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected functions

(continued)

BASES

ACTIONS (continued)

provided by that channel must be declared inoperable and the unit must enter the Condition statement for the particular protection function affected. If the number of inoperable channels for a particular protection function is less than the number of inoperable channels addressed by the Condition statements, then the plant no longer meets the assumptions of the safety analyses. The plant must be placed in a MODE or other condition where the function is no longer required to be OPERABLE.

If a channel of a given process variable becomes inoperable. the goal shall be to return the inoperable channel to service as soon as practical, but no later than prior to return to MODE 2 following entry into MODE 5. This approach to bypass/trip in four channel protection systems is consistent with the applicable criteria of IEEE Standard 279.

Condition A

Condition A applies to inoperability of one FHIS train. The operator is directed to enter the actions of LCO 3.7.15 (Fuel Building Cleanup). The required action performs the safety related function of the FHIS.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.11.1

Surveillance Requirement 3.3.11.1 is the performance of a CHANNEL CHECK on each fuel building radiation monitor channel. A CHANNEL CHECK is the comparison of the indicated parameter values for each of the functions. It is based on the assumption that the redundant channels indicated in the control room area should be reading approximately the same. Agreement is determined by the plant staff based on a combination of the channel instrument uncertainties, including isolation, indication, and readability. If a channel is outside the match criteria, it may be an indication that the transmitter or the signal processing equipment have drifted outside their limit. If the channels are within the match criteria, it is an indication that the channels are OPERABLE. The surveillance interval, about once every shift, is based on the engineering judgment that the probability of more than one channel randomly failing within

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.11.1 (continued)

the same 12 hour interval is extremely low. Thus, SR 3.3.11.1 ensures that an undetected loss of function is extremely unlikely, and that loss of redundancy will be identified in no less than 12 hours.

SR 3.3.11.2

A CHANNEL FUNCTIONAL TEST on each fuel building radiation monitor channel is performed every 31 days to ensure the entire channel will perform its intended function when needed. It is not necessary to perform this test more often because operating experience has shown that the instrumentation stays quite reliable within that time frame. This surveillance can be performed on the individual sensor channels without actuating the train by using test bypass switches.

SR 3.3.11.3

Proper operation of the individual subgroup relays is verified by deenergizing these relays during the CHANNEL FUNCTIONAL TEST of the FHIS manual and the actuation logic every 18 months. This will actuate the function, operating all associated equipment. Proper operation of the equipment actuated by each train is thus verified. The surveillance interval is based on engineering judgment that the actuation logic will remain reliable in this timeframe.

SR 3.3.11.4

A CHANNEL CALIBRATION on each control room radiation monitor channel is performed every 18 months, or approximately every refueling. The 18 month assumption, plus a 25% allowance for late surveillance, is made in the determination of the magnitude of equipment drift in the setpoint analysis. This test is a complete check of the channel from detector through to the actuated equipment. The CHANNEL CALIBRATION shall find that measurement errors and bistable setpoint errors are within the assumptions of the plant-specific setpoint analysis. Completion of this test results in the channel being properly adjusted and expected to remain within the as found tolerance assumed by the setpoint analysis until the next scheduled surveillance.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.11.5

This Surveillance Requirement ensures that the Engineered Safety Features response times are verified to be less than or equal to the values given in [document], which are the maximum values assumed in the Safety Analysis. Response Times are conducted on an 18 month STAGGERED TEST BASIS.

This results in the interval between successive tests of a given channel of n times 18 months, where n is the number of channels in the function. The 18 month intervals are based on engineering judgment and plant operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences. Response Times cannot be determined at power, since equipment operation is required. The test may be performed in one measurement or in overlapping segments, with verification that all components are tested.

REFERENCES

1. NRC Interim Policy Statement, 52 FR 3788, "Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987."

2. Updated FSAR Chapter 6.2, "Containment Systems."

3. Updated FSAR Chapter 7.3, "Engineered Safety Features Systems."

4. Updated FSAR Chapter 9.0, "Auxiliary Systems."

5. Updated FSAR Chapter 15, "Accident Analysis."

B 3.3 INSTRUMENTATION

LCO B 3.3.12 Post Accident Monitoring Instrumentation (PAMI)

BASES

BACKGROUND

Post Accident Monitoring Instrumentation (PAMI) includes those variables that provide primary information (information essential for the direct accomplishment of the specified safety functions) needed to permit the control room operating personnel to take the specified manually controlled actions for which not automatic control is provided and that are required for safety systems to accomplish their safety functions for design basis accident events. These variables are designated as type A, in accordance with Reference 1. Type A, Category 1 design and qualification requires seismic and environmental qualification, the application of single failure criterion, utilization of emergency standby power, immediately accessible display, continuous readout, and recording of display (Ref. 1).

The OPERABILITY of the accident monitoring instrumentation ensures that there is sufficient information available on selected plant parameters to monitor and assess plant status and behavior following an accident. This capacity is consistent with the recommendations of References 1 and 2.

APPLICABLE SAFETY ANALYSES

Design Basis Definition

The Post Accident Monitoring Instrumentation LCO ensures the operability of appropriate instrumentation so that the control room operating staff can:

- o Perform the diagnosis specified in the EOPs. These variables are restricted to pre-planned actions for design basis events, specifically, LOCA, Steam Line Break, Feedwater Line Break, and Steam Generator Tube Rupture (SGTR), and,
- o Take the specified, pre-planned, manually controlled actions, for which no automatic control is provided, that are required for safety systems to accomplish their safety function, and
- o Reach and maintain a safe shutdown condition.

(continued)

BASES

APPLICABLE SAFETY ANALYSES

No single failure within either the accident monitoring instrumentation, its auxiliary supporting features, or its power sources, concurrent wit the failures that are a condition of or result form, a specific design basis event, shall prevent the operator from being presented the required information. Where failure of one accident monitoring channel results in information ambiguity, e.g., the redundant displays disagree, additional information is provided to allow the operator to deduce the plant's actual condition. This is accomplished by providing additional independent channels of the same variable or by providing diverse channel(s) of another variable.

The accident monitoring instrumentation that satisfies the definition of Type A variables in Reference 1 meets the requirements of Criterion 3 of the NRC Interim Policy Statement (Ref. 3).

LCO

The Post Accident Monitoring Instrumentation LCO provides the requirements of Type A, and risk-significant Category 1 monitors which provide information required by the control room operators to perform specific manual actions for which no automatic control is provided and that are required for safety systems to accomplish their safety functions for design basis accident events. Table 3.3.12-1 is for illustration purposes only. It does not attempt to encompass every variable at every plant. The table contains the typical types of variables commonly required by many plants. Plant-specific lists will be developed when the specification is made plant-specific. Listed below is a discussion of selected instrumentation functions. These discussions are intended as examples of what should be provided for each function when the plant-specific list is prepared.

5. Pressurizer Level

Pressurizer water level is used to determine whether to terminate Safety Injection, if still in progress, or to re-initiate Safety Injection if it has been stopped.

6. Core Exit Temperature

Core exit temperatures are used to verify adequate core subcooling to maintain the plant in a safe shutdown conditions. A total of 56 are provided in the core, one in each incore detector assembly.

(continued)

BASES

LCO (continued)

7. Steam Generator Water Level

Steam Generator Water Level (Wide Range) is used to verify that the steam generators are an adequate heat sink for the reactor. Steam Generator Water Level is used to verify plant conditions for termination of Safety Injection during secondary plant high energy line breaks outside containment.

14. Containment Radiation Level

Containment Radiation Level is used to evaluate the impact of post-accident environmental releases. This is a category variable, but not Type A.

APPLICABILITY

Post Accident Monitoring Instrumentation LCO 3.3.12 is applicable in MODES 1, 2 and 3. These variables are related to the diagnosis and preplanned actions required to mitigate design basis events which are assumed to occur in MODES 1, 2 and 3. In MODES 4, 5 and 6, plant conditions are such that the likelihood of an event occurring which would require accident monitoring instrumentation is extremely low.

ACTIONS

A.1

When one required channel of Functions 1 through 13 is inoperable, each inoperable channel must be restored to OPERABLE status within 30 days. The 30-day Completion Time is based on operating experience within the required instrumentation, and the availability of redundant or diverse means to obtain the required information.

B.1

With two required channels of Functions 1 through 13 inoperable in one or more functions, at least one channel is each function must be restored to OPERABLE status within seven days. The Completion Time of seven days is based on the unlikelihood of a DBA and the availability of diverse means to obtain the required information.

(continued)

ACTIONS (continued)

C.1

For the majority of functions in Table 3.3.12-1, if the Required Actions and associated Completion Times of Condition A or B are not met, then the plant must be placed in a MODE in which the LCO requirements are not applicable. This is done by placing the plant in MODE 3 in six hours and MODE 4 in 12 hours. The allowed Completion Times are reasonable, based on operating experience and normal cooldown rates, to reach the required MODES from full power operation without challenging safety systems and operators.

D.1

When one required channel of Function 14 or 15 is inoperable, each inoperable channel must be restored to OPERABLE status within 30 days. The 30-day Completion Time is based on operating experience within the required instrumentation, and the availability of redundant or diverse means to obtain the required information.

E.1

With two required channels of Function 14 or 15 inoperable in one or more functions, at least one channel is each function must be restored to OPERABLE status within seven days. The Completion Time of seven days is based on the unlikelihood of a DBA and the availability of diverse means to obtain the required information.

F.1

For Containment Area Radiation Monitoring and Reactor Vessel Water Level, the Required Action is not to shut the plant down but rather to follow the directions of 5.9.2.c in the Administrative Controls sections of the Technical Specifications. This action is acceptable based on the risk significance and availability of alternate means of monitoring the function.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.12.1

Surveillance Requirement 3.3.12.1 is the performance of a CHANNEL CHECK on each accident monitoring instrumentation channel every 31 days. A CHANNEL CHECK is simply the comparison of the indicated parameter values for each channel of a particular function. It is based upon the assumption that the tow or three channels indicated in the control room should be reading approximately the same. Agreement is determined by the plant staff and should be based on a combination of the channel instrument uncertainties, including control isolation, indication, and readability. If a channel is outside of the match criteria, it may be an indication that the transmitter or the racks have drifted outside of their limit. If the channels are within the match criteria, it is a reasonable assumption that the channels are within specification. If the channels are normally off-scale during plant operations, then the CHANNEL CHECK will only verify that they are off-scale in the same direction. The surveillance frequency of 31 days is based on plant operating experience with regard to channel OPERABILITY and drift.

SR 3.3.12.2

Surveillance Requirements 3.3.12.2 is the performance of a CHANNEL CALIBRATION on each accident monitoring instrumentation channel every 18 months. Additionally, the test is performed while the plant is shutdown because it may not be feasible to test all the transmitters while the plant is at power. The CHANNEL CALIBRATION is a complete check of the process control instrument loop and the transmitter. The surveillance frequency of 18 months is based on plant operating experience.

This surveillance has been modified by a Note indicating that, for the containment radiation level instrumentation, a CHANNEL CALIBRATION may consist of an electronic calibration of the channel, not including the detector, for range decades above 10R/hr, and a one-point calibration check of the detector below 10R/hr with a gamma source.

REFERENCES

1. U.S. NRC Regulatory Guide, RG-1.97, Instrumentation for Light-Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident.

(continued)

BASES

REFERENCES (continued)

2. NRC Interim Policy Statement, 52 FR 3788, "Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987."

3. U.S. NRC NUREG 0737, Clarification of TMI Action Plan Requirements.

Additional References

4. 10 CFR 50, Appendix A, General Design Criteria for Nuclear Power Plants.

5 GDC 22, Protection System Independence.

6. GDC 24, Separation of Protection and Control Systems.

B 3.3 INSTRUMENTATION

LCO B 3.3.13 <u>Remote Shutdown System</u>

BASES

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BACKGROUND

The Remote Shutdown System provides the control room operator with sufficient instrumentation and controls to place and maintain the unit in a safe shutdown condition from a location other than the control room. A safe shutdown condition is defined as MODE 3. An examination of American Nuclear Society (ANS) Condition II, III and IV events revealed that none require a cooldown to MODE 5 for safety-related reasons (Ref. 1). The cooldown may be required to perform long term recovery. However, there is no safety reason to perform this [illegible]down in a limited amount of time. With the unit in MODE 3, [illegible] Auxiliary Feedwater System (AFS) and the steam generator s[illegible] valves or the steam generator atmospheric dump valves can [illegible] used to remove core decay heat and meet all safety requirements. The long term supply of water for the AFS and the ability to borate the Reactor coolant System (RCS) from outside the control Room allows extended operation in MODE 3. Additionally, nothing precludes the eventual achievement of MODE 5, even assuming a Safe Shutdown Earthquake (SSE), a loss of offsite power, or the most limiting active failure required to cool down or on the permissible operator actions outside the control room.

In the event that the control room becomes inaccessible, the operators can establish control at the Remote Shutdown Panel (RSDP), and place and maintain the unit in MODE 3. Not all controls and the necessary transfer switches are located at the RSDPs. Some controls and transfer switches will have to be operated locally at the switchgear, motor control panels, or other local stations. The unit automatically reaches MODE 3 following a plant shutdown and can be maintained safely in MODE 3 for an extended period of time.

The OPERABILITY of the remote shutdown control and instrumentation functions ensure there is sufficient information available on selected plant parameters to place and maintain the unit in MODE 3 should the control room become inaccessible for any reason.

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APPLICABLE SAFETY ANALYSES

The Remote Shutdown System LCO ensures the OPERABILITY of sufficient instrumentation and controls to place and maintain the plant in MODE 3 for an extended period of time from a location other than the Control Room in the event that the Control Room becomes inaccessible. The Remote Shutdown

(continued)

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BASES

APPLICABLE SAFETY ANALYSES (continued)

Instrumentation LCO does not satisfy any of the Selection Criteria of the NRC Interim Policy Statement (Ref. 2), but has been identified by the NRC as a risk significant item for retention in the Technical Specifications. The required instrumentation and control are consistent with GDC 19 of 10 CFR 50.

LCO

The Remote Shutdown System LCO provides the requirements for the OPERABILITY of the instrumentation and controls necessary to place and maintain the plant in MODE 3 from a location other than the Control Room. The instrumentation required is listed in Table B 3.3.13-1, and the table contains the types of variables required. The controls and transfer switches can be found in Reference 3. The controls and transfer switches are those required for:

- o Core reactivity control (initial and long term),
- o Reactor Coolant System pressure control,
- o Decay heat removal via the Auxiliary Feedwater System and the steam generator safety valves or steam generator atmospheric dump valves,
- o Decay heat removal via the Shutdown Cooling System,
- o Reactor Coolant System inventory control via charging flow, and
- o Safety support systems for the above functions, including salt water cooling, component cooling water, and onsite power, including the diesel generators.

APPLICABILITY

The Remote Shutdown System LCO is applicable in MODES 1, 2 and 3. This is required so that the unit can be placed and maintained in MODE 3 for an extended period of time from a location other than the control room. Therefore, this LCO is not applicable in MODES 4, 5 or 6.

ACTIONS

Condition A

Condition A addresses the situation where one or more required channel(s) of the Remote Shutdown System is inoperable. This includes any function listed in Table B 3.3.12-1 as well as the control and transfer switches.

(continued)

BASES

ACTIONS (continued)

The Required Actions is to restore the channel to OPERABLE status. The likelihood of an event which would require evacuation of the control room is sufficiently small to justify the 30-day Completion Time.

Condition B

If the inoperable function cannot be restored to OPERABLE status in 30 days, the prudent action is to place the plant in a MODE in which the LCO requirements are not applicable. This is done by placing the plant in at least MODE 3 in six hours and in MODE 4 in 12 hours. The allowed Completion Times are reasonable based on operating experience and normal cooldown rates to reach the required MODES from full power operation without challenging safety systems and operators.

SURVEILLANCE REQUIREMENTS

SR 3.3.13.1

Surveillance Requirement 3.3.13.1 is the performance of a CHANNEL CHECK on each remote shutdown instrumentation channel every 31 days. A CHANNEL CHECK is simply the comparison of the indicated parameter values for each channel of a particular function. It is based upon the assumption that the channels indicated in the control room should be reading approximately the same. Agreement is determined by the plant staff and should be based on a combination of the channel instrument uncertainties, including control isolation, indication, and readability. If a channel is outside of the match criteria, it may be an indication that the transmitter or the signal processing equipment have drifted outside of their limit. If the channels are within the match criteria, it is a reasonable assumption that the channels are within specification. If the channels are normally off-scale during plant operations, then the CHANNEL CHECK will only verify that they are off-scale in the same direction. The surveillance frequency of once per 31 days is based on the remote location, importance, and because the instruments are not used for routine monitoring of plant parameters.

SR 3.3.13.2

Surveillance Requirement 3.3.13.2 verifies that each required Remote Shutdown System transfer switch and control circuit performs its intended function. This verification is performed from the RSDP and locally, as appropriate. This

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

will ensure that if the control room becomes inaccessible, the unit can be placed and maintained in MODE 3 from the RSDP and the local control stations. The surveillance frequency of every 18 months is based on operating experience.

SR 3.3.13.3

Surveillance Requirement 3.3.13.3 is a the performance of a CHANNEL CALIBRATION for each remote shutdown system instrumentation channel. A CHANNEL CALIBRATION is performed every 18 months. The test is a complete check of the process control instrument loop and the transmitter. A completion of this test results in the channel being properly adjusted and expected to remain within the allowable tolerance until the next scheduled surveillance. The 18 month interval is consistent with the calibration interval for comparable instrumentation on the main control board.

SR 3.3.13.4

Surveillance Requirement 3.3.13.4 is the performance of a CHANNEL FUNCTIONAL TEST of the Reactor Trip Circuit Breaker open/closed indication every 18 months. This test should verify the OPERABILITY of the Reactor Trip Breakers (RTBs) open and closed indication on the Remote Shutdown Panel, by actuating the RTBs. The surveillance frequency of 18 months was chosen because the RTBs cannot be exercised while the plant is at power. Experience has shown that these components virtually always pass the SR when performed on an 18-month frequency. Therefore, the frequency was concluded to be acceptable from a reliability standpoint.

REFERENCES

1. FSAR, Section 7.4.

2. "C-E Owners' Group Restructured Standard Technical Specifications - Volume 1 (Criteria Application)."

3. FSAR, Section 7.

4. GDC 19 of 10 CFR 50.

Table B 3.3.13-1

Remote Shutdown System Instrumentation

| FUNCTION | LOCATION | REQUIRED NUMBER OF CHANNELS |
|---|---|---|

--------------------NOTE--------------------
This table is for illustration purposes only. It does not attempt to encompass every function used at every plant, but does contain the types of functions commonly found. Plant-specific lists will be used when the specification is made plant-specific.
--------------------------------------------

| FUNCTION | LOCATION | REQUIRED NUMBER OF CHANNELS |
|---|---|---|
| 1. Wide Range Excore Power Level | | 1 |
| 2. Source Range Power Level | | 1 |
| 3. Reactor Trip Breaker Position | | 1/trip breaker |
| 4. Reactor Coolant Hot Leg Temperature | | 1/loop |
| 5. Reactor Coolant Cold Leg Temperature | | 1/loop |
| 6. Pressurizer Pressure | | 1 |
| 7. Pressurizer Level | | 1 |
| 8. Steam Generator (SG) Pressure | | 1/SG |
| 9. Steam Generator Level (Wide Range) | | 1/SG |
| 10. Auxiliary Feedwater | | 1 |

# B 3.3 INSTRUMENTATION

## B 3.3.14 Logarithmic (Log) Power Monitoring Instruments

BASES

**BACKGROUND**

The Logarithmic Power Channels provide neutron flux power indication from below 1E-7% RTP to greater than 100% RTP. They also provide reactor protection when the Reactor Trip Circuit Breakers are shut, in the form of a Logarithmic Power Level - High trip.

This Specification addresses MODE 3, 4, and 5 with the RTCBs open. When the RTCBs are shut, the Logarithmic channels are addressed by LCO 3.3.2.

When the RTCBs are open, two of the four Wide Range power channels must be available to monitor neutron flux power. In this application, the RPS channels need not be OPERABLE, since the reactor trip function is not required. By monitoring neutron flux power when the RTCBs are open, loss of shutdown margin caused by boron dilution can be detected as an increase in flux. Alarms are also provided when power increases above the fixed bistable setpoints. For plants employing separate post accident Wide Range Nuclear Instrumentation channels with adequate range, these can be substituted for the Wide Range Channels. Two channels must be OPERABLE to provide single failure protection, and to facilitate detection of channel failure by providing channel check capability.

**APPLICABLE SAFETY ANALYSIS**

Accident Analyses do not rely on Logarithmic Power Level Monitoring for trip signal development or transient termination.

**LCO**

The LCO on the Logarithmic Power channels ensures that adequate information is available to verify core reactivity conditions while shutdown.

**APPLICABILITY**

In MODES 3, 4, and 5, with RTCBs open, Wide Range Power channels must be OPERABLE to monitor core power for reactivity changes.

In MODES 1, 2, and 3, 4, and 5 with the RTCBs shut and the CEAs capable of withdrawal, the Logarithmic Monitoring Channels are addressed as part of the RPS in LCO 3.3.1 and LCO 3.3.2.

(continued)

BASES

APPLICABILITY (continued)

The requirements for source range neutron flux monitoring in MODE 6 are addressed in LCO 3.8.2. The source range Nuclear Instrumentation channels provide neutron flux coverage extending an additional one to two decades below the Logarithmic Channels, for use during refueling, when neutron flux may be extremely low. They are built into the Wide Range Channels in the analog plants, and in many of the post accident channels used in both the digital and analog plants.

ACTIONS

Condition A

A.1

With one required neutron flux channel inoperable, it is impossible to perform a channel check to verify the other channel is OPERABLE. Therefore with either one or both channels inoperable the actions are the same. The absence of reliable neutron flux indication makes it difficult to ensure SHUTDOWN MARGIN is maintained. Required action A.1 therefore requires that all positive reactivity additions which are under operator control, such as boron dilution or RCS temperature changes, be halted immediately, preserving SHUTDOWN MARGIN.

A.2

SHUTDOWN MARGIN must be verified periodically to assure it is being maintained. Both required channels must be restored as soon as possible. The 12 hour frequency is adequate to perform this determination, considering that action A.1 eliminates many of the means by which SHUTDOWN MARGIN can be reduced. The nature of the analysis is also time consuming.

SURVEILLANCE REQUIREMENTS

SR 3.3.14.1

Surveillance Requirement 3.3.14.1 is the performance of a CHANNEL CHECK on each required log power channel every 12 hours. A CHANNEL CHECK is simply the comparison of the indicated parameter values for each channel of a particular function. It is based upon the assumption that the channels indicated in the control room should be reading approximately the same. Agreement is determined by the plant staff and should be based on a combination of the channel instrument uncertainties, including control isolation, indication, and readability. If a channel is outside of the match criteria, it may be an indication that the transmitter or the signal

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.14.1 (continued)

processing equipment have drifted outside of their limit. If the channels are within the match criteria, it is a reasonable assumption that the channels are within specification. The surveillance frequency of once every 12 hours, or about once every shift, is based on the engineering judgment that the probability of both required channels failing in the same 12 hour interval is extremely low. Thus this surveillance ensures that an undetected loss of function is extremely unlikely. Since there are only two required channels, failing a channel check between the two channels makes it difficult to determine if the remaining channel is operable.

SR 3.3.14.2

A CHANNEL FUNCTIONAL TEST on each log power channel is performed every 92 days to ensure the entire channel is capable of properly indicating neutron flux. Internal test circuitry is used to feed preadjusted test signals into the preamplifier to verify channel alignment. It is not necessary to test the detector, because generating a meaningful test signal is difficult, the detectors are of simple construction, and any failures in the detectors will be apparent as change in channel output. This test interval is the same as that employed for the same channels in the other applicable MODES.

SR 3.3.14.3

Surveillance Requirement 3.3.14.3 is a the performance of a CHANNEL CALIBRATION on each log power channel. A CHANNEL CALIBRATION is performed every 18 months. The test is a complete check and readjustment of the Logarithmic Power Channel from the preamplifier input through to the remote indicators. It is not necessary to test the detector, because generating a meaningful test signal is difficult, the detectors are of simple construction, and any failures in the detectors will be apparent as change in channel output. This test interval is the same as that employed for the same channels in the other applicable MODES.

REFERENCES

1. FSAR, Chapter 7, "Instrumentation and Controls," and Chapter 15, "Accident Analysis."

2. IEEE Standard 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations," April 5, 1972.