Attachment 2

Technical Specification Bases Changes

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:

The full power and reduced power LOCA break spectrums have been analyzed in accordance with 10 CFR 50 Appendix K and the approved Evaluation Model in Reference 1. 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 extended or indefinite 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

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.(2)

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.(3) 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 $\geq$ 350 psig or $\geq$ 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) BAW-10192P, BWNT Loss-of-Coolant Evaluation Model for Once-Through Steam Generator Plants, Rev. 0, February 1994.

(2) FSAR, Sections 6.3.1, 9.3.3.2, 15.14.4, and 15.14.5

(3) FSAR, Section 15.14.5