DUKE POWER COMPANY

OCONEE NUCLEAR STATION

ATTACHMENT 1

TECHNICAL SPECIFICATIONS

Remove Page	Insert Page
3.3-1	3.3-1
3.3-2	3.3-2
----	3.3-2a
3.3-6	3.3-6
3.3-7	3.3-7
----	3.3-8
----	3.3-9
----	3.3-10
3.4-2	3.4-2
3.4-4	3.4-4
4.1-9	4.1-9
----	4.1-9a

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3.3 EMERGENCY CORE COOLING, REACTOR BUILDING COOLING, REACTOR BUILDING SPRAY, AND LOW PRESSURE SERVICE WATER SYSTEMS

Applicability

Applies to the emergency core cooling, reactor building cooling, reactor building spray, and low pressure service water systems.

Objective

To define the conditions necessary to assure immediate availability of the emergency core cooling, reactor building cooling, reactor building spray and low pressure service water systems.

Specification

3.3.1 High Pressure Injection (HPI) System

The HPI System shall be operable as follows:

1. Two redundant HPI trains, each comprised of an HPI pump and a flow path from the Borated Water Storage Tank (BWST) to two RCS cold legs, and each capable of automatic actuation upon an Engineered Safeguards (ES) signal (HPI segment).

2. Two redundant flow paths allowing the HPI System to take suction from the discharge side of the LPI System by manual-local operator action.

3. When the reactor is greater than 75% power, three HPI pumps and the HPI crossover valves (HP-409 and HP-410) shall be operable and the suction header shall be cross-connected.

4. When less than three HPI pumps are operable, the HPI pump discharge header shall be hydraulically separated between trains.

APPLICABILITY: When the Reactor Coolant System, with fuel in the core, is above 350°F.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required HPI pump is inoperable. OR Required HPI crossover valve(s) inoperable. OR HPI suction header is not cross-connected when required.	A.1 Restore pump and valve(s) to operable status and cross-connect suction header.	72 hours
B Required Action and associated Completion Time of Condition A not met.	B.1 Reduce reactor power to less than or equal to 75% power.	12 hours
C. One train of HPI is inoperable.	C.1 -----------NOTE------------- Applicable when the train is incapable of automatic actuation and is also incapable of actuation through manual alignment. -------------------------------- Reduce reactor power to less than or equal to 75% power. AND C.2 Restore train to operable status.	 3 hours 72 hours
D. One LPI to HPI flow path is inoperable.	D.1 Restore flow path to operable status.	72 hours
E. Less than three HPI pumps are operable.	E.1 Hydraulically separate the discharge header.	72 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Required Action and associated Completion Time of Condition C, D, or E not met.	F.1 Be in HOT SHUTDOWN.	12 hours
	AND	
OR	F.2 Reduce RCS temperature to less than or equal to 350°F.	36 hours
Both HPI trains are inoperable.		
OR		
Both LPI-HPI flow paths are inoperable.		

3.3.2 Low Pressure Injection (LPI) System

a. When the RCS, with fuel in the core, is in a condition with pressure equal to or greater than 350 psig or temperature equal to or greater than 250°F:

(1) Two independent LPI trains, each comprised of an LPI pump and a flow path capable of taking suction from the borated water storage tank and discharging into the RCS automatically upon ESPS actuation (LPI segment), together with two LPI coolers and two reactor building emergency sump isolation valves (remote-manual) shall be operable.

(2) Tests or maintenance shall be allowed on any component of the LPI system provided the redundant train of the LPI system is operable. If the LPI system is not restored to meet the requirements of Specification 3.3.2.a(1) above within 72 hours, the reactor shall be placed in a hot shutdown condition within 12 hours. If the requirements of Specification 3.3.2.a(1) are not met within 24 hours following hot shutdown, the reactor shall be placed in a condition with RCS pressure below 350 psig and RCS temperature below 250°F within an additional 24 hours.

Bases

Specification 3.3 ensures that, for whatever condition the RCS is in, adequate emergency core cooling, reactor building cooling, reactor building spray, and low pressure service water is provided.

HPI System Overview:

The HPI System consists of two injection trains, Train 'A' and Train 'B', each of which splits to discharge into two RCS cold legs, so that there are a total of four HPI injection lines. Flow limiting orifices are located in each of the four injection lines. Each train takes suction from the Borated Water Storage Tank (BWST), and has an automatic suction valve (HP-24/HP-25) and discharge valve (HP-26/HP-27) which open upon an ES signal. There are three ES-actuated HPI pumps, each of which can provide flow to either train. At least one HPI pump is normally running to provide RCS makeup and seal injection to the reactor coolant pumps. Suction header cross-connect valves (HP-98 & HP-99/HP-100) are normally open, and discharge header cross-connect valves (HP-115 & HP-116/HP-117) may be open or closed, depending upon plant conditions. Additional discharge valves, HP-409/HP-410 (crossover valves), bypass HP-26/HP-27 to assure the ability to feed either train's injection lines from the pump(s) on the other train. Valves HP-26 or HP-410 can feed Train A, and HP-27 or HP-409 can feed Train B. Each of these four valves can be throttled from the control room, and a safety grade flow instrument is provided for the flow path associated with each of the four valves.

The HPI pump suction can be aligned to the LPI pump discharge through valves LP-15 and LP-16, which may be operated either locally or from the control room.

HPI System ECCS Requirements:

To fulfill HPI System ECCS heat removal requirements during a small break LOCA with the reactor above 350°F, one HPI pump is assumed to inject immediately through one HPI train upon ES actuation.

If the power level is above 75%, there are additional HPI System ECCS heat removal requirements to mitigate the consequences of certain small break LOCAs. For example, in the design basis RCP discharge small break LOCA, one HPI train fails to actuate, and the break location is such that full flow from only one of the two injection lines of the other HPI train actually reaches the reactor. Under these conditions, to ensure adequate cooling, at least one HPI pump is assumed to provide flow through the automatically actuating train. In addition, injection through the other HPI train must occur within 10 minutes.

For certain small break LOCAs in which BWST inventory would be depleted before the RCS depressurizes to the point that direct injection from the LPI pumps can be established, "piggyback" operation of the LPI/HPI Systems is required. In piggyback, an LPI pump takes suction on the Reactor Building Emergency Sump (RBES) and discharges to the HPI pump suction header, through LP-15 and/or LP-16, and one or two HPI pumps discharge into the RCS. There are a number of different alignments which would meet requirements during an accident, including supplying all HPI suction through either LP-15 or LP-16.

HPI System Redundancy and Train Separation:

The two HPI trains are redundant, which means that they are designed and aligned such that they are not both susceptible to any single active failure including the failure of any powered component to operate or any single failure of electrical equipment.

The HPI system is not required to withstand passive failures, e.g., excessive leakage from system piping or valves, because it does not provide long term core cooling.

The HPI system redundancy requirements also apply to the two LPI-to-HPI flow paths, with respect to their function as a suction source to the HPI pumps. There are no mechanical separation or cross-connection requirements associated with this function. However, because they are also a part of the LPI system piping, these two flow paths are required to be separated during normal operation by valve LP-9 or LP-10 being closed.

Hydraulic separation on the discharge side of the HPI pumps is only required when a single HPI pump could simultaneously inject through both trains at the beginning of an accident. In this accident configuration, the single HPI pump could experience runout conditions and could fail prior to operator action to throttle flow or start another pump. If only one of the two non-running HPI pumps were capable of automatic actuation upon an ES signal, cross-connection of the HPI pump discharge header could cause a loss of redundancy. This is because a single failure could prevent the non-operating pump from starting, or cause loss of the running pump, leaving a single pump aligned to both trains. If both non-running HPI pumps were incapable of automatic actuation, cross-connection of the HPI pump discharge header would also be unacceptable since the same loss of redundancy could occur even without the single failure. Thus, Specification 3.3.1 requires that the appropriate discharge header cross-connect valves (HP-115 & HP-116/HP-117) are closed if less than three HPI pumps are operable. If all three pumps are operable, operation with the discharge header cross-connected is acceptable.

Hydraulic separation on the suction side of the HPI pumps could cause a loss of redundancy. With HP-98, HP-99, or HP-100 closed, a failure of an automatic suction valve (HP-24/HP-25) to open during an accident could cause two pumps to lose suction. Therefore, valves HP-98, HP-99, and HP-100 must remain opened for HPI System operability above 75% power. It is acceptable to operate with hydraulic separation on the suction side of the HPI pumps below 75% power since the accident analysis requirements are met with one HPI pump injecting through a single train.

HPI System Specifications:

Specification 3.3.1 requires redundant systems and components to ensure that all ECCS requirements of the HPI system would be met in an accident. Whenever degraded HPI system conditions cause this redundancy to be lost, such that a single failure could prevent ECCS requirements from being met, a time limit is imposed upon continued operation. One HPI pump injecting through one train provides sufficient flow to mitigate most small break LOCAs. However, for cold leg breaks located on the discharge of the reactor coolant pumps, some HPI injection will be lost out the break. For this reason, operator actions are credited to open valve(s) HP-409/HP-410 if insufficient flow is present in one train. The safety analyses have determined that the capacity of one HPI train is sufficient to mitigate a small break LOCA on the discharge of the reactor coolant pumps if reactor power is less than or equal to 75% FP. For power levels greater than 75% FP, the additional HPI flow obtained by aligning both HPI trains for injection is necessary to mitigate the reactor coolant pump discharge break small break LOCA.

Specification 3.3.1 provides HPI System operability requirements and defines a train of HPI as an HPI pump and a flow path from the BWST to two RCS cold legs, capable of automatic actuation upon an ES signal (HPI portion). Specification 3.3.1 also requires two redundant flow paths to the suction of the HPI pumps from the discharge of the LPI pumps. Above 75% power, Specification 3.3.1 requires that all three HPI pumps and valves HP-409 and HP-410 shall be operable and that the suction header is cross-connected (HP-98, HP-99, and HP-100 are open). In addition, Specification 3.3.1 requires hydraulic separation of the discharge header if less than three HPI pumps are operable.

Condition A of Specification 3.3.1 addresses the situation where one of the three HPI pumps is inoperable, one or both crossover valves (HP-409 or HP-410) is inoperable, or the suction header is not cross-connected. Required Action A.1 of Specification 3.3.1 requires the inoperable pump or valve(s) to be restored to an operable status and the suction header to be cross-connected within 72 hours. This Completion Time is considered adequate since, barring a single failure, the HPI System can still satisfy the full power accident analysis requirements of two HPI pumps injecting down two trains. If this 72 hour Completion Time is not met, Required Action B.1 requires that the reactor be reduced to less than or equal to 75% power within 12 hours. In addition, if entry into Condition A is due to an inoperable pump, Condition E and Required Action E.1 requires that the discharge header be isolated between the two remaining operable HPI pumps. Required Actions B.1 and E.1 restore the HPI System to an operable status and operation at or below 75% power may continue indefinitely.

One train of HPI is defined as an HPI pump and a flow path from the BWST to two RCS cold legs, capable of automatic actuation upon an ES signal (HPI portion). If one train of HPI is inoperable, and cannot be manually aligned by crediting operator action to cross-connect HPI trains using HP-409 or HP-410, Required Action C.1 requires that the reactor be reduced to less than or equal to 75% power within 3 hours. This action is necessary because one train of HPI is not capable of meeting the safety analysis requirements for power levels in excess of 75% power. The 3 hour time period to reduce reactor power is considered acceptable in that it is more conservative than the shutdown requirements of Specification 3.0. With the reactor less than or equal to 75% power, one train of HPI is capable of satisfying the requirements of the safety analyses. Required Action C.2 allows a total time of 72 hours to restore the inoperable train to an operable status before further shutdown requirements are imposed.

Condition C of Specification 3.3.1 also addresses the situation where one train of HPI is inoperable, but could still be manually aligned by crediting operator action to cross-connect HPI trains by opening HP-409 or HP-410. Under these conditions, Required Action C.2 allows 72 hours to restore the HPI System to an operable status before additional shutdown requirements are imposed. This 72 hour Completion Time is considered reasonable since, barring a single failure, the HPI System is still capable of meeting the full power accident analysis requirements.

Condition D of Specification 3.3.1 requires redundant flow paths from the LPI pump discharge to the HPI pump suction. This ensures that the piggyback alignment is available, should the LOCA break size be such that elevated RCS pressure requires the use of both LPI and HPI pumps to establish recirculation from the RBES. With only one LPI-to-HPI flow path operable, operation is limited to 72 hours. The 72 hour time limit is justified because there is a limited range of break sizes, and therefore a lower probability, for a small break LOCA which would require piggyback operation. Valves LP-15 and LP-16, which are used to align the piggyback mode, must be capable of being operated locally during an accident.

Condition E assures that redundancy requirements are satisfied when the HPI System is operating in a degraded mode. This condition addresses HPI pump runout concerns associated with one HPI pump injecting down two trains. If less than three HPI pumps are operable, 72 hours are allowed to establish hydraulic separation by closing the appropriate discharge header cross-connect valves.

If the requirements of Conditions C, D, or E are not met, both trains of HPI are inoperable, or both LPI-HPI flow paths are inoperable, Condition F of this specification requires the reactor to be at hot shutdown within 12 hours, and below 350°F within the following 24 hours. Condition F addresses the situation where the completion times of Conditions C, D, or E are not met or, assuming no single failure, the HPI System is in a condition where the safety analysis requirements cannot be satisfied.

Two LPI pumps and both core flood tanks are required. In the event of a main coolant loop severance, one LPI pump and both core flood tanks will protect the core and limit the peak cladding temperature to less than 2200°F and the metal-water reaction to that representing less than one percent of the cladding. Both core flood tanks are required as a single core flood tank has insufficient inventory to reflood the core.

The borated water storage tanks are used for two purposes:

(a) As a supply of borated water for accident conditions.

(b) As a supply of borated water for flooding the fuel transfer canal during refueling operation.(1)

Three-hundred and fifty thousand (350,000) gallons of borated water (a level of 46 feet in the BWST) are required to supply emergency core cooling and Reactor Building spray in the event of a loss-of-core cooling accident. This amount fulfills requirements for emergency core cooling. The borated water storage tank capacity of 388,000 gallons is based on refueling volume requirements. Heaters maintain the borated water supply at a temperature above 50°F to lessen the potential for thermal shock of the reactor vessel during high pressure injection system operation. The boron concentration is set at the amount of boron required to maintain the core 1 percent $\Delta k/k$ subcritical at 70°F without any control rods in the core. The minimum boron concentration is specified in the Core Operating Limits Report.

It has been shown that the containment temperature response following a LOCA or main steam line break accident will be within the equipment qualification analysis conditions with one train of Reactor Building spray and two Reactor Building coolers operable.(2) Therefore, a maintenance period of seven days is acceptable for one Reactor Building cooling fan and its associated cooling unit provided two Reactor Building spray systems are operable for seven days or one Reactor Building spray system provided all three Reactor Building cooling units are operable. Valve LPSW-108 is the LPSW isolation valve on the discharge side of each Unit's RBCUs. This valve is required to be locked open in order to assure the LPSW flow path for the RBCUs is available.

Operability of a train of HPI assumes that the associated safety-grade flow instruments, on the injection lines and crossover line, are operable because these indications are used to throttle HPI flow during an accident and assure that runout limits are not exceeded. The safety grade flow instruments of the LPI trains and associated RBS trains are both required for RBS train operability. This is because both LPI and RBS flow must be monitored to ensure that RBS pumps do not exceed NPSH requirements. The LPI pumps are subject to NPSH or runout problems during design accidents, so safety-grade flow instrumentation is required for operability of the LPI trains.

Three low pressure service water pumps serve Oconee Units 1 and 2 and two low pressure service water pumps serve Oconee Unit 3. There is a manual cross-connection on the supply headers for Unit 1, 2, and 3. One low pressure service water pump per unit is required for normal operation.

The Units 1 and 2 LPSW system requires 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: RBCUs, Component Cooling, main turbine oil tank, RC pumps, and LPI coolers. In this configuration, if two of the three LPSW pumps are inoperable, 72 hours are permitted by TS 3.3.7.b to restore two of the three LPSW pumps to operable status. At all other times when the RCS of Unit 1 or 2 is ≥ 350 psig or ≥ 250°F, all three LPSW pumps are required to meet the single failure criterion. When all three LPSW pumps are required to be operable and one of the three pumps is inoperable, 72 hours are permitted by TS 3.3.7.b to restore the pump to operable status.

The operability of redundant equipment(s) is determined based on the results of inservice inspection and testing as required by Technical Specification 4.5 and ASME Section XI.

<u>REFERENCES</u>

1) FSAR, Sections 6.3.1, 9.3.3.2, 15.14.4, and 15.14.5

(2) FSAR, Section 15.14.5

d. With three emergency feedwater pumps and/or both emergency feedwater flow paths inoperable, immediately initiate corrective action to restore at least one emergency feedwater pump and associated emergency feedwater flowpath to operable status. The unit shall be at hot shutdown within 12 hours and below 250°F in another 12 hours if one emergency feedwater pump and associated flowpath are not restored to operable status.

e. If an emergency feedwater pump is inoperable due only to automatic initiation circuitry as specified by 3.4.2, the additional provisions of 3.4.3 a, b, c, and d which require cooldown of the RCS do not apply.

3.4.4 The 16 main steam safety relieve valves shall be operable.

3.4.5 A minimum of 72,000 gallons of water per operating unit shall be available in the upper surge tank, condensate storage tank, and hotwell. A minimum of 6 ft. (=30,000 gal) shall be available in the upper surge tank.

3.4.6 The controls of the emergency feedwater system shall be independent of the Integrated Control System.

3.4.7 The main steam atmospheric dump valve flow path on each steam generator shall be operable.

a. One main steam atmospheric dump valve flow path may be inoperable for a period of 7 days. If the inoperable flow path is not restored to operable status within 7 days, the unit shall be brought to hot shutdown within an additional 12 hours and below 350 °F in another 24 hours.

b. Both main steam atmospheric dump valve flow paths may be inoperable for a period of 24 hours. If one main steam atmospheric dump valve flow path is not restored to an operable status within 24 hours, the unit shall be brought to hot shutdown within an additional 12 hours and below 350 °F in another 24 hours.

The main steam atmospheric dump valves are credited during certain small break LOCAs to depressurize the steam generators and enhance primary-to-secondary heat transfer. The atmospheric dump valves are manual valves and operator action is credited within 25 minutes of an ES signal to open them and depressurize the steam generators for certain reactor coolant pump discharge small break LOCAs.

For each steam generator, a main steam atmospheric dump valve flow path consists of a block valve, throttle valve, and isolation valve. The throttle valve and isolation valve are in parallel and are located downstream of the block valve. The block valve must be opened prior to opening the throttle valve or isolation valve. This is accomplished by first opening a small block valve pressure equalization valve that equalizes the differential pressure across the larger block valve which will allow it to open. Once the block valve is opened, the cooldown rate is controlled using the throttle valve. If additional relief capacity is needed, the operator can open the isolation valve. The capacity of the throttle and isolation valves exceeds decay heat loads and is sufficient to cool down the plant. Operability of the block valve, throttle valve, and isolation valve is necessary for a main steam atmospheric dump valve flow path to be operable per Specification 3.4.7. Implicit in the operability of the block valve is that the small block valve pressure equalization valve is operable.

Since the main steam atmospheric dump valves are credited in small break LOCA analyses, shutdown requirements are equivalent to those for the HPI System.

REFERENCES

1. FSAR, Section 10
2. Selected Licensee Commitment, Section 16.7
3. FSAR, Section 15.14

Table 4.1-2
MINIMUM EQUIPMENT TEST FREQUENCY

	Item	Test	Frequency
1.	Control Rod Movement [1]	Movement of Each Rod	Monthly
2.	Pressurizer Safety Valves	Setpoint	Each Refueling[4]
3.	Main Steam Safety Valves	Setpoint	Each Refueling[4]
4.	Refueling System Interlocks[5]	Functional	Prior to Refueling
5.	Main Steam Stop Valves [1]	Movement of Each Stop Valve	Monthly
6.	Reactor Coolant System [2] Leakage	Evaluate	Daily
7.	Condenser Circulating Water[6] Flow Test	Functional	Each Refueling
8.	High Pressure Service Water Pumps and Power Supplies	Functional	Monthly
9.	Spent Fuel Cooling System	Functional	Prior to Refueling
10.	High Pressure and Low [3] Pressure Injection System	Vent Pump Casings	Monthly and Prior to Testing
11.	Emergency Feedwater Pump Automatic Start and Automatic Valve Actuation Feature	Functional	Each Refueling
12.	Main Steam Atmospheric Dump Valves	Stroke Test	Each Refueling

(1) Applicable only when the reactor is critical.

(2) Applicable only when the reactor coolant is above 200°F and at a steady-state temperature and pressure.

(3) Operating pumps excluded.

(4) Number of safety valves to be tested each refueling shall be in accordance with ASME Codes Section XI, Article IWV-3511, such that each valve is tested at least once every 5 years.

(5) Applicable only to the interlocks associated with the Reactor Building Purge System.

(6) Verification of the Emergency Condenser Circulating Water (ECCW) System function to supply siphon suction to the Low Pressure Service Water System shall be performed to ensure operability of the LPSW System.

DUKE POWER COMPANY

OCONEE NUCLEAR STATION

ATTACHMENT 2

TECHNICAL SPECIFICATIONS
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3.3 EMERGENCY CORE COOLING, REACTOR BUILDING COOLING, REACTOR BUILDING SPRAY, AND LOW PRESSURE SERVICE WATER SYSTEMS

Applicability

Applies to the emergency core cooling, reactor building cooling, reactor building spray, and low pressure service water systems.

Objective

To define the conditions necessary to assure immediate availability of the emergency core cooling, reactor building cooling, reactor building spray and low pressure service water systems.

Specification

3.3.1 High Pressure Injection (HPI) System

Replace with CHANGE #1 (see following)

a. When the reactor coolant system (RCS), with fuel in the core, is in a condition with temperature above 350°F and reactor power less than 60% FP:

(1) Two independent trains, each comprised of an HPI pump and a flow path capable of taking suction from the borated water storage tank and discharging into the reactor coolant system automatically upon Engineered Safeguards Protective System (ESPS) actuation (HPI segment) shall be operable.

(2) Test or maintenance shall be allowed on any component of the HPI system provided one train of the HPI system is operable. If the HPI system is not restored to meet the requirements of Specification 3.3.1.a(1) above within 24 hours, the reactor shall be placed in a hot shutdown condition within 12 hours. If the requirements of Specification 3.3.1.a(1) are not met within 24 hours following hot shutdown, the reactor shall be placed in a condition with RCS temperature below 350°F within an additional 24 hours.

b. When the RCS, with fuel in the core is in a condition with temperature above 350°F:

(1) Two independent flowpaths allowing the HPI system to take suction from the discharge of the LPI system by manual-local operator action shall be operable.

(2) Test or maintenance shall be allowed on any component of either LPI-HPI flowpath provided the redundant flowpath is operable. If the LPI-HPI flowpaths are not restored to meet the requirements of Specification 3.3.1.b(1) above

Replace with CHANGE #1 (see following)

~~within 72 hours, the reactor shall be placed in a hot shutdown condition within 12 hours. If the requirements of Specification 3.3.1.b(1) are not met within 24 hours following hot shutdown, the reactor shall be placed in a condition with RCS temperature below 350° F within an additional 24 hours.~~

c. ~~For all Units, when reactor power is greater than 60% FP:~~

(1) ~~In addition to the requirements of Specification 3.3.1.a(1) and 3.3.1.b(1) above, the remaining HPI pump and valves HP-409 and HP-410 shall be operable and valves HP-99 and HP-100 shall be open.~~

(2) ~~Tests or maintenance shall be allowed on any component of the HPI system, provided two trains of HPI system are operable. If the inoperable component is not restored to operable status within 72 hours, reactor power shall be reduced below 60% FP within an additional 12 hours.~~

3.3.2 Low Pressure Injection (LPI) System

a. When the RCS, with fuel in the core, is in a condition with pressure equal to or greater than 350 psig or temperature equal to or greater than 250°F:

(1) Two independent LPI trains, each comprised of an LPI pump and a flowpath capable of taking suction from the borated water storage tank and discharging into the RCS automatically upon ESPS actuation (LPI segment), together with two LPI coolers and two reactor building emergency sump isolation valves (~~manual or~~ remote-manual) shall be operable.

(2) Tests or maintenance shall be allowed on any component of the LPI system provided the redundant train of the LPI system is operable. If the LPI system is not restored to meet the requirements of Specification 3.3.2.a(1) above within 72 hours, the reactor shall be placed in a hot shutdown condition within 12 hours. If the requirements of Specification 3.3.2.a(1) are not met within 24 hours following hot shutdown, the reactor shall be placed in a condition with RCS pressure below 350 psig and RCS temperature below 250°F within an additional 24 hours.

Bases

replace with CHANGE #2 (see following)

~~Specification 3.3 assures that, for whatever condition the reactor coolant system is in, adequate engineered safety feature equipment is operable.~~

~~For operation up to 60% FP, two high pressure injection pumps are specified. Also, two low pressure injection pumps and both core flood tanks are required. In the event that the need for emergency core cooling should occur, functioning of one high pressure injection pump, one low pressure injection pump, and both core flood tanks will protect the core, and in the event of a main coolant loop severance, limit the peak clad temperature to less than 2,200°F and the metal-water reaction to that representing less than 1 percent of the clad.(1) Both core flooding tanks are required as a single core flood tank has insufficient inventory to reflood the core.~~

~~The requirement to have three HPI pumps and two HPI flowpaths operable during power operation above 60% FP is based on considerations of potential small breaks at the reactor coolant pump discharge piping for which two HPI trains (two pumps and two flow paths) are required to assure adequate core cooling.(2) The analysis of these breaks indicates that for operation at or below 60% FP only a single train of the HPI system is needed to provide the necessary core cooling.~~

~~The requirement for a flowpath from LPI discharge to HPI pump suction is provided to assure availability of long term core cooling following a small break LOCA in which the BWST is depleted and RCS pressure remains above the shutoff head of the LPI pumps.~~

The borated water storage tanks are used for two purposes:

(a) As a supply of borated water for accident conditions.

(b) As a supply of borated water for flooding the fuel transfer canal during refueling operation.~~(3)~~ (1)

Three-hundred and fifty thousand (350,000) gallons of borated water (a level of 46 feet in the BWST) are required to supply emergency core cooling and reactor building spray in the event of a loss-of-core cooling accident. This amount fulfills requirements for emergency core cooling. The borated water storage tank capacity of 388,000 gallons is based on refueling volume requirements. Heaters maintain the borated water supply at a temperature above 50°F to lessen the potential for thermal shock of the reactor vessel during high pressure injection system operation. The boron concentration is set at the amount of boron required to maintain the core 1 percent Δk/k subcritical at 70°F without any control rods in the core. The minimum boron concentration is specified in the Core Operating Limits Report.

It has been shown that the containment temperature response following a LOCA or main steam line break accident will be within the equipment qualification analysis conditions with one train of Reactor Building spray and two Reactor Building coolers operable.~~(4)~~(2) Therefore, a maintenance period of seven days is acceptable for one Reactor Building cooling fan and its associated cooling unit provided two Reactor Building spray systems are operable or one Reactor Building spray system provided all three Reactor Building cooling units are operable.

insert CHANGE#3 (see following)

Valve LPSW-108 is the LPSW isolation valve on the discharge side of each Unit's RBCUs. This valve is required to be locked open in order to assure the LPSW flowpath for the RBCUs is available.

Three low pressure service water pumps serve Oconee Units 1 and 2 and two low pressure service water pumps serve Oconee Unit 3. There is a manual cross-connection on the supply headers for Unit 1, 2, and 3. One low pressure service water pump per unit is required for normal operation.

The Units 1 and 2 LPSW system requires 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: RBCUs, Component Cooling, main turbine oil tank, RC pumps, and LPI coolers. In this configuration, if two of the three LPSW pumps are inoperable, 72 hours are permitted by TS 3.3.7.b to restore two of the three LPSW pumps to operable status. At all other times when the RCS of Unit 1 or 2 is ≥ 350 psig or ≥ 250°F, all three LPSW pumps are required to meet the single failure criterion. When all three LPSW pumps are required to be operable and one of the three pumps is inoperable, 72 hours are permitted by TS 3.3.7.b to restore the pump to operable status.

The operability of redundant equipment(s) is determined based on the results of inservice inspection and testing as required by Technical Specification 4.5 and ASME Section XI.

REFERENCES

~~(1) ECCS Analysis of B&W's 177-FA Lowered-Loop NSS, BAW-10103, Babcock & Wilcox, Lynchburg, Virginia, June 1975.~~

~~(2) Duke Power Company to NRC letter, July 14, 1978, "Proposed Modifications of High Pressure Injection System".~~

(1) ~~(3)~~ FSAR, ~~Section 9.3.3.2~~ Sections 6.3.1, 9.3.3.2, 15.14.4 and 15.14.5

(2) ~~(4)~~ FSAR, Section 15.14.5

d. With three emergency feedwater pumps and/or both emergency feedwater flow paths inoperable, immediately initiate corrective action to restore at least one emergency feedwater pump and associated emergency feedwater flowpath to operable status. The unit shall be at hot shutdown within 12 hours and below 250°F in another 12 hours if one emergency feedwater pump and associated flowpath are not restored to operable status.

e. If an emergency feedwater pump is inoperable due only to automatic initiation circuitry as specified by 3.4.2, the additional provisions of 3.4.3 a, b, c, and d which require cooldown of the RCS do not apply.

3.4.4 The 16 main steam safety relief valves shall be operable.

3.4.5 A minimum of 72,000 gallons of water per operating unit shall be available in the upper surge tank, condensate storage tank, and hotwell. A minimum of 6 ft. (=30,000 gal.) shall be available in the upper surge tank.

3.4.6 The controls of the emergency feedwater system shall be independent of the Integrated Control System.

insert CHANGE #4 (see following)

insert CHANGE# 5

REFERENCES

1. FSAR, Section 10.
2. Selected Licensee Commitments, Section 16.7
3. FSAR, Section 15.14

Table 4.1-2

MINIMUM EQUIPMENT TEST FREQUENCY

	Item	Test	Frequency
1.	Control Rod Movement (1)	Movement of Each Rod	Monthly
2.	Pressurizer Safety Valves	Setpoint	Each Refueling (4)
3.	Main Steam Safety Valves	Setpoint	Each Refueling (4)
4.	Refueling System Interlocks (5)	Functional	Prior to Refueling
5.	Main Steam Stop Valves (1)	Movement of Each Stop Valve	Monthly
6.	Reactor Coolant System (2) Leakage	Evaluate	Daily
7.	Condenser Circulating Water (6) Flow Test	Functional	Each Refueling
8.	High Pressure Service Water Pumps and Power Supplies	Functional	Monthly
9.	Spent Fuel Cooling System	Functional	Prior to Refueling
10.	High Pressure and Low (3) Pressure Injection System	Vent Pump Casings	Monthly and Prior to Testing
11.	Emergency Feedwater Pump Automatic Start and Automatic Valve Actuation Feature	Functional	Each Refueling
12.	Main Steam Atmospheric Dump Valves	Stroke Test	Each Refueling

(1) Applicable only when the reactor is critical.

(2) Applicable only when the reactor coolant is above 200°F and at a steady-state temperature and pressure.

(3) Operating pumps excluded.

(4) Number of safety valves to be tested each refueling shall be in accordance with ASME Codes Section XI, Article IWV-3511, such that each valve is tested at least once every 5 years.

(5) Applicable only to the interlocks associated with the Reactor Building Purge System.

(6) Verification of the Emergency Condenser Circulating Water (ECCW) System function to supply siphon suction to the Low Pressure Service Water System shall be performed to ensure operability of the LPSW system.

CHANGE #1

The HPI System shall be operable as follows:

1. Two redundant HPI trains, each comprised of an HPI pump and a flow path from the Borated Water Storage Tank (BWST) to two RCS cold legs, and each capable of automatic actuation upon an Engineered Safeguards (ES) signal (HPI segment).

2. Two redundant flow paths allowing the HPI System to take suction from the discharge side of the LPI System by manual-local operator action.

3. When the reactor is greater than 75% power, three HPI pumps and the HPI crossover valves (HP-409 and HP-410) shall be operable and the suction header shall be cross-connected.

4. When less than three HPI pumps are operable, the HPI pump discharge header shall be hydraulically separated between trains.

APPLICABILITY: When the Reactor Coolant System, with fuel in the core, is above 350°F.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required HPI pump is inoperable. OR Required HPI crossover valve(s) inoperable. OR HPI suction header is not cross-connected when required.	A.1 Restore pump and valve(s) to operable status and cross-connect suction header.	72 hours
B Required Action and associated Completion Time of Condition A not met.	B.1 Reduce reactor power to less than or equal to 75% power.	12 hours
C. One train of HPI is inoperable.	C.1 ----------NOTE------------- Applicable when the train is incapable of automatic actuation and is also incapable of actuation through manual alignment. -------------------------------- Reduce reactor power to less than or equal to 75% power.	 3 hours
	AND	
	C.2 Restore train to operable status.	72 hours
D. One LPI to HPI flow path is inoperable.	D.1 Restore flow path to operable status.	72 hours
E. Less than three HPI pumps are operable.	E.1 Hydraulically separate the discharge header.	72 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Required Action and associated Completion Time of Condition C, D, or E not met. OR Both HPI trains are inoperable. OR Both LPI-HPI flow paths are inoperable.	F.1 Be in HOT SHUTDOWN. AND F.2 Reduce RCS temperature to less than or equal to 350°F.	12 hours 36 hours

CHANGE #2

Specification 3.3 ensures that, for whatever condition the RCS is in, adequate emergency core cooling, reactor building cooling, reactor building spray, and low pressure service water is provided.

HPI System Overview:

The HPI System consists of two injection trains, Train 'A' and Train 'B', each of which splits to discharge into two RCS cold legs, so that there are a total of four HPI injection lines. Flow limiting orifices are located in each of the four injection lines. Each train takes suction from the Borated Water Storage Tank (BWST), and has an automatic suction valve (HP-24/HP-25) and discharge valve (HP-26/HP-27) which open upon an ES signal. There are three ES-actuated HPI pumps, each of which can provide flow to either train. At least one HPI pump is normally running to provide RCS makeup and seal injection to the reactor coolant pumps. Suction header cross-connect valves (HP-98 & HP-99/HP-100) are normally open, and discharge header cross-connect valves (HP-115 & HP-116/HP-117) may be open or closed, depending upon plant conditions. Additional discharge valves, HP-409/HP-410 (crossover valves), bypass HP-26/HP-27 to assure the ability to feed either train's injection lines from the pump(s) on the other train. Valves HP-26 or HP-410 can feed Train A, and HP-27 or HP-409 can feed Train B. Each of these four valves can be throttled from the control room, and a safety grade flow instrument is provided for the flow path associated with each of the four valves.

The HPI pump suction can be aligned to the LPI pump discharge through valves LP-15 and LP-16, which may be operated either locally or from the control room.

HPI System ECCS Requirements:

To fulfill HPI System ECCS heat removal requirements during a small break LOCA with the reactor above 350°F, one HPI pump is assumed to inject immediately through one HPI train upon ES actuation.

If the power level is above 75%, there are additional HPI System ECCS heat removal requirements to mitigate the consequences of certain small break LOCAs. For example, in the design basis RCP discharge small break LOCA, one HPI train fails to actuate, and the break location is such that full flow from only one of the two injection lines of the other HPI train actually reaches the reactor. Under these conditions, to ensure adequate cooling, at least one HPI pump is assumed to provide flow through the automatically actuating train. In addition, injection through the other HPI train must occur within 10 minutes.

For certain small break LOCAs in which BWST inventory would be depleted before the RCS depressurizes to the point that direct injection from the LPI pumps can be established, "piggyback" operation of the LPI/HPI Systems is required. In piggyback, an LPI pump takes suction on the Reactor Building Emergency Sump (RBES) and discharges to the HPI pump suction header, through LP-15 and/or LP-16, and one or two HPI pumps discharge into the RCS. There are a number of different alignments which would meet requirements during an accident, including supplying all HPI suction through either LP-15 or LP-16.

HPI System Redundancy and Train Separation:

The two HPI trains are redundant, which means that they are designed and aligned such that they are not both susceptible to any single active failure including the failure of any powered component to operate or any single failure of electrical equipment.

The HPI system is not required to withstand passive failures, e.g., excessive leakage from system piping or valves, because it does not provide long term core cooling.

The HPI system redundancy requirements also apply to the two LPI-to-HPI flow paths, with respect to their function as a suction source to the HPI pumps. There are no mechanical separation or cross-connection requirements associated with this function. However, because they are also a part of the LPI system piping, these two flow paths are required to be separated during normal operation by valve LP-9 or LP-10 being closed.

Hydraulic separation on the discharge side of the HPI pumps is only required when a single HPI pump could simultaneously inject through both trains at the beginning of an accident. In this accident configuration, the single HPI pump could experience runout conditions and could fail prior to operator action to throttle flow or start another pump. If only one of the two non-running HPI pumps were capable of automatic actuation upon an ES signal, cross-connection of the HPI pump discharge header could cause a loss of redundancy. This is because a single failure could prevent the non-operating pump from starting, or cause loss of the running pump, leaving a single pump aligned to both trains. If both non-running HPI pumps were incapable of automatic actuation, cross-connection of the HPI pump discharge header would also be unacceptable since the same loss of redundancy could occur even without the single failure. Thus, Specification 3.3.1 requires that the appropriate discharge header cross-connect valves

(HP-115 & HP-116/HP-117) are closed if less than three HPI pumps are operable. If all three pumps are operable, operation with the discharge header cross-connected is acceptable.

Hydraulic separation on the suction side of the HPI pumps could cause a loss of redundancy. With HP-98, HP-99, or HP-100 closed, a failure of an automatic suction valve (HP-24/HP-25) to open during an accident could cause two pumps to lose suction. Therefore, valves HP-98, HP-99, and HP-100 must remain opened for HPI System operability above 75% power. It is acceptable to operate with hydraulic separation on the suction side of the HPI pumps below 75% power since the accident analysis requirements are met with one HPI pump injecting through a single train.

HPI System Specifications:

Specification 3.3.1 requires redundant systems and components to ensure that all ECCS requirements of the HPI system would be met in an accident. Whenever degraded HPI system conditions cause this redundancy to be lost, such that a single failure could prevent ECCS requirements from being met, a time limit is imposed upon continued operation. One HPI pump injecting through one train provides sufficient flow to mitigate most small break LOCAs. However, for cold leg breaks located on the discharge of the reactor coolant pumps, some HPI injection will be lost out the break. For this reason, operator actions are credited to open valve(s) HP-409/HP-410 if insufficient flow is present in one train. The safety analyses have determined that the capacity of one HPI train is sufficient to mitigate a small break LOCA on the discharge of the reactor coolant pumps if reactor power is less than or equal to 75% FP. For power levels greater than 75% FP, the additional HPI flow obtained by aligning both HPI trains for injection is necessary to mitigate the reactor coolant pump discharge break small break LOCA.

Specification 3.3.1 provides HPI System operability requirements and defines a train of HPI as an HPI pump and a flow path from the BWST to two RCS cold legs, capable of automatic actuation upon an ES signal (HPI portion). Specification 3.3.1 also requires two redundant flow paths to the suction of the HPI pumps from the discharge of the LPI pumps. Above 75% power, Specification 3.3.1 requires that all three HPI pumps and valves HP-409 and HP-410 shall be operable and that the suction header is cross-connected (HP-98, HP-99, and HP-100 are open). In addition, Specification 3.3.1 requires hydraulic separation of the discharge header if less than three HPI pumps are operable.

Condition A of Specification 3.3.1 addresses the situation where one of the three HPI pumps is inoperable, one or both crossover valves (HP-409 or HP-410) is inoperable, or the suction header is not cross-connected. Required Action A.1 of Specification 3.3.1 requires the inoperable pump or valve(s) to be restored to an operable status and the suction header to be cross-connected within 72 hours. This Completion Time is considered adequate since, barring a single failure, the HPI System can still satisfy the full power accident analysis requirements of two HPI pumps injecting down two trains. If this 72 hour Completion Time is not met, Required Action B.1 requires that the reactor be reduced to less than or equal to 75% power within 12 hours. In addition, if entry into Condition A is due to an inoperable pump, Condition E and Required Action E.1 requires that the discharge header be isolated between the two remaining operable HPI pumps. Required Actions B.1 and E.1 restore the HPI System to an operable status and operation at or below 75% power may continue indefinitely.

One train of HPI is defined as an HPI pump and a flow path from the BWST to two RCS cold legs, capable of automatic actuation upon an ES signal (HPI portion). If one train of HPI is inoperable, and cannot be manually aligned by crediting operator action to cross-connect HPI trains using HP-409 or HP-410, Required Action C.1 requires that the reactor be reduced to less than or equal to 75% power within 3 hours. This action is necessary because one train of HPI is not capable of meeting the safety analysis requirements for power levels in excess of 75% power. The 3 hour time period to reduce reactor power is considered acceptable in that it is more conservative than the shutdown requirements of Specification 3.0. With the reactor less than or equal to 75% power, one train of HPI is capable of satisfying the requirements of the safety analyses. Required Action C.2 allows a total time of 72 hours to restore the inoperable train to an operable status before further shutdown requirements are imposed.

Condition C of Specification 3.3.1 also addresses the situation where one train of HPI is inoperable, but could still be manually aligned by crediting operator action to cross-connect HPI trains by opening HP-409 or HP-410. Under these conditions, Required Action C.2 allows 72 hours to restore the HPI System to an operable status before additional shutdown requirements are imposed. This 72 hour Completion Time is considered reasonable since, barring a single failure, the HPI System is still capable of meeting the full power accident analysis requirements.

Condition D of Specification 3.3.1 requires redundant flow paths from the LPI pump discharge to the HPI pump suction. This ensures that the piggyback alignment is available, should the LOCA break size be such that elevated RCS pressure requires the use of both LPI and HPI pumps to establish recirculation from the RBES. With only one LPI-to-HPI flow path operable, operation is limited to 72 hours. The 72 hour time limit is justified because there is a limited range of break sizes, and therefore a lower probability, for a small break LOCA which would require piggyback operation. Valves LP-15 and LP-16, which are used to align the piggyback mode, must be capable of being operated locally during an accident.

Condition E assures that redundancy requirements are satisfied when the HPI System is operating in a degraded mode. This condition addresses HPI pump runout concerns associated with one HPI pump injecting down two trains. If less than three HPI pumps are operable, 72 hours are allowed to establish hydraulic separation by closing the appropriate discharge header cross-connect valves.

If the requirements of Conditions C, D, or E are not met, both trains of HPI are inoperable, or both LPI-HPI flow paths are inoperable, Condition F of this specification requires the reactor to be at hot shutdown within 12 hours, and below 350°F within the following 24 hours. Condition F addresses the situation where the completion times of Conditions C, D, or E are not met or, assuming no single failure, the HPI System is in a condition where the safety analysis requirements cannot be satisfied.

Two LPI pumps and both core flood tanks are required. In the event of a main coolant loop severance, one LPI pump and both core flood tanks will protect the core and limit the peak cladding temperature to less than 2200°F and the metal-water reaction to that representing less than one percent of the cladding. Both core flood tanks are required as a single core flood tank has insufficient inventory to reflood the core.

CHANGE #3

Operability of a train of HPI assumes that the associated safety-grade flow instruments, on the injection lines and crossover line, are operable because these indications are used to throttle HPI flow during an accident and assure that runout limits are not exceeded. The safety grade flow instruments of the LPI trains and associated RBS trains are both required for RBS train operability. This is because both LPI and RBS flow must be monitored to ensure that RBS pumps do not exceed NPSH requirements. The LPI pumps are subject to NPSH or runout problems during design accidents, so safety-grade flow instrumentation is required for operability of the LPI trains.

CHANGE #4

3.4.7 The main steam atmospheric dump valve flow path on each steam generator shall be operable.

a. One main steam atmospheric dump valve flow path may be inoperable for a period of 7 days. If the inoperable flow path is not restored to operable status within 7 days, the unit shall be brought to hot shutdown within an additional 12 hours and below 350 °F in another 24 hours.

b. Both main steam atmospheric dump valve flow paths may be inoperable for a period of 24 hours. If one main steam atmospheric dump valve flow path is not restored to an operable status within 24 hours, the unit shall be brought to hot shutdown within an additional 12 hours and below 350 °F in another 24 hours.

CHANGE #5

The main steam atmospheric dump valves are credited during certain small break LOCAs to depressurize the steam generators and enhance primary-to-secondary heat transfer. The atmospheric dump valves are manual valves and operator action is credited within 25 minutes of an ES signal to open them and depressurize the steam generators for certain reactor coolant pump discharge small break LOCAs.

For each steam generator, a main steam atmospheric dump valve flow path consists of a block valve, throttle valve, and isolation valve. The throttle valve and isolation valve are in parallel and are located downstream of the block valve. The block valve must be opened prior to opening the throttle valve or isolation valve. This is accomplished by first opening a small block valve pressure equalization valve that equalizes the differential pressure across the larger block valve which will allow it to open. Once the block valve is opened, the cooldown rate is controlled using the throttle valve. If additional relief capacity is needed, the operator can open the isolation valve. The capacity of the throttle and isolation valves exceeds decay heat loads and is sufficient to cool down the plant. Operability of the block valve, throttle valve, and isolation valve is necessary for a main steam atmospheric dump valve flow path to be operable per Specification 3.4.7. Implicit in the operability of the block valve is that the small block valve pressure equalization valve is operable.

Since the main steam atmospheric dump valves are credited in small break LOCA analyses, shutdown requirements are equivalent to those for the HPI System.

ATTACHMENT 3
TECHNICAL JUSTIFICATION

Overview

Both substantive changes, and changes to improve clarity, are being proposed for Technical Specification 3.3.1. In a letter to the NRC dated August 17, 1995, Duke Power committed to convert to Improved Technical Specifications (ITS) for Oconee Nuclear Site. The proposed changes to Technical Specification 3.3.1 are written in a format consistent with ITS. The decision to submit the proposed HPI Technical Specification in ITS format was based on feedback from operators during the development stage that the ITS format would be easier to understand. In addition, the proposed ITS format for this specification will minimize the changes necessary in converting from current Technical Specifications to ITS.

The technical justification describes the resolution of four general problems associated with the current HPI Technical Specifications. A detailed description of the changes to the current technical specifications, as well as revisions to the Bases for Specification 3.3.1, is provided. A summary flow diagram of the Oconee Emergency Core Cooling System (ECCS) is included as Figure 1. In addition, a new specification is proposed to address operability requirements for the main steam atmospheric dump valves (ADVs). This specification is being proposed because the ADVs are being credited to depressurize the steam generators in the revised small break LOCA analyses. Finally, a minor revision to Specification 3.3.2 for the LPI System is being proposed to clarify that the Reactor Building Emergency Sump isolation valves are remote-manual valves.

Problems Being Corrected

Four problems with current Specification 3.3.1 are being corrected as outlined below:

Problem One: Provision for Manual Actuation of a Second HPI Train

In both the current and proposed Technical Specifications, there is a power level above which additional HPI System restrictions are necessary to mitigate a small break LOCA on the RCP discharge piping. As reported in Duke Power Company's September 9, 1990, Special Report to the NRC ("Oconee Nuclear Station Unit 2 - HPI Train Rendered Automatically Inoperable due to Inappropriate Operator Action"), when power is above this level current Specification 3.3.1.c(2) appears to disallow operation when one HPI train will automatically actuate and the other HPI train is operable based on manual operator actions. However, the analytical basis for the Technical Specifications changes which first incorporated the increased restrictions in Specification 3.3.1.c(1) include an assumption of operator action to actuate the second train. Additional components (valves HP-409 and HP-410) are required to ensure that this manual actuation of the second train can be performed from the control room. This is documented in a December 13, 1979, letter from R. W. Reid (NRC) to W. O. Parker, Jr. (DPC), and (by reference) in Amendments 105/105/102 and 81/81/78 to the Oconee Facility Operating Licenses DPR-38/47/55.

Literal application of current Specification 3.3.1.c(2) wording would prevent performance of required surveillance testing at power. For example, during required testing of automatic injection valve HP-27, the valve is not capable of automatic actuation upon an ES signal.

The intent of Specification 3.3.1.c(2), as the provision for operation in a degraded mode under current Specification 3.3.1.c, is to provide assurance that the HPI system retains the capability to mitigate any postulated accident, despite the allowed degradation of the system. Availability of one automatically operable train and one manually operable train provides this assurance.

A time limit of 72 hours is imposed under Required Action C.2 of proposed Specification 3.3.1 to restore the automatic actuation requirements of a train that is still capable of being manually aligned. This time is considered acceptable because a single failure is not considered while in an action statement. Barring a single failure, the full power accident analysis requirements are satisfied with one train automatically actuating on an engineered safeguards signal and the other train being manually aligned within 10 minutes. Consistent with the requirements in NUREG-1430, Standard Technical Specifications for Babcock and Wilcox Plants, a 72 hour completion time to restore the affected train to an operable status is proposed. The 72 hour completion time in NUREG-1430 is based on a December 1, 1975, NRC memorandum from R. L. Baer to V. Stello, Jr., "Recommended Interim Revisions to LCOs for ECCS Components." This reference concludes that the 72 hour completion time will have a negligible impact on the unreliability of the HPI System. Duke Power has reviewed the bases for the 72 hour completion time in NUREG-1430 for one inoperable HPI train and has concluded that this time constraint is appropriate for the Oconee HPI System. Availability goals for the HPI System assure that outage times are minimized. The extension of the completion time from 24 hours to 72 hours is not expected to significantly impact the unreliability of this system.

Problem Two: Interrelation of Current Specifications 3.3.1.a and 3.3.1.c

Consideration of Problem One led to the realization that current Specification 3.3.1.a, which addresses requirements between 350°F and 60% power (corresponding to 75% power in the proposed specifications), and current Specification 3.3.1.c, which addresses additional requirements when above 60% power, were not properly integrated. For example, while it became clear that degraded operation under current Specification 3.3.1.c should provide for the situation in which one HPI train is automatically operable and the other train is manually operable, the subsequently required reduction in power to below 60% power would lead to another specification (current Specification 3.3.1.a) which did not address this situation. Appropriate time limits for this situation, either when above or below 60% power, were not stated.

This problem is corrected by proposed Specification 3.3.1. This specification differentiates between an HPI train that is incapable of automatic actuation or manual actuation and an HPI train that will not automatically actuate but can be aligned by operator actions.

Specifically, Condition C of Specification 3.3.1 addresses the situation where an HPI train is inoperable and cannot be aligned by manual operator actions. For this condition, Required Action C.1 requires that reactor power be reduced to less than or equal to 75% FP within 3 hours. This action is necessary because a single HPI train will not satisfy the small break LOCA HPI flow requirements above 75% FP. The 3 hour time limit to reduce reactor power is considered acceptable in that it is more conservative than the shutdown requirements of Technical Specification 3.0 and allows the operators time to plan a controlled decrease in reactor power. Required Action C.2 allows a total time of 72 hours to restore the inoperable train to an operable status. The 72 hour completion time is consistent with NUREG-1430. With the reactor at less than or equal to 75% FP, a single HPI train is capable of meeting the accident analysis requirements. The 72 hour completion time is considered acceptable since a small break LOCA with a single failure of the remaining operable HPI train is considered highly unlikely during this time period.

Condition C of proposed Specification 3.3.1 also addresses the situation where an HPI train does not meet the operability requirements related to automatic actuation, but is operable by crediting operator action to cross-connect the HPI trains using HP-409 or HP-410. Barring a single failure, this condition will still result in two HPI pumps injecting down two trains, thus meeting the small break LOCA flow requirements at full power. Therefore, a time limit of 72 hours is imposed under Condition C.2 of proposed Specification 3.3.1 to restore a train to operable status that will not automatically actuate but can be manually aligned. This time is consistent with NUREG-1430.

Current Specification 3.3.1.b, which addresses LPI-to-HPI flow paths is converted into ITS format as Condition D of proposed Specification 3.3.1. This change is primarily editorial. Operability requirements for the LPI-to-HPI flow path are consistent with the current technical specifications and action times are equivalent or conservative with respect to the times specified in the current specifications.

Problem Three: Consideration of Various LOCAs at a Reduced Power Level

The RCP discharge small break LOCA, described in the revised BASES under "HPI ECCS Requirements", is the limiting accident to be mitigated by the HPI system. Above a certain power level (currently 60%, proposed 75%), Specification 3.3.1 provides additional requirements to ensure that two HPI trains will always be available to mitigate this accident. This is accomplished by requiring equipment that would allow a train which did not automatically actuate to be manually aligned from the control room.

As reported in LER 269/90-15, the HPI system operability requirements below 60% power had been based on the small break LOCA on the discharge side of the RCPs. The generic reactor coolant pump discharge small break LOCA analyses assume an even flow split between the injection line connected to the broken cold leg and the injection line connected to the intact cold leg. This is because the back pressure on each line is assumed to equal RCS pressure. In addition, HPI flow from the injection line connected to the broken leg is injected into the reactor coolant pump discharge volume. A computer model then determines how much of this injection flow is lost out the break.

The discovery reported in LER 269/90-15 was that another break location could cause the stated flow split assumption to be non-conservative. If the break location is postulated to be on the HPI injection line itself (0.025 ft^2 break size), downstream of the last check valve but upstream of the RCS cold leg, the appropriate back pressure assumption would be containment pressure for the broken injection line and RCS pressure for the intact injection lines. In addition, none of the HPI flow through the broken injection line would reach the RCS. The resulting flow split from this asymmetric pressure boundary condition would cause less injection flow to reach the reactor. If a break is postulated at the intersection of the HPI injection line and the RCS cold leg (HPI nozzle), the break size could range from 0.025 ft^2 to 0.5 ft^2. The HPI system is not required to mitigate large break LOCAs, defined as being greater than 0.5 ft^2 in area. A break at the HPI nozzle could result in a break size greater than 0.025 ft^2 with the more severe HPI spilling assumption that the injection line connected to the broken cold leg is exposed to containment pressure. Since 10 CFR 50.46 addresses breaks in the RCS piping, the break at an HPI injection nozzle is not included in the break spectrum. Based upon discussions with Framatome Technologies Incorporated (FTI), the break of an HPI injection nozzle is not required to be analyzed, according to the licensing history associated with Babcock & Wilcox pressurized water reactors.

Although the HPI line break scenario (0.025 ft^2 break size) had been analyzed based on full power initial conditions and HPI system operability requirements, this scenario had not been considered in developing the less restrictive HPI requirements for operation below 60% power. Until an explicit analysis of this scenario determined the maximum allowable power level, the immediate corrective action was to apply the more restrictive requirements for operation above 60% power (existing Specification 3.3.1.c) to all operating modes for which the HPI system is required. Margin in the analyses for operation above 60% power ensured that this corrective action was conservative. This problem is being corrected by the proposed changes to Specification 3.3.1 which impose the additional restrictions at 75% power, a value consistent with the analysis, rather than 60% power.

In summary, the available HPI flow is calculated for all small break LOCAs, except the HPI line break, by assuming all injection lines are exposed to RCS pressure. This results in an approximately even flow split between the injection lines. For the HPI line break (0.025 ft^2 break size), it is assumed that the broken HPI line is exposed to containment pressure, resulting in a large percentage of the HPI flow being lost to containment.

Analyses have been performed by FTI to confirm that the plant response to all small break LOCAs from an initial condition of 75% FP, with only one HPI pump/train available to mitigate the event (following an assumed single failure of the second HPI train), meets the acceptance criteria of 10 CFR 50.46. These analyses use the recently approved FTI LOCA Evaluation Model as described in FTI topical report BAW-10192P. This topical report was approved by the staff in a safety evaluation dated February 18, 1997.

The approach taken in the selection of the break spectrum to be analyzed began with a review of the break spectrum results beginning from 100% power and assuming two HPI pumps and trains were available. The full power break spectrum assumes operator action to cross-connect HPI trains at ten minutes in order to balance the HPI flow. The full power break spectrum also assumes operator action to begin manually increasing steam generator levels from the natural circulation level setpoint to the loss of subcooled margin level setpoint within 20 minutes following reactor trip for one steam generator, and within 30 minutes for the second steam generator. These actions are required by the Emergency Operating Procedure following actuation of the HPI System and a loss of subcooled margin.

A complete break spectrum was then analyzed, including the core flood line break and HPI injection line break, to determine the limiting break size and location. The limiting break size was a 0.15 ft^2 on the reactor coolant pump discharge with a peak cladding temperature of less than 1400°F.

Another reactor coolant pump discharge cold leg break spectrum, along with the core flood line break and HPI line break, was then analyzed from 75% FP with only the flow from one HPI pump. No cross-connecting of the HPI System is credited with only one HPI pump in operation. The break is assumed to occur in the loop with the operable HPI train. Steam generator levels are manually raised by the operator similar to the full power analyses. In addition, credit is taken at 25 minutes after HPI actuation for the operator to locally open the atmospheric dump valves (ADVs) in order to begin a depressurization of the steam generators. These actions are required by the Emergency Operating Procedure.

It was determined from the results of these analyses from 75% FP that the limiting break is a 0.08 ft^2 break on the reactor coolant pump discharge piping, with a peak cladding temperature of less than 1700°F. For reactor coolant pump discharge break sizes of 0.06 ft^2 or less, the depressurization of the steam generators by opening the ADVs is required to successfully mitigate the event. For larger break sizes, opening the ADVs is not required. The methodology to model enhanced steam generator heat transfer by crediting raising steam generator levels to the loss of subcooled margin setpoint and depressurizing the steam generators has been demonstrated in FTI topical report BAW-10192P.

The ADVs are not currently included in Technical Specifications. Since the revised small break LOCA analyses credit operation of these valves, Duke Power is proposing that operability requirements for these valves are added to Technical Specifications. Proposed Specification 3.4.7 requires that the ADV flow path on each steam line is operable. One flow path may be inoperable for up to 7 days. If the inoperable flow path is not restored to an operable status within 7 days, proposed specification 3.4.7 requires the unit to be brought to hot shutdown within an additional 12 hours and below 350°F in another 24 hours. Proposed Specification 3.4.7 allows both ADV flow paths to be inoperable for a period of 24 hours. If one ADV flow path is not restored to an operable status within 24 hours, the unit shall be brought to hot shutdown within an additional 12 hours and below 350°F in another 24 hours. These shutdown requirements are consistent with the shutdown requirements for the HPI System.

At Oconee, the ADVs are manual valves that are located on the turbine deck just outside the control rooms. Since these valves are easily accessible, there is a high level of confidence that the valves can be opened within the time limits assumed in the small break LOCA analyses. For each steam generator, a main steam atmospheric dump valve flow path consists of a block valve, throttle valve, and isolation valve. The throttle valve and isolation valve are in parallel and are located downstream of the block valve. The block valve must be opened prior to opening the throttle valve or isolation valve. This is accomplished by first opening a small block valve pressure equalization valve that equalizes the differential pressure across the larger block valve which will allow it to open. Once the block valve is opened, the cooldown rate is controlled using the throttle valve. If additional relief capacity is needed, the operator can open the isolation valve. The capacity of the throttle and isolation valves exceeds decay heat loads and is sufficient to cool down the plant.

Although the valves are not safety-related and seismically designed, they have been proven to be highly reliable based on testing performed each refueling outage. Operability requirements for the valves are currently contained in Selected Licensee Commitment 16.9.9, which includes requirements to stroke test the valves each refueling outage. Operability requirements and allowed outage times in the proposed Technical Specification for the ADVs are consistent with the requirements given in NUREG-1430. Based on the fact that operation of these valves is only required for certain small break LOCAs, the proposed outage times of 7 days for one flow path and 24 hours for two flow paths being inoperable are considered acceptable.

It should be noted that the turbine bypass valves would normally be used to depressurize the steam generators and cool down the plant in the event of an accident. However, for the unlikely scenario where there is a small break LOCA and a loss of offsite power, the turbine bypass valves would not be available. Thus, the ADVs provide a reliable, alternate means of depressurizing the steam generators in the event of a loss of offsite power and are credited in the small break LOCA analyses supporting this license amendment.

Based on the results of an analysis of a spectrum of small break LOCAs and assuming flow from only one HPI pump, it is concluded that the proposed Technical Specification revision regarding HPI System operability requirements at power levels less than or equal to 75% FP is justified.

Problem Four: Clarification Regarding Separation Requirements for the HPI Pump Discharge Header

As discussed in the revised BASES under "HPI System Redundancy and Train Separation", operation with the discharge header cross-connected violates neither the requirement for train redundancy nor the requirement for "independent trains" stated in the current specifications. Duke Power Company's Design Basis Documentation work shows that the proper interpretation of "independence" and "redundancy" for the Oconee HPI system is that the system must be designed and aligned to withstand required failures, as stated in the revised BASES. These failure criteria continue to be met with the HPI pump discharge header cross-connected, provided that appropriate measures are taken when

HPI pump operability is degraded, as stated in the proposed Technical Specification and BASES.

The existing specification uses the wording "Two independent trains..." though past license amendment changes (Amendment 81/81/78 to DPR-38/47/55) had already required the HPI suction header to be cross-connected. The proposed specification utilizes new wording ("redundant trains" vs. "independent trains") to distinguish between the requirements for the HPI system and those for systems required for long term core cooling (e.g., Low Pressure Injection). Only systems required for long term core cooling are required to withstand passive failures. The ability of the HPI system to withstand other failures requires hydraulic separation of the pump discharge header only in certain situations.

New restrictions, in proposed Specification 3.3.1, define when the discharge header must be separated. Operation with the discharge header open increases the safety margin. This is because the worst single failure results in two HPI pumps initially injecting through one train. The current plant lineup, with the discharge header isolated, could result in only one HPI pump initially injecting through one train following the worst single failure. Thus, it is considered a safety benefit to allow operation with the discharge header cross-connected when three HPI pumps are operable.

DETAILED DESCRIPTION OF CHANGES

NOTE: The proposed BASES provide a discussion of each proposed specification under "HPI System Specifications".

<u>Specification 3.3.1.a(1)</u>
(replaced with 3.3.1, Item 1)

This specification is revised to integrate the requirements above 350°F with those above 75% FP, as described under Problem Two. Item 1 in proposed Specification 3.3.1 retains the definition of an operable HPI train currently in Specification 3.3.1.a.(1). Wording changes are made to more accurately and concisely define an HPI train, particularly by stating that each train must provide a flow path to two RCS cold legs. These wording changes do not represent any change in practice. In addition, the word "independent" is replaced by "redundant", as described under Problem Four.

<u>Specification 3.3.1.a(2)</u>
(replaced with proposed 3.3.1, REQUIRED ACTIONS C and F)

The requirements in current Specification 3.3.1.a(2) are revised to an ITS format. Conditions C and F in proposed Specification 3.3.1, and their associated Completion Times, replace the requirements currently given in Specification 3.3.1.a(2). The ITS format results in simplified language. For example, the phrase "Test or maintenance shall be allowed on any component..." is replaced by a simple description of the HPI System operability condition. The BASES to Specification 3.1.1 provide additional information to assure that the specification is properly implemented.

As stated under Problems One and Two, proposed Specification 3.3.1 corrects a situation in which an operating mode recognized in the licensing basis of the plant has not been adequately addressed in the Technical Specifications. The plant was modified to add remotely-operated valves HP-409 and HP-410, such that the operator could provide flow to both trains even if components(s) in one train failed to actuate. This modification was performed to ensure that ECCS requirements would be met for a RCP discharge small break LOCA originating from above a certain power level (then 60%, now 75% power).

When the reactor is at or below 75% power, the additional capability provided by HP-409 and HP-410, or by other means of manually actuating a second train when only one is automatically operable, represents a substantial increase in safety relative to that addressed by current Specification 3.3.1.a(2). This is because the basis for current Specification 3.3.1.a(2) assumes that only one train is capable of actuation, and that a single failure could prevent any actuation.

Proposed Required Action C.1 of Specification 3.1.1 in effect replaces current Specification 3.3.1.a(2), because it addresses the situation in which only one train is capable of automatic actuation and the other train cannot be manually aligned. The proposed 72 hour completion time to restore the inoperable train to an operable status (Required Action C.2) is consistent with NUREG-1430.

When coupled with the requirement to reduce reactor power to less than or equal to 75% FP within 3 hours, this specification is considered adequate in that a small break LOCA and single failure of the operable HPI train within this time period is considered highly unlikely. The 3 hour requirement to reduce reactor power to less than or equal to 75% FP is considered necessary since, with only one HPI train capable of injection, the ECCS flow requirements cannot be satisfied above 75% FP. Since single failures are not considered while in an action statement, reducing reactor power to less than or equal to 75% FP within 3 hours results in the HPI System being capable of satisfying the ECCS flow requirements for the remainder of the 72 hour Completion Time associated with Condition C.

When one train is not automatically operable, but can be manually aligned, Required Action C.2 allows 72 hours to restore the train to an operable status. The proposed 72 hour completion time for Condition C.2 is consistent with the requirements in NUREG-1430 for a standard B&W plant. This is because a single failure will not result in a loss of safety function. As stated before, the basis for the 72 hour completion time in NUREG-1430 for one inoperable ECCS train is applicable to Oconee.

Currently, Specification 3.3.1.a.(2) states that, if an inoperable HPI train is not restored to an operable status within 24 hours, the reactor shall be placed in a hot shutdown condition within 24 hours. If the inoperable train is not restored to an operable status within 24 hours following hot shutdown, the reactor shall be placed in a condition with RCS temperature below 350°F within an additional 24 hours. Thus, the Technical Specifications currently allow a total of 60 hours to exit the applicable conditions for the HPI System if one train is inoperable.

Condition F of proposed Specification 3.3.1 requires that, if an inoperable train is not restored to an operable status within 72 hours, the reactor shall be placed in a hot shutdown condition within 12 hours and shall be below 350°F within an additional 24 hours. The Time Requirements of Condition F are more restrictive than the current Technical

Specifications and are being proposed to be consistent with the requirements of NUREG-1430.

Specification 3.3.1.b
(replaced with proposed 3.3.1, Item 2 and Condition D)

This specification is converted to ITS format as proposed by Item 2 and Condition D of Specification 3.3.1. None of the changes to 3.3.1.b(1) represent any change in the application of this specification. The requirements contained in current Specification 3.3.1.b are included as Item 2 of proposed Specification 3.3.1. The proposed BASES describe the LPI-to-HPI flow path redundancy requirements under "HPI System Redundancy and Train Separation". Redundancy requirements of the HPI system also apply to the LPI-to-HPI flow paths, because "piggyback" operation is an integral part of the HPI system operation prior to stabilizing RCS conditions for long term core cooling.

The requirements of current Specification 3.3.1.b(2) are addressed by Condition F of proposed Specification 3.3.1. The proposed completion times of Condition F are more conservative than currently required by specification 3.3.1.b(2). This is because a total of 36 hours, as opposed to 60 hours, is allowed to restore an inoperable LPI-to-HPI flow path to an operable status prior to exiting the applicability conditions for the HPI System.

Specification 3.3.1.c(1)
(replaced with proposed 3.3.1, Item 3 and Condition A)

The requirements for current Specification 3.3.1.c(1) are addressed by Item 3 and Condition A of proposed Specification 3.1.1. Currently, Specification 3.3.1.c(1) requires HP-99 and HP-100 to be open. If valve HP-98, HP-99, or HP-100 is closed, a single failure of HP-24 or HP-25 to open could isolate suction flow to two HPI pumps. Normal operating practice is for all three of the suction header valves to be open. The requirement that HP-99 and HP-100 are open, as dictated by current Specification 3.3.1.c(1), is addressed by Item 3 of proposed Specification 3.3.1. For completeness, the proposed BASES also address the requirement for HP-98 to be open.

Item 3 in Specification 3.3.1 requires that, above 75% FP, all three HPI pumps and HP-409 and HP-410 shall be operable. These requirements were previously prescribed by Specification 3.3.1.c(1).

<u>Specification 3.3.1.c(2)</u>
(replaced with proposed 3.3.1, Conditions A, B, E and F)

Conditions A and B of proposed Specification 3.3.1 address the requirements if one HPI pump or the crossover valves are inoperable or the suction header is not cross-connected. Condition A allows a 72 hour completion time to restore an inoperable HPI pump or valve(s) to an operable status. This is consistent with the 72 hours currently allowed by Specification 3.3.1.c(2). Required Action E.1 requires that if only two HPI pumps are operable, the discharge header between these two pumps shall be isolated. This requirement protects against HPI pump runout by preventing a single HPI pump from injecting down two trains in the event of a failure of one of the two operable HPI pumps. The BASES contain additional details to assure that the proposed specification is properly implemented.

If an inoperable HPI pump, crossover valve, or suction header is not restored to an operable status within 72 hours, Required Action B.1 stipulates that reactor power is reduced to less than or equal to 75% FP within 12 hours. This requirement is consistent with the 12 hours currently specified in Specification 3.3.1.c.(2). Once power is reduced to less than or equal to 75% FP, Condition B allows continued operation at the reduced power level. This is because two trains of HPI are operable and only one train of HPI is required to meet the ECCS flow requirements at or below 75% FP.

<u>Specification 3.3.2.a(1)</u>

The words "(manual or remote-manual)", in reference to the Reactor Building Emergency Sump isolation valves, have been changed to "(remote-manual)". Duke Power Company analyses have shown that these valves could be inaccessible, due to high radiation exposure, during a licensing basis accident. Therefore, it is inappropriate to refer to manual (i.e., local) operation of these valves.

Proposed specification 3.4.7

As described earlier in Problem 3, the revised small break LOCA analyses credit operator action to open the ADVs within 25 minutes of an ES signal. Since depressurizing the generators is credited in the revised small break LOCA analyses, Duke Power is proposing a new Technical Specification for these valves.

Proposed specification 3.4.7 requires that the ADV flow path on each steam line is operable. One flow path may be inoperable for up to 7 days. If the inoperable flow path is not restored to an operable status within 7 days, proposed specification 3.4.7 requires the unit to be brought to hot shutdown within an additional 12 hours and below 350°F in another 24 hours. Proposed specification 3.4.7 allows both ADV flow paths to be inoperable for a period of 24 hours. If one ADV flow path is not restored to an operable status within 24 hours, the unit shall be brought to hot shutdown within an additional 12 hours and below 350°F in another 24 hours. Since the ADVs are credited in some small break LOCA analyses, the proposed shutdown requirements for these valves are consistent with the shutdown requirements for the HPI System.

At Oconee, the ADVs are manual valves that are located on the turbine deck just outside the control rooms. Since these valves are easily accessible, there is a high level of confidence that the valves can be opened within the time limits assumed in the small break LOCA analyses. Although the valves are not safety-related and seismically designed, they have been proven to be highly reliable based on testing performed each refueling outage. Operability requirements for the valves are currently contained in Selected Licensee Commitment 16.9.9, which includes requirements to stroke test the valves each refueling outage. Table 4.1.2 of the current Technical Specifications is revised to include the surveillance testing of these valves each refueling outage. Operability requirements and allowed outage times in the proposed Technical Specification for the ADVs are consistent with the requirements given in NUREG-1430. Based on the fact that operation of these valves is only required for certain small break LOCAs, the proposed outage times of 7 days for one flow path and 24 hours for two flow paths being inoperable are considered acceptable.

Changes to BASES

The section in the BASES for Specification 3.3.1 which addresses the HPI System has been replaced with a greatly expanded description. ECCS requirements, redundancy and train separation requirements, and an explanation of the proposed actions and completion times for Specification 3.3.1 are included in the revised BASES. These proposed BASES, which are self-explanatory, are intended to provide more detailed guidance to operators who will apply Specification 3.3.1.

In addition, changes to the BASES of Specification 3.4 are proposed to address crediting the ADVs in the revised small break LOCA analyses.

Changes to UFSAR

Section 15.14 of the Oconee UFSAR will be revised to reflect the results of the revised SBLOCA analyses which support this Technical Specification change. Section 10.4 of the Oconee UFSAR will be revised to address use of the main steam atmospheric dump valves during a SBLOCA.

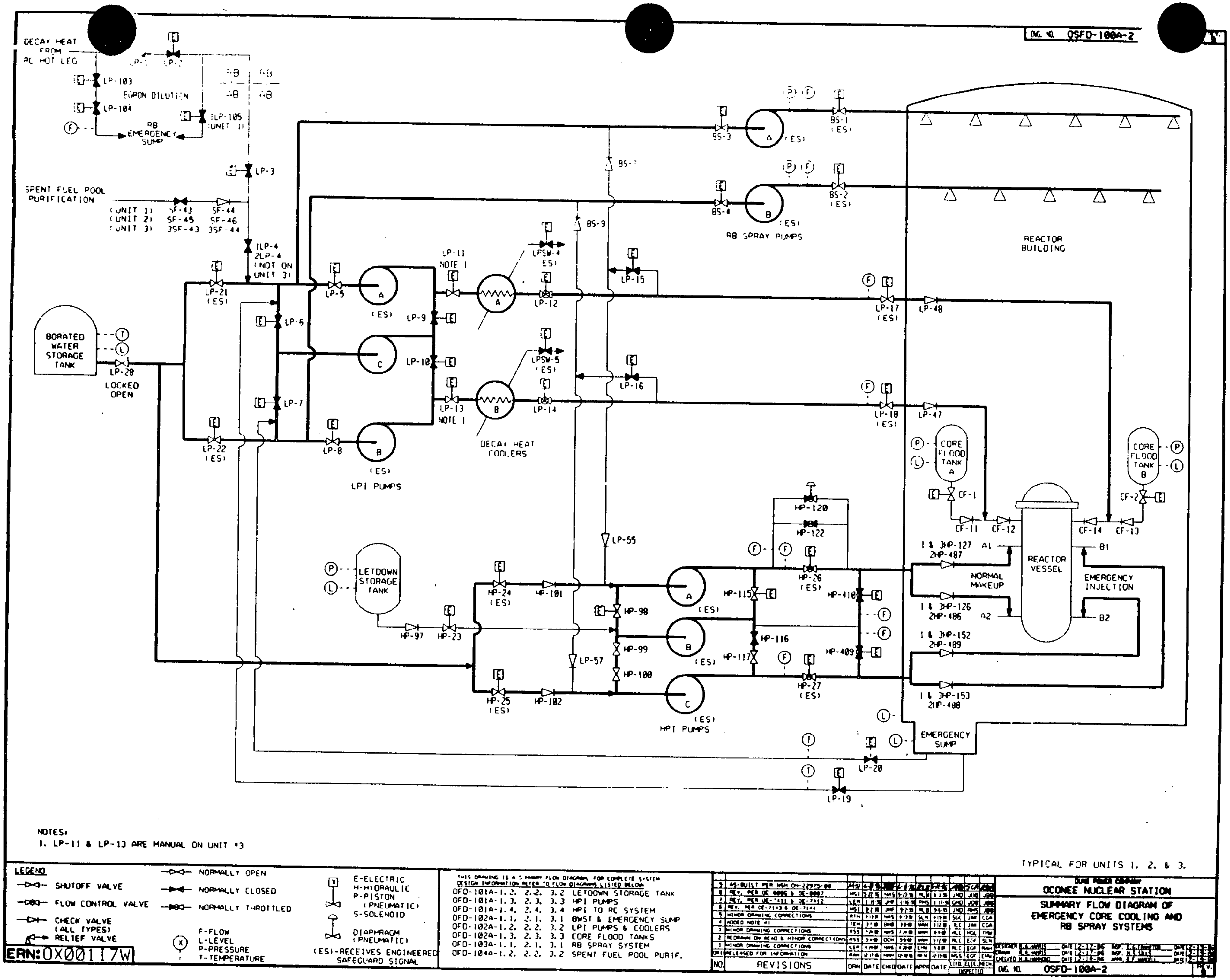
DWG NO. OSFD-100A-2
DECAY HEAT FROM RC HOT LEG
LP-1
LP-2
LP-103
LP-104
BORON DILUTION
RB EMERGENCY SUMP
LP-105 (UNIT 1)
LP-3
SPENT FUEL POOL PURIFICATION
(UNIT 1) SF-43 SF-44
(UNIT 2) SF-45 SF-46
(UNIT 3) 3SF-43 3SF-44
1LP-4 2LP-4 (NOT ON UNIT 3)
BORATED WATER STORAGE TANK
LP-28 LOCKED OPEN
LP-21 (ES)
LP-22 (ES)
LP-6
LP-7
LP-5
LP-8
LP-9
LP-10
LPI PUMPS
LP-11 NOTE 1
LP-13 NOTE 1
LP-12
LP-14
LPSW-4 (ES)
LPSW-5 (ES)
DECAY HEAT COOLERS
BS-3
BS-4
BS-7
BS-9
BS-1 (ES)
BS-2 (ES)
RB SPRAY PUMPS
LP-15
LP-16
LP-17 (ES)
LP-18 (ES)
LP-48
LP-47
REACTOR BUILDING
CORE FLOOD TANK A
CORE FLOOD TANK B
CF-1
CF-2
CF-11
CF-12
CF-13
CF-14
REACTOR VESSEL
NORMAL MAKEUP
EMERGENCY INJECTION
1 & 3HP-127 2HP-487
1 & 3HP-126 2HP-486
1 & 3HP-152 2HP-489
1 & 3HP-153 2HP-488
LP-55
LP-57
LETDOWN STORAGE TANK
HP-97
HP-23
HP-24 (ES)
HP-25 (ES)
HP-101
HP-102
HP-98
HP-99
HP-100
HPI PUMPS
HP-115
HP-116
HP-117
HP-120
HP-122
HP-26 (ES)
HP-27 (ES)
HP-410
HP-409
EMERGENCY SUMP
LP-20
LP-19
NOTES:
1. LP-11 & LP-13 ARE MANUAL ON UNIT #3
TYPICAL FOR UNITS 1, 2, & 3.
LEGEND
SHUTOFF VALVE
FLOW CONTROL VALVE
CHECK VALVE (ALL TYPES)
RELIEF VALVE
NORMALLY OPEN
NORMALLY CLOSED
NORMALLY THROTTLED
E-ELECTRIC
H-HYDRAULIC
P-PISTON (PNEUMATIC)
S-SOLENOID
DIAPHRAGM (PNEUMATIC)
F-FLOW
L-LEVEL
P-PRESSURE
T-TEMPERATURE
(ES)-RECEIVES ENGINEERED SAFEGUARD SIGNAL
OFD-101A-1, 2. 2.2. 3.2 LETDOWN STORAGE TANK
OFD-101A-1, 3. 2.3. 3.3 HPI PUMPS
OFD-101A-1, 4. 2.4. 3.4 HPI TO RC SYSTEM
OFD-102A-1, 1. 2.1. 3.1 BWST & EMERGENCY SUMP
OFD-102A-1, 2. 2.2. 3.2 LPI PUMPS & COOLERS
OFD-102A-1, 3. 2.3. 3.3 CORE FLOOD TANKS
OFD-103A-1, 1. 2.1. 3.1 RB SPRAY SYSTEM
OFD-104A-1, 2. 2.2. 3.2 SPENT FUEL POOL PURIF.
REVISIONS
OCONEE NUCLEAR STATION
SUMMARY FLOW DIAGRAM OF EMERGENCY CORE COOLING AND RB SPRAY SYSTEMS
DWG NO. OSFD-100A-2
ERN:0X00117W

Figure 1

NO SIGNIFICANT HAZARDS CONSIDERATION EVALUATION

Pursuant to 10 CFR 50.91, Duke Power Company (Duke) has made the determination that this amendment request involves a No Significant Hazards Consideration by applying the standards established by the NRC regulations in 10 CFR 50.92. This ensures that operation of the facility in accordance with the proposed amendment would not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated:

No. None of the proposed changes has any impact upon the probability of any accident which has been evaluated in the UFSAR. The only potential change in operating configuration is allowing operation with the HPI System pump discharge header cross-connected. This operating mode does not affect the probability of a LOCA or of any other accident evaluated in the UFSAR.

None of these changes have any impact upon the ability of the HPI System to add soluble poison to the Reactor Coolant System, as addressed by Specification 3.2. The remaining potential impact is upon the ability to mitigate the consequences of a small break LOCA, which is addressed below. The small break LOCA is the limiting design basis accident with respect to HPI System operability requirements.

The proposed changes to Specification 3.3.1 provide appropriate actions to address any degradation in the operability of the HPI System. The operability requirements for the HPI System are supported by a spectrum of small break LOCA analyses based on the approved Evaluation Model described in FTI topical report BAW-10192P. These small break LOCA analyses demonstrate that the acceptance criteria of 10CFR 50.46 are not violated.

Two trains of HPI are required to mitigate a small break LOCA above 75% FP. Operability requirements in the proposed Technical Specifications assure that the HPI System can withstand the worst single failure and still result in two HPI pumps injecting through two trains. The full power small break LOCA analyses supporting this proposed license amendment have been performed in accordance with the approved Evaluation Model described in FTI topical report BAW-10192P. The proposed Technical Specifications limit operation above 75% FP with a degraded HPI System to 72 hours before a power reduction to less than 75% FP (or a reactor shutdown) must be initiated. The required actions depend on the HPI System components that are inoperable. The 72 hour completion time is consistent with the time requirements for HPI specified in NUREG-1430.

When at or below 75% FP, one HPI train provides sufficient flow to mitigate a small break LOCA. The 75% power level is justified by analyses using the Evaluation Model described in FTI topical report BAW-10192P, considering the worst case break location and size described in LER 269/90-15 and Attachment 3 to this submittal. The proposed Technical Specifications require two HPI trains to be operable at or below 75% FP. These requirements ensure that, following the worst single failure, one train of HPI would remain available to mitigate a small break LOCA. Operation with less than two HPI trains operable is restricted to 72 hours before shutdown requirements are imposed. This completion time is consistent with the time requirements specified for an HPI System in NUREG-1430.

The additional HPI system restriction that requires the HPI pump discharge header to be cross-connected when all three HPI pumps are operable does not increase the consequences of a small break LOCA. If a single failure prevents one HPI train from actuating, this lineup results in at least two HPI pumps initially injecting through the automatically actuating train. This increases the amount of cooling flow initially delivered to the core as compared to the current system configuration.

The impact of this alignment has been evaluated, considering the potential single active failures, including the failure of any powered component to operate and any single failure of electrical equipment.

It has been determined that, when each of the three HPI pumps is either running or is capable of automatic actuation upon an Engineered Safeguards signal, cross-connection of the HPI pump discharge header does not introduce susceptibility to any single failure. Therefore, the potential consequences of a small break LOCA are not increased. If fewer than three HPI pumps are either running or are capable of automatic actuation, and the HPI pump discharge header were cross-connected, a single failure of one pump could cause a single pump to be aligned to both HPI trains. In this condition, the single pump could experience runout conditions prior to corrective operator action. However, proposed Specification 3.3.1 requires the discharge header to be isolated between the two remaining operable HPI pumps. The proposed BASES provide guidelines to ensure that the requirements for redundancy are properly implemented. Therefore, the proposed specifications ensure that the consequences of a small break LOCA are not increased by allowing the HPI pump discharge header to be cross-connected.

In addition, proposed Specification 3.4.7 requires new operability requirements for the main steam atmospheric dump valves. These operability requirements do not impact the probability or consequences of any accident. The proposed specification for the atmospheric dump valves provides additional assurance that these valves will be operable in the event of a small break LOCA.

In summary, the proposed Technical Specifications provide adequate controls to assure that operability of the HPI System is maintained in a manner consistent with the requirements of the design basis accidents. Therefore, it is concluded that this amendment request will not significantly increase the probability or consequences of an accident previously evaluated.

(2) Create the possibility of a new or different kind of accident from any kind of accident previously evaluated:

No. Of the proposed substantive changes, only cross-connection of the HPI pump discharge header represents any change to the way in which the facility is normally operated. Operation with the discharge header cross-connected is not a new configuration, as it has always been used for HPI pump testing both at power and during shutdown conditions. Potential failure modes have already been considered as described earlier. No new initiating events or potentially unanalyzed conditions have been created. Therefore, this proposed amendment will not create the possibility of any new or different kind of accident.

(3) Involve a significant reduction in a margin of safety.

No. The HPI restrictions associated with the proposed Technical Specifications are supported by analyses which demonstrate that the acceptance criteria of 10 CFR 50.46 are not violated for any small break LOCA. These analyses were performed in accordance with the Evaluation Model described in FTI topical report BAW-10192P. Therefore, it is concluded that the proposed amendment request will not result in a significant decrease in the margin of safety.

Duke has concluded, based on the above, that there are no significant hazards considerations involved in this amendment request.

Attachment 5

ENVIRONMENTAL IMPACT ANALYSIS

Pursuant to 10 CFR 51.22 (b), an evaluation of the proposed amendment has been performed to determine whether or not it meets the criteria for categorical exclusion set forth in 10 CFR 51.22 (c) 9 of the regulations. The proposed amendment does not involve:

1) A significant hazards consideration.

This conclusion is supported by the No Significant Hazards Consideration evaluation which is contained in Attachment 4.

2) A significant change in the types or significant increase in the amounts of any effluents that may be released offsite.

The proposed amendment will not change the types or amounts of any effluents that may be released offsite.

3) A significant increase in the individual or cumulative occupational radiation exposure.

The proposed will not increase the individual or cumulative occupational radiation exposure.

In summary, the proposed amendment request meets the criteria set forth in 10 CFR 51.22 (c) 9 of the regulations for categorical exclusion from an environmental impact statement.