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# SSSES MANUAL

Manual Name: TSB1

Manual Title: TECHNICAL SPECIFICATION BASES UNIT 1 MANUAL

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## B 3.3 INSTRUMENTATION

### B 3.3.3.1 Post Accident Monitoring (PAM) Instrumentation

#### BASES

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**BACKGROUND** The primary purpose of the PAM instrumentation is to display plant variables that provide information required by the control room operators during accident situations. This information provides the necessary support for the operator to take the manual actions for which no automatic control is provided and that are required for safety systems to accomplish their safety functions for Design Basis Events. The instruments that monitor these variables are designated as Type A, Category I, and non-Type A, Category I, in accordance with Regulatory Guide 1.97 (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 capability is consistent with the recommendations of Reference 1.

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#### APPLICABLE SAFETY ANALYSES

The PAM instrumentation LCO ensures the OPERABILITY of Regulatory Guide 1.97, Type A variables so that the control room operating staff can:

- Perform the diagnosis specified in the Emergency Operating Procedures (EOPs). These variables are restricted to preplanned actions for the primary success path of Design Basis Accidents (DBAs), (e.g., loss of coolant accident (LOCA)), and
- Take the specified, preplanned, manually controlled actions for which no automatic control is provided, which are required for safety systems to accomplish their safety function.

The PAM instrumentation LCO also ensures OPERABILITY of Category I, non-Type A, variables so that the control room operating staff can:

- Determine whether systems important to safety are performing their intended functions;

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(continued)

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BASES

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APPLICABLE  
SAFETY  
ANALYSES  
(continued)

- Determine the potential for causing a gross breach of the barriers to radioactivity release;
- Determine whether a gross breach of a barrier has occurred; and
- Initiate action necessary to protect the public and for an estimate of the magnitude of any impending threat.

The plant specific Regulatory Guide 1.97 Analysis (Ref. 2 and 3) documents the process that identified Type A and Category I, non-Type A, variables.

Accident monitoring instrumentation that satisfies the definition of Type A in Regulatory Guide 1.97 meets Criterion 3 of the NRC Policy Statement. (Ref. 4) Category I, non-Type A, instrumentation is retained in Technical Specifications (TS) because they are intended to assist operators in minimizing the consequences of accidents. Therefore, these Category I variables are important for reducing public risk.

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LCO

LCO 3.3.3.1 requires two OPERABLE channels for all but one Function to ensure that no single failure prevents the operators from being presented with the information necessary to determine the status of the plant and to bring the plant to, and maintain it in, a safe condition following that accident.

Furthermore, provision of two channels allows a CHANNEL CHECK during the post accident phase to confirm the validity of displayed information.

The exception to the two channel requirement is primary containment isolation valve (PCIV) position. In this case, the important information is the status of the primary containment penetrations. The LCO requires one position indicator for each active PCIV. This is sufficient to redundantly verify the isolation status of each isolable penetration either via indicated status of the active valve and prior knowledge of passive valve or via system boundary

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(continued)

## BASES

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LCO  
(continued)

status. If a normally active PCIV is known to be closed and deactivated, position indication is not needed to determine status. Therefore, the position indication for valves in this state is not required to be OPERABLE.

The following list is a discussion of the specified instrument Functions listed in Table 3.3.3.1-1 in the accompanying LCO. Table B 3.3.3.1-1 provides a listing of the instruments that are used to meet the operability requirements for the specific functions.

### 1. Reactor Steam Dome Pressure

Reactor steam dome pressure is a Type A, Category 1, variable provided to support monitoring of Reactor Coolant System (RCS) integrity and to verify operation of the Emergency Core Cooling Systems (ECCS). Two independent pressure channels, consisting of three wide range control room indicators and one wide range control room recorder per channel with a range of 0 psig to 1500 psig, monitor pressure. The wide range recorders are the primary method of indication available for use by the operators during an accident, therefore, the PAM Specification deals specifically with this portion of the instrument channel.

### 2. Reactor Vessel Water Level

Reactor vessel water level is a Type A, Category 1, variable provided to support monitoring of core cooling and to verify operation of the ECCS. A combination of three different level instrument ranges, with two independent channels each, monitor Reactor Vessel Water Level. The extended range instrumentation measures from -150 inches to 180 inches and outputs to three control room level indicators per channel. The wide range instrumentation measures from -150 inches to 60 inches and outputs to one control room recorder and three control room indicators per channel. The fuel zone range instrumentation measures from -310 inches to -110 inches and outputs to a control room recorder (one channel) and a control room indicator (one channel). These three ranges of instruments combine to provide level indication from the bottom of the Core to above the main steam line. The wide range level recorders, the fuel zone level indicator and level recorder, and one inner ring extended range level indicator per channel are the primary method of indication available for use by the operator during an accident, therefore the PAM

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(continued)

## BASES

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### LCO

#### 2. Reactor Vessel Water Level (continued)

Specification deals specifically with this portion of the instrument channel.

#### 3. Suppression Chamber Water Level

Suppression chamber water level is a Type A, Category 1, variable provided to detect a breach in the reactor coolant pressure boundary (RCPB). This variable is also used to verify and provide long term surveillance of ECCS function. A combination of two different level instrument ranges, with two independent channels each, monitor Suppression chamber water level. The wide range instrumentation measures from the ECCS suction lines to approximately the top of the chamber and outputs to one control room recorder per channel. The wide range recorders are the primary method of indication available for use by the operator during an accident, therefore the PAM Specification deals specifically with this portion of the instrument channel.

#### 4. Primary Containment Pressure

Primary Containment pressure is a Type A, Category 1, variable provided to detect a breach of the RCPB and to verify ECCS functions that operate to maintain RCS integrity. A combination of two different pressure instrument ranges, with two independent channels each, monitor primary containment pressure. The LOCA range measures from -15 psig to 65 psig and outputs to one control room recorder per channel. The accident range measures from 0 psig to 250 psig and outputs to one control room recorder per channel (same recorders as the LOCA range). The recorders (both ranges) are the primary method of indication available for use by the operator during an accident, therefore the PAM Specification deals specifically with this portion of the instrument channel.

#### 5. Primary Containment High Radiation

Primary containment area radiation (high range) is provided to monitor the potential of significant radiation releases

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(continued)

BASES

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LCO

5. Primary Containment High Radiation (continued)

and to provide release assessment for use by operators in determining the need to invoke site emergency plans. Two independent channels, which output to one control room recorder per channel with a range of  $10^0$  to  $1 \times 10^8$  R/hr, monitor radiation. The PAM Specification deals specifically with this portion of the instrument channel.

6. Primary Containment Isolation Valve (PCIV) Position

PCIV position is provided for verification of containment integrity. In the case of PCIV position, the important information is the isolation status of the containment penetration. The LCO requires a channel of valve position indication in the control room to be OPERABLE for an active PCIV in a containment penetration flow path, i.e., two total channels of PCIV position indication for a penetration flow path with two active valves. For containment penetrations with only one active PCIV having control room indication, Note (b) requires a single channel of valve position indication to be OPERABLE. This is sufficient to redundantly verify the isolation status of each isolable penetration via indicated status of the active valve, as applicable, and prior knowledge of passive valve or system boundary status. If a penetration flow path is isolated, position indication for the PCIV(s) in the associated penetration flow path is not needed to determine status. Therefore, the position indication for valves in an isolated penetration flow path is not required to be OPERABLE. These valves which require position indication are specified in Table B 3.6.1.3-1. Furthermore, the loss of position indication does not necessarily result in the PCIV being inoperable.

The PCIV position PAM instrumentation consists of position switches unique to PCIVs, associated wiring and control room indicating lamps (not necessarily unique to a PCIV) for active PCIVs (check valves and manual valves are not required to have position indication). Therefore, the PAM Specification deals specifically with these instrument channels.

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(continued)

BASES

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LCO  
(continued)

7. Neutron Flux

Wide range neutron flux is a Category I variable provided to verify reactor shutdown. The Neutron Monitoring System Average Power Range Monitors (APRM) provides reliable neutron flux measurement from 0% to 125% of full power. The APRM consists of four channels each with their own chassis powered with redundant power supplies. The APRM sends signals to the analog isolator module which in turn sends individual APRM signals to the recorders used for post accident monitoring. The PAM function for neutron flux is satisfied by having any 2 channels of APRM provided for post accident monitoring. The PAM Specification deals specifically with this portion of the instrument channel.

The Neutron Monitoring System (NMS) was evaluated against the criteria established in General Electric NEDO-31558A to ensure its acceptability for post-accident monitoring. NEDO-31558A provides alternate criteria for the NMS to meet the post-accident monitoring guidance of Regulatory Guide 1.97. Based on the evaluation, the NMS was found to meet the criteria established in NEDO-31558A. The APRM sub-function of the NMS is used to provide the Neutron Flux monitoring identified in TS 3.3.3.1 (Ref. 5 and 6).

8. Not Used

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(continued)

BASES

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LCO  
(continued)

9. Drywell Atmosphere Temperature

Drywell atmosphere temperature is a Category 1 variable provided to verify RCS and containment integrity and to verify the effectiveness of ECCS actions taken to prevent containment breach. Two independent temperature channels, consisting of two control room recorders per channel with a range of 40 to 440 degrees F, monitor temperature. The PAM Specification deals specifically with the inner ring temperature recorder portion of the instrument channel.

10. Suppression Chamber Water Temperature

Suppression Chamber water temperature is a Type A, Category 1, variable provided to detect a condition that could potentially lead to containment breach and to verify the effectiveness of ECCS actions taken to prevent containment breach. The suppression chamber water temperature instrumentation allows operators to detect trends in suppression chamber water temperature in sufficient time to take action to prevent steam quenching vibrations in the suppression pool. Two channels are required to be OPERABLE. Each channel consists of eight sensors of which a minimum of four sensors (one sensor in each quadrant) must be OPERABLE to consider a channel OPERABLE. The outputs for the temperature sensors are displayed on two independent indicators in the control room and recorded on the monitoring units located on control room panel 1C601. The temperature indicators are the primary method of indication available for use by the operator during an accident, therefore the PAM Specification deals specifically with this portion of the instrument channel.

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APPLICABILITY

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

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(continued)

BASES (continued)

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ACTIONS

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

A.1

When one or more Functions have one required channel that is inoperable, the required inoperable channel must be restored to OPERABLE status within 30 days. The 30 day Completion Time is based on operating experience and takes into account the remaining OPERABLE channels, the passive nature of the instrument (no critical automatic action is assumed to occur from these instruments), and the low probability of an event requiring PAM instrumentation during this interval.

B.1

If a channel has not been restored to OPERABLE status in 30 days, this Required Action specifies initiation of action in accordance with Specification 5.6.7, which requires a written report to be submitted to the NRC. This report discusses the results of the root cause evaluation of the inoperability and identifies proposed restorative actions.

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(continued)

BASES

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ACTIONS

B.1 (continued)

This action is appropriate in lieu of a shutdown requirement because alternative actions are identified before the written report is submitted to the NRC, and given the likelihood of plant conditions that would require information provided by this instrumentation.

C.1

When one or more Functions have two required channels that are inoperable (i.e., two channels inoperable in the same Function), one channel in the Function should be restored to OPERABLE status within 7 days. The Completion Time of 7 days is based on the relatively low probability of an event requiring PAM instrument operation and the availability of alternate means to obtain the required information. Continuous operation with two required channels inoperable in a Function is not acceptable because the alternate indications may not fully meet all performance qualification requirements applied to the PAM instrumentation. Therefore, requiring restoration of one inoperable channel of the Function limits the risk that the PAM Function will be in a degraded condition should an accident occur.

D.1

This Required Action directs entry into the appropriate Condition referenced in Table 3.3.3.1-1. The applicable Condition referenced in the Table is Function dependent. Each time an inoperable channel has not met any Required Action of Condition C, as applicable, and the associated Completion Time has expired, Condition D is entered for that channel and provides for transfer to the appropriate subsequent Condition.

E.1

For the majority of Functions in Table 3.3.3.1-1, if any Required Action and associated Completion Time of Condition C are not met, the plant must be brought to a MODE in which the LCO not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions

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(continued)

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BASES

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ACTIONS

E.1 (continued)

from full power conditions in an orderly manner and without challenging plant systems.

F.1

Since alternate means of monitoring primary containment area radiation have been developed and tested, the Required Action is not to shut down the plant, but rather to follow the directions of Specification 5.6.7. These alternate means will be temporarily installed if the normal PAM channel cannot be restored to OPERABLE status within the allotted time. The report provided to the NRC should discuss the alternate means used, describe the degree to which the alternate means are equivalent to the installed PAM channels, justify the areas in which they are not equivalent, and provide a schedule for restoring the normal PAM channels.

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SURVEILLANCE  
REQUIREMENTS

The following SRs apply to each PAM instrumentation Function in Table 3.3.3.1-1.

SR 3.3.3.1.1

Performance of the CHANNEL CHECK once every 31 days ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel against a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between instrument channels could be an indication of excessive instrument drift in one of the channels or something even more serious. A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria which are determined by the plant staff based on an investigation of a combination of the channel instrument uncertainties, may be used to support this

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(continued)

## BASES

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### SURVEILLANCE REQUIREMENTS    SR 3.3.3.1.1 (continued)

parameter comparison and include indication and readability. If a channel is outside the criteria, it may be an indication that the instrument has drifted outside its limit and does necessarily indicate the channel is Inoperable.

The Frequency of 31 days is based upon plant operating experience, with regard to channel OPERABILITY and drift, which demonstrates that failure of more than one channel of a given Function in any 31 day interval is rare. The CHANNEL CHECK supplements less formal checks of channels during normal operational use of those displays associated with the required channels of this LCO.

### SR 3.3.3.1.2 and SR 3.3.3.1.3

A CHANNEL CALIBRATION is performed every 24 months except for the PCIV Position Function. The PCIV Position Function is adequately demonstrated by the Remote Position Indication performed in accordance with 5.5.6, "Inservice Testing Program". CHANNEL CALIBRATION verifies that the channel responds to measured parameter with the necessary range and accuracy, and does not include alarms.

The CHANNEL CALIBRATION for the Containment High Radiation instruments shall consist of an electronic calibration of the channel, not including the detector, for range decades above 10 R/hr and a one point calibration check of the detector below 10 R/hr with an installed or portable gamma source.

The Frequency is based on operating experience and for the 24 month Frequency consistency with the industry refueling cycles.

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(continued)

## BASES

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### REFERENCES

1. Regulatory Guide 1.97 Rev. 2, "Instrumentation for Light Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," February 6, 1985
  2. Nuclear Regulatory Commission Letter A. Schwencer to N. Curtis, Emergency Response Capability, Conformance to R.G. 1.97, Rev. 2, dated February 6, 1985.
  3. PP&L Letter (PLA-2222), N. Curtis to A. Schwencer, dated May 31, 1984.
  4. Final Policy Statement on Technical Specifications Improvements, July 22, 1993 (58 FR 32193)
  5. NEDO-31558A, BWROG Topical Report, Position on NRC Reg. Guide 1.97, Revision 3 Requirements for Post Accident Neutron Monitoring System (NMS).
  6. Nuclear Regulatory Commission Letter from C. Poslusny to R.G. Byram dated July 3, 1996.
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TABLE B 3.3.3.1-1

Post Accident Instruments  
(Page 1 of 3)

Instrument/Variable	Element	Transmitter	Recorder	Indicator
1. Reactor Steam Dome Pressure	N/A	PT-14201A	UR-14201A (red)*	PI-14202A PI-14202A1 PI-14204A
	N/A	PT-14201B	UR-14201B (red)*	PI-14202B (left side) PI-14202B1 (left side) PI-14204B (left side)
2. Reactor Vessel Water Level	N/A	LT-14201A (Wide Range)	UR-14201A (blue)*	LI-14201A (left side) LI-14201A1 (left side) LI-14203A (left side)
	N/A	LT-14201B (Wide Range)	UR-14201B (blue)*	LI-14201B (left side) LI-14201B1 (left side) LI-14203B (left side)
	N/A	LT-14203A (Extended Range)	N/A	LI-14201A (right side) <sup>*(1)</sup> LI-14201A1 (right side) LI-14203A (right side)
	N/A	LT-14203B (Extended Range)	N/A	LI-14201B (right side) <sup>*(1)</sup> LI-14201B1 (right side) LI-14203B (right side)
	N/A	LT-14202A (Fuel Zone Range)	UR-14201A (brown)*	N/A
	N/A	LT-14202B (Fuel Zone Range)	UR-14201B (brown)*	N/A
	N/A	LT-15776A (Wide Range)	UR-15776A (red)*	N/A
3. Suppression Chamber Water Level	N/A	LT-15776B (Wide Range)	UR-15776B (red)*	N/A
	N/A	LT-15775A (Narrow Range)	UR-15776A (blue)	LI-15775A
	N/A	LT-15775B (Narrow Range)	UR-15776B (blue)	LI-15775B
	N/A	LT-15776A (Wide Range)	UR-15776A (red)*	N/A

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TABLE B 3.3.3.1-1  
Post Accident Instruments  
(Page 2 of 3)

Instrument/Variable	Element	Transmitter	Recorder	Indicator
4. Primary Containment Pressure	N/A	PT-15709A (0 to 250 psig)	UR-15701A (Dark Blue)*	N/A
	N/A	PT-15709B (0 to 250 psig)	UR-15701B (Dark Blue)*	N/A
	N/A	PT-15710A (-15 to 65 psig)	UR-15701A (Red)*	N/A
	N/A	PT-15710B (-15 to 65 psig)	UR-15701B (Red)*	N/A
5. Primary Containment High Radiation	RE-15720A	RITS-15720A	UR-15776A (Green)*	N/A
	RE-15720B	RITS-15720B	UR-15776B (Green)*	N/A
6. PCIV Position	See Technical Specification Bases Table B 3.6.1.3-1 for PCIV that require position indication to be OPERABLE			
7. Neutron Flux	N/A	APRM-1	NR-C51-1R603A (red pen)*	N/A
	N/A	APRM-2	NR-C51-1R603B (red pen)*	N/A
	N/A	APRM-3	NR-C51-1R603C (red pen)*	N/A
	N/A	APRM-4	NR-C51-1R603D (red pen)*	N/A
8. Not Used				

TABLE B 3.3.3.1-1

Post Accident Instruments  
(Page 3 of 3)

Instrument/Variable	Element	Transmitter	Recorder	Indicator
9. Drywell Atmosphere Temperature	TE-15790A	TT-15790A	UR-15701A (Brown)* TR-15790A (point # 1)	N/A
	TE-15790B	TT-15790B	UR-15701B (Brown)* TR-15790B (point # 1)	N/A
10. Suppression Chamber Water Temperature	TE-15753 TE-15755 TE-15757 TE-15759 TE-15763 TE-15765 TE-15767 TE-15769	TX-15751	TIAH-15751*	TI-15751
	TE-15752 TE-15754 TE-15758 TE-15760 TE-15762 TE-15766 TE-15768 TE-15770	TX-15752	TIAH-15752*	TI-15752

\* Indicates that the instrument (and associated components in the instrument channel) is considered as instrument channel surveillance acceptance criteria.

- (1) In the case of the inner ring indicators for extended range level, it is recommended that LI-14201A and LI-14201B be used as acceptance criteria, however LI-14201A1, LI-14201B1, LI-14203A, or LI-14203B may be used in their place provided that surveillance requirements are satisfied. Only one set of these instruments needs to be OPERABLE.

## B 3.3 INSTRUMENTATION

### B 3.3.6.2 Secondary Containment Isolation Instrumentation

#### BASES

**BACKGROUND** The secondary containment isolation instrumentation automatically initiates closure of appropriate secondary containment isolation valves (SCIVs) and starts the Standby Gas Treatment (SGT) System. The function of these systems, in combination with other accident mitigation systems, is to limit fission product release during and following postulated Design Basis Accidents (DBAs) (Ref. 1). Secondary containment isolation and establishment of vacuum with the SGT System within the assumed time limits ensures that fission products that leak from primary containment following a DBA, or are released outside primary containment, or are released during certain operations when primary containment is not required to be OPERABLE are maintained within applicable limits.

The isolation instrumentation includes the sensors, relays, and switches that are necessary to cause initiation of secondary containment isolation. When the setpoint is reached, the channel sensor actuates, which then outputs a secondary containment isolation signal to the isolation logic. Functional diversity is provided by monitoring a wide range of independent parameters. The input parameters to the isolation logic are (1) reactor vessel water level, (2) drywell pressure, (3) refuel floor high exhaust duct radiation - high, (4) refuel floor wall exhaust duct radiation - high, and (5) railroad access shaft exhaust duct radiation - high. Only appropriate ventilation zones are isolated for different isolation signals. Isolation signals for drywell pressure and vessel water level will isolate the affected Unit's zone (Zone I for Unit 1 and Zone II for Unit 2) and Zone III. Redundant sensor input signals from each parameter are provided for initiation of isolation. In addition, manual initiation of the logic is provided.

The Functions are arranged as follows for each trip system. The Reactor Vessel Water Level - Low Low, Level 2 and Drywell Pressure - High are each arranged in a two-out-of-two logic. The Refuel Floor High Exhaust Duct Radiation - High, Refuel Floor Wall Exhaust Duct Radiation - High and the Railroad Access Shaft Exhaust Duct Radiation - High are arranged into one-out-of-one trip systems. One trip

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BASES

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BACKGROUND  
(continued)

system initiates isolation of one automatic isolation valve (damper) and starts one SGT subsystem (including its associated reactor building recirculation subsystem) while the other trip system initiates isolation of the other automatic isolation valve in the penetration and starts the other SGT subsystem (including its associated reactor building recirculation subsystem). Each logic closes one of the two valves on each penetration and starts one SGT subsystem, so that operation of either logic isolates the secondary containment and provides for the necessary filtration of fission products.

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APPLICABLE  
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ANALYSES,  
LCO, and  
APPLICABILITY

The isolation signals generated by the secondary containment isolation instrumentation are implicitly assumed in the safety analyses of References 1 and 2 to initiate closure of valves and start the SGT System to limit offsite and control room doses.

Refer to LCO 3.6.4.2, "Secondary Containment Isolation Valves (SCIVs)," and LCO 3.6.4.3, "Standby Gas Treatment (SGT) System," Applicable Safety Analyses Bases for more detail of the safety analyses.

The secondary containment isolation instrumentation satisfies Criterion 3 of the NRC Policy Statement. (Ref. 7) Certain instrumentation Functions are retained for other reasons and are described below in the individual Functions discussion.

The OPERABILITY of the secondary containment isolation instrumentation is dependent on the OPERABILITY of the individual instrumentation channel Functions. Each Function must have the required number of OPERABLE channels with their setpoints set within the specified Allowable Values, as shown in Table 3.3.6.2-1. The actual setpoint is calibrated consistent with applicable setpoint methodology assumptions. A channel is inoperable if its actual trip setpoint is not within its required Allowable Value. Each channel must also respond within its assumed response time, where appropriate.

Allowable Values are specified for each Function specified in the Table. Nominal trip setpoints are specified in the setpoint calculations. The nominal setpoints are selected to ensure that the setpoints do not exceed the Allowable Value between CHANNEL CALIBRATIONS. Operation with a trip setpoint less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable.

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## BASES

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APPLICABLE  
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APPLICABILITY  
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Trip setpoints are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter reaches the setpoint, the associated device changes state. The analytic limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the analytic limits, corrected for calibration, process, and some of the instrument errors. The trip setpoints are then determined accounting for the remaining instrument errors (e.g., drift). The trip SAFETY ANALYSES, setpoints derived in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

In general, the individual Functions are required to be OPERABLE in the MODES or other specified conditions when SCIVs and the SGT System are required.

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

### 1. Reactor Vessel Water Level—Low Low, Level 2

Low reactor pressure vessel (RPV) water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage could result. An isolation of the secondary containment and actuation of the SGT System are initiated in order to minimize the potential of an offsite dose release. The Reactor Vessel Water Level—Low Low, Level 2 Function is one of the Functions assumed to be OPERABLE and capable of providing isolation and initiation signals. The isolation and initiation systems on Reactor Vessel Water Level-Low Low, Level 2 support actions to ensure that any offsite releases are within the limits calculated in the safety analysis.

Reactor Vessel Water Level—Low Low, Level 2 signals are initiated from level instruments that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water

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BASES

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ANALYSES,  
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APPLICABILITY

1. Reactor Vessel Water Level-Low Low, Level 2 (continued)

level (variable leg) in the vessel. Four channels of Reactor Vessel Water Level-Low Low, Level 2 Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Reactor Vessel Water Level-Low Low, Level 2 Allowable Value was chosen to be the same as the High Pressure Coolant Injection/Reactor Core Isolation Cooling (HPCI/RCIC) Reactor Vessel Water Level-Low Low, Level 2 Allowable Value (LCO 3.3.5.1 and LCO 3.3.5.2), since this could indicate that the capability to cool the fuel is being threatened.

The Reactor Vessel Water Level-Low Low, Level 2 Function is required to be OPERABLE in MODES 1, 2, and 3 where considerable energy exists in the Reactor Coolant System (RCS); thus, there is a probability of pipe breaks resulting in significant releases of radioactive steam and gas. In MODES 4 and 5, the probability and consequences of these events are low due to the RCS pressure and temperature limitations of these MODES; thus, this Function is not required. In addition, the Function is also required to be OPERABLE during operations with a potential for draining the reactor vessel (OPDRVs) because the capability of isolating potential sources of leakage must be provided to ensure that offsite and control room dose limits are not exceeded if core damage occurs.

Reactor Vessel Water Level-Low Low, Level 2 will isolate the affected Unit's zone (i.e., Zone I for Unit 1 and Zone II for Unit 2) and Zone III.

2. Drywell Pressure-High

High drywell pressure can indicate a break in the reactor coolant pressure boundary (RCPB). An isolation of the secondary containment and actuation of the SGT System are initiated in order to minimize the potential of an offsite dose release. The isolation on high drywell pressure supports actions to ensure that any offsite releases are within the limits calculated in the safety analysis. However, the Drywell Pressure-High Function associated with

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BASES

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APPLICABILITY

2. Drywell Pressure - High (continued)

isolation is not assumed in any FSAR accident or transient analyses. It is retained for the overall redundancy and diversity of the secondary containment isolation instrumentation as required by the NRC approved licensing basis.

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

The Allowable Value was chosen to be the same as the ECCS Drywell Pressure-High Function Allowable Value (LCO 3.3.5.1) since this is indicative of a loss of coolant accident (LOCA).

The Drywell Pressure-High Function is required to be OPERABLE in MODES 1, 2, and 3 where considerable energy exists in the RCS; thus, there is a probability of pipe breaks resulting in significant releases of radioactive steam and gas. This Function is not required in MODES 4 and 5 because the probability and consequences of these events are low due to the RCS pressure and temperature limitations of these MODES.

Drywell Pressure-High will isolate the affected Unit's zone (i.e., Zone I for Unit 1 and Zone II for Unit 2) and Zone III.

3, 4, 5, 6, 7 Refuel Floor High Exhaust Duct, Refuel Floor Wall Exhaust Duct, and Railroad Access Shaft Exhaust Duct Radiation-High

High secondary containment exhaust radiation is an indication of possible gross failure of the fuel cladding due to a fuel handling accident. When Exhaust Radiation-High is detected, secondary containment isolation and actuation of the SGT System are initiated to limit the release of fission products as assumed in the FSAR safety analyses (Ref. 4).

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APPLICABILITY

3, 4, 5, 6, 7 Refuel Floor High Exhaust Duct, Refuel Floor Wall Exhaust  
Duct, and Railroad Access Shaft Exhaust Duct Radiation-High

(continued)

The Exhaust Radiation-High signals are initiated from radiation detectors that are located on the ventilation exhaust ductwork coming from the refueling floor zones and the Railroad Access Shaft. The signal from each detector is input to an individual monitor whose trip outputs are assigned to an isolation channel. Eight channels of Refuel Floor High Exhaust Duct and Wall Exhaust Duct Radiation-High Function (four from Unit 1 and four from Unit 2) and two channels of Railroad Access Shaft Exhaust Duct Radiation - High Function (both from Unit 1) are available to ensure that no single instrument failure can preclude the isolation function.

The Allowable Values are chosen to promptly detect gross failure of the fuel cladding.

The Refuel Floor Exhaust Radiation-High Functions are required to be OPERABLE during CORE ALTERATIONS, OPDRVs, and movement of irradiated fuel assemblies in the secondary containment, because the capability of detecting radiation releases due to fuel failures (due to a fuel handling accident) must be provided to ensure that offsite and control room dose limits are not exceeded.

The Railroad Access Shaft Exhaust Duct Radiation-High Function is only required to be OPERABLE during handling of irradiated fuel within the Railroad Access Shaft, and directly above the Railroad Access Shaft with the Railroad Access Shaft Equipment Hatch open. This provides the capability of detecting radiation releases due to fuel failures resulting from dropped fuel assemblies which ensures that offsite and control room dose limits are not exceeded.

Refuel Floor High and Wall Exhaust Duct and Railroad Access Shaft Exhaust Duct Radiation - High Functions will isolate Zone III of secondary containment.

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BASES

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APPLICABLE  
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8. Manual Initiation

A Manual Initiation can be performed for secondary containment isolation by initiating a Primary Containment Isolation. There is no specific FSAR safety analysis that takes credit for this Function. It is retained for the overall redundancy and diversity of the secondary containment isolation instrumentation as required by the NRC approved licensing basis.

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

Two channels of Manual Initiation Function are available and are required to be OPERABLE in MODES 1, 2, and 3, and during CORE ALTERATIONS, OPDRVs, and movement of irradiated fuel assemblies in the secondary containment. These are the MODES and other specified conditions in which the Secondary Containment Isolation automatic Functions are required to be OPERABLE.

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ACTIONS

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

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## BASES

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### ACTIONS (continued)

#### A.1

Because of the diversity of sensors available to provide isolation signals and the redundancy of the isolation design, an allowable out of service time of 12 hours for Function 2, and 24 hours for Functions other than Function 2, has been shown to be acceptable (Refs. 5 and 6) to permit restoration of any inoperable channel to OPERABLE status. This out of service time is only acceptable provided the associated Function is still maintaining isolation capability (refer to Required Action B.1 Bases). If the inoperable channel cannot be restored to OPERABLE status within the allowable out of service time, the channel must be placed in the tripped condition per Required Action A.1. Placing the inoperable channel in trip would conservatively compensate for the inoperability, restore capability to accommodate a single failure, and allow operation to continue.

Alternately, if it is not desired to place the channel in trip (e.g., as in the case where placing the inoperable channel in trip would result in an isolation), Condition C must be entered and its Required Actions taken.

#### B.1

Required Action B.1 is intended to ensure that appropriate actions are taken if multiple, inoperable, untripped channels within the same Function result in a complete loss of automatic isolation capability for the associated penetration flow path(s) or a complete loss of automatic initiation capability for the SGT System. A Function is considered to be maintaining secondary containment isolation capability when sufficient channels are OPERABLE or in trip, such that one trip system will generate a trip signal from the given Function on a valid signal. This ensures that one of the two SCIVs in the associated penetration flow path and one SGT subsystem (including its associated reactor building recirculation subsystem) can be initiated on an isolation signal from the given Function.

For the Functions with two logic trip systems (Functions 1, 2, 3, 4, 5, 6 and 7), this would require one trip system to have the required channel(s) OPERABLE or in trip. The Condition does not include the Manual Initiation Function (Function 8), since it is not assumed in any accident or transient analysis. Thus, a total loss of manual initiation capability for 24 hours (as allowed by Required Action A.1) is allowed.

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(continued)

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BASES

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ACTIONS

B.1 (continued)

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

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

If any Required Action and associated Completion Time of Condition A or B are not met, the ability to isolate the secondary containment and start the SGT System cannot be ensured. Therefore, further actions must be performed to ensure the ability to maintain the secondary containment function. Isolating the associated zone (closing the ventilation supply and exhaust automatic isolation dampers) and starting the associated SGT subsystem (including its associated reactor building recirculation subsystem) in emergency mode (Required Action C.1) performs the intended function of the instrumentation and allows operation to continue.

Alternately, declaring the associated SCIVs and SGT subsystem(s) (including its associated reactor building recirculation subsystem) inoperable (Required Actions C.2.1 and C.2.2) is also acceptable since the Required Actions of the respective LCOs (LCO 3.6.4.2 and LCO 3.6.4.3) provide appropriate actions for the inoperable components.

One hour is sufficient for plant operations personnel to establish required plant conditions or to declare the associated components inoperable without unnecessarily challenging plant systems.

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SURVEILLANCE  
REQUIREMENTS

As noted at the beginning of the SRs, the SRs for each Secondary Containment Isolation instrumentation Function are located in the SRs column of Table 3.3.6.2-1.

The Surveillances are modified by a Note to indicate that when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated Function maintains secondary containment isolation capability. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the

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(continued)

BASES

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SURVEILLANCE  
REQUIREMENTS  
(continued)

channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. This Note is based on the reliability analysis (Refs. 5 and 6) assumption of the average time required to perform channel surveillance. That analysis demonstrated the 6 hour testing allowance does not significantly reduce the probability that the SCIVs will isolate the associated penetration flow paths and that the SGT System will initiate when necessary.

SR 3.3.6.2.1

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

Agreement criteria which are determined by the plant staff based on an investigation of a combination of the channel instrument uncertainties, may be used to support this parameter comparison and include indication and readability. If a channel is outside the criteria, it may be an indication that the instrument has drifted outside its limit, and does not necessarily indicate the channel is Inoperable.

The Frequency is based on operating experience that demonstrates channel failure is rare. The CHANNEL CHECK supplements less formal checks of channel status during normal operational use of the displays associated with channels required by the LCO.

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(continued)

BASES

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SURVEILLANCE  
REQUIREMENTS  
(continued)

SR 3.3.6.2.2

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function.

This SR is modified by a Note that provides a general exception to the definition of CHANNEL FUNCTIONAL TEST. This exception is necessary because the design of instrumentation does not facilitate functional testing of all required contacts of the relay which input into the combinational logic. (Reference 8) Performance of such a test could result in a plant transient or place the plant in an undo risk situation. Therefore, for this SR, the CHANNEL FUNCTIONAL TEST verifies acceptable response by verifying the change of state of the relay which inputs into the combinational logic. The required contacts not tested during the CHANNEL FUNCTIONAL TEST are tested under the LOGIC SYSTEM FUNCTIONAL TEST, SR 3.3.6.2.5. This is acceptable because operating experience shows that the contacts not tested during the CHANNEL FUNCTIONAL TEST normally pass the LOGIC SYSTEM FUNCTIONAL TEST, and the testing methodology minimizes the risk of unplanned transients.

The Frequency of 92 days is based on the reliability analysis of References 5 and 6.

SR 3.3.6.2.3 and SR 3.3.6.2.4

A CHANNEL CALIBRATION verifies that the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

The Frequencies of SR 3.3.6.2.3 and SR 3.3.6.2.4 are based on the assumption of a 92 day and an 24 month calibration interval, respectively, in the determination of the magnitude of equipment drift in the setpoint analysis.

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BASES

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SURVEILLANCE  
REQUIREMENTS  
(continued)

SR 3.3.6.2.5

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required isolation logic for a specific channel. The system functional testing performed on SCIVs and the SGT System in LCO 3.6.4.2 and LCO 3.6.4.3, respectively, overlaps this Surveillance to provide complete testing of the assumed safety function.

The 24 month Frequency is based on the need to perform portions of this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power.

Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency.

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REFERENCES

1. FSAR, Section 6.3.
  2. FSAR, Chapter 15
  3. FSAR, Section 15.2.
  4. FSAR, Sections 15.7.
  5. NEDC-31677P-A, "Technical Specification Improvement Analysis for BWR Isolation Actuation Instrumentation," July 1990.
  6. NEDC-30851P-A Supplement 2, "Technical Specifications Improvement Analysis for BWR Isolation Instrumentation Common to RPS and ECCS Instrumentation," March 1989.
  7. Final Policy Statement on Technical Specifications Improvements, July 22, 1993. (58 FR 32193)
  8. NRC Inspection and Enforcement Manual, Part 9900: Technical Guidance, Standard Technical Specification Section 1.0 Definitions, Issue date 12/08/86.
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B 3.3 INSTRUMENTATION

B 3.3.7.1 Control Room Emergency Outside Air Supply (CREOAS) System  
Instrumentation

BASES

**BACKGROUND** The CREOAS System is designed to provide a radiologically controlled environment to ensure the habitability of the control room for the safety of control room operators under all plant conditions. Two independent CREOAS subsystems are each capable of fulfilling the stated safety function. The instrumentation and controls for the CREOAS System automatically initiate action to pressurize the main control room to minimize the consequences of radioactive material in the control room environment.

In the event of a loss of coolant accident (LOCA) signal (Reactor Vessel Water Level-Low Low, Level 2 or Drywell Pressure-High), Refuel Floor High Exhaust Duct Radiation-High, Refuel Floor Wall Exhaust Duct Radiation-High, Railroad Access Shaft Exhaust Duct Radiation-High or Main Control Room Outside Air Intake Radiation-High signal, the CREOAS System is automatically started in the pressurization/filtration mode.

The CREOAS System instrumentation has two trip systems. Each trip system receives input from each of the Functions listed above and initiates associated subsystem. The Functions are arranged for each trip system as follows: the Reactor Vessel Water Level-Low Low, Level 2 and Drywell Pressure-High are each arranged in a two-out-of-two logic. The Refuel Floor High Exhaust Duct Radiation - High, Refuel Floor Wall Exhaust Duct Radiation - High, the Main Control Room Outside Air Intake Radiation - High and the Railroad Access Shaft Exhaust Duct Radiation - High are arranged in a one-out-of-one logic. With the exception of the Main Control Room Outside Air Intake Radiation - High all the instruments also initiate a secondary containment isolation. When the setpoint is reached, the sensor actuates, which then outputs a CREOAS System initiation signal to the initiation logic.

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BASES (continued)

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APPLICABLE  
SAFETY  
ANALYSES,  
LCO, and  
APPLICABILITY

The ability of the CREOAS System to maintain the habitability of the main control room is explicitly assumed for certain accidents as discussed in the FSAR safety analyses (Refs. 1 and 2). CREOAS System operation ensures that the radiation exposure of control room personnel, through the duration of any one of the postulated accidents, does not exceed regulatory limits.

CREOAS System instrumentation satisfies Criterion 3 of the NRC Policy Statement. (Ref. 5)

The OPERABILITY of the CREOAS System instrumentation is dependent upon the OPERABILITY of the individual instrumentation channel Functions specified in Table 3.3.7.1-1. Each Function must have a required number of OPERABLE channels, with their setpoints within the specified Allowable Values, where appropriate. A channel is inoperable if its actual trip setpoint is not within its required Allowable Value. The actual setpoint is calibrated consistent with applicable setpoint methodology assumptions.

Allowable Values are specified for each CREOAS System Function specified in the Table. Nominal trip setpoints are specified in the setpoint calculations. The nominal setpoints are selected to ensure that the setpoints do not exceed the Allowable Value between successive CHANNEL CALIBRATIONS. Operation with a trip setpoint less conservative than the nominal trip setpoint, but within its Allowable Value, is acceptable. Trip setpoints are those predetermined values of output at which an action should take place. The setpoints are compared to the actual process parameter (e.g., reactor vessel water level), and when the measured output value of the process parameter reaches the setpoint, the associated device changes state. The analytic limits are derived from the limiting values of the process parameters obtained from the safety analysis. The Allowable Values are derived from the analytic limits, corrected for calibration, process, and some of the instrument errors. The trip setpoints are then determined accounting for the remaining instrument errors (e.g., drift). The trip setpoints derived in this manner provide adequate protection because instrumentation uncertainties, process effects, calibration tolerances, instrument drift, and severe environment errors (for channels that must

(continued)

## BASES

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APPLICABLE  
SAFETY  
ANALYSES,  
LCO, and  
APPLICABILITY  
(continued)

function in harsh environments as defined by 10 CFR 50.49) are accounted for.

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

### 1. Reactor Vessel Water Level-Low Low, Level 2

Low reactor pressure vessel (RPV) water level indicates that the capability of cooling the fuel may be threatened. A low reactor vessel water level could indicate a LOCA and will automatically initiate the CREOAS System, since this could be a precursor to a potential radiation release and subsequent radiation exposure to control room personnel.

Reactor Vessel Water Level-Low Low, Level 2 signals are initiated from four level instruments that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. Four channels of Reactor Vessel Water Level-Low Low, Level 2 Function are available (two channels per trip system) and are required to be OPERABLE to ensure that no single instrument failure can preclude a CREOAS System initiation. The Reactor Vessel Water Level-Low Low, Level 2 Allowable Value was chosen to be the same as the HPCI and RCIC Reactor Vessel Water Level—Low Low Low, Level 1 Allowable Value (LCO 3.3.5.1, "ECCS Instrumentation and LCO 3.3.5.2 "RCIC Instrumentation").

The Reactor Vessel Water Level-Low Low, Level 2 Function is required to be OPERABLE in MODES 1, 2, and 3, and during operations with a potential for draining the reactor vessel (OPDRVs) to ensure that the control room personnel are protected during a LOCA. In MODES 4 and 5 at times other than OPDRVs, the probability of a vessel draindown event resulting in a release of radioactive material into the environment is minimal. In addition, adequate protection is performed by the Control Room Air Inlet Radiation-High Function. Therefore, this Function is not required in other MODES and specified conditions.

(continued)

BASES

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APPLICABLE  
SAFETY  
ANALYSES,  
LCO, and  
APPLICABILITY  
(continued)

2. Drywell Pressure-High

High pressure in the drywell could indicate a break in the reactor coolant pressure boundary. A high drywell pressure signal could indicate a LOCA and will automatically initiate the CREOAS System, since this could be a precursor to a potential radiation release and subsequent radiation exposure to control room personnel.

Drywell Pressure-High signals are initiated from four pressure instruments that sense drywell pressure. Four channels of Drywell Pressure-High Function are available (two channels per trip system) and are required to be OPERABLE to ensure that no single instrument failure can preclude CREOAS System initiation. The Drywell Pressure-High Allowable Value was chosen to be the same as the ECCS Drywell Pressure-High Allowable Value (LCO 3.3.5.1).

The Drywell Pressure-High Function is required to be OPERABLE in MODES 1, 2, and 3 to ensure that control room personnel are protected in the event of a LOCA. In MODES 4 and 5, the Drywell Pressure-High Function is not required since there is insufficient energy in the reactor to pressurize the drywell to the Drywell Pressure-High setpoint.

3, 4, 5, 6, 7 Refuel Floor High Exhaust Duct, Refuel Floor Wall Exhaust Duct and Railroad Access Shaft Exhaust Duct Radiation-High

High secondary containment exhaust radiation is an indication of possible gross failure of the fuel cladding. The release may have originated from the refueling floor due to a fuel handling accident. When Exhaust Radiation-High is detected CREOAS is initiated to maintain the habitability of the main control room.

The Exhaust Radiation-High signals are initiated from radiation detectors that are located on the ventilation exhaust ducting coming from the refueling floor zone and the Railroad Access Shaft. The signal from each detector is input to an individual monitor whose trip outputs are assigned to an isolation channel. Eight total channels Refuel Floor High Exhaust Duct and Wall Exhaust

(continued)

## BASES

APPLICABLE  
SAFETY  
ANALYSES,  
LCO, and  
APPLICABILITY

3, 4, 5, 6, 7 Refuel Floor High Exhaust Duct, Refuel Floor Wall Exhaust  
Duct and Railroad Access Shaft Exhaust Duct Radiation-High  
(continued)

Duct Radiation—High Function (four from Unit 1 and four from Unit 2), and two channels of the Railroad Access Shaft Exhaust Radiation - High Function (both from Unit 1) are available and are required to be OPERABLE when the associated Refuel Floor Exhaust System is in operation to ensure that no single instrument failure can preclude the initiation function.

The Allowable Values are chosen to promptly detect gross failure of the fuel cladding. The Refuel Floor Exhaust Duct and Wall Exhaust Duct Radiation-High are required to be OPERABLE during CORE ALTERATIONS, OPDRVs, and movement of irradiated fuel assemblies in the secondary containment, because the capability of detecting radiation releases due to fuel failures (due to fuel uncover or dropped fuel assemblies) must be provided to ensure that offsite and control room dose limits are not exceeded.

The Railroad Access Shaft Exhaust Duct Radiation - High Function is only required to be OPERABLE during handling of irradiated fuel within the Railroad Access Shaft, and directly above the Railroad Access Shaft with the Railroad Access Shaft Equipment Hatch open, because the capability of detecting radiation releases due to fuel failures (dropped fuel assemblies) must be provided to ensure that offsite and control room dose limits are not exceeded.

8. Main Control Room Outside Air Intake Radiation-High

The main control room outside air intake radiation monitors measure radiation levels at the control structure outside air intake duct. A high radiation level may pose a threat to main control room personnel; thus, automatically initiating the CREOAS System. The Control Room Air Inlet Radiation-High Function consists of two independent monitors. Two channels of Control Room Air Inlet Radiation-High are available and are required to be OPERABLE to ensure that no single instrument failure can preclude CREOAS System initiation. The Allowable Value was selected to ensure protection of the control room personnel.

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BASES

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APPLICABLE  
SAFETY  
ANALYSES,  
LCO, and  
APPLICABILITY

8. Main Control Room Outside Air Intake Radiation-High (continued)

The Control Room Air Inlet Radiation-High Function is required to be OPERABLE in MODES 1, 2, and 3 and during CORE ALTERATIONS, OPDRVs, and movement of irradiated fuel assemblies in the secondary containment, to ensure that control room personnel are protected during a LOCA, fuel handling event, or vessel draindown event. During MODES 4 and 5, when these specified conditions are not in progress (e.g., CORE ALTERATIONS), the probability of a LOCA or fuel damage is low; thus, the Function is not required.

9. Manual Initiation

A Manual Initiation can be performed for CREOAS isolation by initiating a Primary Containment Isolation. There is no specific FSAR safety analysis that takes credit for this Function. It is retained for the overall redundancy and diversity of the secondary containment isolation instrumentation as required by the NRC approved licensing basis.

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

Two channels of Manual Initiation Function are available and are required to be OPERABLE in MODES 1, 2, and 3, and during CORE ALTERATIONS, OPDRVs, and movement of irradiated fuel assemblies in the secondary containment. These are the MODES and other specified conditions in which the Secondary Containment Isolation automatic Functions are required to be OPERABLE.

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ACTIONS

A Note has been provided to modify the ACTIONS related to CREOAS System instrumentation channels. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate

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(continued)

## BASES

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### ACTIONS (continued)

entry into the Condition. Section 1.3 also specifies that Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable CREOAS System instrumentation channels provide appropriate compensatory measures for separate inoperable channels. As such, a Note has been provided that allows separate Condition entry for each inoperable CREOAS System instrumentation channel.

#### A.1

Required Action A.1 directs entry into the appropriate Condition referenced in Table 3.3.7.1-1. The applicable Condition specified in the Table is Function dependent. Each time a channel is discovered inoperable, Condition A is entered for that channel and provides for transfer to the appropriate subsequent Condition.

#### B.1.1, B.1.2, B.2.1, and B.2.2

Because of the diversity of sensors available to provide initiation signals and the redundancy of the CREOAS System design, an allowable out of service time of 12 hours for Function 2 and 24 hours for all other Functions has been shown to be acceptable (Refs. 3 and 4) to permit restoration of any inoperable channel to OPERABLE status. However, this out of service time is only acceptable provided the associated Function is still maintaining CREOAS System initiation capability. A Function is considered to be maintaining CREOAS System initiation capability when sufficient channels are OPERABLE or in trip such that one trip system will generate an initiation signal from the given Function on a valid signal. For Functions 1 and 2, this would require one trip system to have two channels per logic string OPERABLE or in trip. For Functions 3, 4, 5, 6 and 7, this would require one trip system to have one channel OPERABLE.

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BASES

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ACTIONS

B.1.1, B.1.2, B.2.1, and B.2.2 (continued)

Required Action B.1.2 is provided to allow the associated CREOAS subsystem(s) to be placed in the pressurization/filtration mode of operation within 1 hour. This is acceptable because placing the associated CREOAS subsystem(s) in the pressurization/filtration mode performs the safety function of the affected instrumentation. The method used to place the CREOAS subsystem(s) in operation must provide for automatically re-initiating the subsystem(s) upon restoration of power following a loss of power to the CREOAS subsystem(s).

The 1 hour Completion Time (B.1.1, B.1.2) is acceptable because it minimizes risk while allowing time for restoring, tripping of channels or placing in operation.

If the inoperable channel cannot be restored to OPERABLE status within the allowable out of service time, the channel must be placed in the tripped condition per Required Action B.2.1. Placing the inoperable channel in trip would conservatively compensate for the inoperability, restore capability to accommodate a single failure, and allow operation to continue.

Required Action B.2.2 is provided to allow the associated CREOAS subsystem(s) to be placed in the pressurization/filtration mode of operation. This is acceptable because placing the associated CREOAS subsystem(s) in the pressurization/filtration mode performs the safety function of the affected instrumentation. The method used to place the CREOAS subsystem(s) in operation must provide for automatically re-initiating the subsystem(s) upon restoration of power following a loss of power to the CREOAS subsystem(s).

C.1.1, C.1.2 and C.2

Because of the diversity of sensors available to provide initiation signals and the redundancy of the CREOAS System design, an allowable out of service time of 6 hours is provided to permit restoration of any inoperable channel to OPERABLE status. However, this out of service time is only acceptable provided the associated Function is still maintaining CREOAS System initiation capability. A Function

(continued)

BASES

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ACTIONS

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

is considered to be maintaining CREOAS System initiation capability when sufficient channels are OPERABLE or in trip such that one trip system will generate an initiation signal from the given Function on a valid signal. For Function 8, this would require one trip system to have one channel OPERABLE or in trip. For loss of CREOAS System initiation capability, the 6 hour allowance of Required Action C.2 is not appropriate. If the Function is not maintaining CREOAS System initiation capability, the CREOAS System must be declared inoperable within 1 hour of discovery of the loss of CREOAS System initiation capability in both trip systems.

Required Action C.1.2 is provided to allow the associated CREOAS subsystem(s) to be placed in pressurization/filtration mode of operation within 1 hour. This is acceptable because placing the associated CREOAS subsystem(s) in the pressurization/filtration mode performs the safety function of the affected instrumentation. The method used to place the CREOAS subsystem(s) in operation must provide for automatically re-initiating the subsystem(s) upon restoration of power following a loss of power to the CREOAS subsystem(s).

The 1 hour Completion Time (C.1.1 and C.1.2) is acceptable because it minimizes risk while allowing time for restoring or tripping of channels.

If the inoperable channel cannot be restored to OPERABLE status within the allowable out of service time, the channel must be placed in the tripped condition per Required Action C.2. Placing the inoperable channel in trip performs the intended function of the channel (starts the lead CREOAS subsystems in the pressurization/filtration mode). Alternately, if it is not desired to place the channel in trip (e.g., as in the case where it is not desired to start the subsystem), Condition D must be entered and its Required Action taken. The 6 hour Completion Time is based on the consideration that this Function provides the primary signal to start the CREOAS System; thus, ensuring that the design basis of the CREOAS System is met.

(continued)

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BASES

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ACTIONS  
(continued)

D.1

With any Required Action and associated Completion Time not met, the associated CREOAS subsystem must be declared inoperable immediately per Required Action D.1 to ensure that control room personnel will be protected in the event of a Design Basis Accident.

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SURVEILLANCE  
REQUIREMENTS

As noted at the beginning of the SRs, the SRs for each CREOAS System instrumentation Function are located in the SRs column of Table 3.3.7.1-1.

The Surveillances are modified by a Note to indicate that when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours, provided the associated Function maintains CREOAS System initiation capability. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. This Note is based on the reliability analysis (Refs. 3 and 4) assumption of the average time required to perform channel surveillance. That analysis demonstrated that the 6 hour testing allowance does not significantly reduce the probability that the CREOAS System will initiate when necessary.

SR 3.3.7.1.1

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

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(continued)

BASES

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SURVEILLANCE  
REQUIREMENTS

SR 3.3.7.1.1 (continued)

Agreement criteria, which are determined by the plant staff based on an investigation of a combination of the channel instrument uncertainties, may be used to support this parameter comparison and include indication and readability. If a channel is outside the criteria, it may be an indication that the instrument has drifted outside its limit, and does not necessarily indicate the channel is Inoperable.

The Frequency is based upon operating experience that demonstrates channel failure is rare. The CHANNEL CHECK supplements less formal checks of channel status during normal operational use of the displays associated with channels required by the LCO.

SR 3.3.7.1.2

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function.

The Frequency of 92 days is based on the reliability analyses of References 3 and 4.

This SR is modified by two Notes. Note 1 provides a general exception to the definition of CHANNEL FUNCTIONAL TEST. This exception is necessary because the design of instrumentation does not facilitate functional testing of all required contacts of the relays which input into the combinational logic. (Reference 6) Performance of such a test could result in a plant transient or place the plant in an undo risk situation. Therefore, for this SR, the CHANNEL FUNCTIONAL TEST verifies acceptable response by verifying the change of state of the relay which inputs into the combinational logic. The required contacts not tested during the CHANNEL FUNCTIONAL TEST are tested under the LOGIC SYSTEM FUNCTIONAL TEST, SR 3.3.7.1.5. This is acceptable because operating experience shows that the contacts not tested during the CHANNEL FUNCTIONAL TEST normally pass the LOGIC SYSTEM FUNCTIONAL TEST, and the testing methodology minimizes the risk of unplanned transients.

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BASES

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SURVEILLANCE  
REQUIREMENTS  
(continued)

SR 3.3.7.1.2

Note 2 provides a second specific exception to the definition of CHANNEL FUNCTIONAL TEST. For Function 8, certain channel relays are not included in the performance of the CHANNEL FUNCTIONAL TEST. These exceptions are necessary because the circuit design does not facilitate functional testing of the entire channel through to the coil of the relay, which enters the combinational logic. (Reference 6) Specifically, testing of all required relays would require lifting of leads and inserting test equipment, which could lead to unplanned transients. Therefore, for these circuits, the CHANNEL FUNCTIONAL TEST verifies acceptable response by verifying the actuation of circuit devices up to the point where further testing would result in an unplanned transient. (References 7 and 8) The required relays not tested during the CHANNEL FUNCTIONAL TEST are tested under the LOGIC SYSTEM FUNCTIONAL TEST, SR 3.3.7.1.5. This is acceptable because operating experience shows that the devices not tested during the CHANNEL FUNCTIONAL TEST normally pass the LOGIC SYSTEM FUNCTIONAL TEST, and the testing methodology minimizes the risk of unplanned transients.

SR 3.3.7.1.3 and SR 3.3.7.1.4

A CHANNEL CALIBRATION verifies that the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

The Frequencies of SR 3.3.7.1.3 and SR 3.3.7.1.4 are based upon the assumption of a 92 day and a 24 month calibration interval respectively, in the determination of the magnitude of equipment drift in the setpoint analysis.

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## BASES

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### SURVEILLANCE REQUIREMENTS (continued)

#### SR 3.3.7.1.5

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required initiation logic for a specific channel. The system functional testing performed in LCO 3.7.3, "Control Room Emergency Outside Air Supply (CREOAS) System," overlaps this Surveillance to provide complete testing of the assumed safety function.

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

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### REFERENCES

1. FSAR, Section 6.4.1.
  2. FSAR, Table 15.2.
  3. GENE-770-06-1, "Bases for Changes to Surveillance Test Intervals and Allowed Out-of-Service Times for Selected Instrumentation Technical Specifications," February 1991.
  4. NEDC-31677P-A, "Technical Specification Improvement Analysis for BWR Isolation Actuation Instrumentation," July 1990.
  5. Final Policy Statement on Technical Specification Improvements, July 22, 1993 (58 FR 32193).
  6. NRC Inspection and Enforcement Manual, Part 9900: Technical Guidance, Standard Technical Specification Section 1.0 Definitions, Issue date 12/08/86.
  7. PPL Letter to NRC, PLA-2618, Response to NRC INSPECTION REPORTS 50-387/85-28 and 50-388/85-23, dated April 22, 1986.
  8. Susquehanna Steam Electric Station NRC REGION I COMBINED INSPECTION 50-387/90-20; 50-388/90-20, File R41-2, dated March 5, 1986.
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