

December 16, 2002

U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Document Control Desk

Subject: Oconee Nuclear Station
Docket Numbers 50-269, 270, and 287
Technical Specification Bases (TSB) Change

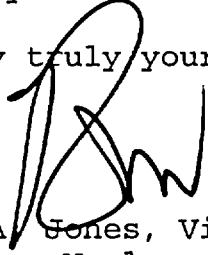
Please see attached revisions to Technical Specification Bases (TSB) 3.3.8, Post Accident Monitoring (PAM) Instrumentation, 3.5.3 Low Pressure Injection (LPI), and 3.6.5 Reactor Building Spray and Cooling Systems, which were implemented on December 11, 2002. These changes clarify and document the interdependency between the Reactor Building Spray (RBS) and LPI system with respect to pump runout. It also documents that if a RBS train or LPI train is physically secured to prevent post accident initiation, there is no dependence between the systems on the affected unit.

Additionally, please see attached revisions to Technical Specification (TSB) 3.7.9 Control Room Ventilation System (CRVS) and 3.7.16 Control Room Area Cooling Systems (CRACS). These changes reflect the capacity of each CRVS Booster Fan train in the Background section and revises "louvers" to "dampers" in SR 3.7.9.1. The Bases LCO for TS 3.7.16 CRACS is being revised to add clarifying information related to operability.

Attachment 1 contains the new TSB page and Attachment 2 contains the markup version of the Bases page.

If any additional information is needed, please contact Larry E. Nicholson, at (864-885-3292).

Very truly yours,


R. A. Jones, Vice President
Oconee Nuclear Site

A 001

U. S. Nuclear Regulatory Commission
December 16, 2002
Page 2

cc: Mr. L. N. Olshan
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Mr. L. A. Reyes, Regional Administrator
U. S. Nuclear Regulatory Commission - Region II
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, Georgia 30303

Mel Shannon
Senior Resident Inspector
Oconee Nuclear Station

Virgil R. Autry, Director
Division of Radioactive Waste Management
Bureau of Land and Waste Management
Department of Health & Environmental Control
2600 Bull Street
Columbia, SC 29201

U. S. Nuclear Regulatory Commission
December 16, 2002
Page 3

bcc: w/o attachments

B. H. Hamilton
W. W. Foster
L. F. Vaughn
C. J. Thomas - MNS
G. D. Gilbert - CNS

w/attachments

Document Management
ELL
NSRB
Licensing Working Group

Attachment 1

B 3.3 INSTRUMENTATION

B 3.3.8 Post Accident Monitoring (PAM) Instrumentation

BASES

BACKGROUND

The primary purpose of the PAM instrumentation is to display unit 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 OPERABILITY of the accident monitoring instrumentation ensures that there is sufficient information available on selected unit parameters to monitor and to assess unit status and behavior following an accident.

The availability of accident monitoring instrumentation is important so that responses to corrective actions can be observed, and so that the need for and magnitude of further actions can be determined. These essential instruments are identified by the ONS specific Regulatory Guide 1.97 analysis (Ref. 1), UFSAR, Section 7.5 (Ref. 2), and the NRC's Safety Evaluation Report for the ONS Regulatory Guide 1.97 analysis (Ref. 3) which address the recommendations of Regulatory Guide 1.97 (Ref. 4), as required by Supplement 1 to NUREG-0737 (Ref. 5).

The instrument channels required to be OPERABLE by this LCO equate to two classes of parameters identified during unit specific implementation of Regulatory Guide 1.97 as Type A and Category 1 variables.

Type A variables are specified because they provide the primary information that permits the control room operator to take specific manually controlled actions that are required when no automatic control is provided and that are required for safety systems to accomplish their safety functions for accidents.

Category 1 variables are the key variables deemed risk significant because they are needed to:

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

BASES

BACKGROUND (continued)

- Provide information to the operators that will enable them to determine the potential for causing a gross breach of the barriers to radioactivity release; and
- Provide information regarding the release of radioactive materials to allow for early indication of the need to initiate action necessary to protect the public and to estimate the magnitude of any impending threat.

These key variables are identified by the ONS specific Regulatory Guide 1.97 analysis (Ref. 1). This analysis identifies the unit specific Type A and Category 1 variables and provides justification for deviating from the NRC proposed list of Category 1 variables.

The specific instrument Functions listed in Table 3.3.8-1 are discussed in the LCO Bases Section.

APPLICABLE SAFETY ANALYSES

The PAM instrumentation ensures the availability of information so that the control room operating staff can:

- Perform the diagnosis specified in the emergency operating procedures. These variables are restricted to preplanned actions for the primary success path of accidents (e.g., loss of coolant accident (LOCA));
- Take the specified, preplanned, manually controlled actions, for which no automatic control is provided, which are required for safety systems to accomplish their safety functions;
- Determine whether systems important to safety are performing their intended functions;
- Determine the potential for causing a gross breach of the barriers to radioactivity release;
- Determine if a gross breach of a barrier has occurred; and
- Initiate action necessary to protect the public and estimate the magnitude of any impending threat.

BASES

APPLICABLE SAFETY ANALYSES (continued) The ONS specific Regulatory Guide 1.97 analysis (Ref. 1) documents the process that identifies Type A and Category 1 non-Type A variables.

PAM instrumentation that meets the definition of Type A in Regulatory Guide 1.97 satisfies Criterion 3 of 10 CFR 50.36 (Ref. 6). Category 1, non-type A, instrumentation must be retained in Technical Specifications because it is intended to assist operators in minimizing the consequences of accidents. Category 1, non-Type A variables are important for reducing public risk, and therefore, satisfy Criterion 4 of 10 CFR 50.36 (Ref. 6).

LCO LCO 3.3.8 requires two OPERABLE channels for all but one Function to ensure no single failure prevents the operators from being presented with the information necessary to determine the status of the unit and to bring the unit to, and maintain it in, a safe condition following that accident. Furthermore, provision of two channels allows a CHANNEL CHECK during the post accident phase to confirm the validity of displayed information.

Where a channel includes more than one control room indication, such as both an indicator and a recorder, the channel is OPERABLE when at least one indication is OPERABLE.

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

Each of the specified instrument Functions listed in Table 3.3.8-1 are discussed below:

BASES

LCO
(continued)

1. Wide Range Neutron Flux

Wide Range Neutron Flux indication is a Type B, Category 1 variable provided to verify reactor shutdown. The Wide Range Neutron Flux channels consist of two channels of fission chamber based instrumentation with readout on one recorder. (Note: four channels are available only two are required). The channels provide indication over a range of 1E-8% to 200% RTP.

2. Reactor Coolant System (RCS) Hot Leg Temperature

RCS Hot Leg Temperature instrumentation is a Type B, Category 1 variable provided for verification of core cooling and long term surveillance. The two channels provide readout on two indicators. Control room display is through the inadequate core cooling monitoring system. The channels provide indication over a range of 50EF to 700EF.

3, 5. Reactor Vessel Head Level and RCS Hot Leg Level

Reactor Vessel Water Level instrumentation is a Type B, Category 1 variable provided for verification and long term surveillance of core cooling. The reactor vessel level monitoring system provides an indication of the liquid level from the top of the Hot Leg on each steam generator to the bottom of the Hot Leg as it exits the vessel and from the top of the reactor vessel head to the bottom of the Hot Leg as it exits the vessel. Compensation is provided for impulse line temperature variations.

The Reactor Vessel Water Level channels consist of two Reactor Vessel Head Level channels that provide readout on two indicators (RC-LT0125 and RC-LT0126) with one channel recorded in the control room and two RCS Hot Leg Level channels that provide readout on two indicators (RC-LT0123 and RC-LT0124) with one channel recorded in the control room.

4. RCS Pressure (Wide Range)

RCS Pressure (Wide Range) instrumentation is a Type A, Category 1 variable provided for verification of core cooling and RCS integrity long term surveillance.

BASES

LCO

4. RCS Pressure (Wide Range) (continued)

Wide range RCS loop pressure is measured by pressure transmitters with a span of 0 psig to 3000 psig. The pressure transmitters are located outside the RB. Redundant monitoring capability is provided by two trains of instrumentation. Control room indications are provided through the inadequate core cooling plasma display. The inadequate core cooling plasma display is the primary indication used by the operator during an accident. Therefore, the accident monitoring specification deals specifically with this portion of the instrument string.

RCS Pressure is a Type A, Category 1 variable because the operator uses this indication to monitor the cooldown of the RCS following a steam generator (SG) tube rupture or small break LOCA. Operator actions to maintain a controlled cooldown, such as adjusting SG pressure or level, would use this indication. In addition, high pressure injection (HPI) flow is throttled based on RCS Pressure and subcooled margin. For some small break LOCAs, low pressure injection (LPI) may actuate with RCS pressure stabilizing above the shutoff head of the LPI pumps. If this condition exists, the operator is instructed to verify HPI flow and then terminate LPI flow prior to exceeding 30 minutes of LPI pump operation against a deadhead pressure. RCS Pressure, in conjunction with LPI flow, is also used to determine if a core flood line break has occurred.

6. Containment Sump Water Level (Wide Range)

Containment Sump Water Level (Wide Range) instrumentation is a Type B, Category 1 variable provided for verification and long term surveillance of RCS integrity. The Containment Sump Water Level instrumentation consists of two channels with readout on two indicators (LT-90 and LT-91) and one recorder. The indicated range is 0 to 15 feet.

BASES

LCO
(continued)

7. Containment Pressure (Wide Range)

Containment Pressure (Wide Range) instrumentation is a Type B, Category 1 variable provided for verification of RCS and containment OPERABILITY. Containment Pressure instrumentation consists of two channels with readout on two indicators (PT-230 and PT-231) and one channel recorded. The indicated range is -5.0 psig to 175 psig.

8. Containment Isolation Valve Position

Containment isolation valve (CIV) position is a Type B, Category 1 variable provided for verification of electrically controlled containment isolation valve position. In the case of CIV position, the important information is the isolation status of the containment penetration. The LCO requires one channel of valve position indication in the control room to be OPERABLE for each electrically controlled CIV in a containment penetration flow path, i.e., two total channels of CIV position indication for a penetration flow path with two electrically controlled valves. For containment penetrations with only one electrically controlled CIV 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 electrically controlled valve, as applicable, and prior knowledge of passive valve or system boundary status. As indicated by Note (a) to the Required Channels, if a penetration flow path is isolated by at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured, position indication for the CIV(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. Note (c) to the Required Channels indicates that position indication requirements apply only to CIVs that are electrically controlled. The CIV position PAM instrumentation consists of limit switches that operate both Closed-Not Closed and Open-Not Open control switch indication via indicating lights in the control room.

BASES

LCO
(continued)

9. Containment Area Radiation (High Range)

Containment Area Radiation (High Range) instrumentation is a Type C, Category 1 variable provided to monitor the potential for significant radiation releases and to provide release assessment for use by operators in determining the need to invoke site emergency plans. The Containment Area Radiation instrumentation consists of two channels (RIA 57 and 58) with readout on two indicators and one channel recorded. The indicated range is 1 to 10^7 R/hr.

10. Containment Hydrogen Concentration

Containment Hydrogen Concentration instrumentation is a Type A, Category 1 variable provided to detect high hydrogen concentration conditions that represent a potential for containment breach. This variable is also important in verifying the adequacy of mitigating actions. The Containment Hydrogen Concentration instrumentation consists of two channels (MT 80 and 81) with readout on two indicators and one channel recorded. The indicated range is 0 to 10% hydrogen concentration.

11. Pressurizer Level

Pressurizer Level instrumentation is a Type A, Category 1 variable used in combination with other system parameters to determine whether to terminate safety injection (SI), if still in progress, or to reinitiate SI if it has been stopped. Knowledge of pressurizer water level is also used to verify the unit conditions necessary to establish natural circulation in the RCS and to verify that the unit is maintained in a safe shutdown condition. The Pressurizer Level instrumentation consists of three channels (two for Train A and one for Train B) with two channels indicated and one channel recorded.

(Note: three channels are available only two are required). The indicated range is 0 to 400 inches (11% to 84% level as a percentage of volume).

BASES

LCO
(continued)

12. Steam Generator Water Level

Steam Generator Water Level instrumentation is a Type A, Category 1 variable provided to monitor operation of decay heat removal via the SG. The indication of SG level is the extended startup range level instrumentation, covering a span of 0 inches to 388 inches above the lower tubesheet.

The operator relies upon SG level information following an accident (e.g., main steam line break, steam generator tube rupture) to isolate the affected SG to confirm adequate heat sinks for transients and accidents.

The extended startup range Steam Generator Level instrumentation consists of four transmitters (two per SG) that feed four gauges.

13. Steam Generator Pressure

Steam Generator Pressure instrumentation is a Type A, Category 1 variable provided to support operator diagnosis of a main steam line break or SG tube rupture accident to identify and isolate the affected SG. In addition, SG pressure is a key parameter used by the operator to evaluate primary-to-secondary heat transfer.

Steam generator pressure measurement is provided by two pressure transmitters per SG. Each instrument channel inputs to the ICCM cabinet that provide safety inputs to two indicators located on the main control board in the control room. One channel per SG also provides input to a recorder located in the control room.

14. Borated Water Storage Tank (BWST) Level

BWST Level instrumentation is a Type A, Category 1 variable provided to support action for long term cooling requirements, i.e., to determine when to initiate the switch over of the core cooling pump suction from the BWST to sump recirculation. BWST level measurement is provided by three channels with readout on two indicators and one recorder. (Note: three channels are available only two are required). Two of the three channels provide inputs

BASES

LCO

14. Borated Water Storage Tank (BWST) Level (continued)

to the ICCM cabinet which provides inputs to qualified indicators on the Control Board. The third channel provides a safety input to a dedicated recorder. The channels provide level indication over a range of 0 to 50 feet (13% to 100% of volume).

15. Upper Surge Tank (UST) Level

Upper Surge Tank Level instrumentation is a Type A, Category 1 variable provided to ensure a water supply for EFW. EFW draws condensate grade suction from the USTs and the Condenser Hotwell.

Two Category 1 instrumentation channels are provided for monitoring UST level. These instrument channels are inputs to corresponding train A and B Inadequate Core Cooling Monitoring (ICCM) system cabinets. The ICCM Train A cabinet provides UST level input to a dedicated qualified recorder and to a qualified indicator, both located in the Control Room. The ICCM Train B cabinet also provides an input to a qualified indicator located in the Control Room. The range of UST level indication is 0 to 12 feet.

UST Level is the primary indication used by the operator to identify loss of UST volume. The operator can then decide to replenish the UST or align suction to the EFW pumps from the hotwell.

16. Core Exit Temperature

Core Exit Temperature is a Type A, Category 1 variable provided for verification and long term surveillance of core cooling.

The operator relies on this information following a LOCA to secure HPI and throttle LPI, following a SBLOCA to throttle HPI and begin forced HPI cooling if needed, and following a MSLB and SG Tube Rupture to throttle HPI and isolate the affected SG.

BASES

LCO

16. Core Exit Temperature (continued)

There are a total of 52 Core Exit Thermocouples (CETs) per Oconee Unit. Twenty-four (12 per train) meet seismic and environmental qualification requirements (Category 1). The unit computer is the primary display for 47 CETs. Five CETs are displayed on the corresponding SSF Unit console. The CETs are distributed to provide monitoring of four or more in each quadrant for each train. The ICCM plasma displays (1 per train) located in the Control Room serve as safety related backup displays for the twenty-four Category 1 CETs. The range of the readouts is 50°F to 2300°F.

The ICCM CET function uses inputs from twelve incore thermocouples per train to calculate and display temperatures of the reactor coolant as it exits the core and to provide indication of thermal conditions across the core at the core exit. Each of the twelve qualified thermocouples per train is displayed on a spatially oriented core map on the plasma display. Trending of CET temperature is available continuously on the plasma display. The average of the five hottest CETs is trendable for the past forty minutes.

An evaluation was made of the minimum number of valid core exit thermocouples (CETs) necessary for inadequate core cooling detection. The evaluation determined the reduced complement of CETs necessary to detect initial core recovery and to trend the ensuing core heatup. The evaluations account for core nonuniformities and cold leg injection. Based on these evaluations, adequate or inadequate core cooling detection is ensured with two sets of five valid CETs.

Table 3.3.8-1 Note (d) indicates that the subcooling margin monitor takes the average of the five highest

CETs for each of the ICCM trains. Two channels ensure that a single failure will not disable the ability to determine the representative core exit temperature.

BASES

LCO
(continued)

17. Subcooling Monitor

The Subcooling Monitor is a Type A, Category 1 variable provided for verification and long term surveillance of core cooling. This variable is a computer calculated value using various inputs from the Primary System.

Two channels of indication are provided. An operable Subcooling Monitor shall consist of: 1) One direct indication from one channel for RCS Loop Saturation margin and one direct indication from the other channel for Core Saturation margin, or 2) One direct indication from each of the two channels for RCS Loop Saturation margin. The indication readouts are located in the control room. This variable also inputs to the unit computer through isolation buffers and is available for trend recording upon operator demand. The range of the readouts is 200°F subcooled to 50°F superheat. The control room display is through the ICCM plasma display unit.

A backup method for determining subcooling margin ensures the capability to accurately monitor RCS subcooling margin (Refer to Specification 5.5.17).

18. HPI System Flow

HPI System Flow instrumentation is a Type A, Category 1 variable provided to support action for short term cooling requirements, to prevent HPI pump runout and inadequate NPSH, and to indicate the need for flow cross connect. HPI flow is throttled based on RCS pressure, subcooled margin, and pressurizer level. Flow measurement is provided by one channel per train with readout on an indicator and recorder. There are two HPI trains. The channels provide flow indication over a range of 0 to 750 gpm.

BASES

LCO
(continued)

19. LPI System Flow

LPI System Flow instrumentation is a Type A, Category 1 variable provided to support action for long term cooling requirements, to prevent LPI and Reactor Building Spray pump runout. The indication is also used to identify an LPI pump operating at system pressures above its shutoff head. Flow measurement is provided by one channel per train with readout on an indicator and recorder. There are two LPI trains. The LPI channels provide flow indication over a range of 0 to 6000 gpm.

20. Reactor Building Spray Flow

Reactor Building Spray Flow instrumentation is a Type A, Category 1 variable provided to support action for long term cooling requirements and iodine removal and to prevent Reactor Building Spray and LPI pump runout. Flow measurement is provided by one channel per train with readout on an indicator and recorder. There are two RBS trains. The channels provide flow indication over a range from 0 to 2000 gpm.

21. Emergency Feedwater Flow

EFW Flow instrumentation is a Type D, Category 1 variable provided to monitor operation of RCS heat removal via the SGs. Two channels provide indication of EFW Flow to each SG over a range of approximately 100 gpm to 1200 gpm. Redundant monitoring capability is provided by the two independent channels of instrumentation for each SG. Each flow transmitter provides an input to a control room indicator. One channel also provides input to a recorder.

EFW Flow is the primary indication used by the operator to verify that the EFW System is delivering the correct flow to each SG. However, the primary indication used by the operator to ensure an adequate inventory is SG level.

BASES

LCO
(continued)

22. Low Pressure Service Water (LPSW) flow to LPI Coolers

LPSW flow to LPI Coolers is a Type A, Category 1 variable which is provided to prevent LPSW pump runout and inadequate NPSH. LPSW flow to LPI Coolers is throttled to maintain proper flow balance in the LPSW System.

Flow measurement is provided by one channel per train with readout on an indicator and the plant computer via a qualified signal isolator. The channels provide flow indication over a range from 0-8000 gpm.

APPLICABILITY

The PAM instrumentation LCO is applicable in MODES 1, 2, and 3. These variables are related to the diagnosis and preplanned actions required to mitigate accidents and transients. The applicable accidents and transients are assumed to occur in MODES 1, 2, and 3. In MODES 4, 5, and 6, unit conditions are such that the likelihood of an event occurring that would require PAM instrumentation is low; therefore, the PAM instrumentation is not required to be OPERABLE in these MODES.

ACTIONS

The ACTIONS are modified by two Notes. Note 1 is added to the ACTIONS to exclude the MODE change restriction of LCO 3.0.4. This exception allows entry into an applicable MODE while relying on the ACTIONS even though the ACTIONS may eventually require a unit shutdown. This exception is acceptable due to the passive function of the instruments, the operator's ability to respond to an accident utilizing alternate instruments and methods, and the low probability of an event requiring these instruments.

Note 2 is added to the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed in Table 3.3.8-1. When the Required Channels for a function in Table 3.3.8-1 are specified on a "per" basis (e.g., per loop, per SG, per penetration flow path), then the Condition may be entered separately for each loop, SG, penetration flow path, etc., as appropriate. The Completion Time(s) of the inoperable channels of a Function are tracked separately for each Function starting from the time the Condition is entered for that Function.

BASES

ACTIONS (continued)

A.1

When one or more Functions have one required channel inoperable, the inoperable channel must be restored to OPERABLE status within 30 days. The 30 day Completion Time is based on operating experience. This takes into account the remaining OPERABLE channel, 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.

Condition A is modified by a Note indicating this Condition is not applicable to PAM Functions 14, 18, 19, 20, and 22.

B.1

Required Action B.1 specifies initiation of action described in Specification 5.6.6 that 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. This action is appropriate in lieu of a shutdown requirement since alternative actions are identified before loss of functional capability and given the likelihood of unit conditions that would require information provided by this instrumentation. The Completion Time of "Immediately" for Required Action B.1 ensures the requirements of Specification 5.6.6 are initiated.

C.1

When one or more Functions have two required channels inoperable (i.e., two channels inoperable in the same Function), one channel in the Function should be restored to OPERABLE status within 7 days. This Condition does not apply to the hydrogen monitor channels. The Completion Time of 7 days is based on the relatively low probability of an event requiring PAM instrumentation action operation and the availability of alternative 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 of 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.

BASES

ACTIONS

C.1 (continued)

Condition C is modified by a Note indicating this Condition is not applicable to PAM Functions 10, 14, 18, 19, 20, and 22.

D.1

When two required hydrogen monitor channels are inoperable, Required Action D.1 requires one channel to be restored to OPERABLE status. This action restores the monitoring capability of the hydrogen monitor. The 72 hour Completion Time is based on the relatively low probability of an event requiring hydrogen monitoring. Continuous operation with two required channels inoperable is not acceptable because alternate indications are not available.

Condition D is modified by a Note indicating this Condition is only applicable to PAM Function 10.

E.1

When one required BWST water level channel is inoperable, Required Action E.1 requires the channel to be restored to OPERABLE status. The 24 hour Completion Time is based on the relatively low probability of an event requiring BWST water and the availability of the remaining BWST water level channel. Continuous operation with one of the two required channels inoperable is not acceptable because alternate indications are not available. This indication is crucial in determining when the water source for ECCS should be swapped from the BWST to the reactor building sump.

Condition E is modified by a Note indicating this Condition is only applicable to PAM Function 14.

F.1

When a flow instrument channel is inoperable, Required Action F.1 requires the affected HPI, LPI, or RBS train to be declared inoperable and the requirements of LCO 3.5.2, LCO 3.5.3, or LCO 3.6.5 apply. For Function 22, LPSW flow to LPI coolers, the affected train is the

BASES

ACTIONS

F.1 (continued)

associated LPI train. For Function 18, HPI flow, an inoperable flow instrument channel causes the affected HPI train's automatic function to be inoperable. The HPI train continues to be manually OPERABLE provided the HPI discharge crossover valves and associated flow instruments are OPERABLE. Therefore, HPI is in a condition where one HPI train is incapable of being automatically actuated but capable of being manually actuated. The required Completion Time for declaring the train(s) inoperable is immediately. Therefore, LCO 3.5.2, LCO 3.5.3, or LCO 3.6.5 is entered immediately, and the Required Actions in the LCOs apply without delay. This action is necessary since there is no alternate flow indication available and these flow indications are key in ensuring each train is capable of performing its function following an accident. HPI, LPI, and RBS train OPERABILITY assumes that the associated PAM flow instrument is OPERABLE because this indication is used to throttle flow during an accident and assure runout limits are not exceeded or to ensure the associated pumps do not exceed NPSH requirements.

Condition F is modified by a Note indicating this Condition is only applicable to PAM Functions 18, 19, 20, and 22.

G.1

Required Action G.1 directs entry into the appropriate Condition referenced in Table 3.3.8-1. The applicable Condition referenced in the Table is Function dependent. Each time an inoperable channel has not met the Required Action and associated Completion Time of Condition C, D, or E, as applicable, Condition G is entered for that channel and provides for transfer to the appropriate subsequent Condition.

H.1 and H.2

If the Required Action and associated Completion Time of Conditions C, D or E are not met and Table 3.3.8-1 directs entry into Condition H, the unit must be brought to a MODE in which the requirements of this LCO do not apply. To achieve this status, the unit must be brought to at least MODE 3 within 12 hours and MODE 4 within 18 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

BASES

ACTIONS (continued)

I.1

If the Required Action and associated Completion Time of Condition C, D or E are not met and Table 3.3.8-1 directs entry into Condition I, alternate means of monitoring the parameter should be applied and the Required Action is not to shut down the unit, but rather to follow the directions of Specification 5.6.6 in the Administrative Controls section of the Technical Specifications. These alternative means may be temporarily installed if the normal PAM channel cannot be restored to OPERABLE status within the allowed time. The report provided to the NRC should discuss the alternative means used, describe the degree to which the alternative 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.

Both the RCS Hot Leg Level and the Reactor Vessel Level are methods of monitoring for inadequate core cooling capability. The subcooled margin monitors (SMM), and core-exit thermocouples (CET) provide an alternate means of monitoring for this purpose. The function of the ICC instrumentation is to increase the ability of the unit operators to diagnose the approach to and recovery from ICC. Additionally, they aid in tracking reactor coolant inventory.

The alternate means of monitoring the Reactor Building Area Radiation (High Range) consist of a combination of installed area radiation monitors and portable instrumentation.

SURVEILLANCE REQUIREMENTS

As noted at the beginning of the SRs, the SRs apply to each PAM instrumentation Function in Table 3.3.8-1 except where indicated.

SR 3.3.8.1

Performance of the CHANNEL CHECK once every 31 days for each required instrumentation channel that is normally energized ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel with a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the two

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.8.1 (continued)

instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; therefore, it is key to verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION. The high radiation instrumentation should be compared with similar unit instruments located throughout the unit. If the radiation monitor uses keep alive sources or check sources OPERABLE from the control room, the CHANNEL CHECK should also note the detector's response to these sources.

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

The Frequency is based on operating experience that demonstrates channel failure is rare. The CHANNEL CHECK supplements less formal but more frequent checks of channels during normal operational use of the displays associated with this LCO's required channels.

SR 3.3.8.2 and SR 3.3.8.3

A CHANNEL CALIBRATION is a complete check of the instrument channel, including the sensor. This test verifies the channel responds to measured parameters within the necessary range and accuracy.

Note 1 to SR 3.3.8.3 clarifies that the neutron detectors are not required to be tested as part of the CHANNEL CALIBRATION. There is no adjustment that can be made to the detectors. Furthermore, adjustment of the detectors is unnecessary because they are passive devices, with minimal drift. Slow changes in detector sensitivity are compensated for by performing the daily calorimetric calibration and the monthly axial channel calibration.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.8.2 and SR 3.3.8.3 (continued)

For the Containment Area Radiation instrumentation, a CHANNEL CALIBRATION may 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 a gamma source.

Whenever a sensing element is replaced, the next required CHANNEL CALIBRATION of the resistance temperature detectors (RTD)sensors or Core Exit thermocouple sensors is accomplished by an inplace cross calibration that compares the other sensing elements with the recently installed sensing element.

SR 3.3.8.2 is modified by a Note indicating that it is applicable only to Functions 7, 10 and 22. SR 3.3.8.3 is modified by Note 2 indicating that it is not applicable to Functions 7, 10 and 22. The Frequency of each SR is based on operating experience and is justified by the assumption of the specified calibration interval in the determination of the magnitude of equipment drift.

REFERENCES

1. Duke Power Company letter from Hal B. Tucker to Harold M. Denton (NRC) dated September 28, 1984.
 2. UFSAR, Section 7.5.
 3. NRC Letter from Helen N. Pastis to H. B. Tucker, "Emergency Response Capability - Conformance to Regulatory Guide 1.97," dated March 15, 1988.
 4. Regulatory Guide 1.97, "Instrumentation for Light Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," Revision 3, May 1983.
 5. NUREG-0737, "Clarification of TMI Action Plan Requirements," 1980.
 6. 10 CFR 50.36.
-

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.3 Low Pressure Injection (LPI)

BASES

BACKGROUND

The function of the ECCS is to provide core cooling to ensure that the reactor core is protected after any of the following accidents:

- a. Loss of coolant accident (LOCA);
- b. Rod ejection accident (REA);
- c. Steam generator tube rupture (SGTR); and
- d. Main steam line break (MSLB).

There are two phases of ECCS operation: injection and recirculation. In the injection phase, all injection is initially added to the Reactor Coolant System (RCS) via the cold legs or Core Flood Tank (CFT) lines to the reactor vessel. After the borated water storage tank (BWST) has been depleted, the recirculation phase is entered as the suction is transferred to the reactor building sump.

Two redundant low pressure injection (LPI) trains are provided. The LPI trains consist of piping, valves, instruments, controls, heat exchangers, and pumps, such that water from the borated water storage tank (BWST) can be injected into the Reactor Coolant System (RCS). In MODES 1, 2 and 3, both trains of LPI must be OPERABLE. This ensures that 100% of the core cooling requirements can be provided even in the event of a single active failure. The LPI discharge header crossover valves must be manually (locally and remotely) OPERABLE in MODE 1, 2, and 3 to assure abundant, long term core cooling. Only one LPI train is required for MODE 4.

A suction header supplies water from the BWST or the reactor building sump to the LPI pumps. LPI discharges into each of the two core flood nozzles on the reactor vessel that discharge into the vessel downcomer area.

The LPI pumps are capable of discharging to the RCS at an RCS pressure of approximately 200 psia. When the BWST has been nearly emptied, the suction for the LPI pumps is manually transferred to the reactor building sump.

BASES

BACKGROUND (continued)

In the long term cooling period, flow paths in the LPI System are established to preclude the possibility of boric acid in the core region reaching an unacceptably high concentration. Two gravity flow paths are available by means of a drain line from the hot leg to the Reactor Building sump which draws coolant from the top of the core, thereby inducing core circulation. The system is designed with redundant drain lines.

During a large break LOCA, RCS pressure will rapidly decrease. The LPI System is actuated upon receipt of an ESPS signal. If offsite power is available, the safeguard loads start immediately. If offsite power is not available, the Engineered Safeguards (ES) buses are connected to the Keowee Hydro Units. The time delay (38 seconds) associated with Keowee Hydro Unit startup and pump starting determines the time required before pumped flow is available to the core following a LOCA. Full LPI flow is not available until the LPI valve strokes full open.

The LPI and HPI (LCO 3.5.2, "High Pressure Injection (HPI)"), along with the passive CFTs and the BWST covered in LCO 3.5.1, "Core Flood Tanks (CFTs)," and LCO 3.5.4, "Borated Water Storage Tank (BWST)," provide the cooling water necessary to meet 10 CFR 50.46 (Ref. 1).

APPLICABLE SAFETY ANALYSES

The LCO helps to ensure that the following acceptance criteria for the ECCS, established by 10 CFR 50.46 (Ref. 1), will be met following a LOCA:

- a. Maximum fuel element cladding temperature is $\leq 2200^{\circ}\text{F}$;
- b. Maximum cladding oxidation is ≤ 0.17 times the total cladding thickness before oxidation;
- c. Maximum hydrogen generation from a zirconium water reaction is ≤ 0.01 times the hypothetical amount generated if all of the metal in the cladding cylinders surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react;
- d. Core is maintained in a coolable geometry; and
- e. Adequate long term core cooling capability is maintained.

The LCO also helps ensure that reactor building temperature limits are met.

BASES

APPLICABLE
SAFETY ANALYSES
(continued)

The LPI System is assumed to provide injection in the large break LOCA analysis at full power (Ref. 2). This analysis establishes a minimum required flow for the LPI pumps, as well as the minimum required response time for their actuation.

The large break LOCA event assumes a loss of offsite power and a single failure (loss of the CT-4 transformer). For analysis purposes, the loss of offsite power assumption may be conservatively inconsistent with the assumed operation of some equipment, such as reactor coolant pumps (Ref. 3). During the blowdown stage of a LOCA, the RCS depressurizes as primary coolant is ejected through the break into the reactor building. The nuclear reaction is terminated by moderator voiding during large breaks. Following depressurization, emergency cooling water is injected into the reactor vessel core flood nozzles, then flows into the downcomer, fills the lower plenum, and refloods the core.

In the event of a Core Flood line break which results in a LOCA, with a concurrent single failure on the unaffected LPI train opposite the Core Flood break, the LPI discharge header crossover valves (LP-9 and LP-10) must be capable of being manually (locally and remotely) opened. The LPI cooler outlet throttle valves and LPI header isolation valves must be capable of being manually opened to provide assurance that flow can be established in a timely manner even if the capability to operate them from the control room is lost. These manual actions will allow cross-connection of the LPI pump discharge to the intact LPI/Core Flood tank header to provide abundant emergency core cooling.

The safety analyses show that an LPI train will deliver sufficient water to match decay heat boiloff rates for a large break LOCA.

In the large break LOCA analyses, full LPI is not credited until 53 seconds after actuation of the ESPS signal. This is based on a loss of offsite power and the associated time delays in Keowee Hydro Unit startup, valve opening and pump start. Further, LPI flow is not credited until RCS pressure drops below the pump's shutoff head. For a large break LOCA, HPI is not credited at all.

The LPI trains satisfy Criterion 3 of 10 CFR 50.36 (Ref. 4).

LCO

In MODES 1, 2, and 3, two independent (and redundant) LPI trains are required to ensure that at least one LPI train is available, assuming a single failure in the other train. Additionally, individual components within the LPI trains may be called upon to mitigate the consequences of other transients

BASES

LCO
(continued)

and accidents. Each LPI train includes the piping, instruments, pumps, valves, heat exchangers and controls to ensure an OPERABLE flow path capable of taking suction from the BWST upon an ES signal and the capability to manually (remotely) transfer suction to the reactor building sump. The safety grade flow indicator of an LPI train is required to support OPERABILITY of the LPI and RBS trains to preclude NPSH or runout problems. In addition, during an event, RBS train flow must be monitored and controlled to support the LPI pumps to ensure that the NPSH requirements for the LPI pumps are not exceeded. If the flow instrumentation or the capability to control the flow in a RBS train is unavailable then the associated LPI train's OPERABILITY is affected until such time as the RBS train is restored or the associated RBS pump is placed in a secured state to prevent actuation during an event. The safety grade flow indicator associated with LPSW flow to an LPI cooler is required to be OPERABLE to support LPI train OPERABILITY.

In MODE 4, one of the two LPI trains is required to ensure sufficient LPI flow is available to the core.

During an event requiring LPI injection, a flow path is required to provide an abundant supply of water from the BWST to the RCS, via the LPI pumps and their respective supply headers, to the reactor vessel. In the long term, this flow path may be switched to take its supply from the reactor building sump.

This LCO is modified by three Notes. Note 1 changes the LCO requirement when in MODE 4 for the number of OPERABLE trains from two to one. Note 2 allows an LPI train to be considered OPERABLE during alignment, when aligned or when operating for decay heat removal if capable of being manually (remotely) realigned to the LPI mode of operation. This provision is necessary because of the dual requirements of the components that comprise the LPI and decay heat removal modes of the LPI System. Note 3 requires the LPI discharge header crossover valves (LP-9 and LP-10) to be OPERABLE in MODES 1, 2, and 3.

The flow path for each train must maintain its designed independence to ensure that no single failure can disable both LPI trains. If both LPI discharge header crossover valves (LP-9 and LP-10) are simultaneously open then only one LPI train is considered OPERABLE.

APPLICABILITY

In MODES 1, 2 and 3, the LPI train OPERABILITY requirements for the Design Basis Accident, a large break LOCA, are based on full power operation. The LPI discharge crossover valve OPERABILITY requirements for CFT line break is based on full power operation. Although reduced power would not require the same level of performance, the accident

BASES

APPLICABILITY (continued)

analysis does not provide for reduced cooling requirements in the lower MODES.

In MODE 4, one OPERABLE LPI train is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the limited core cooling requirements.

In MODES 5 and 6, unit conditions are such that the probability of an event requiring LPI injection is extremely low. Core cooling requirements in MODE 5 are addressed by LCO 3.4.7, "RCS Loops—MODE 5, Loops Filled," and LCO 3.4.8, "RCS Loops—MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.4, "DHR and Coolant Circulation—High Water Level," and LCO 3.9.5, "DHR and Coolant Circulation—Low Water Level."

ACTIONS

A.1

With one LPI train inoperable in MODES 1, 2 or 3, the inoperable train must be returned to OPERABLE status within 72 hours. The 72 hour Completion Time is based on NRC recommendations (Ref. 5) that are based on a risk evaluation and is a reasonable time for many repairs. This reliability analysis has shown the risk of having one LPI train inoperable to be sufficiently low to justify continued operation for 72 hours.

B.1

With one or more LPI discharge crossover valves inoperable, the inoperable valve(s) must be returned to OPERABLE status within 72 hours. The 72 hour Completion Time is based on NRC recommendations (Ref. 5) that are based on a risk evaluation and is a reasonable time for many repairs.

C.1

If the Required Action and associated Completion Time of Condition A or B are not met, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 12 hours and MODE 4 within 60 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

BASES

ACTIONS
(continued)D.1

With one required LPI train inoperable in MODE 4, the unit is not prepared to respond to an event requiring low pressure injection and may not be prepared to continue cooldown using the LPI pumps and LPI heat exchangers. The Completion Time of immediately, which would initiate action to restore at least one LPI train to OPERABLE status, ensures that prompt action is taken to restore the required LPI capacity. Normally, in MODE 4, reactor decay heat must be removed by a decay heat removal (DHR) loop operating with suction from the RCS. If no LPI train is OPERABLE for this function, reactor decay heat must be removed by some alternate method, such as use of the steam generator(s).

The alternate means of heat removal must continue until one of the inoperable LPI trains can be restored to operation so that continuation of decay heat removal (DHR) is provided.

With the LPI pumps (including the non ES pump) and LPI heat exchangers inoperable, it would be unwise to require the unit to go to MODE 5, where the only available heat removal system is the LPI trains operating in the DHR mode. Therefore, the appropriate action is to initiate measures to restore one LPI train and to continue the actions until the subsystem is restored to OPERABLE status.

D.2

Required Action D.2 requires that the unit be placed in MODE 5 within 24 hours. This Required Action is modified by a Note that states that the Required Action is only required to be performed if a DHR loop is OPERABLE. This Required Action provides for those circumstances where the LPI trains may be inoperable but otherwise capable of providing the necessary decay heat removal. Under this circumstance, the prudent action is to remove the unit from the Applicability of the LCO and place the unit in a stable condition in MODE 5. The Completion Time of 24 hours is reasonable, based on operating experience, to reach MODE 5 in an orderly manner and without challenging unit systems.

SURVEILLANCE
REQUIREMENTSSR 3.5.3.1

Verifying the correct alignment for manual and non-automatic power operated valves in the LPI flow paths provides assurance that the proper flow paths will exist for LPI operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves were verified to be in the correct position prior to locking, sealing, or securing. Similarly, this SR does not apply to automatic valves since

BASES

SURVEILLANCE
REQUIREMENTSSR 3.5.3.1 (continued)

automatic valves actuate to their required position upon an accident signal. This Surveillance does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. The 31 day Frequency is appropriate because the valves are operated under administrative control, and an inoperable valve position would only affect a single train. This Frequency has been shown to be acceptable through operating experience.

When in MODE 4 an LPI train may be considered OPERABLE during alignment, when aligned or when operating for decay heat removal if capable of being manually realigned to the LPI mode of operation. Therefore, for this condition, the SR verifies that LPI is capable of being manually realigned to the LPI mode of operation.

SR 3.5.3.2

With the exception of systems in operation, the LPI pumps are normally in a standby, non-operating mode. As such, the flow path piping has the potential to develop voids and pockets of entrained gases. Venting the LPI pump casings periodically reduces the potential that such voids and pockets of entrained gases can adversely affect operation of the LPI System. This will also minimize the potential for water hammer, pump cavitation, and pumping of noncondensable gas (e.g., air, nitrogen, or hydrogen) into the reactor vessel following an ESPS signal or during shutdown cooling. This Surveillance is modified by a Note that indicates it is not applicable to operating LPI pump(s). The 31 day Frequency takes into consideration the gradual nature of gas accumulation in the LPI piping and the existence of procedural controls governing system operation.

SR 3.5.3.3

Periodic surveillance testing of LPI pumps to detect gross degradation caused by impeller structural damage or other hydraulic component problems is required by Section XI of the ASME Code (Ref. 6). SRs are specified in the Inservice Testing Program, which encompasses Section XI of the ASME Code.

BASES

SURVEILLANCE
REQUIREMENTS
(continued)SR 3.5.3.4 and SR 3.5.3.5

These SRs demonstrate that each automatic LPI valve actuates to the required position on an actual or simulated ESPS signal and that each LPI pump starts on receipt of an actual or simulated ESPS signal. This SR is not required for valves that are locked, sealed, or otherwise secured in position under administrative controls. The test will be considered satisfactory if control board indication verifies that all components have responded to the ESPS actuation signal properly (all appropriate ESPS actuated pump breakers have opened or closed and all ESPS actuated valves have completed their travel). The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. The 18 month Frequency is also acceptable based on consideration of the design reliability (and confirming operating experience) of the equipment. The actuation logic is tested as part of the ESPS testing, and equipment performance is monitored as part of the Inservice Testing Program.

SR 3.5.3.6

Periodic inspections of the reactor building sump suction inlet ensure that it is unrestricted and stays in proper operating condition. The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage, on the need to preserve access to the location, and on the potential for an unplanned transient if the Surveillance were performed with the reactor at power. This Frequency has been found to be sufficient to detect abnormal degradation and has been confirmed by operating experience.

SR 3.5.3.7

The function of the LPI discharge header crossover valves (LP-9, LP-10) is to open and allow a cross-connection between LPI trains. The LPI cooler outlet throttle valves (LP-12, LP-14) and LPI header isolation valves (LP-17, LP-18) must be capable of being manually opened to provide assurance that flow can be established in a timely manner even if the capability to operate them from the control room is lost. Manually cycling each valve open demonstrates the ability to fulfill this function. This test is performed on an 18 month Frequency. Operating experience has shown that these components usually pass the Surveillance when performed at the this Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

BASES (continued)

- REFERENCES
1. 10 CFR 50.46.
 2. UFSAR, Section 15.14.3.3.6.
 3. UFSAR, Section 15.14.3.3.5.
 4. 10 CFR 50.36.
 5. NRC Memorandum to V. Stello, Jr., from R.L. Baer, "Recommended Interim Revisions to LCOs for ECCS Components," December 1, 1975.
 6. ASME, Boiler and Pressure Vessel Code, Section XI, Inservice Inspection, Article IWB-3400.
-

B 3.6 CONTAINMENT SYSTEMS

B 3.6.5 Reactor Building Spray and Cooling Systems

BASES

BACKGROUND

The Reactor Building Spray and Reactor Building Cooling systems provide containment atmosphere cooling to limit post accident pressure and temperature in containment to less than the design values. Reduction of containment pressure and the iodine removal capability of the spray reduces the release of fission product radioactivity from containment to the environment, in the event of an accident, to within limits. The Reactor Building Spray and Reactor Building Cooling systems are designed to meet ONS Design Criteria (Ref. 1).

The Reactor Building Cooling System and Reactor Building Spray System are Engineered Safeguards (ES) systems. They are designed to ensure that the heat removal capability required during the post accident period can be attained. The Reactor Building Spray System and Reactor Building Cooling System provide containment heat removal operation. The Reactor Building Spray System and Reactor Building Cooling System provide methods to limit and maintain post accident conditions to less than the containment design values.

Reactor Building Spray System

The Reactor Building Spray System consists of two separate trains of equal capacity, each capable of meeting the design basis. Each train includes a reactor building spray pump, spray headers, nozzles, valves, piping and a flow indicator. Each train is powered from a separate ES bus. The borated water storage tank (BWST) supplies borated water to the Reactor Building Spray System during the injection phase of operation. In the recirculation mode of operation, Reactor Building Spray System pump suction is manually transferred to the reactor building sump.

BASES

BACKGROUND Reactor Building Spray System (continued)

The Reactor Building Spray System provides a spray of relatively cold borated water into the upper regions of containment to reduce the containment pressure and temperature and to reduce the concentration of fission products in the containment atmosphere during an accident. In the recirculation mode of operation, heat is removed from the reactor building sump water by the decay heat removal coolers. Each train of the Reactor Building Spray System provides adequate spray coverage to meet the system design requirements for containment heat removal.

The Reactor Building Spray System is actuated automatically by a containment High-High pressure signal. An automatic actuation opens the Reactor Building Spray System pump discharge valves and starts the two Reactor Building Spray System pumps.

Reactor Building Cooling System

The Reactor Building Cooling System consists of three reactor building cooling trains. Each cooling train is equipped with cooling coils, and an axial vane flow fan driven by a two speed electric motor.

During normal operation, two reactor building cooling trains with two fans operating at high speed, serve to cool the containment atmosphere. The third unit is on standby. Upon receipt of an emergency signal, the two operating cooling fans running at high speed will automatically change to low speed, and the idle unit is energized at low speed. The fans are operated at the lower speed during accident conditions to prevent motor overload from the higher density atmosphere.

APPLICABLE SAFETY ANALYSES	<p>The Reactor Building Spray System and Reactor Building Cooling System reduce the temperature and pressure following an accident. The limiting accidents considered are the loss of coolant accident (LOCA) and the steam line break. The postulated accidents are analyzed, with regard to containment ES systems, assuming the loss of one ES bus. This is the worst-case single active failure, resulting in one train of the Reactor Building Spray System and one train of the Reactor Building Cooling System being inoperable.</p>
---------------------------------------	---

The analysis and evaluation show that, under the worst-case scenario (LOCA with worst-case single active failure), the highest peak containment pressure is 58.9 psig. The analysis shows that the peak containment

BASES

**APPLICABLE
SAFETY ANALYSES
(continued)**

temperature is 285°F. Both results are less than the design values. The analyses and evaluations assume a power level of 2619 MWt, one reactor building spray train and two reactor building cooling trains operating, and initial (pre-accident) conditions of 110°F and 16.2 psia. The analyses also assume a delayed initiation to provide conservative peak calculated containment pressure and temperature responses.

The Reactor Building Spray System total delay time of 92 seconds includes Keowee Hydro Unit startup (for loss of offsite power), reactor building spray pump startup, and spray line filling (Ref. 2).

Reactor building cooling train performance for post accident conditions is given in Reference 2. The result of the analysis is that any combination of two trains can provide 100% of the required cooling capacity during the post accident condition. The train post accident cooling capacity under varying containment ambient conditions is also shown in Reference 2.

The Reactor Building Cooling System total delay time of 78 seconds includes signal delay, Keowee Hydro Unit startup (for loss of offsite power), low pressure service water pump startup and low pressure service water valve stroke times (Ref. 2).

The Reactor Building Spray System and the Reactor Building Cooling System satisfy Criterion 3 of 10 CFR 50.36 (Ref. 3).

LCO

During an accident, a minimum of two reactor building cooling trains and one reactor building spray train are required to maintain the containment pressure and temperature following a LOCA. Additionally, one reactor building spray train is required to remove iodine from the containment atmosphere and maintain concentrations below those assumed in the safety analysis. To ensure that these requirements are met, two reactor building spray trains and three reactor building cooling trains must be OPERABLE in MODES 1 and 2. In MODES 3 or 4, one reactor building spray train and two reactor building cooling trains are required to be OPERABLE. The LCO is provided with a note that clarifies this requirement. Therefore, in the event of an accident, the minimum requirements are met, assuming the worst-case single active failure occurs.

Each reactor building spray train shall include a spray pump, spray headers, nozzles, valves, piping, instruments, and controls to ensure an OPERABLE flow path capable of taking suction from the BWST (via the

BASES

LCO
(continued)

LPI System) upon an Engineered Safeguards Protective System signal and manually transferring suction to the reactor building sump. The safety grade flow indicator of an RBS train is required to support OPERABILITY of the RBS and LPI trains to preclude NPSH or runout problems. In addition, during an event, LPI train flow must be monitored and controlled to support the RBS train pumps to ensure that the NPSH requirements for the RBS pumps are not exceeded. If the flow instrumentation or the capability to control the flow in a LPI train is unavailable then the associated RBS train's OPERABILITY is affected until such time as the LPI train is restored or the associated LPI pump is placed in a secured state to prevent actuation during an event.

Each reactor building cooling train shall include cooling coils, fusible dropout plates, an axial vane flow fan, instruments, valves, and controls to ensure an OPERABLE flow path. Valve LPSW-108 shall be locked open to support system OPERABILITY.

APPLICABILITY

In MODES 1, 2, 3, and 4, an accident could cause a release of radioactive material to containment and an increase in containment pressure and temperature, requiring the operation of the reactor building spray trains and reactor building cooling trains.

In MODES 5 and 6, the probability and consequences of these events are reduced due to the pressure and temperature limitations of these MODES. Thus, the Reactor Building Spray System and the Reactor Building Cooling System are not required to be OPERABLE in MODES 5 and 6.

ACTIONS

A.1

With one reactor building spray train inoperable in MODE 1 or 2, the inoperable reactor building spray train must be restored to OPERABLE status within 7 days. In this Condition, the remaining OPERABLE spray and cooling trains are adequate to perform the iodine removal and containment cooling functions. The 7 day Completion Time takes into account the redundant heat removal capability afforded by the OPERABLE reactor building spray train, reasonable time for repairs, and the low probability of an accident occurring during this period.

The 14 day portion of the Completion Time for Required Action A.1 is based upon engineering judgment. It takes into account the low probability of coincident entry into two Conditions in this LCO coupled with the low probability of an accident occurring during this time. Refer to Section 1.3, Completion Times, for a more detailed discussion of the purpose of the "from discovery of failure to meet the LCO" portion of the Completion Time.

BASES

ACTIONS
(continued)

B.1

With one of the reactor building cooling trains inoperable in MODE 1 or 2, the inoperable reactor building cooling train must be restored to OPERABLE status within 7 days. The components in this degraded condition provide iodine removal capabilities and are capable of providing at least 100% of the heat removal needs after an accident. The 7 day Completion Time was developed taking into account the redundant heat removal capabilities afforded by combinations of the Reactor Building Spray System and Reactor Building Cooling System and the low probability of an accident occurring during this period.

The 14 day portion of the Completion Time for Required Action B.1 is based upon engineering judgment. It takes into account the low probability of coincident entry into two Conditions in this LCO coupled with the low probability of an accident occurring during this time. Refer to Section 1.3 for a more detailed discussion of the purpose of the "from discovery of failure to meet the LCO" portion of the Completion Time.

C.1

With one reactor building spray train and one reactor building cooling train inoperable in MODE 1 or 2, at least one of the inoperable trains must be restored to OPERABLE status within 24 hours. In this Condition, the remaining OPERABLE spray and cooling trains are adequate to provide iodine removal capabilities and are capable of providing at least 100% of the heat removal needs after an accident. The 24 hour Completion Time takes into account the heat removal capability afforded by the remaining OPERABLE spray train and cooling trains, reasonable time for repairs, and the low probability of an accident occurring during this period.

D.1

If the Required Action and associated Completion Time of Condition A, B or C are not met, the unit must be brought to a MODE in which the LCO, as modified by the Note, does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 12 hours. The allowed Completion Time is reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

BASES

ACTIONS
(continued)

E.1

With one of the required reactor building cooling trains inoperable in MODE 3 or 4, the required reactor building cooling train must be restored to OPERABLE status within 24 hours.

The 24 hour Completion Time is reasonable based on engineering judgement taking into account the iodine and heat removal capabilities of the remaining required train of reactor building spray and cooling.

F.1

With one required reactor building spray train inoperable in MODE 3 or 4, the required reactor building spray train must be restored to OPERABLE status within 24 hours. The 24 hour Completion Time is reasonable based on engineering judgement taking into account the heat removal capabilities of the remaining required trains of reactor building cooling.

G.1

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

H.1

With two reactor building spray trains, two reactor building cooling trains or any combination of three or more reactor building spray and reactor building cooling trains inoperable in MODE 1 or 2, the unit is in a condition outside the accident analysis. Therefore, LCO 3.0.3 must be entered immediately.

With any combination of two or more required reactor building spray and reactor building cooling trains inoperable in MODE 3 or 4, the unit is in a condition outside the accident analysis. Therefore, LCO 3.0.3 must be entered immediately.

BASES (continued)

SURVEILLANCE
REQUIREMENTS

SR 3.6.5.1

Verifying the correct alignment for manual and non-automatic power operated valves in the reactor building spray flow path provides assurance that the proper flow paths will exist for Reactor Building Spray System operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these were verified to be in the correct position prior to locking, sealing, or securing. Similarly, this SR does not apply to automatic valves since automatic valves actuate to their required position upon an accident signal. This SR also does not apply to valves that cannot be inadvertently misaligned, such as check valves. This SR does not require any testing or valve manipulation. Rather, it involves verification, through a system walkdown, that those valves outside containment and capable of potentially being mispositioned are in the correct position.

SR 3.6.5.2

Operating each required reactor building cooling train fan unit for ≥ 15 minutes ensures that all trains are OPERABLE and that all associated controls are functioning properly. It also ensures that blockage, fan or motor failure, or excessive vibration can be detected for corrective action. The 31 day Frequency was developed considering the known reliability of the fan units and controls, the three train redundancy available, and the low probability of a significant degradation of the reactor building cooling trains occurring between surveillances and has been shown to be acceptable through operating experience.

SR 3.6.5.3

Verifying that each required Reactor Building Spray pump's developed head at the flow test point is greater than or equal to the required developed head ensures that spray pump performance has not degraded during the cycle. Flow and differential pressure are normal tests of centrifugal pump performance required by Section XI of the ASME Code (Ref. 4). Since the Reactor Building Spray System pumps cannot be tested with flow through the spray headers, they are tested on recirculation flow. This test confirms one point on the pump design curve and is indicative of overall performance. Such inservice tests confirm component OPERABILITY, trend performance, and may detect incipient failures by indicating abnormal performance. The Frequency of this SR is in accordance with the Inservice Testing Program.

BASES

**SURVEILLANCE
REQUIREMENTS**
(continued)

SR 3.6.5.4

Verifying the containment heat removal capability provides assurance that the containment heat removal systems are capable of maintaining containment temperature below design limits following an accident. This test verifies the heat removal capability of the Low Pressure Injection (LPI) Coolers and Reactor Building Cooling Units. The 18 month Frequency was developed considering the known reliability of the low pressure service water, reactor building spray and reactor building cooling systems and other testing performed at shorter intervals that is intended to identify the possible loss of heat removal capability.

SR 3.6.5.5 and SR 3.6.5.6

These SRs require verification that each automatic reactor building spray valve actuates to its correct position and that each reactor building spray pump starts upon receipt of an actual or simulated actuation signal. The test will be considered satisfactory if visual observation and control board indication verifies that all components have responded to the actuation signal properly; the appropriate pump breakers have closed, and all valves have completed their travel. This SR is not required for valves that are locked, sealed, or otherwise secured in position under administrative controls. The 18 month Frequency is based on the need to perform these Surveillances under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillances were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillances when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.6.5.7

This SR requires verification that each required reactor building cooling train actuates upon receipt of an actual or simulated actuation signal. The test will be considered satisfactory if control board indication verifies that all components have responded to the actuation signal properly, the appropriate valves have completed their travel, and fans are running at half speed. The 18 month Frequency is based on engineering judgment and has been shown to be acceptable through operating experience. See SR 3.6.5.5 and SR 3.6.5.6, above, for further discussion of the basis for the 18 month Frequency.

BASES

**SURVEILLANCE
REQUIREMENTS**
(continued)

SR 3.6.5.8

With the reactor building spray header isolated and drained of any solution, station compressed air is introduced into the spray headers to verify the availability of the headers and spray nozzles. Performance of this Surveillance demonstrates that each spray nozzle is unobstructed and provides assurance that spray coverage of the containment during an accident is not degraded. Due to the passive nature of the design of the nozzles, a test at 10 year intervals is considered adequate to detect obstruction of the spray nozzles.

REFERENCES

1. UFSAR, Section 3.1.
 2. UFSAR, Section 6.2.
 3. 10 CFR 50.36.
 4. ASME, Boiler and Pressure Vessel Code, Section XI.
-
-

B 3.7 PLANT SYSTEMS

B 3.7.9 Control Room Ventilation System (CRVS) Booster Fans

BASES

BACKGROUND	<p>The CRVS Booster Fan trains provide a protected environment from which operators can control the unit following an uncontrolled release of radioactivity, chemicals, or toxic gas.</p> <p>Each CRVS Booster Fan train provides 50% capacity and consists of a fan filter assembly, Booster Fans, Ducting, and Dampers. Each filter train consists of a pre-filter, a high efficiency particulate air (HEPA) filter, and a charcoal filter.</p> <p>The CRVS Booster Fan trains are an emergency system. Upon receipt of a radiation alarm from the control room air radiation monitor, the CRVS Booster Fan trains can be started manually to minimize unfiltered air from entering the control room. Upon starting the fans, dampers are automatically positioned to isolate the control room. The pre-filters remove any large particles in the air, and any entrained water droplets present, to prevent excessive loading of the HEPA and carbon filters.</p> <p>The two CRVS Booster Fan trains, when operated simultaneously, can pressurize the control room to minimize infiltration of unfiltered air. The CRVS operation is discussed in the UFSAR, Section 9.4 (Ref. 1).</p>
APPLICABLE SAFETY ANALYSES	<p>The CRVS Booster Fan train components are arranged in two ventilation trains. The location of components and ducting ensures an adequate supply of filtered air to all areas requiring access. The CRVS provides airborne radiological protection for the control room operators for the most limiting design basis loss of coolant accident fission product release presented in the UFSAR, Chapter 15 (Ref. 2).</p> <p>The CRVS Booster Fan trains satisfy Criterion 3 of 10 CFR 50.36 (Ref. 3).</p>
LCO	<p>Two CRVS trains are required to be OPERABLE. Total system failure could result in excessive doses to the control room operators in the event of a large radioactive release.</p>

BASES

LCO
(continued)

The CRVS Booster Fan trains are considered **OPERABLE** when the individual components necessary to control operator exposure are **OPERABLE** in both trains. A CRVS Booster Fan train is considered **OPERABLE** when the associated:

- a. Booster Fan is **OPERABLE**;
- b. HEPA filter and carbon absorber are not excessively restricting flow, and are capable of performing their filtration functions; and
- c. Ductwork, valves, and dampers are **OPERABLE**, and control room pressurization can be maintained with both trains operating.

In addition, the control room boundary, including the integrity of the walls, floors, ceilings, ductwork, and access doors, must be maintained within the assumptions of the design analysis.

Breaches (excluding the removal of system performance test port caps per testing procedures) in the CRVS, most commonly due to the opening of access doors, introduces the possibility of allowing unfiltered or unanalyzed concentrations of inleakage into the Control Room. This applies to breaches of the outside air filter trains, main air handling units and all ductwork outside the Control Room pressure boundary. Breaches are equivalent to two Booster Fan trains out of service.

APPLICABILITY

In MODES 1, 2, 3, and 4, the CRVS Booster Fan trains must be **OPERABLE** to reduce radiation dose to personnel in the control room during and following an accident.

ACTIONS

A.1

With the two CRVS Booster Fan trains incapable of pressurizing the control room, the capability to pressurize the control room must be restored within 30 days. In this Condition, the capability to minimize the radiation dose to personnel located in the control room during and after an accident is not assured. One or both CRVS Booster Fan trains may be **OPERABLE** in this Condition. If one or both CRVS Booster Fans are simultaneously inoperable, the Completion Time for these separate Conditions is more limiting than the 30 day Completion Time for Action A.1. If **OPERABLE** the CRVS Booster Fan train(s) can provide some

BASES

ACTIONS

A.1 (continued)

dose reduction. The 30 day Completion Time is based on the low probability of an accident occurring during the time period and the potential for OPERABLE CRVS Booster Fan trains to provide some dose reduction.

B.1

With one CRVS Booster Fan train inoperable for reasons other than Condition A, action must be taken to restore the train to OPERABLE status within 72 hours. In this Condition, the remaining OPERABLE CRVS Booster Fan train provides some dose reduction for personnel in the control room. The 72 hour Completion Time is based on the low probability of an accident occurring during this time period, and ability of the remaining train to provide some dose reduction.

C.1

With the two CRVS Booster Fan trains inoperable for reasons other than Condition A, one train must be restored to OPERABLE status within 24 hours. In this Condition, the capability to minimize the radiation dose to personnel located in the control room during and after an accident is unavailable. The 24 hour Completion Time is based on the low probability of an accident occurring during this time period.

D.1

If the inoperable CRVS Booster Fan trains cannot be restored to OPERABLE status within the required Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours, and in MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.9.1

Standby systems should be checked periodically to ensure that they function properly. As the environment and normal operating conditions on this system are not severe, testing each train once every 92 days

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.9.1 (continued)

adequately checks this system. The trains need only be operated for \geq one hour and all dampers verified to be OPERABLE to demonstrate the function of the system. This test includes an external visual inspection of the CRVS Booster Fan trains. The 92 day Frequency is based on the known reliability of the equipment.

SR 3.7.9.2

This SR verifies that the required CRVS Booster Fan train testing is performed in accordance with the Ventilation Filter Testing Program (VFTP). The CRVS Booster Fan train filter test frequencies are in accordance with Regulatory Guide 1.52 (Ref. 4). The VFTP includes testing HEPA filter performance and carbon adsorber efficiency. Specific test frequencies and additional information are discussed in detail in the VFTP.

SR 3.7.9.3

This SR verifies the integrity of the control room enclosure. The control room positive pressure, with respect to potentially contaminated adjacent areas, is periodically tested to verify that the CRVS Booster Fan trains are functioning properly. During the emergency mode of operation, the CRVS Booster Fan trains are designed to pressurize the control room to minimize unfiltered inleakage. The CRVS Booster Fan trains are designed to maintain this positive pressure with both trains in operation. The Frequency of 18 months is consistent with industry practice.

REFERENCES

1. UFSAR, Section 9.4.
 2. UFSAR, Chapter 15.
 3. 10 CFR 50.36.
 4. Regulatory Guide 1.52, Rev. 2, March 1978.
-

B 3.7 PLANT SYSTEMS

B 3.7.16 Control Room Area Cooling Systems (CRACS)

BASES

BACKGROUND

The CRACS provides temperature control for the control areas.

The control area is defined as the control room, cable room, and equipment room for each unit. Units 1 and 2 have a shared control room, and Unit 3 has an independent control room. The cable and equipment rooms are independent for each unit. The control rooms, cable rooms, and equipment rooms for each unit contain vital electrical equipment, such as 125 VDC Vital I&C Power and 120 VAC Vital I&C Power, which is essential for achieving safe shutdown on the units. A control area portion is defined as a cable room, equipment room, or control room, for which a set of redundant CRVS cooling trains is required. The control area portions are listed in the table below. Through the use of alternative air flow paths, air handling units AHU-34 and AHU-35 provide redundant cooling to both Units 1 and 2 cable rooms.

The AHUs which cool the control areas are part of the CRVS for each unit. The Chilled Water System (WC) serves as the heat sink for the CRVS on all three units. The WC System consists of two redundant cooling trains which serve all three units.

UFSAR Section 3.11.5 (Ref. 1) requires that redundant air conditioning and ventilation equipment be available to assure that no single failure of an active component within the CRVS and WC System will prevent proper control area environmental control. During a LOOP event, power will be temporarily lost to the equipment within these systems. Upon restoration of power the equipment will be required to restart. This restart makes the equipment susceptible to a single active failure. Without redundant cooling capability, acceptable temperatures within the control area could be exceeded. This could result in the potential failure of vital electrical equipment which is needed for safe shutdown of the units.

BASES

BACKGROUND
(continued)

The following table identifies each portion of the CRVS where redundancy is required:

Table B 3.7.16-1
CRVS Redundant Equipment

Control Area Portion	Associated CRVS Cooling Trains
Unit 1&2 Control Room	AHU-11 and AHU-12
Unit 1 Cable Room	AHU-34 and AHU-35
Unit 1 Equipment Room	AHU-22 and AHU-34
Unit 2 Cable Room	AHU-34 and AHU-35
Unit 2 Equipment Room	AHU-23 and AHU-35
Unit 3 Control Room	AHUs 3-13 and 3-14
Unit 3 Cable Room	AHUs 3-11 and 3-12
Unit 3 Equipment Room	AHUs 3-15 and 3-16

A single train will provide the required temperature control. The CRACS operation to maintain control room temperature is discussed in the UFSAR, Section 9.4.1 (Ref. 2).

APPLICABLE**SAFETY ANALYSES**

The design basis of the CRACS is to maintain control area temperature to ensure cooling of vital equipment.

The CRACS components are arranged in redundant trains. A single active failure of a CRACS component does not impair the ability of the system to perform as designed. The CRACS is designed to remove sensible and latent heat loads from the control area, including consideration of equipment heat loads to ensure equipment OPERABILITY.

The CRACS satisfies Criterion 3 of the NRC Policy Statement.

BASES (continued)

LCO

Two redundant trains of the CRACS and WC Systems train are required to be OPERABLE to ensure that at least one train in each system is available, assuming a single active failure disables the other train in one or both systems. Total system failure could result in the equipment operating temperature exceeding limits. A Train of CRVS consists of one of the redundant AHUs specified in Table B 3.7.16-1 for each of the three portions of the control area for an Oconee unit and associated ducts, dampers, instrumentation and controls. A single AHU can function as a component in more than one train on an Oconee unit and can function as a component on trains in multiple Oconee units. For example AHU-34, and its associated ducts, damper, instrumentation and controls, can simultaneously function as the AHU for a train of CRVS serving the Unit 1 cable room, the Unit 1 equipment room as well as the Unit 2 cable room. The combination of AHU-34 and either AHU-11 or AHU-12 along with their associated equipment constitutes a combination of equipment which can satisfy the requirement for one train of CRVS for Unit 1. Additionally, AHU-34 can simultaneously serve as the AHU for the portion of a Unit 2 CRVS train serving the Unit 2 cable room. AHU-35 in combination with either AHU-11 or AHU-12 along with their associated equipment constitutes a combination of equipment which can satisfy the requirement for one train of CRVS for Unit 2.

For the Units 1 and 2 cable and equipment rooms, a system of motorized dampers is provided to allow AHU-34 and AHU-35 to provide cooling to the opposite unit's cable and equipment rooms in the event of the loss of one of the AHU's. The flow path for cooling is accomplished by closing redundant dampers between the unit's cable and equipment rooms upon loss of the opposite units cable room AHU.

If AHU-34 fails, the dampers between the Unit 2 cable and equipment rooms will close, allowing AHU-35 to cool both Units 1 and 2 cable and equipment rooms providing AHU-22 and AHU-23 are operating. If one or both of the dampers in the flow path, fail open, then both AHU's are inoperable for Unit 1. If both dampers close, an adequate flow path for OPERABILITY is maintained even if one of two motor operated dampers on Unit 1 fail closed. If the Unit 2 dampers fail closed, OPERABILITY is not affected for the AHU-34 failure scenario. OPERABILITY is not maintained if one or both of the fire dampers between cable rooms or equipment rooms is closed. Compensatory measures, such as opening the damper must be taken to maintain OPERABILITY.

If AHU-35 fails, the dampers between the Unit 1 cable and equipment rooms will close, allowing AHU-34 to cool both Units 1 and 2 cable and equipment rooms providing AHU-22 and AHU-23 are operating. If one or both of the dampers in the flow path, fail open, then both AHU's are

BASES (continued)

inoperable for Unit 2. If both dampers close, an adequate flow path for OPERABILITY is maintained even if one of two motor operated dampers on Unit 2 fail closed. If the Unit 1 dampers fail closed, OPERABILITY is not affected for the AHU-35 failure scenario. OPERABILITY is not maintained if one or both of the fire dampers between cable rooms or equipment rooms is closed. Compensatory measures, such as opening the damper and posting a fire watch must be taken to maintain OPERABILITY.

The CRACS is considered OPERABLE when the individual components that are necessary to maintain control area temperature are OPERABLE in both trains of CRVS and WC System. Each CRVS train listed in Table B 3.7.16-1 includes the associated ductwork, instrumentation, and air handling unit, which includes the fan, fan motor, cooling coils, and isolation dampers. Each WC train consists of a chiller, chilled water pump, condenser service water pump, and associated controls. Although each chilled water pump is normally associated with, and aligned to, a specific chiller, any OPERABLE chilled water pump maybe aligned to any OPERABLE chiller to maintain one OPERABLE train when a component has been removed from service. The two redundant trains can include a temporarily installed full-capacity control area cooling train. Any temporary cooling train shall have a power source with availability equivalent to the source of the permanently installed train. In addition, the CRACS must be OPERABLE to the extent that air circulation can be maintained.

APPLICABILITY

In MODES 1, 2, 3, and 4 the CRACS must be OPERABLE to ensure that the control area temperature will not exceed equipment OPERABILITY requirements.

BASES (continued)

ACTIONS

A.1

With one CRVS train inoperable for the control area, action must be taken to restore the CRVS train to OPERABLE status within 30 days. In this Condition, the remaining OPERABLE CRVS train is adequate to maintain the control area temperature within limits. However, the overall reliability is reduced because a failure in the OPERABLE CRVS train could result in a loss of CRVS cooling function. The 30 day Completion Time is based on the low probability of a loss of CRVS cooling component and the time necessary to perform repairs to CRVS cooling equipment.

B.1

With one WC train inoperable for a control area portion, action must be taken to restore the WC train to OPERABLE status within 30 days. In this Condition, the remaining OPERABLE WC train is adequate to maintain the control area portion temperature within limits. However, the overall reliability is reduced because a failure in the OPERABLE WC train could result in a loss of CRACS cooling function. The 30 day Completion Time is based on the low probability of a loss of WC cooling component, and on the time necessary to perform repairs to WC cooling equipment.

C.1

With the control room area air temperature outside its limit, action must be taken to restore the air temperature to within the limit within 7 days. If the control room area air temperature exceeds its limit, the ability of a single train of CRACS to maintain control room area temperature may be affected. The Completion Time of 7 days is reasonable considering the remaining CRACS train available to perform the required temperature control function and the low probability of an event occurring that would require the CRACS operation during that time.

The Required Actions are modified by a Note that states LCO 3.0.4 is not applicable. In consideration of the redundant CRACS train available, the small variation in temperature expected between 12 hour surveillances, and the marginal impact small temperature variations may have on the ability of a CRACS train to maintain the control room temperature within limits, an exception to LCO 3.0.4 is applicable for this condition.

BASES

ACTIONS (continued)

D.1 and D.2

If the Required Actions and associated Completion Times of Conditions A, B, or C are not met, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours, and in MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner without challenging unit systems.

E.1

If both CRVS trains or both WC trains are inoperable, the CRACS may not be capable of performing the intended function and the unit is in a condition outside the accident analyses. Therefore, LCO 3.0.3 must be entered immediately.

SURVEILLANCE REQUIREMENTS

SR 3.7.16.1

This SR verifies that the heat removal capability of the system is sufficient to maintain the temperature in the control room and cable room at or below 80°F and maintain the temperature in the electrical equipment room at or below 85°F. The temperature is determined by reading gauges in each area or computer points which are considered representative of the average area temperature. These temperature limits are based on operating history and are intended to provide an indication of degradation of the cooling systems. The limits are conservative with respect to equipment operability temperature limits. The values for the SR are values at which the system is removing sufficient heat to meet design requirements (i.e., OPERABLE) and sufficiently above the values associated with normal operation during hot weather. The temperature in the equipment room is typically slightly higher than the temperature in the control room or cable room. Because of that, a higher value is specified for this area. The 12 hour Frequency is appropriate since significant degradation of the CRACS is slow and is not expected over this time period.

REFERENCES

1. UFSAR, Section 3.11.5.
2. UFSAR, Section 9.4.1.

Attachment 2

BASES

LCO
(continued)

19. LPI System Flow

LPI System Flow instrumentation is a Type A, Category 1 variable provided to support action for long term cooling requirements, to prevent LPI pump runout ~~and for flow balance~~. The indication is also used to identify an LPI pump operating at system pressures above its shutoff head. Flow measurement is provided by one channel per train with readout on an indicator and recorder. There are two LPI trains. The LPI channels provide flow indication over a range of 0 to 6000 gpm.

20. Reactor Building Spray Flow

Reactor Building Spray Flow instrumentation is a Type A, Category 1 variable provided to support action for long term cooling requirements and iodine removal and to prevent Reactor Building Spray and LPI pump runout. Flow measurement is provided by one channel per train with readout on an indicator and recorder. There are two RBS trains. The channels provide flow indication over a range from 0 to 2000 gpm.

21. Emergency Feedwater Flow

EFW Flow instrumentation is a Type D, Category 1 variable provided to monitor operation of RCS heat removal via the SGs. Two channels provide indication of EFW Flow to each SG over a range of approximately 100 gpm to 1200 gpm. Redundant monitoring capability is provided by the two independent channels of instrumentation for each SG. Each flow transmitter provides an input to a control room indicator. One channel also provides input to a recorder.

EFW Flow is the primary indication used by the operator to verify that the EFW System is delivering the correct flow to each SG. However, the primary indication used by the operator to ensure an adequate inventory is SG level.

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.3 Low Pressure Injection (LPI)

BASES

BACKGROUND

The function of the ECCS is to provide core cooling to ensure that the reactor core is protected after any of the following accidents:

- a. Loss of coolant accident (LOCA);
- b. Rod ejection accident (REA);
- c. Steam generator tube rupture (SGTR); and
- d. Main steam line break (MSLB).

There are two phases of ECCS operation: injection and recirculation. In the injection phase, all injection is initially added to the Reactor Coolant System (RCS) via the cold legs or Core Flood Tank (CFT) lines to the reactor vessel. After the borated water storage tank (BWST) has been depleted, the recirculation phase is entered as the suction is transferred to the reactor building sump.

Two redundant low pressure injection (LPI) trains are provided. The LPI trains consist of piping, valves, instruments, controls, heat exchangers, and pumps, such that water from the borated water storage tank (BWST) can be injected into the Reactor Coolant System (RCS). ~~Safety grade flow instrumentation is required to support OPERABILITY of the LPI trains to preclude NPSH or runout problems.~~ In MODES 1, 2 and 3, both trains of LPI must be OPERABLE. This ensures that 100% of the core cooling requirements can be provided even in the event of a single active failure. The LPI discharge header crossover valves must be manually (locally and remotely) OPERABLE in MODE 1, 2, and 3 to assure abundant, long term core cooling. Only one LPI train is required for MODE 4.

A suction header supplies water from the BWST or the reactor building sump to the LPI pumps. LPI discharges into each of the two core flood nozzles on the reactor vessel that discharge into the vessel downcomer area.

The LPI pumps are capable of discharging to the RCS at an RCS pressure of approximately 200 psia. When the BWST has been nearly emptied, the suction for the LPI pumps is manually transferred to the reactor building sump.

BASES

LCO (continued)

and accidents. Each LPI train includes the piping, instruments, pumps, valves, heat exchangers and controls to ensure an OPERABLE flow path capable of taking suction from the BWST upon an ES signal and the capability to manually (remotely) transfer suction to the reactor building sump. The safety grade flow indicator associated with an LPI train is

~~required to be OPERABLE to support LPI train OPERABILITY. The safety grade flow indicator associated with LPSW flow to an LPI cooler is required to be OPERABLE to support LPI train OPERABILITY.~~ Insert 1

In MODE 4, one of the two LPI trains is required to ensure sufficient LPI flow is available to the core.

During an event requiring LPI injection, a flow path is required to provide an abundant supply of water from the BWST to the RCS, via the LPI pumps and their respective supply headers, to the reactor vessel. In the long term, this flow path may be switched to take its supply from the reactor building sump.

This LCO is modified by three Notes. Note 1 changes the LCO requirement when in MODE 4 for the number of OPERABLE trains from two to one. Note 2 allows an LPI train to be considered OPERABLE during alignment, when aligned or when operating for decay heat removal if capable of being manually (remotely) realigned to the LPI mode of operation. This provision is necessary because of the dual requirements of the components that comprise the LPI and decay heat removal modes of the LPI System. Note 3 requires the LPI discharge header crossover valves (LP-9 and LP-10) to be OPERABLE in MODES 1, 2, and 3.

The flow path for each train must maintain its designed independence to ensure that no single failure can disable both LPI trains. If both LPI discharge header crossover valves (LP-9 and LP-10) are simultaneously open then only one LPI train is considered OPERABLE.

APPLICABILITY

In MODES 1, 2 and 3, the LPI train OPERABILITY requirements for the Design Basis Accident, a large break LOCA, are based on full power operation. The LPI discharge crossover valve OPERABILITY requirements for CFT line break is based on full power operation. Although reduced power would not require the same level of performance, the accident analysis does not provide for reduced cooling requirements in the lower MODES.

In MODE 4, one OPERABLE LPI train is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the limited core cooling requirements.

B 3.6 CONTAINMENT SYSTEMS

B 3.6.5 Reactor Building Spray and Cooling Systems

BASES

BACKGROUND

The Reactor Building Spray and Reactor Building Cooling systems provide containment atmosphere cooling to limit post accident pressure and temperature in containment to less than the design values. Reduction of containment pressure and the iodine removal capability of the spray reduces the release of fission product radioactivity from containment to the environment, in the event of an accident, to within limits. The Reactor Building Spray and Reactor Building Cooling systems are designed to meet ONS Design Criteria (Ref. 1).

The Reactor Building Cooling System and Reactor Building Spray System are Engineered Safeguards (ES) systems. They are designed to ensure that the heat removal capability required during the post accident period can be attained. The Reactor Building Spray System and Reactor Building Cooling System provide containment heat removal operation. The Reactor Building Spray System and Reactor Building Cooling System provide methods to limit and maintain post accident conditions to less than the containment design values.

Reactor Building Spray System

The Reactor Building Spray System consists of two separate trains of equal capacity, each capable of meeting the design basis. Each train includes a reactor building spray pump, spray headers, nozzles, valves, piping and a flow indicator. ~~The safety grade flow indicator of an RBS train and the safety grade flow indicator of the associated LPI train are both required to be OPERABLE to support RBS train OPERABILITY. Both LPI and RBS train flow must be monitored to ensure that the RBS pump does not runout or exceed NPSH requirements.~~ Each train is powered from a separate ES bus. The borated water storage tank (BWST) supplies borated water to the Reactor Building Spray System during the injection phase of operation. In the recirculation mode of operation, Reactor Building Spray System pump suction is manually transferred to the reactor building sump.

BASES

LCO
(continued)

LPI System) upon an Engineered Safeguards Protective System signal and manually transferring suction to the reactor building sump. ~~The safety-grade flow indicator of an RBS train and the safety grade flow indicator of the associated LPI train are both required to be OPERABLE to support RBS train OPERABILITY.~~ INSERT 2

Each reactor building cooling train shall include cooling coils, fusible dropout plates, an axial vane flow fan, instruments, valves, and controls to ensure an OPERABLE flow path. Valve LPSW-108 shall be locked open to support system OPERABILITY.

APPLICABILITY

In MODES 1, 2, 3, and 4, an accident could cause a release of radioactive material to containment and an increase in containment pressure and temperature, requiring the operation of the reactor building spray trains and reactor building cooling trains.

In MODES 5 and 6, the probability and consequences of these events are reduced due to the pressure and temperature limitations of these MODES. Thus, the Reactor Building Spray System and the Reactor Building Cooling System are not required to be OPERABLE in MODES 5 and 6.

ACTIONS

A 1

With one reactor building spray train inoperable in MODE 1 or 2, the inoperable reactor building spray train must be restored to OPERABLE status within 7 days. In this Condition, the remaining OPERABLE spray and cooling trains are adequate to perform the iodine removal and containment cooling functions. The 7 day Completion Time takes into account the redundant heat removal capability afforded by the OPERABLE reactor building spray train, reasonable time for repairs, and the low probability of an accident occurring during this period.

The 14 day portion of the Completion Time for Required Action A.1 is based upon engineering judgment. It takes into account the low probability of coincident entry into two Conditions in this LCO coupled with the low probability of an accident occurring during this time. Refer to Section 1.3, Completion Times, for a more detailed discussion of the purpose of the "from discovery of failure to meet the LCO" portion of the Completion Time.

INSERT 1

The safety grade flow indicator of an LPI train is required to support OPERABILITY of the LPI and ^R~~R~~BS trains to preclude NPSH or runout problems. In addition, during an event, RBS train flow must be monitored and controlled to support the LPI pumps to ensure that the NPSH requirements for the LPI pumps are not exceeded. If the flow instrumentation or the capability to control the flow in a RBS train is unavailable then the associated LPI train's OPERABILITY is affected until such time as the RBS train is restored or the associated RBS pump is placed in a secured state to prevent actuation during an event. The safety grade flow indicator associated with LPSW flow to an LPI cooler is required to be OPERABLE to support LPI train OPERABILITY.

INSERT 2

The safety grade flow indicator of an RBS train is required to support OPERABILITY of the RBS and LPI trains to preclude NPSH or runout problems. In addition, during an event, LPI train flow must be monitored and controlled to support the RBS pumps to ensure that the NPSH requirements for the RBS pumps are not exceeded. If the flow instrumentation or the capability to control the flow in a LPI train is unavailable then the associated RBS train's OPERABILITY is affected until such time as the LPI train is restored or the associated LPI pump is placed in a secured state to prevent actuation during an event.

B 3.7 PLANT SYSTEMS

B 3.7.9 Control Room Ventilation System (CRVS) Booster Fans

BASES

BACKGROUND The CRVS Booster Fan trains provide a protected environment from which operators can control the unit following an uncontrolled release of radioactivity, chemicals, or toxic gas. provides 50% capacity and

Each CRVS Booster Fan train consist^{CS} of a fan filter assembly, Booster Fans, Ducting, and Dampers. Each filter train consists of a pre-filter, a high efficiency particulate air (HEPA) filter, and a charcoal filter.

The CRVS Booster Fan trains are an emergency system. Upon receipt of a radiation alarm from the control room air radiation monitor, the CRVS Booster Fan trains can be started manually to minimize unfiltered air from entering the control room. Upon starting the fans, dampers are automatically positioned to isolate the control room. The pre-filters remove any large particles in the air, and any entrained water droplets present, to prevent excessive loading of the HEPA and carbon filters.

The two CRVS Booster Fan trains, when operated simultaneously, can pressurize the control room to minimize infiltration of unfiltered air. The CRVS operation is discussed in the UFSAR, Section 9.4 (Ref. 1).

APPLICABLE SAFETY ANALYSES The CRVS Booster Fan train components are arranged in two ventilation trains. The location of components and ducting ensures an adequate supply of filtered air to all areas requiring access. The CRVS provides airborne radiological protection for the control room operators for the most limiting design basis loss of coolant accident fission product release presented in the UFSAR, Chapter 15 (Ref. 2).

The CRVS Booster Fan trains satisfy Criterion 3 of 10 CFR 50.36 (Ref. 3).

LCO Two CRVS trains are required to be OPERABLE. Total system failure could result in excessive doses to the control room operators in the event of a large radioactive release.

BASES

SURVEILLANCE
REQUIREMENTS

SR 3.7.9.1 (continued)

adequately checks this system ^{dampers} The trains need only be operated for \geq one hour and all louvers verified to be OPERABLE to demonstrate the function of the system. This test includes an external visual inspection of the CRVS Booster Fan trains. The 92 day Frequency is based on the known reliability of the equipment.

SR 3.7.9.2

This SR verifies that the required CRVS Booster Fan train testing is performed in accordance with the Ventilation Filter Testing Program (VFTP). The CRVS Booster Fan train filter test frequencies are in accordance with Regulatory Guide 1.52 (Ref. 4). The VFTP includes testing HEPA filter performance and carbon adsorber efficiency. Specific test frequencies and additional information are discussed in detail in the VFTP.

SR 3.7.9.3

This SR verifies the integrity of the control room enclosure. The control room positive pressure, with respect to potentially contaminated adjacent areas, is periodically tested to verify that the CRVS Booster Fan trains are functioning properly. During the emergency mode of operation, the CRVS Booster Fan trains are designed to pressurize the control room to minimize unfiltered inleakage. The CRVS Booster Fan trains are designed to maintain this positive pressure with both trains in operation. The Frequency of 18 months is consistent with industry practice.

REFERENCES

1. UFSAR, Section 9.4.
 2. UFSAR, Chapter 15.
 3. 10 CFR 50.36.
 4. Regulatory Guide 1.52, Rev 2, March 1978
-

BASES (continued)

LCO

Two redundant trains of the CRACS and WC Systems train are required to be OPERABLE to ensure that at least one train in each system is available, assuming a single active failure disables the other train in one or both systems. Total system failure could result in the equipment operating temperature exceeding limits. A Train of CRVS consists of one of the redundant AHUs specified in Table B 3.7.16-1 for each of the three portions of the control area for an Oconee unit and associated ducts, dampers, instrumentation and controls. A single AHU can function as a component in more than one train on an Oconee unit and can function as a component on trains in multiple Oconee units. For example AHU-34, and its associated ducts, damper, instrumentation and controls, can simultaneously function as the AHU for a train of CRVS serving the Unit 1 cable room, the Unit 1 equipment room as well as the Unit 2 cable room. The combination of AHU-34 and either AHU-11 or AHU-12 along with their associated equipment constitutes a combination of equipment which can satisfy the requirement for one train of CRVS for Unit 1. Additionally, AHU-34 can simultaneously serve as the AHU for the portion of a Unit 2 CRVS train serving the Unit 2 cable room. AHU-35 in combination with either AHU-11 or AHU-12 along with their associated equipment constitutes a combination of equipment which can satisfy the requirement for one train of CRVS for Unit 2.

Insert A →

The CRACS is considered OPERABLE when the individual components that are necessary to maintain control area temperature are OPERABLE, in both trains of CRVS and WC System. Each CRVS train listed in Table B 3.7.16-1 includes the associated ductwork, instrumentation, and air handling unit, which includes the fan, fan motor, cooling coils, and isolation dampers. Each WC train consists of a chiller, chilled water pump, condenser service water pump, and associated controls. Although each chilled water pump is normally associated with, and aligned to, a specific chiller, any OPERABLE chilled water pump may be aligned to any OPERABLE chiller to maintain one OPERABLE train when a component has been removed from service. The two redundant trains can include a temporarily installed full-capacity control area cooling train. Any temporary cooling train shall have a power source with availability equivalent to the source of the permanently installed train. In addition, the CRACS must be OPERABLE to the extent that air circulation can be maintained.

APPLICABILITY

In MODES 1, 2, 3, and 4 the CRACS must be OPERABLE to ensure that the control area temperature will not exceed equipment OPERABILITY requirements.

Insert A for B 3.7.16

^{the}
For Units 1 and 2 cable and equipment rooms, a system of motorized dampers is provided to allow AHUs 1-34 and 2-35 to be able to provide cooling to the opposite unit's cable and equipment rooms in the event of the loss of one of the AHU's. The flow path for the cooling is accomplished by closing redundant dampers between the unit's cable and equipment rooms upon loss of the opposite unit's cable room AHU.

providing
If Unit 1 AHU 1-34 fails, the dampers between Unit 2 cable and equipment rooms (~~1-VSDACD0013 and 2-VSDACD0014~~) will close, allowing Unit 2 AHU 2-35 to cool both Units 1 & 2 cable & equipment rooms assuming AHU 1-22 and AHU 1-23 are still operating. If one or both of the dampers that are supposed to close fail open, then both AHU's are inoperable for Unit 1. If both dampers close properly, ^{in the flow path,} adequate flow path for operability is maintained even if one of two motor operated dampers on the Unit 1 side (~~1-VSDACD0013 or 1-VSDACD0014~~) fail closed. If the Unit 2 dampers fail open, operability is not affected for the AHU 1-34 failure scenario. Operability is not maintained if one or both of the fire dampers between cable rooms or equipment rooms (~~0-VSDAFD01, 02, 03, or 04~~) is closed, and it will be necessary to provide compensatory measures, such as opening the damper and posting a fire watch, to maintain operability. *must be taken*

providing
If Unit 2 AHU 2-35 fails, the dampers between Unit 1 cable and equipment rooms (~~1-VSDACD0013 and 2-VSDACD0014~~) will close, allowing Unit 1 AHU 1-34 to cool both Units 1 & 2 cable & equipment rooms assuming AHU 2-22 and AHU 2-23 are still operating. If one or both of the dampers that are supposed to close fail open, then both AHU's are inoperable for Unit 2. If both dampers close properly, ^{in the flow path,} adequate flow path for operability is maintained even if one of two motor operated dampers on the Unit 2 side (~~2-VSDACD0013 or 2-VSDACD0014~~) fail closed. If the Unit 1 dampers fail open, operability is not affected for the AHU 2-35 failure scenario. Operability is not maintained if one or both of the fire dampers between cable rooms or equipment rooms (~~0-VSDAFD01, 02, 03, or 04~~) is closed, and it will be necessary to provide compensatory measures such as opening the damper and posting a fire watch to maintain operability. *must be taken*
OPERABILITY.