ATTACHMENT 3

Revised, Retyped Bases Pages

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(continued)

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.2 High Pressure Injection (HPI)

BASES

BACKGROUND

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

a. Loss of coolant accident (LOCA);

b. Rod ejection accident (REA);

c. Steam generator tube rupture (SGTR); and

d. Main steam line break (MSLB).

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

The HPI System consists of two independent trains, each of which splits to discharge into two RCS cold legs, so that there are a total of four HPI injection lines. Each train takes suction from the BWST, and has an automatic suction valve and discharge valve which open upon receipt of an Engineered Safeguards Protective System (ESPS) signal. The two HPI trains are designed and aligned such that they are not both susceptible to any single active failure including the failure of any power operating component to operate or any single failure of electrical equipment. The HPI System is not required to withstand passive failures.

There are three ESPS actuated HPI pumps; the discharge flow paths for two of the pumps are normally aligned to automatically support HPI train "A" and the discharge flow path for the third pump is normally aligned to automatically support HPI train "B." The discharge flow paths can be manually aligned such that each of the HPI pumps can provide

(continued)

BASES

LCO (continued)

e. HPI suction headers cross-connected; and

f. HPI discharge headers separated.

The LCO establishes the minimum conditions required to ensure that the HPI System delivers sufficient water to mitigate a small break LOCA. Additionally, individual components within the HPI trains may be called upon to mitigate the consequences of other transients and accidents.

Each HPI train includes the piping, instruments, pump, and controls to ensure an OPERABLE flow path capable of taking suction from the BWST and injecting into the RCS cold legs upon an ESPS signal. For an HPI train to be OPERABLE, the associated HPI pump must be capable of taking suction from the BWST through the suction header valve associated with that train upon an ESPS signal. For example:

1) if HPI pump "B" is being credited as part of HPI train "A," then it must be capable of taking suction through HP-24 upon an ESPS signal; or

2) if HPI pump "B" is being credited as part of HPI train "B," then it must be capable of taking suction through HP-25 upon an ESPS signal.

The safety grade flow indicator associated with the normal discharge valve is required to be OPERABLE to support the associated HPI train's automatic OPERABILITY.

To support HPI pump OPERABILITY, the piping, valves and controls which ensure the HPI pump can take suction from the BWST upon an ESPS signal are required to be OPERABLE.

To support HPI discharge crossover valve OPERABILITY, the safety grade flow indicator associated with the HPI discharge crossover valve is required to be OPERABLE.

Each LPI-HPI flow path includes the piping, instruments, valves and controls to ensure the capability to manually transfer suction to the reactor building sump (LPI-HPI flow path). The OPERABILITY requirements regarding the LPI System are addressed in LCO 3.5.3, "Low Pressure Injection (LPI)."

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Atmospheric Dump Valve (ADV) Flow Paths

(continued)

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.2 High Pressure Injection (HPI)

BASES

BACKGROUND

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

a. Loss of coolant accident (LOCA);

b. Rod ejection accident (REA);

c. Steam generator tube rupture (SGTR); and

d. Main steam line break (MSLB).

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

The HPI System consists of two ~~redundant~~ independent trains, each of which splits to discharge into two RCS cold legs, so that there are a total of four HPI injection lines. Each train takes suction from the BWST, and has an automatic suction valve and discharge valve which open upon receipt of an Engineered Safeguards Protective System (ESPS) signal. The two HPI trains are designed and aligned such that they are not both susceptible to any single active failure including the failure of any power operating component to operate or any single failure of electrical equipment. There are three ESPS actuated HPI pumps; ~~each of which can provide flow to either train.~~ At least one pump is normally running ~~providing~~ to provide RCS makeup and seal injection to the reactor coolant pumps. Suction header cross-connect valves are normally open; ~~and~~ discharge ~~header~~ cross-~~connect~~ valves are normally closed; ~~Additional discharge valves (HPI discharge crossover valves)~~ can be used to bypass the normal discharge valves and assure the ability to feed either train's injection lines ~~from the pump(s) on the other train.~~ A safety grade flow indicator is provided ~~for the flow path associated with each of these four discharge valves. These~~ For each discharge valve and discharge crossover valve, (continued)

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The HPI System is not required to withstand passive failures.

INSERT A

; Cross-connecting the HPI Suction headers during normal operation was approved by the NRC in Reference 6. The

these valves via HPI pump "B"

to enable the operator

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BASES

LCO (continued)

may be called upon to mitigate the consequences of other transients and accidents. (HP) Each HPI train includes the piping, instruments, pumps, valves, and controls to ensure an OPERABLE flow path capable of taking suction from the BWST and injecting into the RCS cold legs upon an ESPS signal. The safety grade flow indicator associated with the normal discharge valve is required to be OPERABLE to support the associated HPI train's OPERABILITY. Each LPI-HPI flow path includes the piping, instruments, ~~pumps,~~ valves and controls to ensure the capability to manually transfer suction to the reactor building sump (LPI-HPI flow path).

automatic

INSERT N

INSERT E

(P)

The OPERABILITY requirements regarding the LPI System are addressed in LCO 3.5.3, "Low Pressure Injection (LPI)."

During an event requiring HPI actuation, a flow path is provided to ensure an abundant supply of water from the BWST to the RCS via the HPI pumps and their respective discharge flow paths to each of the four cold leg injection nozzles and the reactor vessel. In the ~~long term,~~ this flow path ~~may be~~ is manually transferred to take its supply from the reactor building sump and to supply borated water to the RCS via the LPI-HPI flow path (piggy-back mode).

recirculation phase

INSERT F

The flow path for each HPI train must maintain its designed independence to ensure that no single active failure can disable both HPI trains.

The LCO is modified by a Note that requires three HPI pumps and the HPI discharge crossover valves (HP-409 and HP-410) to be OPERABLE and the suction header to be cross-connected when THERMAL POWER is > 60% RTP. The safety grade flow indicator associated with a HPI discharge crossover valve is required to be OPERABLE to support HPI discharge crossover valve OPERABILITY. The Note modifies the pump and valve OPERABILITY and valve alignment requirements to provide additional requirements assumed by the safety analyses at power levels > 60% RTP.

APPLICABILITY

System

In MODES 1 and 2, and MODE 3 with RCS temperature > 350°F, the HPI ~~train~~ OPERABILITY requirements for the small break LOCA are based on full power operation. Although reduced power would not require the same level of performance, the accident analysis does not provide for reduced cooling requirements in the lower MODES. The HPI pump performance is based on the small break LOCA, which establishes the pump

on analysis performed at 100% RTP

(continued)