6.4 DESCRIPTION

6.4.1 High Pressure Coolant Injection System

The High Pressure Coolant Injection System (HPCI) consists of a steam turbine assembly driving a constant-flow pump assembly and system piping, valves, controls, and instrumentation. The HPCI mechanical control diagram is shown in Figures 6.4-1, 6.4-3, and 6.4-5.

The principal HPCI equipment is installed in the Reactor Building. The turbine-pump assembly is located in a shielded area to assure that personnel access to adjacent areas is not restricted during operation of the HPCI. Suction piping comes from the condensate supply header and the pressure suppression pool. Injection water is piped to the reactor feedwater pipe at a T-connection outside the primary containment. Steam supply for the turbine is piped from a main steam header in the primary containment. This piping is provided with an isolation valve on each side of the drywell barrier. Remote controls for valve and turbine operation are provided in the plant control room. The controls and instrumentation of the HPCI are described, illustrated, and evaluated in detail in Subsection 7.4, "Emergency Core Cooling Systems Control and Instrumentation."

The HPCI is provided to assure that the reactor is adequately cooled to limit fuel cladding temperature in the event of a small break in the nuclear system and loss of coolant which does not result in rapid depressurization of the reactor vessel. The HPCI permits the nuclear plant to be shut down, while maintaining sufficient reactor vessel water inventory until the reactor vessel is depressurized. The HPCI continues to operate until the reactor vessel pressure is below the pressure at which LPCI operation or Core Spray System operation maintains core cooling.

If a loss-of-coolant accident occurs, the reactor scrams upon receipt of a low-water-level signal or a high-drywell-pressure signal. The HPCI starts when the water level reaches a pre-selected height above the core, or if high pressure exists in the primary containment (drywell). The HPCI automatically stops when a high water level in the reactor vessel is signaled. The HPCI automatically resets and will restart if vessel water level again reaches a pre-selected height above the core.

The HPCI is designed to pump water into the reactor vessel for a wide range of pressures in the reactor vessel. Two sources of water are available. Initially, condensate water from the condensate storage header is used instead of injecting the less desirable water from the pressure suppression pool into the reactor. This provides reactor-grade water to the reactor vessel for the case where the need for the HPCI is rapidly satisfied. The condensate water from the normally assigned condensate storage tank for each unit is sufficient for maintaining an adequate reactor coolant inventory for a minimum of eight hours at hot shutdown conditions (MODE 3) (non-accident). The condensate tanks for all three units may also be

aligned to provide condensate supply to any individual unit. In addition, two spare 500,000-gallon condensate storage tanks may be aligned to supply HPCI on any unit.

When the level in the condensate header falls below a predetermined setpoint or the level in the pressure suppression pool increases to a predetermined setpoint, the HPCI pump suction is automatically transferred to the pressure suppression pool. With HPCI taking suction from the condensate storage tank and injecting to the reactor vessel, there is sufficient inventory in the tank such that the high suppression pool level suction transfer will occur before a low condensate header level would be created. This transfer may also be made from the control room using remote controls. This establishes a closed loop for recirculation of water escaping from a break and satisfies safety design basis 11. Water from either source is pumped into the reactor vessel via the feedwater line. Flow is distributed within the reactor vessel through the feedwater spargers to obtain mixing with the hot water or steam in the reactor pressure vessel.

The pump assembly is located below the level of the condensate header and below the water level in the pressure suppression pool to assure positive suction head to the pumps. Pump NPSH requirements are met by providing adequate suction head and adequate suction line size.

The water supply lines for the HPCI are also shown on Figures 6.4-1, 6.4-3, 6.4-5, and 7.4-1b sheets 1, 2, and 3. Trapped air is initially removed with vent lines connected to the high points of the HPCI System. Whenever HPCI is lined up to take suction from the condensate storage tank, the discharge piping of the HPCI is periodically vented from the high point of the system and water flow observed in accordance with Technical Specifications surveillance frequency requirements for system operability.

The formation of air pockets in the water supply line can create water-hammer problems upon initiation of the systems.

Maintaining the pump discharge lines of the HPCI System full of water ensures that the ECCS will perform properly upon demand. This will also prevent water hammer following an ECCS initiation signal. One acceptable method of ensuring that the lines are full is by venting the system.

Constant hydrostatic overpressure on the water supply line in the HPCI System prevents air pockets from forming.

The HPCI turbine-pump assembly and piping are located so as to be protected from the physical effects of design basis accidents such as pipe whip and high temperatures. The equipment is located outside the primary containment. This arrangement satisfies safety design basis 9.

The HPCI turbine is driven by steam from the reactor which is generated by decay heat and residual heat. The steam is extracted from a main steam header upstream of the main steam line isolation valves. The two HPCI isolation valves in the steam line to the HPCI turbine are normally open in order to keep the piping to the turbine pressurized to permit rapid startup of the HPCI. To permit a controlled warmup of the steam line following a HPCI maintenance outage, a motor-operated bypass valve around the outboard containment isolation valve is provided. Signals from the HPCI control system open or close the turbine stop valve.

A condensate drain pot is provided upstream of the turbine stop and HPCI steam supply valves to prevent the HPCI steam supply line from filling with water. The drain pot normally routes the condensate to the main condenser, but upon HPCI initiation isolation valves on the condensate drain pot line automatically shut. Condensate in the supply lines during this time will discharge via drain lines from the turbine stop valve seat, steam chest areas, and turbine casing exhaust drains.

The HPCI pump set flow rate is controlled by a speed governor which controls the turbine speed in response to a demand signal from the flow controller. This arrangement allows for a constant HPCI flow rate over the range of discharge pressures which HPCI must operate.

As reactor steam pressure decreases, the HPCI turbine throttle valve is modulated by the governor control system to control turbine steam flow in order to provide the required pump flow called for by the flow controller. The capacity of the system is selected to provide sufficient core cooling to limit cladding temperatures while the pressure in the reactor vessel is above the pressure at which core spray and LPCI become effective.

Exhaust steam from the HPCI turbine is discharged to the pressure suppression pool. A drain pot at the low point in the exhaust line collects moisture present in the steam. Collected moisture is discharged to the gland seal condenser. Therefore, condensate will not collect in the turbine exhaust line and the turbine drain line to create steam compression problems upon initiation of these systems. After operation of the HPCI system, the HPCI turbine exhaust drain line to the gland seal condenser may be full of water. A stopcheck glove valve stops the backflow of suppression pool water into the turbine through the turbine exhaust line.

The HPCI turbine gland seals are vented to the gland seal condenser and part of the water from the HPCI pump is routed through the condenser for cooling purposes. To prevent over-pressurization of the gland seal condenser, an orifice and relief valve are provided upstream of the condenser.

Noncondensable gases from the gland seal condenser are pumped to the Standby Gas Treatment System.

The system piping material is carbon steel and is designed to USAS B31.1.0, 1967 edition. The pumps are designed to the ASME Boiler and Pressure Vessel Code, Section III, Class C, 1965 edition. The pumps are also designed and tested in accordance with the standards of the Hydraulic Institute.

A condensing sparger is attached to the HPCI turbine exhaust line to reduce the noise made by the exhausting steam and improve turbine exhaust pressure stability.

The sparger is capped at the bottom end and contains holes drilled through the walls for discharging the steam. The uppermost row of holes is under approximately two feet of water. Additional holes are spaced at regular intervals down to the capped ends. The lower row of holes is under approximately eight feet of water. For the HPCI there are 1296 holes, 1 inch in diameter. The ratio of total hole area to the cross sectional area of the pipe is about 2.5 to 1 (the discharge path area available in the sparger design is about 2.5 times that in the open pipe design).

A vacuum breaker is installed on the HPCI turbine exhaust lines to prevent unacceptable vibration and movement of the line. The breaker prevents intermittent negative pressure in this piping run from pulling water out of the torus and causing a water-hammer problem. The Unit 1 and Unit 3 vacuum breaker consists of 2-inch check valves with connecting piping and the Unit 2 vacuum breaker consists of 3-inch check valves with connecting piping which allows torus air to enter the exhaust line whenever negative pressure exists in that line.

To ensure operability and at the same time prevent steam bypassing the pressure suppression pool due to a check valve sticking open, four check valves are installed on the system in a one-out-of-two-twice configuration. Thus, the vacuum breaker piping will be arranged with a common line penetrating the torus wall that includes a normally open manual valve and a normally open motor-operated valve (MOV) in series. Downstream of the MOV on Unit 1, the line branches with separate lines going to the HPCI and to the RCIC vacuum breaker connected to the turbine exhaust lines outside the torus, but downstream of the respective stop check valves. Units 2 and 3 have separate HPCI and RCIC turbine exhaust vacuum breaker lines. This arrangement is shown on Figures 6.4-1, 6.4-3, and 6.4-5.

Electrical power to operate the MOV is normally disconnected and indication is provided in the Main Control Room to warn of any inadvertent connection. Controls and electrical power for the valve are located where they are accessible following a LOCA.

The HPCI equipment, piping, and support structures are designed Seismic Class I equipment (see Appendix C). This satisfies design basis 10.

Assuming the system is tested every two months, the system is designed for a service life of 40 years, accounting for corrosion, erosion, and material fatigue. The following Aging Management Programs (see Appendix O for summary descriptions) are used to manage the effects of the HPCI for the 60 year operating life:

- ASME Section XI Subsections IWB, IWC, and IWD Inservice Inspection Program (Section O.1.4)
- Chemistry Control Program (Section O.1.5)
- BWR Stress Corrosion Cracking Program (Section O.1.10)
- Flow-Accelerated Corrosion Program (Section O.1.14)
- Bolting Integrity Program (Section O.1.15)
- One-Time Inspection Program (Section O.1.26)
- Selective Leaching of Materials Program (Section O.1.27)
- Systems Monitoring Program (Section O.2.1)

Material fatigue for the 60 year operating life has been evaluated as a Time Limited Aging Analysis (TLAA). The summary of this evaluation is provided in Appendix O, Sections O.3.2.3 and O.3.2.4.

Startup of the HPCI is completely independent of AC power. Only DC power from the plant batteries and steam extracted from the nuclear system are necessary. This satisfies safety design basis 5.

The various operations of the HPCI components are summarized as follows.

The HPCI controls automatically start the system and bring it to design flow rate within 30 seconds (see Section 6.5 for value assumed in Emergency Core Cooling System analyses) from receipt of a reactor vessel low-low-water-level signal or a primary containment (drywell) high-pressure signal.

The HPCI turbine is shut down automatically by any of the following signals:

a. Turbine overspeed--This prevents damage to the turbine and turbine casing.

b. Reactor vessel high water level--This indicates that core cooling requirements are satisfied.

c. HPCI pump low suction pressure--This prevents damage to the pump due to loss of flow.

d. HPCI turbine exhaust high pressure--This indicates a turbine or turbine control malfunction.

e. Automatic isolation signal--This indicates a HPCI steam line rupture or rupture disc failure.

f. Low steam supply pressure.

If an initiation signal is received after the turbine is shut down, the system is capable of automatic restart if no shutdown signals exist.

Because the steam supply line to the HPCI turbine is part of the nuclear system process barrier, certain signals automatically isolate this line, causing shutdown of the HPCI turbine. The system is not capable of automatic restart following isolation of the steam supply line. Automatic shutoff of the steam supply is described in Subsection 7.3, "Primary Containment and Reactor Vessel Isolation Control System." However, automatic depressurization and the low pressure systems of the ECCS act as backup, and automatic shutoff of the steam supply does not negate the ability of the ECCS to satisfy the safety objective.

In addition to the automatic operational features of the system, provisions are included for remote-manual startup, operation, and shutdown (provided initiation or shutdown signals do not exist).

During a HPCI initiation, the following valves automatically actuate:

HPCI pump CST flow test throttle and block valves
HPCI pump CST suction valve (if closed)
HPCI pump injection valve
HPCI pump discharge isolation valve (if closed)
HPCI turbine stop and control valves
HPCI turbine steam supply valve
HPCI gland seal condenser drain line isolation valves
(close if open)
HPCI turbine inlet drain pot isolation valves
HPCI minimum flow valve

Startup of the auxiliary oil pump and proper functioning of the lube oil system are required to open the turbine stop and control valves. Operation of the gland seal condenser is required to ensure that turbine seal outleakage is minimized. Gland seal condenser startup is automatic and its failure does not prevent the HPCI System from performing its core cooling objective. When the turbine stop valve begins to open, it signals the speed governor to begin ramping turbine speed up. Once the speed governor ramp signal exceeds the flow controller demand signal, turbine control is switched to the flow controller. The flow controller maintains the HPCI flow rate at a constant rate as reactor pressure fluctuates.

A minimum flow bypass is provided for pump protection. Following an initiation signal, the bypass valve automatically opens due to a low-flow signal, and automatically closes on a high-flow signal or a HPCI turbine trip. When the bypass is open, flow is directed to the pressure suppression pool. A full-flow test line is provided to verify system operation. The line directs flow to the condensate storage tank when the test return line throttle and block valves are open. These valves are sequenced to close by the signal which actuates system operation and are interlocked closed when either suction valve from the pressure suppression pool is open.

As previously stated, the HPCI System is not dependent upon AC power for operation. In the event of a loss-of-all AC power, the time limits for the operation of HPCI would be dependent upon the power available from the 250-V batteries which supply the DC power to the HPCI system. Best-estimate analyses have been performed for an assumed scenario of loss-of-all AC power and it is indicated that the batteries have sufficient capacity for 4 hours.

6.4.2 Automatic Depressurization System

In case the capability of the HPCI is not sufficient to maintain the reactor water level, the Automatic Depressurization System functions to reduce the reactor pressure so that flow from the LPCI and the Core Spray System enters the reactor vessel in time to cool the core and limit fuel cladding temperature.

The Automatic Depressurization System uses six (6) of the nuclear system main steam relief valves to relieve the high pressure steam to the pressure suppression pool. Per Subsection 4.4, between four and six ADS valves are required to meet the requirements for ADS dependent upon the recognized single failure. As shown in Table 6.5-3, due to a limiting failure of a battery which results in the loss of the normal power supply to ADS logic, Units 1, 2, and 3 are designed with an automatic transfer scheme to provide four automatic ADS valves. The design, description, and evaluation of the main steam relief valves are discussed in detail in Subsection 4.4, "Nuclear System Pressure Relief System," and it is shown that safety design bases 5, 9, and 10 are satisfied.

Discharge pressure indication of one LPCI pump or two core spray pumps combined with one of the following initiation paths will cause the ADS main steam relief valves to open: (1) reactor vessel low water level and primary containment (drywell) high pressure in conjunction with a 120 seconds timer timed out; or (2) sustained reactor low water level for 360 seconds. The time delay provides time for the operator to cancel the automatic depressurization signal if control room information indicates the signal is false or is not needed.

The controls and instrumentation of the Automatic Depressurization System are given in Subsection 7.4, "Emergency Core Cooling System Controls and Instrumentation."

6.4.3 Core Spray System

Two independent loops are provided as a part of the Core Spray System. Each loop consists of two 50 percent-capacity centrifugal pumps driven by electric motors, a spray sparger in the reactor vessel above the core, piping and valves to convey water from the pressure suppression pool to the sparger, and the associated controls and instrumentation. Figures 6.4-2, 6.4-4, and 6.4-6 show a flow diagram of the Core Spray System.

In the case of low-low-low water level in the reactor vessel or high pressure in the drywell plus low reactor vessel pressure, the Core Spray System, when reactor vessel pressure is low enough, automatically sprays water onto the top of the fuel assemblies in time and at a sufficient flow rate to cool the core and limit fuel cladding temperature. (The Low Pressure Coolant Injection System starts from the same signals and operates independently to achieve the same objective by flooding the reactor vessel.)

The Core Spray System provides protection to the core for the large break in the nuclear system when the control rod drive water pumps, RCIC, and the HPCI are unable to maintain reactor vessel water level.

The protection provided by the Core Spray System also extends to a small break in which the control rod drive water pumps, RCIC, and HPCI are all unable to maintain the reactor vessel water level and the Automatic Depressurization System has operated to lower the reactor vessel pressure so LPCI and the Core Spray System can provide core cooling.

The core spray pumps for each unit receive power from the plant 4160-V shutdown boards. Each core spray pump motor and the associated automatic motor-operated valves for one unit receive AC power from different buses. Similarly, control power for each pump of the Core Spray System for one unit comes from different DC buses. This arrangement satisfies design basis 5 (see Subsection 8.5, "Standby AC Power Supply and Distribution," and 8.6, "250-V DC Power Supply and Distribution").

The core spray pumps and all automatic valves can be operated individually by manual switches in the control room. Operating information is provided in the control room with pressure indicators, flow meters and indicator lights.

The major equipment for one loop is described in the following paragraphs.

When the system is actuated, water is taken from the pressure suppression pool. Flow then passes through a normally open motor-operated valve in the suction line to each 50 percent pump. Each valve can be closed by a remote-manual switch from the control room to isolate the system from the pressure suppression pool in the case of a leak from the Core Spray System. This valve, which is normally open, is located in the core spray pump suction line as close to the pressure suppression pool as practical.

A local pressure gauge by each pump indicates the presence of a suction head for the pump. The core spray pumps are located in the Reactor Building below the water level in the pressure suppression pool to assure positive pump suction. The pumps, piping, controls, and instrumentation of each loop are separated and protected so that any single physical event, or missiles generated by rupture of any pipe in any system within the containment drywell, cannot make both core spray loops inoperable. The switchgear for each loop is in a separate cabinet for the same reason. This arrangement satisfies safety design basis 9.

A shaft seal drain line is provided from the seal housing to the Radwaste System. A normally closed test valve is connected to the line in order to provide a means for measuring seal leakage during primary containment leak rate testing.

A low flow bypass-line is provided from the pump discharge to below the surface of the pressure suppression pool. The bypass flow is required to prevent the pump from overheating when pumping against a closed discharge valve. Two orifices in series limit the bypass flow. A manual valve normally open is used to close the bypass line for maintenance.

The piping diagram for the Core Spray System is shown on Figures 6.4-2, 6.4-4, and 6.4-6. Flush and drain connections on the high and low points (flush and drain systems not shown) permit solid filling of these systems. A hydrostatic overpressure is maintained on the system through two check valves and a normally open hand valve. Thus, water-hammer problems are avoided in the Core Spray System by periodically venting the discharge lines while they are under a hydrostatic pressure in order to eliminate any air pockets which might form.

Discharge line check valve seat leakage from hydrostatic pressure will drain into the torus.

A relief valve, set for 500 psig, protects the low pressure Core Spray System upstream of the outboard shutoff valve from reactor pressure. The relief valve discharges to the equipment drain sump and thence to the Radwaste System.

A full-flow test line permits circulating water to the pressure suppression pool for testing the system during normal plant operations. A normally closed, motor-operated valve in the line is controlled by a remote-manual switch in the

control room. Orifices and partial opening of the valve in the test line provide rated core spray flow at a pressure drop equivalent to discharging into the reactor vessel. A restricting orifice is provided to minimize vibration in the pump test lines. A flow indicator in the control room signals that water is or is not flowing to the core spray sparger or test line.

Two motor-operated valves are provided to isolate the Core Spray System from the nuclear system when the core spray pumps are not running. These valves admit core spray water to the reactor when signaled to open. Both valves are installed outside the drywell to facilitate operation and maintenance, but as close as practical to the drywell to limit the length of line exposed to reactor pressure. The valve nearer the containment is normally closed to back up the inside check valve for containment purposes. The outboard valve is normally open to limit the equipment needed to operate in an accident condition. By closing the outboard valve, the inboard valve can be operated for test with the reactor vessel pressurized. A drain line is provided between the two shutoff valves to measure leakage through the inside check valve or the inboard shutoff valve. The drain line is normally closed with two valves.

A check valve is provided in each core spray pipeline just inside the primary containment to prevent loss of reactor coolant outside containment in case the core spray line breaks.

A normally open manual valve is provided downstream of the inside check valve to shut off the Core Spray System from the reactor during shutdown conditions for maintenance of the upstream valves. The two Core Spray System pipes enter the reactor vessel through nozzles 120 degrees apart. Each internal pipe then divides into a semicircular header with a downcomer at each end, which turns through the shroud near the top. A semicircular sparger is attached to each of the four outlets to make two practically complete circles, one above the other. Short elbow nozzles are spaced around the spargers to spray the water radially onto the tops of the fuel assemblies.

Core spray piping upstream of the outboard shutoff valve is designed for the lower pressure and temperature of the core spray pump discharge and is fabricated from carbon steel. The outboard valve and piping downstream are designed for reactor vessel pressure and temperature. The high pressure piping portion of the system is designed to USASI B31.1.0, 1967 edition. Material for the portion of the system piping inside the drywell to the second isolation valve is high toughness (A333 Grade 6) carbon steel and type 304 stainless steel.

The core spray equipment, piping, and support structures are designed in accordance with Class I seismic criteria (see Appendix C) to resist the motion at the installed location within the supporting building from the Design Basis Earthquake.

The Core Spray System is assumed filled with water for seismic analysis. It is concluded that safety design basis 10 is satisfied.

Upon signals of reactor low-low-low water level or drywell high pressure plus low reactor vessel pressure, the automatic controls turn on the core spray pumps and restore valves to the spray mode. When reactor pressure decreases, the core spray shutoff valves are signaled to open. Flow to the sparger begins when the core spray discharge pressure is sufficient to open the injection check valve located inside the drywell. Subsection 7.4, "Emergency Core Cooling System Controls and Instrumentation," contains further details and evaluation.

For Units 1 and 2, a Core Spray signal will initiate the ECCS preferred pump logic to trip any running RHR and Core Spray pumps in the opposite unit. In the event of a LOCA in conjunction with a spurious accident signal from the opposite unit, the ECCS preferred pump logic will dedicate the Division I pumps (1A and 1C) to Unit 1 and the Division II pumps (2B and 2D) to Unit 2. This will ensure that the shared Unit 1/2 4KV shutdown boards are not overloaded in the event of a real and spurious accident signal.

6.4.4 Low Pressure Coolant Injection System

In case of low-low-low water level in the reactor or high pressure in the containment drywell plus low reactor vessel pressure, the Low Pressure Coolant Injection System (LPCI) mode of operation of the Residual Heat Removal System pumps water into the reactor vessel in time to flood the core and limit fuel clad temperature. (The Core Spray System starts from the same signals and operates independently to achieve the same objective.)

The LPCI has been modified for Units 1, 2, and 3. This modification has been described in reports entitled "Browns Ferry Nuclear Plant Units 1 and 2 Emergency Core Cooling Systems Low Pressure Coolant Injection Modifications for Performance Improvement" (October, 1977) for Units 1 and 2 and for Unit 3. The reports were submitted to the Nuclear Regulatory Commission.

The LPCI system modifications to BFNP Units 1, 2, and 3 provide a significant reduction in peak fuel clad temperature following a postulated recirculation line break. This, in turn, results in increased MAPLHGR limits. The modifications eliminate the LPCI recirculation loop selection logic and permit simultaneous injection into both recirculation loops. Additional resistance in the form of orifices in the pump discharge line was added to prevent the RHR pumps from going to a full runout flow in the event the RHR pumps are discharging to a broken recirculation loop. The orifices (and resultant increased NPSH) assure the availability of the RHR pumps for long-term cooling. For the modified design, the LPCI injection valves and RHR cross-tie valve are normally closed. (The Unit 1 LPCI loop cross-tie valve is removed; and the corresponding cross connection is removed by a combination of a

blind flange and cut, capped connections.) On receipt of an initiation signal following a recirculation line break, both LPCI injection valves are signaled to open (when the pressure interlock is met), both recirculation pump discharge valves are signaled to close when the reactor pressure decreases to 230 psig, and the LPCI flow from two RHR pumps (one LPCI loop) is directed to the unbroken recirculation loop. Flow from the other two RHR pumps (one LPCI loop) is directed to the broken recirculation loop.

The LPCI logic was again modified prior to Unit 1 restart to support combined Units 1 and 2 operation. The Division I RHR (LPCI) initiation logic will only start the Division I pumps (A and C) and open the Division I inboard injection valve. The Division II RHR (LPCI) initiation logic will only start the Division II pumps (B and D) and open the Division II inboard injection valve.

For Units 1 and 2, a RHR (LPCI) signal will initiate the ECCS preferred pump logic to trip any running RHR and Core Spray pumps in the opposite unit. In the event of a LOCA in conjunction with a spurious accident signal from the opposite unit, the ECCS preferred pump logic will dedicate the Division I pumps (1A and 1C) to Unit 1 and the Division II pumps (2B and 2D) to Unit 2. This will ensure that the shared Unit 1/2 4KV shutdown boards are not overloaded in the event of a real and spurious accident signal.

The pumps, piping, controls and instrumentation of the LPCI loops are separated and protected so that no single failure or any single physical event for which LPCI operation is required can make both loops inoperable.

LPCI pumps and piping equipment are described in detail in Subsection 4.8, "Residual Heat Removal System," which also describes the other functions served by the same pumps if not needed for the LPCI function. The portions of the RHRS required for accident protection are designed in accordance with Class I seismic criteria (see Appendix C). It is concluded that safety design basis 10 is satisfied.