DAVE BAXTER
Vice President
Oconee Nuclear Station

Duke Energy Corporation
ON01VP/7800 Rochester Highway
Seneca, SC 29672

864-885-4460
864-885-4208 fax
dabaxter@dukeenergy.com

October 23, 2008

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

Subject: Duke Energy Carolinas, LLC
Oconee Nuclear Site, Units 1, 2, and 3
Docket Numbers 50-269, 50-270, and 50-287
Request for Additional Information associated with the License Amendment Request (LAR) for Low Pressure Service Water Reactor Building Waterhammer Prevention System Modification
LAR No. 2006-05

In accordance with 10 CFR 50.90, Duke Energy Carolinas, LLC (Duke) proposes to amend Renewed Facility Operating Licenses Nos. DPR-38, DPR-47, and DPR-55. A LAR was submitted on October 16, 2007 to the Nuclear Regulatory Commission (NRC) seeking review and approval of a plant modification that addresses waterhammer concerns described in Generic Letter (GL) 96-06. The modification will install check valves in the Low Pressure Service Water (LPSW) supply header and automatic pneumatic discharge isolation valves, controllable vacuum breaker valves in the LPSW return header, and associated circuitry to isolate Engineered Safeguards (ES) portions of the LPSW system to mitigate waterhammers. The affected LPSW piping is located inside the containment, the turbine building, and the auxiliary building and provides cooling to the Reactor Building Cooling Units (RBCUs), Reactor Building Auxiliary Coolers (RBACs) and the Reactor Coolant Pump Motor (RCPM) Coolers. This request also proposes Technical Specifications (TS) and associated bases in support of maintaining the Containment Integrity and Containment Heat Removal Functions of the system.

Duke met with the NRC on January 24, 2008, to discuss the submittal. In an email dated March 12, 2008, Duke received a request for additional information (RAIs). Duke submitted the RAI response by letter dated May 7, 2008. In an email dated June 12, 2008 and a conference call on July 22, 2008, Duke was asked to clarify information associated with valve leakage and to address the accumulator. The RAI response was submitted in a letter dated September 2, 2008. In subsequent conversations, additional questions have been raised relative to the Waterhammer analysis and setpoints. Revisions to the TSs are required to resolve the additional questions and additional clarification is provided regarding the capacity of the accumulator. Enclosure 1

provides Duke's descriptions of proposed TS changes and the capacity of the accumulator. Attachments 1 and 2 contain the TS retypes and mark-ups, respectively that are required as a result of discussion surrounding the Waterhammer Analysis.

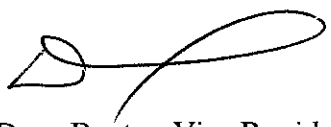
In accordance with Duke administrative procedures and the Quality Assurance Program Topical Report, these proposed changes have been reviewed and approved by the Plant Operations Review Committee Chairman and Nuclear Safety Review Board Director. Additionally, a copy of this response is being sent to the State of South Carolina in accordance with 10 CFR 50.91 requirements.

Implementation dates for the Waterhammer Prevention modifications were committed to in a letter to the NRC dated February 14, 2007. To support the commitment dates specified, Duke requests that this amendment be effective upon issuance. Modification implementation will start with Unit 2 startup from the fall 2008 outage and continue through the outages which follow for Units 1 and 3 in the fall and spring of 2009 respectively. Notes included in the proposed Technical Specifications control the applicability for these Units prior to the modifications being installed and can be removed or modified after the modifications have been completed on all three Oconee Units. There are no new commitments being made as a result of this letter.

Inquiries on this proposed amendment request should be directed to Reene' Gambrell of the Oconee Regulatory Compliance Group at (864) 885-3364.

I declare under penalty of perjury that the foregoing is true and correct. Executed on October 23, 2008.

Sincerely,



Dave Baxter, Vice President
Oconee Nuclear Site

Enclosures:
1. Requests For Additional Information

Attachments:
1. Technical Specifications – Mark Up
2. Technical Specifications – Reprinted Page

bc w/enclosures and attachments:

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

Mr. Lenny Olshan, Project Manager
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Stop O-8 G9A
Washington, D. C. 20555

Mr. Andy Hutto
Senior Resident Inspector
Oconee Nuclear Site

Mrs. Susan E. Jenkins, Manager
Infectious and Radioactive Waste Management Section
Department of Health & Environmental Control
2600 Bull Street
Columbia, SC 29201

bcc w/enclosures and attachments:

B. G. Davenport
R. V. Gambrell
J. A. Kammer
P. J. Earnhardt
H. E. Harling
V. B. Bowman
T. N. Glenn
L. F. Vaughn
C. E. Curry
C. G. Abellana
J. E. Burchfield
T. N. Inman
R. L. Gill – NRI&IA
R. D. Hart – CNS
K. L. Ashe - MNS
NSRB, EC05N
ELL, ECO50
File - T.S. Working
ONS Document Management

ENCLOSURE 1

REQUESTS FOR ADDITIONAL INFORMATION

Enclosure 1 – Requests For Additional Information
License Amendment Request No. 2006-05
October 23, 2008

RAI 1: Technical Specifications

Description of Changes:

TS 3.3.27, LPSW RB Waterhammer Prevention Circuitry

The TS was revised to remove the term 'reset' from the title, LCO, Conditions, and Required Actions. This was done to account for the two functions provided by the Waterhammer Prevention System and the fact that you cannot remove one function from service without affecting the other. Condition C will require opening two LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation valves in the same header. Along with opening the Isolation valves, actions shall be initiated to restore required LPSW RB Waterhammer Prevention analog or digital logic channels to OPERABLE status. Once the LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation valves are opened, the Waterhammer Protection System is no longer OPERABLE. Condition B of LCO 3.7.7 must also be entered. Another 7 days is allowed to return the circuitry to service; while 7 days is allowed to have the LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation valves out of service. This is acceptable based on similar TS, engineering judgment, and the low probability of an event occurring during this time.

The TS Bases was revised to reflect both functions of the LPSW RB Waterhammer Prevention System.

TS 3.7.7, Low Pressure Service Water (LPSW) System

Technical Specification (TS) 3.7.7 was revised to add the Waterhammer Prevention System (WPS).

An LCO will be added to ensure the WPS is OPERABLE on Units with the modification installed.

The old Condition B will be resequenced to Condition C.

New Condition B will be added to allow the WPS to be out of service for 7 days. This is based on similar TS, engineering judgment, and the low probability of an event happening.

New Surveillance Requirements (SR) are being added as follows:

SR 3.7.7.1 will verify the correct level in the leakage accumulator to provide assurance that in the event of boundary valve leakage during a LOOP event, there is sufficient water to keep the LPSW piping filled. The required water level is between half full and full, which corresponds to a level indication of 20.5" to 41". Any level glass reading is bounded by 20.5" to 41" level indication, therefore any level glass reading is considered acceptable. During LPSW testing, accumulator level > 41" is acceptable because the mass of air in the accumulator is unchanged in the short term; therefore the accumulator is still capable of performing its safety function.

SR 3.7.7.5 will verify LPSW leakage accumulator is able to provide makeup flow lost due to boundary valve leakage on Units with LPSW RB Waterhammer modification installed.

SR 3.7.7.6 will verify LPSW WPS boundary valve leakage is $\leq$ 20 gpm for Units with LPSW RB Waterhammer modification installed.

Existing SRs were renumbered to accommodate the above.

The TS Bases was revised to reflect the above, as well as correct some editorial errors.

RAI 2: WPS Accumulator Size

The WPS accumulator is sized to hold approximately 76 gallons of water.

ATTACHMENT 1

TECHNICAL SPECIFICATION - RETYPE

REMOVE	INSERT
----------	TS 3.3.27-1
----------	TS 3.3.27-2
----------	TS 3.3.27-3
TS 3.7.7-1	TS 3.7.7-1
TS 3.7.7-2	TS 3.7.7-2
----------	TS 3.7.7-3
----------	TSB B 3.3.27-1
----------	TSB B 3.3.27-2
----------	TSB B 3.3.27-3
----------	TSB B 3.3.27-4
----------	TSB B 3.3.27-5
----------	TSB B 3.3.27-6
TSB B 3.7.7-1	TSB B 3.7.7-1
TSB B 3.7.7-2	TSB B 3.7.7-2
TSB B 3.7.7-3	TSB B 3.7.7-3
TSB B 3.7.7-4	TSB B 3.7.7-4
----------	TSB B 3.7.7-5
----------	TSB B 3.7.7.6

3.3 INSTRUMENTATION

3.3.27 Low Pressure Service Water (LPSW) Reactor Building (RB) Waterhammer Prevention Circuitry

LCO 3.3.27 Three LPSW RB Waterhammer Prevention analog channels and two digital logic channels shall be OPERABLE.

----------NOTES----------
Applicable on each unit after completion of the LPSW RB Waterhammer Modification on the respective Unit.

APPLICABILITY: MODES 1, 2, 3, and 4

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required LPSW RB Waterhammer Prevention analog channel inoperable.	A.1 Restore required LPSW RB Waterhammer Prevention analog channel to OPERABLE status.	7 days
B. One required LPSW RB Waterhammer Prevention digital logic channel inoperable.	B.1 Restore required LPSW RB Waterhammer Prevention digital logic channel to OPERABLE status.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Two or more required LPSW RB Waterhammer Prevention analog channels inoperable. OR Two required LPSW RB Waterhammer Prevention digital logic channels inoperable. OR Required Actions and associated Completion Times of Condition A or B not met.	C.1 Open two LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation valves in the same header. AND C.2 Initiate actions to restore required LPSW RB Waterhammer Prevention analog or digital logic channels to OPERABLE status.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.27.1	Perform CHANNEL CHECK.	12 hours
SR 3.3.27.2	Perform CHANNEL FUNCTIONAL TEST.	92 days
SR 3.3.27.3	Perform CHANNEL CALIBRATION.	18 months

3.7 PLANT SYSTEMS

3.7.7 Low Pressure Service Water (LPSW) System

LCO 3.7.7 For Unit 1 or Unit 2, three LPSW pumps and one flow path shall be OPERABLE.

For Unit 3, two LPSW pumps and one flow path shall be OPERABLE.

The LPSW Waterhammer Prevention System (WPS) shall be OPERABLE on Units where the LPSW RB Waterhammer modification is installed.

----------NOTE----------
With either Unit 1 or Unit 2 defueled and appropriate LPSW loads secured on the defueled Unit, such that one LPSW pump is capable of mitigating the consequences of a design basis accident on the remaining Unit, only two LPSW pumps for Unit 1 or Unit 2 are required.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One required LPSW pump inoperable.	A.1	Restore required LPSW pump to OPERABLE status.	72 hours
B. LPSW WPS inoperable on Units with LPSW RB Waterhammer modification installed.	C.1	Restore the LPSW WPS to OPERABLE status.	7 days
C. Required Action and associated Completion Time of Condition A and B not met.	B.1	Be in MODE 3.	12 hours
	AND		
	B.2	Be in MODE 5.	60 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.7.7.1	Verify LPSW leakage accumulator level is within Water levels between 20.5" to 41" for Units with LPSW RB Waterhammer modification installed. During LPSW testing, accumulator level > 41" is acceptable.	12 hours
SR 3.7.7.2	----------NOTE---------- Isolation of LPSW flow to individual components does not render the LPSW System inoperable. ---------- Verify each LPSW manual, and non-automatic power operated valve in the flow path servicing safety related equipment, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
SR 3.7.7.3	Verify each LPSW automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	18 months
SR 3.7.7.4	Verify each LPSW pump starts automatically on an actual or simulated actuation signal.	18 months
SR 3.7.7.5	Verify LPSW leakage accumulator is able to provide makeup flow lost due to boundary valve leakage on Units with LPSW RB Waterhammer modification installed.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.7.7.6	Verify LPSW WPS boundary valve leakage is ≤ 20 gpm for Units with LPSW RB Waterhammer modification installed.	18 months

B 3.3 INSTRUMENTATION

B 3.3.27 Low Pressure Service Water (LPSW) Reactor Building (RB) Waterhammer Prevention Circuitry

BASES

BACKGROUND

NRC Generic Letter 96-06 identified three issues of concern relative to effects of fluid in piping following postulated design basis events. One area of concern is the cooling water system piping serving the containment air coolers. The Low Pressure Service Water (LPSW) system provides cooling water to the safety related Reactor Building Cooling Units (RBCUs), non-safety related Reactor Building Auxiliary Cooling Units (RBACs) and non-safety related Reactor Coolant Pump Motor (RCPM) coolers. There is a possibility of waterhammer in the LPSW piping inside containment during either a Loss-of-Coolant Accident (LOCA) or a Main Steam Line Break (MSLB) concurrent with a loss of off-site power (LOOP) without means to prevent waterhammer.

The LPSW RB Waterhammer Prevention System (WPS) is composed of check valves, active pneumatic discharge isolation valves, and active controllable vacuum breaker valves. The LPSW RB Waterhammer Prevention Circuitry isolates LPSW to the RBCUs, RBACs and RCPM coolers any time the LPSW header pressure decreases significantly, such as during a LOOP event or LPSW pump failure during normal operations. The isolation function prevents and/or minimizes the potential waterhammers in the associated piping. The LPSW RB Waterhammer Prevention Circuitry will also re-establish flow to the containment air coolers following WPS actuation once the LPSW system has repressurized.

The RBCU fans and RBCU cooling water motor operated return valves are Engineered Safeguards (ES) features. On an ES actuation, these valves open. The LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation Valves are designed to close on low LPSW supply header pressure and re-open when the LPSW supply header pressure is restored. The LPSW RB Waterhammer Prevention Controllable Vacuum Breaker Valves are designed to open on low LPSW pressure and re-close when LPSW pressure is restored.

The LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation Valves fail open on loss of instrument air. During normal operation, a control solenoid valve in the instrument air supply to each

BASES

BACKGROUND (continued)

LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation Valve is energized to vent air from the actuator to maintain the isolation valves in the open position. On loss of two of four of the analog input signals for the LPSW RB Waterhammer Prevention Isolation Circuitry, the 3-way control solenoid valve is de-energized to align the air accumulator with the pneumatic operator; thereby closing the LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation Valve(s). LPSW RB Waterhammer Prevention Controllable Vacuum Breaker Valves are located downstream of the pneumatic discharge isolation valves. The LPSW RB Waterhammer Prevention Controllable Vacuum Breaker Valves are normally closed. They open simultaneously with the closing of the LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation Valves in order to break vacuum in the return header by energizing the control solenoid valve.

The LPSW RB Waterhammer Prevention Circuitry contains four analog sensor channels and two digital actuation logic channels. Only three analog sensor channels are required to support OPERABILITY. Each analog sensor channel contains a safety grade pressure transmitter and current switch. The two digital actuation logic channels consist of safety grade relays in a two-out-of-two logic configuration. The actuation of the LPSW RB Waterhammer Prevention Circuitry requires two of the three required LPSW pressure signals supplied from the LPSW header pressure transmitters.

APPLICABLE SAFETY ANALYSES

In a LOOP event, the LPSW RB Waterhammer Prevention Circuitry isolates the cooling water flow to the RBCUs, RBACs and RCPM cooler on low LPSW supply header pressure prior to LPSW pump restart to prevent waterhammers. The LPSW RB Waterhammer Prevention Circuitry will also re-establish flow to the containment air coolers following WPS actuation once the LPSW system has repressurized. Isolating and re-establishing the LPSW flowpath ensures that Containment Integrity and Containment Heat Removal functions are maintained.

The RBCU Fans presently have a 3 minute delay to re-start following ES activation. LPSW flow will be restored to the RBCUs prior to the RBCU fan restart. This ensures the Containment Heat Removal function is unaffected.

The LPSW RB Waterhammer Prevention Circuitry satisfies Criterion 3 of 10 CFR 50.36 (Ref. 1).

BASES (continued)

LCO

Three LPSW RB Waterhammer Prevention analog channels and two digital logic channels shall be OPERABLE. Each analog sensor channel contains a safety related pressure transmitter and current switch. The two digital logic channels consist of safety related relays. The LPSW RB Waterhammer Prevention Circuitry design ensures that a single active failure will not prevent the circuitry and associated components from performing the intended safety functions.

There are four analog channels, but only three are required to support OPERABILITY. These three analog channels are configured in a two out of three control logic scheme that will isolate/reset the LPSW RB Waterhammer Prevention Circuitry. The LPSW RB Waterhammer Prevention Circuitry will close/open the four LPSW RB Pneumatic Discharge Isolation Valves when LPSW pressure is either low or returns to normal. Either digital logic channel will trip/restore the flow path.

The actuation logic used for the LPSW RB Waterhammer Prevention Circuitry is similar to other safety related circuitry currently being used. The LCO allowed required action and Completion Times are acceptable based on the number of channels normally available. Though one of the four analog channels can be out of service for an extended period, it is not a normal practice.

When one required analog channel is taken out of service, the two out of three analog control logic scheme is reduced to a two out of two analog control logic scheme. This control logic scheme will trip/reset the digital channels on decreasing/increasing supply header pressure.

Failure of an analog channel while in the two out of two control logic mode will reduce the control logic to a one out of two control logic scheme. This control logic is unacceptable because a failure will prevent the LPSW RB Waterhammer Prevention Circuitry from working as required.

The two digital channels are triggered by two of four analog channels consisting of a pressure transmitter/current switch. On decreasing/increasing supply header pressure, two of four analog channels will trip/reset the digital channels. If one of the two digital channels is inoperable or out of service, the system is no longer single failure proof.

The LCO is modified by a note. The note states that the LCO becomes applicable on each Unit after completion of the LPSW RB Waterhammer Modification.

BASES

APPLICABILITY

The LPSW RB Waterhammer Prevention Circuitry is required to be OPERABLE in MODES 1, 2, 3, and 4. This ensures LPSW is available to support the OPERABILITY of the equipment serviced by the LPSW system.

In MODES 5 and 6, the probability and consequences of the events that the LPSW System supports is reduced due to the pressure and temperature limitations of these MODES. As a result, the LPSW RB Waterhammer Prevention Circuitry is not required to be OPERABLE in MODES 5 and 6.

ACTIONS

A.1

If one required LPSW RB Waterhammer Prevention analog channel is inoperable, the LPSW RB Waterhammer Prevention Circuitry is no longer single failure proof and the control logic scheme is reduced to a two out of two configuration. Required Action A.1 requires the LPSW RB Waterhammer Prevention analog channels be restored to OPERABLE status within 7 days.

The 7 day Completion Time takes into account the allowed outage times of similar systems, reasonable time for repairs, and the low probability of an event occurring during this period.

B.1

If one required LPSW RB Waterhammer Prevention digital logic channel is inoperable, the LPSW RB Waterhammer Prevention Circuitry is not single failure proof. Required Action B.1 requires the digital channels be restored to OPERABLE status within 7 days.

The 7 day Completion Time takes into account the allowed outage times of similar systems, reasonable time for repairs, and the low probability of an event occurring during this period.

BASES

ACTIONS (continued)

C.1 and C.2

If two or more required LPSW RB Waterhammer Prevention analog channel(s) or two digital logic channel(s) are inoperable or the Required Actions and associated Completion Times of Condition A or B are not met, the WPS must be configured in order to assure the Containment Integrity and Heat removal functions are maintained. To achieve this status, actions to prevent automatic closing by manually opening (remote or local) two LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation valves in the same header shall be completed immediately and actions to repair the inoperable equipment shall be taken immediately. LCO 3.7.7 will also apply when the LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation valves in the same header are opened.

SURVEILLANCE REQUIREMENTS

SR 3.3.27.1

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

Agreement criteria are determined, based on a combination of the channel instrument uncertainties, including isolation, indication, and readability. If a channel is outside the criteria, it may be an indication that the transmitter or the signal processing equipment has drifted outside its limit.

The Frequency, equivalent to every shift, is based on operating experience that demonstrates channel failure is rare. Since the probability of two random failures in redundant channels in any 12 hour

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.27.1 (continued)

period is extremely low, the CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. The CHANNEL CHECK supplements less formal, but potentially more frequent, checks of channel operability during normal operational use of the displays associated with the LCO's required channels.

SR 3.3.27.2

A CHANNEL FUNCTIONAL TEST is performed on each channel to ensure the circuitry will perform its intended function. The Frequency of 92 days is based on engineering judgment and operating experience, with regard to channel OPERABILITY and drift, which demonstrates that failure of more than one channel in any 92 day interval is a rare event.

SR 3.3.27.3

A CHANNEL CALIBRATION is a complete check of the analog instrument channel, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. The CHANNEL CALIBRATION leaves the components adjusted to account for instrument drift to ensure that the circuitry remains operational between successive tests. The 18-month Frequency is justified by the assumption of an 18-month calibration interval in the setpoint analysis determination of instrument drift during that interval.

REFERENCES

1. 10 CFR 50.36.

B 3.7 PLANT SYSTEMS

B 3.7.7 Low Pressure Service Water (LPSW) System

BASES

BACKGROUND

The LPSW System provides a heat sink for the removal of process and operating heat from safety related components during a transient or accident. During normal operation and normal shutdown, the LPSW System also provides this function for various safety related and nonsafety related components.

The LPSW system for Unit 1 and Unit 2 is shared and consists of three LPSW pumps which can supply multiple combinations of path ways to supply required components. The LPSW system for Unit 3 consists of two LPSW pumps which can supply multiple combinations of path ways to supply required components. Although multiple combinations of path ways exist, only one flow path is necessary, since no single failure of an active component can prevent the LPSW system from supplying necessary components. The pumps and valves are remote manually aligned, except in the unlikely event of a loss of coolant accident (LOCA) or other accidents. The pumps are automatically started upon receipt of an Engineered Safeguards actuation signal, and automatic valves are aligned to their post accident positions. The LPSW System also provides cooling directly to the Reactor Building Cooling Units (RBCU) and Low Pressure Injection coolers, turbine driven EFW pump, HPI pump motor coolers, and the motor driven EFW pumps.

GL 96-06 required consideration of waterhammer inside containment during a LOCA or MSLB combined with a loss of offsite power (LOOP) event. As a result, the LPSW Reactor Building (RB) Waterhammer Prevention System (WPS) was added to maintain LPSW piping water solid inside containment during any event that causes a loss of LPSW system pressure. The WPS is fully automatic. Other functions of the WPS are addressed by LCO 3.3.27 and LCO 3.6.5.

Additional information about the design and operation of the LPSW System, along with a list of the components served, is presented in the UFSAR, Section 9.2.2 (Ref. 1).

APPLICABLE SAFETY ANALYSES

The primary safety function of the LPSW System is, in conjunction with a 100% capacity reactor building cooling system, (a combination of the reactor building spray and reactor building air coolers) to remove core decay heat following a design basis LOCA, as discussed in the UFSAR,

BASES

APPLICABLE SAFETY ANALYSES (continued)

Section 6.3 (Ref. 2). This provides for a gradual reduction in the temperature of the fluid, as it is supplied to the Reactor Coolant System (RCS) by the High Pressure and Low Pressure Injection pumps.

The LPSW System is designed to perform its function with a single active failure of any component, assuming loss of offsite power.

The LPSW System also cools the unit from Decay Heat Removal (DHR) System entry conditions, to MODE 5 during normal and post accident operation. The time required for this evolution is a function of the number of DHR System trains that are operating. One LPSW pump per unit and a flowpath is sufficient to remove decay heat during subsequent operations in MODES 5 and 6. This assumes a maximum LPSW System temperature of 90°F occurring simultaneously with maximum heat loads on the system.

The LPSW System satisfies Criterion 3 of 10 CFR 50.36 (Ref. 2).

LCO

For the LPSW system shared by Units 1 and 2, three LPSW pumps are required to be OPERABLE to provide the required redundancy to ensure that the system functions to remove post accident heat loads, assuming the worst case single active failure occurs coincident with the loss of offsite power. The LCO is modified by a Note which requires only two LPSW pumps to be OPERABLE for Units 1 or 2 if either Unit is defueled and one LPSW pump is capable of mitigating the DBA on the fueled Unit. The Units 1 and 2 LPSW System requires only two pumps to meet the single failure criterion provided that one of the units has been defueled and the following LPSW System loads on the defueled unit are isolated: Reactor Building Cooling Units (RBCU), Reactor Building Auxiliary Coolers, Component Cooling, Main Turbine Oil Tank, Reactor Coolant (RC) Pumps, and Low Pressure Injection (LPI) Coolers.

For the LPSW system for Unit 3, two LPSW pumps are required to be OPERABLE to provide the required redundancy to ensure that the system functions to remove post accident heat loads, assuming the worst case single active failure occurs coincident with the loss of offsite power.

An LPSW flow path is considered OPERABLE when the associated piping, valves, heat exchangers, and instrumentation and controls required to perform the safety related function are OPERABLE. Any combination of pathways to supply the required components is acceptable, provided there is no single active failure which can prevent supplying necessary loads and applicable design criteria (e.g., seismic qualification) are satisfied.

BASES

LCO (continued)

The LPSW WPS is considered OPERABLE when the associated leakage accumulator, relief valves, seat leakage limits for check valves and pneumatic discharge isolation valves, closure capability of pneumatic discharge isolation valves, and opening capability of the controllable vacuum breaker valves are OPERABLE.

APPLICABILITY

In MODES 1, 2, 3, and 4, the LPSW System is a normally operating system that is required to support the OPERABILITY of the equipment serviced by the LPSW System. Therefore, the LPSW System is required to be OPERABLE in these MODES.

In MODES 5 and 6, the OPERABILITY requirements of the LPSW System are determined by the systems it supports.

ACTIONS

A.1

If one required LPSW pump is inoperable, action must be taken to restore the required LPSW pump to OPERABLE status within 72 hours. In this Condition, the remaining OPERABLE LPSW pump(s) are adequate to perform the heat removal function. However, the overall reliability is reduced because a single failure in the OPERABLE LPSW pump(s) could result in loss of LPSW system function. The 72 hour Completion Time is based on the redundant capabilities afforded by the OPERABLE pump, and the low probability of a DBA occurring during this period.

B.1

If the LPSW WPS is inoperable, action shall be taken to restore the required LPSW WPS components to OPERABLE status within 7 days for Units with the LPSW RB Waterhammer modification installed.

The 7 day Completion Time is based on similar systems and is considered reasonable based on engineering judgment and the low probability of a DBA occurring during the period of maintenance.

C.1 and C.2

If the LPSW pump or WPS cannot be restored to OPERABLE status within the associated Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit

BASES

ACTIONS

C.1 and C.2 (continued)

must be placed in at least MODE 3 within 12 hours, and in MODE 5 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. The extended interval to reach MODE 5 provides additional time to restore the required LPSW pump and is reasonable considering that the potential for an accident or transient is reduced in MODE 3.

SURVEILLANCE REQUIREMENTS

SR 3.7.7.1

For Units with LPSW RB Waterhammer Prevention System installed, verifying the correct level in the leakage accumulator will provide assurance that in the event of boundary valve leakage during a LOOP event, there is sufficient water to keep the LPSW piping filled. The required water level is between half full and full, which corresponds to a level indication of 20.5" to 41". Any level glass reading is bounded by 20.5" to 41" level indication, therefore any level glass reading is considered acceptable. During LPSW testing, accumulator level > 41" is acceptable because the mass of air in the accumulator is unchanged in the short term; therefore the accumulator is still capable of performing its safety function.

The 12 hour Frequency is based on engineering judgment and considered sufficient to ensure the appropriate amount of water is available in the accumulator.

SR 3.7.7.2

Verifying the correct alignment for manual, and power operated valves in the LPSW System flow path provides assurance that the proper flow paths exist for LPSW System operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since they are verified to be in the correct position prior to locking, sealing, or securing. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of potentially being mispositioned are in the correct position. This SR also does not apply to valves that cannot be inadvertently misaligned, such as check valves.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.7.2 (continued)

The 31 day Frequency is based on engineering judgment, is consistent with the procedural controls governing valve operation, and ensures correct valve positions.

This SR is modified by a Note indicating that the isolation of components or systems supported by the LPSW System does not affect the OPERABILITY of the LPSW System.

SR 3.7.7.3

The SR verifies proper automatic operation of the LPSW System valves. The LPSW System is a normally operating system that cannot be fully actuated as part of the normal testing. 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 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. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

SR 3.7.7.4

The SR verifies proper automatic operation of the LPSW System pumps on an actual or simulated actuation signal. The LPSW System is a normally operating system that cannot be fully actuated as part of normal testing during normal operation. The 18 month Frequency is consistent with the Inservice Testing Program. Operating experience has shown that these components usually pass the Surveillance when performed at an 18 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

SR 3.7.7.5

For Units with LPSW RB Waterhammer Prevention System installed, the SR verifies proper operation of the LPSW RB Waterhammer Prevention System leakage accumulator. Verifying adequate flow from the accumulator will provide assurance that in the event of boundary valve leakage during a LOOP event, there is sufficient water to keep LPSW piping filled.

The 18 month Frequency is based on engineering judgment and operating experience.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.7.6

For Units with LPSW RB Waterhammer Prevention System installed, the SR verifies that LPSW WPS boundary valve leakage is ≤ 20 gpm. Verifying boundary valve leakage is within limits will ensure that in the event of a LOOP, a waterhammer will not occur, because the LPSW leakage accumulator will be able to maintain the LPSW piping water solid.

The LPSW Leakage Accumulator is designed to allow up to 25 gpm of aggregate leakage for one minute. The boundary valve leakage is limited to 20 gpm in order to allow five (5) gpm of miscellaneous leakage.

The 18 month Frequency is based on engineering judgment and operating experience.

REFERENCES

1. UFSAR, Section 9.2.2.
2. UFSAR, Section 6.3.
3. 10 CFR 50.36.

ATTACHMENT 2

TECHNICAL SPECIFICATIONS – MARK UP

3.3 INSTRUMENTATION

3.3.27 Low Pressure Service Water (LPSW) Reactor Building (RB) Waterhammer Prevention Circuitry

LCO 3.3.27 Three LPSW RB Waterhammer Prevention analog channels and two digital logic channels shall be OPERABLE.

----------NOTES----------
Applicable on each unit after completion of the LPSW RB Waterhammer Modification on the respective Unit.

APPLICABILITY: MODES 1, 2, 3, and 4

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required LPSW RB Waterhammer Prevention analog channel inoperable.	A.1 Restore required LPSW RB Waterhammer Prevention analog channel to OPERABLE status.	7 days
B. One required LPSW RB Waterhammer Prevention digital logic channel inoperable.	B.1 Restore required LPSW RB Waterhammer Prevention digital logic channel to OPERABLE status.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Two or more required LPSW RB Waterhammer Prevention analog channels inoperable. OR Two required LPSW RB Waterhammer Prevention digital logic channels inoperable. OR Required Actions and associated Completion Times of Condition A or B not met.	C.1 Open two LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation valves in the same header. AND C.2 Initiate actions to restore required LPSW RB Waterhammer Prevention analog or digital logic channels to OPERABLE status.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.27.1	Perform CHANNEL CHECK.	12 hours
SR 3.3.27.2	Perform CHANNEL FUNCTIONAL TEST.	92 days
SR 3.3.27.3	Perform CHANNEL CALIBRATION.	18 months

3.7 PLANT SYSTEMS

3.7.7 Low Pressure Service Water (LPSW) System

LCO 3.7.7 For Unit 1 or Unit 2, three LPSW pumps and one flow path shall be OPERABLE.

For Unit 3, two LPSW pumps and one flow path shall be OPERABLE.

The LPSW Waterhammer Prevention System (WPS) shall be OPERABLE on Units where the LPSW RB Waterhammer modification is installed.

---NOTE---

With either Unit 1 or Unit 2 defueled and appropriate LPSW loads secured on the defueled Unit, such that one LPSW pump is capable of mitigating the consequences of a design basis accident on the remaining Unit, only two LPSW pumps for Unit 1 or Unit 2 are required.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required LPSW pump inoperable.	A.1 Restore required LPSW pump to OPERABLE status.	72 hours
B. LPSW WPS inoperable on Units with LPSW RB Waterhammer modification installed.	C.1 Restore the LPSW WPS to OPERABLE status.	7 days
C. Required Action and associated Completion Time of Condition A and B not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	12 hours 60 hours

Add B&C

Add SR

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.7.7.1	Verify LPSW leakage accumulator level is within Water levels between 20.5" to 41" for Units with LPSW RB Waterhammer modification installed. During LPSW testing, accumulator level > 41" is acceptable.	12 hours
SR 3.7.7.2	----------NOTE---------- Isolation of LPSW flow to individual components does not render the LPSW System inoperable. ---------- Verify each LPSW manual, and non-automatic power operated valve in the flow path servicing safety related equipment, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
SR 3.7.7.3	Verify each LPSW automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	18 months
SR 3.7.7.4	Verify each LPSW pump starts automatically on an actual or simulated actuation signal.	18 months
SR 3.7.7.5	Verify LPSW leakage accumulator is able to provide makeup flow lost due to boundary valve leakage on Units with LPSW RB Waterhammer modification installed.	18 months
SR 3.7.7.6	Verify LPSW WPS boundary valve leakage is ≤ 20 gpm for Units with LPSW RB Waterhammer modification installed.	18 months

Add SRs 3.7.7.5 & 3.7.7.6

B 3.3 INSTRUMENTATION

B 3.3.27 Low Pressure Service Water (LPSW) Reactor Building (RB) Waterhammer Prevention Circuitry

BASES

BACKGROUND

NRC Generic Letter 96-06 identified three issues of concern relative to effects of fluid in piping following postulated design basis events. One area of concern is the cooling water system piping serving the containment air coolers. The Low Pressure Service Water (LPSW) system provides cooling water to the safety related Reactor Building Cooling Units (RBCUs), non-safety related Reactor Building Auxiliary Cooling Units (RBACs) and non-safety related Reactor Coolant Pump Motor (RCPM) coolers. There is a possibility of waterhammer in the LPSW piping inside containment during either a Loss-of-Coolant Accident (LOCA) or a Main Steam Line Break (MSLB) concurrent with a loss of off-site power (LOOP) without means to prevent waterhammer.

The LPSW RB Waterhammer Prevention System (WPS) is composed of check valves, active pneumatic discharge isolation valves, and active controllable vacuum breaker valves. The LPSW RB Waterhammer Prevention Circuitry isolates LPSW to the RBCUs, RBACs and RCPM coolers any time the LPSW header pressure decreases significantly, such as during a LOOP event or LPSW pump failure during normal operations. The isolation function prevents and/or minimizes the potential waterhammers in the associated piping. The LPSW RB Waterhammer Prevention Circuitry will also re-establish flow to the containment air coolers following WPS actuation once the LPSW system has repressurized.

The RBCU fans and RBCU cooling water motor operated return valves are Engineered Safeguards (ES) features. On an ES actuation, these valves open. The LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation Valves are designed to close on low LPSW supply header pressure and re-open when the LPSW supply header pressure is restored. The LPSW RB Waterhammer Prevention Controllable Vacuum Breaker Valves are designed to open on low LPSW pressure and re-close when LPSW pressure is restored.

The LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation Valves fail open on loss of instrument air. During normal operation, a control solenoid valve in the instrument air supply to each

BASES

BACKGROUND (continued)

LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation Valve is energized to vent air from the actuator to maintain the isolation valves in the open position. On loss of two of four of the analog input signals for the LPSW RB Waterhammer Prevention Isolation Circuitry, the 3-way control solenoid valve is de-energized to align the air accumulator with the pneumatic operator; thereby closing the LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation Valve(s). LPSW RB Waterhammer Prevention Controllable Vacuum Breaker Valves are located downstream of the pneumatic discharge isolation valves. The LPSW RB Waterhammer Prevention Controllable Vacuum Breaker Valves are normally closed. They open simultaneously with the closing of the LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation Valves in order to break vacuum in the return header by energizing the control solenoid valve.

The LPSW RB Waterhammer Prevention Circuitry contains four analog sensor channels and two digital actuation logic channels. Only three analog sensor channels are required to support OPERABILITY. Each analog sensor channel contains a safety grade pressure transmitter and current switch. The two digital actuation logic channels consist of safety grade relays in a two-out-of-two logic configuration. The actuation of the LPSW RB Waterhammer Prevention Circuitry requires two of the three required LPSW pressure signals supplied from the LPSW header pressure transmitters.

APPLICABLE SAFETY ANALYSES

In a LOOP event, the LPSW RB Waterhammer Prevention Circuitry isolates the cooling water flow to the RBCUs, RBACs and RCPM cooler on low LPSW supply header pressure prior to LPSW pump restart to prevent waterhammers. The LPSW RB Waterhammer Prevention Circuitry will also re-establish flow to the containment air coolers following WPS actuation once the LPSW system has repressurized. Isolating and re-establishing the LPSW flowpath ensures that Containment Integrity and Containment Heat Removal functions are maintained.

The RBCU Fans presently have a 3 minute delay to re-start following ES activation. LPSW flow will be restored to the RBCUs prior to the RBCU fan restart. This ensures the Containment Heat Removal function is unaffected.

The LPSW RB Waterhammer Prevention Circuitry satisfies Criterion 3 of 10 CFR 50.36 (Ref. 1).

BASES (continued)

LCO

Three LPSW RB Waterhammer Prevention analog channels and two digital logic channels shall be OPERABLE. Each analog sensor channel contains a safety related pressure transmitter and current switch. The two digital logic channels consist of safety related relays. The LPSW RB Waterhammer Prevention Circuitry design ensures that a single active failure will not prevent the circuitry and associated components from performing the intended safety functions.

There are four analog channels, but only three are required to support OPERABILITY. These three analog channels are configured in a two out of three control logic scheme that will isolate/reset the LPSW RB Waterhammer Prevention Circuitry. The LPSW RB Waterhammer Prevention Circuitry will close/open the four LPSW RB Pneumatic Discharge Isolation Valves when LPSW pressure is either low or returns to normal. Either digital logic channel will trip/restore the flow path.

The actuation logic used for the LPSW RB Waterhammer Prevention Circuitry is similar to other safety related circuitry currently being used. The LCO allowed required action and Completion Times are acceptable based on the number of channels normally available. Though one of the four analog channels can be out of service for an extended period, it is not a normal practice.

When one required analog channel is taken out of service, the two out of three analog control logic scheme is reduced to a two out of two analog control logic scheme. This control logic scheme will trip/reset the digital channels on decreasing/increasing supply header pressure.

Failure of an analog channel while in the two out of two control logic mode will reduce the control logic to a one out of two control logic scheme. This control logic is unacceptable because a failure will prevent the LPSW RB Waterhammer Prevention Circuitry from working as required.

The two digital channels are triggered by two of four analog channels consisting of a pressure transmitter/current switch. On decreasing/increasing supply header pressure, two of four analog channels will trip/reset the digital channels. If one of the two digital channels is inoperable or out of service, the system is no longer single failure proof.

The LCO is modified by a note. The note states that the LCO becomes applicable on each Unit after completion of the LPSW RB Waterhammer Modification.

BASES

APPLICABILITY

The LPSW RB Waterhammer Prevention Circuitry is required to be OPERABLE in MODES 1, 2, 3, and 4. This ensures LPSW is available to support the OPERABILITY of the equipment serviced by the LPSW system.

In MODES 5 and 6, the probability and consequences of the events that the LPSW System supports is reduced due to the pressure and temperature limitations of these MODES. As a result, the LPSW RB Waterhammer Prevention Circuitry is not required to be OPERABLE in MODES 5 and 6.

ACTIONS

A.1

If one required LPSW RB Waterhammer Prevention analog channel is inoperable, the LPSW RB Waterhammer Prevention Circuitry is no longer single failure proof and the control logic scheme is reduced to a two out of two configuration. Required Action A.1 requires the LPSW RB Waterhammer Prevention analog channels be restored to OPERABLE status within 7 days.

The 7 day Completion Time takes into account the allowed outage times of similar systems, reasonable time for repairs, and the low probability of an event occurring during this period.

B.1

If one required LPSW RB Waterhammer Prevention digital logic channel is inoperable, the LPSW RB Waterhammer Prevention Circuitry is not single failure proof. Required Action B.1 requires the digital channels be restored to OPERABLE status within 7 days.

The 7 day Completion Time takes into account the allowed outage times of similar systems, reasonable time for repairs, and the low probability of an event occurring during this period.

ACTIONS (continued)

C.1 and C.2

If two or more required LPSW RB Waterhammer Prevention analog channel(s) or two digital logic channel(s) are inoperable or the Required Actions and associated Completion Times of Condition A or B are not met, the WPS must be configured in order to assure the Containment Integrity and Heat removal functions are maintained. To achieve this status, actions to prevent automatic closing by manually opening (remote or local) two LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation valves in the same header shall be completed immediately and actions to repair the inoperable equipment shall be taken immediately. LCO 3.7.7 will also apply when the LPSW RB Waterhammer Prevention Pneumatic Discharge Isolation valves in the same header are opened.

SURVEILLANCE REQUIREMENTS

SR 3.3.27.1

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

Agreement criteria are determined, based on a combination of the channel instrument uncertainties, including isolation, indication, and readability. If a channel is outside the criteria, it may be an indication that the transmitter or the signal processing equipment has drifted outside its limit.

The Frequency, equivalent to every shift, is based on operating experience that demonstrates channel failure is rare. Since the probability of two random failures in redundant channels in any 12 hour

SURVEILLANCE REQUIREMENTS

SR 3.3.27.1 (continued)

period is extremely low, the CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. The CHANNEL CHECK supplements less formal, but potentially more frequent, checks of channel operability during normal operational use of the displays associated with the LCO's required channels.

SR 3.3.27.2

A CHANNEL FUNCTIONAL TEST is performed on each channel to ensure the circuitry will perform its intended function. The Frequency of 92 days is based on engineering judgment and operating experience, with regard to channel OPERABILITY and drift, which demonstrates that failure of more than one channel in any 92 day interval is a rare event.

SR 3.3.27.3

A CHANNEL CALIBRATION is a complete check of the analog instrument channel, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy. The CHANNEL CALIBRATION leaves the components adjusted to account for instrument drift to ensure that the circuitry remains operational between successive tests. The 18-month Frequency is justified by the assumption of an 18-month calibration interval in the setpoint analysis determination of instrument drift during that interval.

REFERENCES

1. 10 CFR 50.36.

B 3.7 PLANT SYSTEMS

B 3.7.7 Low Pressure Service Water (LPSW) System

BASES

BACKGROUND

The LPSW System provides a heat sink for the removal of process and operating heat from safety related components during a transient or accident. During normal operation and normal shutdown, the LPSW System also provides this function for various safety related and nonsafety related components.

The LPSW system for Unit 1 and Unit 2 is shared and consists of three LPSW pumps which can supply multiple combinations of path ways to supply required components. The LPSW system for Unit 3 consists of two LPSW pumps which can supply multiple combinations of path ways to supply required components. Although multiple combinations of path ways exist, only one flow path is necessary, since no single failure of an active component can prevent the LPSW system from supplying necessary components. The pumps and valves are remote manually aligned, except in the unlikely event of a loss of coolant accident (LOCA) or other accidents. The pumps are automatically started upon receipt of an Engineered Safeguards actuation signal, and automatic valves are aligned to their post accident positions. The LPSW System also provides cooling directly to the Reactor Building Cooling Units (RBCU) and Low Pressure Injection coolers, turbine driven EFW pump, HPI pump motor coolers, and the motor driven EFW pumps.

GL 96-06 required consideration of waterhammer inside containment during a LOCA or MSLB combined with a loss of offsite power (LOOP) event. As a result, the LPSW Reactor Building (RB) Waterhammer Prevention System (WPS) was added to maintain LPSW piping water solid inside containment during any event that causes a loss of LPSW system pressure. The WPS is fully automatic. Other functions of the WPS are addressed by LCO 3.3.27 and LCO 3.6.5.

Additional information about the design and operation of the LPSW System, along with a list of the components served, is presented in the UFSAR, Section 9.2.2 (Ref. 1).

APPLICABLE SAFETY ANALYSES

The primary safety function of the LPSW system is, in conjunction with a 100% capacity reactor building cooling system, (a combination of the reactor building spray and reactor building air coolers) to remove core decay heat following a design basis LOCA, as discussed in the UFSAR,

BASES

APPLICABLE SAFETY ANALYSES (continued)

Section 6.3 (Ref. 2). This provides for a gradual reduction in the temperature of the fluid, as it is supplied to the Reactor Coolant System (RCS) by the High Pressure and Low Pressure Injection pumps.

The LPSW System is designed to perform its function with a single active failure of any component, assuming loss of offsite power.

The LPSW System also cools the unit from Decay Heat Removal (DHR) System entry conditions, to MODE 5 during normal and post accident operation. The time required for this evolution is a function of the number of DHR System trains that are operating. One LPSW pump per unit and a flowpath is sufficient to remove decay heat during subsequent operations in MODES 5 and 6. This assumes a maximum LPSW System temperature of 90°F occurring simultaneously with maximum heat loads on the system.

The LPSW system satisfies Criterion 3 of 10 CFR 50.36 (Ref. 2).

LCO

For the LPSW system shared by Units 1 and 2, three LPSW pumps are required to be OPERABLE to provide the required redundancy to ensure that the system functions to remove post accident heat loads, assuming the worst case single active failure occurs coincident with the loss of offsite power. The LCO is modified by a Note which requires only two LPSW pumps to be OPERABLE for Units 1 or 2 if either Unit is defueled and one LPSW pump is capable of mitigating the DBA on the fueled Unit. The Units 1 and 2 LPSW System requires only two pumps to meet the single failure criterion provided that one of the units has been defueled and the following LPSW System loads on the defueled unit are isolated: Reactor Building Cooling Units (RBCU), Reactor Building Auxiliary Coolers, Component Cooling, Main Turbine Oil Tank, Reactor Coolant (RC) Pumps, and Low Pressure Injection (LPI) Coolers.

For the LPSW system for Unit 3, two LPSW pumps are required to be OPERABLE to provide the required redundancy to ensure that the system functions to remove post accident heat loads, assuming the worst case single active failure occurs coincident with the loss of offsite power.

An LPSW flow path is considered OPERABLE when the associated piping, valves, heat exchangers, and instrumentation and controls required to perform the safety related function are OPERABLE. Any combination of pathways to supply the required components is acceptable, provided there is no single active failure which can prevent supplying necessary loads and applicable design criteria (e.g., seismic qualification) are satisfied.

BASES

LCO (continued)

The LPSW WPS is considered OPERABLE when the associated leakage accumulator, relief valves, seat leakage limits for check valves and pneumatic discharge isolation valves, closure capability of pneumatic discharge isolation valves, and opening capability of the controllable vacuum breaker valves are OPERABLE.

APPLICABILITY

In MODES 1, 2, 3, and 4, the LPSW System is a normally operating system that is required to support the OPERABILITY of the equipment serviced by the LPSW System. Therefore, the LPSW System is required to be OPERABLE in these MODES.

In MODES 5 and 6, the OPERABILITY requirements of the LPSW System are determined by the systems it supports.

ACTIONS

A.1

If one required LPSW pump is inoperable, action must be taken to restore the required LPSW pump to OPERABLE status within 72 hours. In this Condition, the remaining OPERABLE LPSW pump(s) are adequate to perform the heat removal function. However, the overall reliability is reduced because a single failure in the OPERABLE LPSW pump(s) could result in loss of LPSW system function. The 72 hour Completion Time is based on the redundant capabilities afforded by the OPERABLE pump, and the low probability of a DBA occurring during this period.

B.1

If the LPSW WPS is inoperable, action shall be taken to restore the required LPSW WPS components to OPERABLE status within 7 days for Units with the LPSW RB Waterhammer modification installed.

The 7 day Completion Time is based on similar systems and is considered reasonable based on engineering judgment and the low probability of a DBA occurring during the period of maintenance.

C.1 and C.2

If the LPSW pump or WPS cannot be restored to OPERABLE status within the associated Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit

BASES

ACTIONS C.1 and C.2 (continued)

must be placed in at least MODE 3 within 12 hours, and in MODE 5 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. The extended interval to reach MODE 5 provides additional time to restore the required LPSW pump and is reasonable considering that the potential for an accident or transient is reduced in MODE 3.

SURVEILLANCE REQUIREMENTS SR 3.7.7.1

For Units with LPSW RB Waterhammer Prevention System installed, verifying the correct level in the leakage accumulator will provide assurance that in the event of boundary valve leakage during a LOOP event, there is sufficient water to keep the LPSW piping filled. The required water level is between half full and full, which corresponds to a level indication of 20.5" to 41". Any level glass reading is bounded by 20.5" to 41" level indication, therefore any level glass reading is considered acceptable. During LPSW testing, accumulator level > 41" is acceptable because the mass of air in the accumulator is unchanged in the short term; therefore the accumulator is still capable of performing its safety function.

The 12 hour Frequency is based on engineering judgment and considered sufficient to ensure the appropriate amount of water is available in the accumulator.

SR 3.7.7.2

Verifying the correct alignment for manual, and power operated valves in the LPSW System flow path provides assurance that the proper flow paths exist for LPSW System operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since they are verified to be in the correct position prior to locking, sealing, or securing. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of potentially being mispositioned are in the correct position. This SR also does not apply to valves that cannot be inadvertently misaligned, such as check valves.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.7.2 (continued)

The 31 day Frequency is based on engineering judgment, is consistent with the procedural controls governing valve operation, and ensures correct valve positions.

This SR is modified by a Note indicating that the isolation of components or systems supported by the LPSW System does not affect the OPERABILITY of the LPSW System.

SR 3.7.7.3

The SR verifies proper automatic operation of the LPSW System valves. The LPSW System is a normally operating system that cannot be fully actuated as part of the normal testing. 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 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. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

SR 3.7.7.4

The SR verifies proper automatic operation of the LPSW System pumps on an actual or simulated actuation signal. The LPSW System is a normally operating system that cannot be fully actuated as part of normal testing during normal operation. The 18 month Frequency is consistent with the Inservice Testing Program. Operating experience has shown that these components usually pass the Surveillance when performed at an 18 month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

SR 3.7.7.5

For Units with LPSW RB Waterhammer Prevention System installed, the SR verifies proper operation of the LPSW RB Waterhammer Prevention System leakage accumulator. Verifying adequate flow from the accumulator will provide assurance that in the event of boundary valve leakage during a LOOP event, there is sufficient water to keep LPSW piping filled.
The 18 month Frequency is based on engineering judgment and operating experience.

BASES

SURVEILLANCE REQUIREMENTS (continued)	SR 3.7.7.6 For Units with LPSW RB Waterhammer Prevention System installed, the SR verifies that LPSW WPS boundary valve leakage is ≤ 20 gpm. Verifying boundary valve leakage is within limits will ensure that in the event of a LOOP, a waterhammer will not occur, because the LPSW leakage accumulator will be able to maintain the LPSW piping water solid.
	The LPSW Leakage Accumulator is designed to allow up to 25 gpm of aggregate leakage for one minute. The boundary valve leakage is limited to 20 gpm in order to allow five (5) gpm of miscellaneous leakage.
	The 18 month Frequency is based on engineering judgment and operating experience.

REFERENCES

1. UFSAR, Section 9.2.2.
2. UFSAR, Section 6.3.
3. 10 CFR 50.36.