CHARGING PUMP - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.3 One# charging pump in the boron injection flow path required by Specification 3.1.2.1 shall be OPERABLE and capable of being powered from an OPERABLE emergency power source.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no charging pump OPERABLE or capable of being powered from an OPERABLE emergency power source, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

4.1.2.3.1 The above required charging pump shall be demonstrated OPERABLE by verifying a differential pressure across the pump of greater than or equal to 2380 psid is developed when tested pursuant to Specification 4.0.5.

4.1.2.3.2 All centrifugal charging pumps, excluding the above required OPERABLE pump, shall be demonstrated inoperable at least once per 31 days, except when the reactor vessel head is removed, by verifying that the motor circuit breakers are secured in the open position or by verifying the discharge of each charging pump has been isolated from the Reactor Coolant System by at least two isolation valves with power removed from the valve operators.

#Two charging pumps may be operable and operating for ≤15 minutes to allow swapping charging pumps.

CHARGING PUMPS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.4 At least two# charging pumps shall be OPERABLE.

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

ACTION:

With only one charging pump OPERABLE, restore at least two charging pumps to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to at least 1% delta k/k at 200°F within the next 6 hours; restore at least two charging pumps to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.4.1 At least two charging pumps shall be demonstrated OPERABLE by verifying a differential pressure across each pump of greater than or equal to 2380 psid is developed when tested pursuant to Specification 4.0.5.

4.1.2.4.2 All centrifugal charging pumps, except the above required OPERABLE pump, shall be demonstrated inoperable at least once per 31 days whenever the temperature of one or more of the RCS cold legs is less than or equal to 300°F by verifying that the motor circuit breakers are secured in the open position or by verifying the discharge of each charging pump has been isolated from the Reactor Coolant System by at least two isolation valves with power removed from the valve operators.

#A maximum of one centrifugal charging pump shall be OPERABLE whenever the temperature of one or more of the RCS cold legs is less than or equal to 300°F. Two charging pumps may be operable and operating for ≤ 15 minutes to allow swapping charging pumps.

3/4.5.3 ECCS SUBSYSTEMS - $T_{avg} \leq 350°F$

LIMITING CONDITION FOR OPERATION

3.5.3 As a minimum, one ECCS subsystem comprised of the following shall be OPERABLE:

a. One OPERABLE centrifugal charging pump,#

b. One OPERABLE RHR heat exchanger,

c. One OPERABLE RHR pump, and

d. An OPERABLE flow path capable of taking suction from the refueling water storage tank upon being manually realigned and transferring suction to the containment sump during the recirculation phase of operation.

APPLICABILITY: MODE 4.

ACTION:

a. With no ECCS subsystem OPERABLE because of the inoperability of either the centrifugal charging pump or the flow path from the refueling water storage tank, restore at least one ECCS subsystem to OPERABLE status within 1 hour or be in COLD SHUTDOWN within the next 20 hours.

b. With no ECCS subsystem OPERABLE because of the inoperability of either the RHR heat exchanger or RHR pump, restore at least one ECCS subsystem to OPERABLE status or maintain the Reactor Coolant System T_{avg} less than 350°F by use of alternate heat removal methods.

c. In the event the ECCS is actuated and injects water into the Reactor Coolant System, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date. The current value of the usage factor for each affected Safety Injection nozzle shall be provided in this Special Report whenever its value exceeds 0.70.

#A maximum of one centrifugal charging pump and one Safety Injection pump shall be OPERABLE whenever the temperature of one or more of the RCS cold legs is less than or equal to 300°F. Two charging pumps may be operable and operating for ≤ 15 minutes to allow swapping charging pumps.

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MODERATOR TEMPERATURE COEFFICIENT (Continued)

The Surveillance Requirements for measurement of the MTC at the beginning and near the end of the fuel cycle are adequate to confirm that the MTC remains within its limits since this coefficient changes slowly due principally to the reduction in RCS boron concentration associated with fuel burnup.

3/4.1.1.4 MINIMUM TEMPERATURE FOR CRITICALITY

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 551°F. This limitation is required to ensure: (1) the moderator temperature coefficient is within it analyzed temperature range, (2) the trip instrumentation is within its normal operating range, (3) the pressurizer is capable of being in an OPERABLE status with a steam bubble, and (4) the reactor vessel is above its minimum RT_{NDT} temperature.

3/4.1.2 BORATION SYSTEMS

The Boron Injection System ensures that negative reactivity control is available during each mode of facility operation. The components required to perform this function include: (1) borated water sources, (2) charging pumps, (3) separate flow paths, (4) boric acid transfer pumps, (5) associated Heat Tracing Systems, and (6) an emergency power supply from OPERABLE diesel generators.

With the RCS average temperature above 200°F, a minimum of two boron injection flow paths are required to ensure single functional capability in the event an assumed failure renders one of the flow paths inoperable. The boration capability of either flow path is sufficient to provide a SHUTDOWN MARGIN from expected operating conditions of 1.3% delta k/k after xenon decay and cooldown to 200°F. The maximum expected boration capability requirement occurs at EOL from full power equilibrium xenon conditions. The minimum borated water volumes and concentrations required to maintain shutdown margin for the Boric Acid Storage System and the Refueling Water Storage Tank are presented in the Core Operating Limits Report.

The Technical Specification LCO value for the Boric Acid Storage Tank and the Refueling Water Storage Tank minimum contained water volume during Modes 1-4 is based on the required volume to maintain shutdown margin, an allowance for unusable volume and additional margin as follows:

Boric Acid Storage Tank Requirements for Maintaining SDM - Modes 1-4

Required volume for maintaining SDM	presented in the COLR
Unusable volume (to maintain full suction pipe)	4,132 gallons
Additional margin	6,470 gallons

BORATION SYSTEMS (Continued)

Refueling Water Storage Tank Requirements for Maintaining SDM - Modes 1-4

Required volume for maintaining SDM	presented in the COLR
Unusable volume (below nozzle)	16,000 gallons
Additional margin	17,393 gallons

With the RCS temperature below 200°F, one Boron Injection System is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the additional restrictions prohibiting CORE ALTERATIONS and positive reactivity changes in the event the single Boron Injection System becomes inoperable.

The limitation for a maximum of one centrifugal charging pump to be OPERABLE and the Surveillance Requirement to verify all charging pumps except the required OPERABLE pump to be inoperable below 300°F provides assurance that a mass addition pressure transient can be relieved by the operation of a single PORV. . . . See Attached Page A

The boron capability required below 200°F is sufficient to provide a SHUTDOWN MARGIN of 1% delta k/k after xenon decay and cooldown from 200°F to 140°F. The minimum borated water volumes and concentrations required to maintain shutdown margin for the Boric Acid Storage System and the Refueling Water Storage Tank are presented in the Core Operating Limits Report.

The Technical Specification LCO value for the Boric Acid Storage Tank and the Refueling Water Storage Tank minimum contained water volume during Modes 5 and 6 is based on the required volume to maintain shutdown margin, an allowance for unusable volume and additional margin as follows:

Boric Acid Storage Tank Requirements for Maintaining SDM - Modes 5 & 6

Required volume for maintaining SDM	presented in the COLR
Unusable volume (to maintain full suction pipe)	4,132 gallons
Additional margin	1,415 gallons

Refueling Water Storage Tank Requirements for Maintaining SDM - Modes 5 & 6

Required volume for maintaining SDM	presented in the COLR
Unusable volume (below nozzle)	16,000 gallons
Additional margin	6,500 gallons

The contained water volume limits include allowance for water not available because of discharge line location and other physical characteristics.

ATTACHED PAGE A

.... Allowing two Centrifugal Charging pumps to operate simultaneously for ≤ 15 minutes increases the margin of safety with respect to the Reactor Coolant pump seal failure resulting in a LOCA in that the Reactor Coolant pump seal injection flow is not interrupted during pump swap. For the 15 minute period during which simultaneous Centrifugal Charging pump operation is allowed, the safety margins as related to the mass addition analysis are not appreciably reduced.. Technical Specification 3.4.9.3 requires two PORVs to be operable during this period of operation thus a mass addition transient can be relieved as required assuming the two PORV's function properly.

3/4.5.2 and 3/4.5.3 ECCS SUBSYSTEMS

The OPERABILITY of two independent ECCS subsystems ensures that sufficient emergency core cooling capability will be available in the event of a LOCA assuming the loss of one subsystem through any single failure consideration. Either subsystem operating in conjunction with the accumulators is capable of supplying sufficient core cooling to limit the peak cladding temperatures within acceptable limits for all postulated break sizes ranging from the double ended break of the largest RCS cold leg pipe downward. In addition, each ECCS subsystem provides long-term core cooling capability in the recirculation mode during the accident recovery period.

With the RCS temperature below 350°F, one OPERABLE ECCS subsystem is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the limited core cooling requirements.

The limitation for a maximum of one centrifugal charging pump and one Safety Injection pump to be OPERABLE and the Surveillance Requirement to verify all charging pumps and Safety Injection pumps except the required OPERABLE charging pump to be inoperable below 300°F provides assurance that a mass addition pressure transient can be relieved by the operation of a single PORV. . . . . see Attached Page A

The Surveillance Requirements provided to ensure OPERABILITY of each component ensures that at a minimum, the assumptions used in the safety analyses are met and that subsystem OPERABILITY is maintained. Surveillance Requirements for throttle valve position stops and flow balance testing provide assurance that proper ECCS flows will be maintained in the event of a LOCA. Maintenance of proper flow resistance and pressure drop in the piping system to each injection point is necessary to: (1) prevent total pump flow from exceeding runout conditions when the system is in its minimum resistance configuration, (2) provide the proper flow split between injection points in accordance with the assumptions used in the ECCS-LOCA analyses, and (3) provide an acceptable level of total ECCS flow to all injection points equal to or above that assumed in the ECCS-LOCA analyses.

3/4.5.4

[Deleted]

3/4.5.5 REFUELING WATER STORAGE TANK

The OPERABILITY of the refueling water storage tank (RWST) as part of the ECCS ensures that a sufficient supply of borated water is available for injection by the ECCS in the event of a LOCA. The limits on RWST minimum volume and boron concentration ensure that: (1) sufficient water is available within containment to permit recirculation cooling flow to the core, and (2) the reactor will remain subcritical in the cold condition following mixing of the RWST and the RCS water volumes with all control rods inserted except

ATTACHED PAGE A

.... Allowing two Centrifugal Charging pumps to operate simultaneously for ≤ 15 minutes increases the margin of safety with respect to the Reactor Coolant pump seal failure resulting in a LOCA in that the Reactor Coolant pump seal injection flow is not interrupted during pump swap. For the 15 minute period during which simultaneous Centrifugal Charging pump operation is allowed, the safety margins as related to the mass addition analysis are not appreciably reduced.. Technical Specification 3.4.9.3 requires two PORVs to be operable during this period of operation thus a mass addition transient can be relieved as required assuming the two PORV's function properly.

ATTACHMENT 2

TECHNICAL JUSTIFICATION

Technical Justification:

The justification for operating two NV pumps in Modes 4, 5, and 6 when needed for train swaps is that this condition contributes positively to nuclear safety because the action assures NC pump seal integrity thus precluding a small break LOCA event via NC pump seal failure. Specifically:

1. NC pump operation requires continuous NC pump seal supply per approved NC system operating procedure.

2. Removing NC pumps from service to swap NV pumps would induce unnecessary NC system pressure and temperature transients and adversely impact unit startup activities.

3. The new Standardized Technical Specification (see Att. 4) previously approved by the NRC allows two NV pump operation in this fashion for a maximum of 15 minutes.

Technical Specification surveillance 4.1.2.3.2 states "All Centrifugal Charging pumps, excluding the above required OPERABLE pump, shall be demonstrated inoperable at least once per 31 days, except when the reactor vessel head is removed, by verifying that the motor circuit breakers are secured in the open position or by verifying the discharge of each charging pump has been isolated from the Reactor Coolant System by at least two isolation valves with power removed from the valve operator."

The footnote associated with Technical Specification 3.1.2.4 states that "A maximum of one Centrifugal Charging pump shall be OPERABLE whenever the temperature of one or more of the NCS cold legs is less than or equal to 300° F.

The footnote associated with Technical Specification 3.5.3 states "A maximum of one Centrifugal Charging pump and one Safety Injection pump shall be OPERABLE whenever the temperature of the one or more of the NCS cold legs is less than or equal to 300° F.

The combination of these technical specifications precludes having more than one NV pump operable (i.e. racked in service or operating) until Reactor Coolant (NC) system temperature exceeds 300° F.

During unit startup at temperatures less than 300° F, unforeseen circumstances may sporadically arise, i.e. necessity to change operating trains, chemical additions, etc. which require the Operators to swap trains of safety related equipment, including the NV pumps. The NV pumps supply seal injection water to the NC pumps. Since at least one NC pump is running to support Reactor Coolant system heatup, NC pump seal supply from the NV pump is required to be maintained.

When such circumstances arise, a second NV pump is racked in and started in order to maintain NC pump seal flow until the first NV pump can be shutdown and racked out of service. For a short period during this transition, both NV pumps are operable, and compliance with subject TS requirements is not achieved. From a nuclear safety standpoint, it is safer to have two pumps operating in this condition than to have no pumps operating (as required by current technical specifications). Furthermore, the associated Action Statements do not provide any actions directly related to this situation.

The proposed TS Amendment would allow operation of two NV pumps in the above described fashion for up to 15 minutes in order to preserve seal supply to the operating NC pumps. Duke Power believes this approach is in the interest of nuclear safety in that the NV flow to the NC pump is required to maintain the integrity of the NC pump seals thus preventing a potential NC pump seal failure and the accompanying small break Loss Of Coolant Accident event. The 15 minute time limit is per the Standardized Technical Specification (see Att. 4) as previously approved by the NRC. Regarding PORV operability while operating two NV pumps, the appropriate operating procedures will be changed to require that the two PORV's be operable and functional prior to starting the second centrifugal charging pump.

The action described above is reflected in Required Action B.1 of Limiting Condition for Operation 3.4.12 of the new Standardized Technical Specification (see Att. 4) which has been previously endorsed by the NRC.

ATTACHMENT 3

SAFETY EVALUATION

AND

NO SIGNIFICANT HAZARDS ANALYSIS

Safety Analysis:

The limit of one NV pump operation associated with TS 3.1.2.3, 3.1.2.4, and 3.5.3 provides assurance that a low temperature mass addition pressure transient on the NCS can be relieved by the operation of a single PORV. The proposed TS Amendment would increase the margin of safety in regards to the NC pump seal failure LOCA in that operating two NV pumps would decrease the potential of NC pump seal failure due to lost seal injection flow.

TS 3.4.9.3 requires two PORVs to be operable during this period of operation thus a mass addition transient can be relieved as required. During the majority of time spent operating in Modes 5 and 6, two PORVs are gagged open and/or a NCS Code Safety is removed (meets LTOP 4.5 square inch vent requirement) to provide sufficient overpressure protection. Also, during Modes 5 and 6, both Safety Injection pumps are normally inoperable (motor breakers racked out) except for special pump and check valve testing and special NI system operational activities. Therefore, normal LTOP operating conditions provide extra levels of overpressure protection for the NCS.

Additionally, the PORV LTOP setpoint calculation (MCC-1223.03-00-0005, Rev. 6) contains information to show that ND pump suction relief valve 1ND-3 will also provide NCS overpressure protection nearly equivalent to a PORV for most mass addition events during steady state heatup and cooldown conditions in Modes 4, 5, and 6. Since the RHR system is required by Technical Specifications (3/4.1.4.1, 3/4.1.4.2, 3/4.9.8.1, 3/4.9.8.2) to be in service during most of Modes 5 and 6 and part of Mode 4, 1ND-3 will provide significant additional NCS overpressure protection.

Currently TS 3.5.3 allows a maximum of one NV pump (560 GPM maximum flow) and one Safety Injection pump (675 GPM maximum flow) to be operable with any one NCS cold leg $\leq$ 300 °F. With a maximum time period of 15 minutes for having a second NV pump operable, the probability of an inadvertent NCS mass addition event during this period is low such that safety margins related to mass addition analysis are not appreciably reduced. Also, Action Statement "a" of TS 3.4.9.3 permits one PORV to be inoperable up to 7 days during LTOP operation. This existing limit is based on the low probability of a LTOP overpressure event occurring in this 7 day window. Similarly, because the probability of a LTOP overpressure event occurring within a 15 minute period inside the 7 day window with two NV pumps operable is so low, safety margins related to this TS are not significantly reduced.

Thus, based on current NCS low temperature overpressure protection system Technical Specification limits, operating practices, and the short time limit of $\leq$ 15 minutes applied to having both NV pumps operating or operable, safety margins as related to a low temperature NCS mass addition event are not significantly reduced.

No Significant Hazards Analysis:

The standards for determination that the proposed TS Amendment does not involve a significant hazards consideration is that operation of the facility in accordance with the proposed changes would not: (1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or, (2) Create the possibility of a new or different kind of accident from any previously evaluated; or (3) Involve a significant reduction in a margin of safety.

1. Basis for Conclusion That the Amendment Would Not Involve a Significant Increase in the Probability or Consequences of an Accident Previously Evaluated:

No significant increase in probability of an accident previously analyzed will occur. While the probability of the mass addition pressure transient will increase slightly, this increase is judged to be insignificant due to the short time of operation with two NV pumps (≤ 15 minutes) and the accompanying TS 3.4.9.3 requirement for two operable NC system PORVs.

The consequences of the mass addition pressure transient accident will not increase for the same reasons described above.

2. Basis for Conclusion that the Amendment Would Not Create the Possibility of a New or Different Kind of Accident From Any Previously Analyzed:

The accident related to the operation of an additional NV pump is the mass addition pressure transient accident as previously analyzed and documented in the basis for TS 3.1.2.3, 3.1.2.4, and 3.5.3. No other new accident or different kind of accident will be created by allowing two NV pump operation for ≤ 15 minutes via this proposed TS Amendment.

3. Basis for Conclusion That the Amendment Would Not Represent A Significant Reduction in A Margin Of Safety:

The margin of safety regarding the mass addition pressure transient will not be appreciably decreased due to the short duration (≤ 15 minutes) of two NV pump operation combined with the operability of two NC system PORVs required by TS 3.4.9.3 in Mode 4 (≤ 300° F). Additionally, the margin of safety will be marginally increased as relates to the NC pump seal failure small break LOCA due to the increased assurance of NC pump seal flow during NV train swaps.

Environmental Impact Statement:

Duke Power Company has reviewed this amendment request against the criteria of 10CFR51.22 for environmental considerations. The proposed amendment does not involve any increase in the amount of effluents or the types of effluents that may be released offsite, nor significantly increase the individual or cumulative occupational radiation exposure. Based on this assessment, this amendment request meets the criteria given in 10CFR51.22(c)(9) for categorical exclusion from the requirement for an Environmental Impact Review.

ATTACHMENT 4

STANDARDIZED TECHNICAL SPECIFICATION

3.4.12 – LTOP

3.5.3 – ECCS-SHUTDOWN

APPLICABLE STS BASES

New W STS

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.12 Low Temperature Overpressure Protection (LTOP) System

LCO 3.4.12 An LTOP System shall be OPERABLE with a maximum of [one] [high pressure injection (HPI)] pump [and one charging pump] capable of injecting into the RCS and the accumulators isolated and either a or b below.

a. Two RCS relief valves, as follows:

1. Two power operated relief valves (PORVs) with lift settings within the limits specified in the PTLR, or

[2. Two residual heat removal (RHR) suction relief valves with setpoints ≥ [436.5] psig and ≤ [463.5] psig, or]

[3. One PORV with a lift setting, within the limits specified in the PTLR, and one RHR suction relief valve with a setpoint ≥ [436.5] psig and ≤ [463.5] psig].

b. The RCS depressurized and an RCS vent of ≥ [2.07] square inches.

APPLICABILITY: MODE 4 when any RCS cold leg temperature is ≤ [275]°F,
MODE 5,
MODE 6 when the reactor vessel head is on.

---------------------------NOTE---------------------------
Accumulator isolation is only required when accumulator pressure is greater than or equal to the maximum RCS pressure for the existing RCS cold leg temperature allowed by the P/T limit curves provided in the PTLR.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Two or more [HPI] pumps capable of injecting into the RCS.	A.1	Initiate action to verify a maximum of [one] [HPI] pump is capable of injecting into the RCS.	Immediately
[B. Two or more charging pumps capable of injecting into the RCS.	B.1	---------NOTE--------- Two charging pumps may be capable of injecting into the RCS during pump swap operation for ≤ 15 minutes. --------------------- Initiate action to verify a maximum of [one] charging pump is capable of injecting into the RCS.	Immediately]
C. An accumulator not isolated when the accumulator pressure is greater than or equal to the maximum RCS pressure for existing cold leg temperature allowed in the PTLR.	C.1	Isolate affected accumulator.	1 hour

(continued)

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.3 ECCS—Shutdown

LCO 3.5.3 One ECCS train shall be OPERABLE.

APPLICABILITY: MODE 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
[A. Required ECCS residual heat removal (RHR) subsystem inoperable.	A.1	Initiate action to restore required ECCS RHR subsystem to OPERABLE status.	Immediately]
B. Required ECCS [high head subsystem] inoperable.	B.1	Restore required ECCS [high head subsystem] to OPERABLE status.	1 hour
C. Required Action and associated Completion Time [of Condition B] not met.	C.1	Be in MODE 5.	24 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.3.1	-------------------NOTE------------------- An RHR train may be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned to the ECCS mode of operation. -- The following SRs are applicable for all equipment required to be OPERABLE: [SR 3.5.2.1] [SR 3.5.2.7] [SR 3.5.2.3] SR 3.5.2.8 SR 3.5.2.4	In accordance with applicable SRs

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.12 Low Temperature Overpressure Protection (LTOP) System

BASES

BACKGROUND

The LTOP System controls RCS pressure at low temperatures so the integrity of the reactor coolant pressure boundary (RCPB) is not compromised by violating the pressure and temperature (P/T) limits of 10 CFR 50, Appendix G (Ref. 1). The reactor vessel is the limiting RCPB component for demonstrating such protection. The PTLR provides the maximum allowable actuation logic setpoints for the power operated relief valves (PORVs) and the maximum RCS pressure for the existing RCS cold leg temperature during cooldown, shutdown, and heatup to meet the Reference 1 requirements during the LTOP MODES.

The reactor vessel material is less tough at low temperatures than at normal operating temperature. As the vessel neutron exposure accumulates, the material toughness decreases and becomes less resistant to pressure stress at low temperatures (Ref. 2). RCS pressure, therefore, is maintained low at low temperatures and is increased only as temperature is increased.

The potential for vessel overpressurization is most acute when the RCS is water solid, occurring only during shutdown; a pressure fluctuation can occur more quickly than an operator can react to relieve the condition. Exceeding the RCS P/T limits by a significant amount could cause brittle cracking of the reactor vessel. LCO 3.4.3, "RCS Pressure and Temperature (P/T) Limits," requires administrative control of RCS pressure and temperature during heatup and cooldown to prevent exceeding the PTLR limits.

This LCO provides RCS overpressure protection by having a minimum coolant input capability and having adequate pressure relief capacity. Limiting coolant input capability requires deactivating all but [one] [high pressure injection (HPI)] pump [and one charging pump] and isolating the accumulators. The pressure relief capacity requires either two redundant RCS relief valves or a depressurized RCS and an RCS vent of sufficient size. One RCS relief valve or the open RCS vent is the overpressure protection device that acts to terminate an increasing pressure event.

(continued)

BASES

BACKGROUND (continued)

With minimum coolant input capability, the ability to provide core coolant addition is restricted. The LCO does not require the makeup control system deactivated or the safety injection (SI) actuation circuits blocked. Due to the lower pressures in the LTOP MODES and the expected core decay heat levels, the makeup system can provide adequate flow via the makeup control valve and, if needed, until the [HPSI] pump is actuated by SI.

The LTOP System for pressure relief consists of two PORVs with reduced lift settings, or two residual heat removal (RHR) suction relief valves, or one PORV and one RHR suction relief valve, or a depressurized RCS and an RCS vent of sufficient size. Two RCS relief valves are required for redundancy. One RCS relief valve has adequate relieving capability to keep from overpressurization for the required coolant input capability.

PORV Requirements

As designed for the LTOP System, each PORV is signaled to open if the RCS pressure approaches a limit determined by the LTOP actuation logic. The LTOP actuation logic monitors both RCS temperature and RCS pressure and determines when a condition not acceptable in the PTLR limits is approached. The wide range RCS temperature indications are auctioneered to select the lowest temperature signal.

The lowest temperature signal is processed through a function generator that calculates a pressure limit for that temperature. The calculated pressure limit is then compared with the indicated RCS pressure from a wide range pressure channel. If the indicated pressure meets or exceeds the calculated value, a PORV is signaled to open.

The PTLR presents the PORV setpoints for LTOP. The setpoints are normally staggered so only one valve opens during a low temperature overpressure transient. Having the setpoints of both valves within the limits in the PTLR ensures that the Reference 1 limits will not be exceeded in any analyzed event.

When a PORV is opened in an increasing pressure transient, the release of coolant will cause the pressure increase to slow and reverse. As the PORV releases coolant, the RCS

(continued)

BASES

BACKGROUND

PORV Requirements (continued)

pressure decreases until a reset pressure is reached and the valve is signaled to close. The pressure continues to decrease below the reset pressure as the valve closes.

RHR Suction Relief Valve Requirements

[During LTOP MODES, the RHR System is operated for decay heat removal and low pressure letdown control. Therefore, the RHR suction isolation valves are open in the piping from the RCS hot legs to the inlets of the RHR pumps. While these valves are open and the RHR suction valves are open, the RHR suction relief valves are exposed to the RCS and are able to relieve pressure transients in the RCS.

The RHR suction isolation valves and the RHR suction valves must be open to make the RHR suction relief valves OPERABLE for RCS overpressure mitigation. Autoclosure interlocks are not permitted to cause the RHR suction isolation valves to close. The RHR suction relief valves are spring loaded, bellows type water relief valves with pressure tolerances and accumulation limits established by Section III of the American Society of Mechanical Engineers (ASME) Code (Ref. 3) for Class 2 relief valves.]

RCS Vent Requirements

Once the RCS is depressurized, a vent exposed to the containment atmosphere will maintain the RCS at containment ambient pressure in an RCS overpressure transient, if the relieving requirements of the transient do not exceed the capabilities of the vent. Thus, the vent path must be capable of relieving the flow resulting from the limiting LTOP mass or heat input transient, and maintaining pressure below the P/T limits. The required vent capacity may be provided by one or more vent paths.

For an RCS vent to meet the flow capacity requirement, it requires removing a pressurizer safety valve, removing a PORV's internals, and disabling its block valve in the open position, or similarly establishing a vent by opening an RCS vent valve. The vent path(s) must be above the level of reactor coolant, so as not to drain the RCS when open.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES

Safety analyses (Ref. 4) demonstrate that the reactor vessel is adequately protected against exceeding the Reference 1 P/T limits. In MODES 1, 2, and 3, and in MODE 4 with RCS cold leg temperature exceeding [275]°F, the pressurizer safety valves will prevent RCS pressure from exceeding the Reference 1 limits. At about [275]°F and below, overpressure prevention falls to two OPERABLE RCS relief valves or to a depressurized RCS and a sufficient sized RCS vent. Each of these means has a limited overpressure relief capability.

The actual temperature at which the pressure in the P/T limit curve falls below the pressurizer safety valve setpoint increases as the reactor vessel material toughness decreases due to neutron embrittlement. Each time the PTLR curves are revised, the LTOP System must be re-evaluated to ensure its functional requirements can still be met using the RCS relief valve method or the depressurized and vented RCS condition.

The PTLR contains the acceptance limits that define the LTOP requirements. Any change to the RCS must be evaluated against the Reference 4 analyses to determine the impact of the change on the LTOP acceptance limits.

Transients that are capable of overpressurizing the RCS are categorized as either mass or heat input transients, examples of which follow:

<u>Mass Input Type Transients</u>

a. Inadvertent safety injection; or

b. Charging/letdown flow mismatch.

<u>Heat Input Type Transients</u>

a. Inadvertent actuation of pressurizer heaters;

b. Loss of RHR cooling; or

c. Reactor coolant pump (RCP) startup with temperature asymmetry within the RCS or between the RCS and steam generators.

(continued)

BASES

APPLICABLE SAFETY ANALYSES

Heat Input Type Transients (continued)

The following are required during the LTOP MODES to ensure that mass and heat input transients do not occur, which either of the LTOP overpressure protection means cannot handle:

a. Deactivating all but [one] [HPI] pump [and one charging pump] OPERABLE;

b. Deactivating the accumulator discharge isolation valves in their closed positions; and

c. Disallowing start of an RCP if secondary temperature is more than [50]°F above primary temperature in any one loop. LCO 3.4.6, "RCS Loops—MODE 4," and LCO 3.4.7, "RCS Loops—MODE 5, Loops Filled," provide this protection.

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The Reference 4 analyses demonstrate that either one RCS relief valve or the depressurized RCS and RCS vent can maintain RCS pressure below limits when only one [HPI] pump [and one charging pump are] is [are] actuated by SI. Thus, the LCO allows only [one] [HPI] pump [and one charging pump] OPERABLE during the LTOP MODES. Since neither one RCS relief valve nor the RCS vent can handle a full SI actuation, the LCO also requires the accumulators isolated.

The isolated accumulators must have their discharge valves closed and the valve power supply breakers fixed in their open positions. The analyses show the effect of accumulator discharge is over a narrower RCS temperature range ([175]°F and below) than that of the LCO ([275]°F and below). Fracture mechanics analyses established the temperature of LTOP Applicability at [275]°F.

The consequences of a small break loss of coolant accident (LOCA) in LTOP MODE 4 conform to 10 CFR 50.46 and 10 CFR 50, Appendix K (Refs. 5 and 6), requirements by having a maximum of [one] [HPI] pump [and one charging pump] OPERABLE and SI actuation enabled.

(continued)

ATTACHMENT 5

JUSTIFICATION FOR EXIGENT TECHNICAL SPECIFICATION CHANGE

Justification for Exigent TS Change:

Why the exigent situation occurred:

in the past, when two charging (NV) pumps were operated simultaneously during pump swapping operations, the applicable technical specifications were entered into the Technical Specification Action Item Logs. It had been assumed that this action and a request for a technical specification interpretation were sufficient to resolve this issue.

During two development review meetings for this TS Interpretation on September 29, 1994, it was realized that an interpretation would not be allowed because it would, in effect, alter the intent of the subject technical specifications.

It was then determined that a Discretionary Enforcement would be needed to avoid a possible violation of the subject TS's for Unit 1 because it is currently in cycle 10 startup process where a need for NV pumps swapping might arise.

On September 30, 1994, the request for Discretionary Enforcement was denied by the NRC. This denial resulted in submittal of this Exigent Technical Specification Amendment.

Why the licensee could not avoid this situation:

When unplanned NV pumps swapping is needed, for example due to failure of the operating NV pump or failure of the operating NV train supporting systems, the second NV pump is racked in and started in order to maintain NC pump seal flow until the first NV pump can be shutdown and racked out of service. For a short period during this transition, both NV pumps are operable, and compliance with the subject TS requirements is not achieved. Furthermore, the associated Action Statements do not provide any actions directly related to this situation. Duke Power believes this approach is in the interest of nuclear safety in that the NV flow to the NC pump is required to maintain the integrity of the NC pump seals thus preventing a potential NC pump seal failure and the accompanying small break Loss Of Coolant Accident (LOCA) event.