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PG&E Letter DCL-02-115

U. S. Nuclear Regulatory Commission
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Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
License Amendment Request (LAR) 01-08
Credit for Automatic Actuation of Pressurizer Power Operated Relief Valves;
Pressurizer Safety Valve Loop Seal Temperature

Dear Commissioners and Staff:

In accordance with 10 CFR 50.90, enclosed is an application for amendment to Facility Operating License Nos. DPR-80 and DPR-82 for Pacific Gas and Electric Company's Diablo Canyon Power Plant Units 1 and 2, respectively. This license amendment request (LAR) would modify Technical Specifications (TS) 3.4.11, "Pressurizer Power Operated Relief Valves (PORVs)," and the licensing basis to credit automatic actuation of the Class 1 power operated relief valves (PORVs), instead of the pressurizer safety valves (PSVs), to limit reactor coolant system pressure changes for the spurious operation of the safety injection system at power event, and other design basis accidents. Also, TS 3.4.10, "Pressurizer Safety Valves," would be revised to allow PSV loop seal temperatures to be less than the lower design temperature during plant heatup and cooldown in Mode 3, and in Mode 4 when any reactor coolant system cold leg temperature is greater than the low temperature overpressure protection arming temperature specified in the pressure temperature limits report, provided at least one Class I PORV is available and capable of providing automatic pressure relief. This would allow gradual stabilization of the loop seal temperatures, and avoid having to partially drain the loop seals to establish the proper PSV inlet temperature.

Enclosure 1 contains a description of the proposed changes, the supporting technical analysis, and the significant hazards determination. Enclosures 2 and 3 contain marked-up and revised TS pages, respectively.

The changes proposed in this LAR are not required to address an immediate safety concern. PG&E requests that these changes be approved no later than September 2003. PG&E requests that the amendments be effective immediately upon issuance, to be implemented within 30 days from the date of issuance, or within 30 days following upgrade of the automatic actuation circuitry for the Class 1 PORVs for each unit, whichever is later.

Sincerely,

Greg Rueger

Gregory M. Rueger
Senior Vice President -- Generation and Chief Nuclear Officer

tcg/4231
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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of PACIFIC GAS AND ELECTRIC COMPANY	Docket No. 50-275 Facility Operating License No. DPR-80
Diablo Canyon Power Plant Units 1 and 2	Docket No. 50-323 Facility Operating License No. DPR-82

AFFIDAVIT

Gregory M. Rueger, of lawful age, first being duly sworn upon oath says that he is Senior Vice President - Generation and Chief Nuclear Officer of Pacific Gas and Electric Company; that he has executed LAR 01-08 on behalf of said company with full power and authority to do so; that he is familiar with the content thereof; and that the facts stated therein are true and correct to the best of his knowledge, information, and belief.

Greg Rueger

Gregory M. Rueger
Senior Vice President – Generation and Chief Nuclear Officer

Subscribed and sworn to before me this 24th day of September, 2002
County of San Francisco
State of California

Amy Emiko Dong

Notary Public

AMY EMIKO DONG
Commission # 1206749
Notary Public - California
San Francisco County
My Comm. Expires Jan 2, 2003

LICENSE AMENDMENT REQUEST FOR DIABLO CANYON POWER PLANT CREDIT FOR AUTOMATIC ACTUATION OF PRESSURIZER POWER OPERATED RELIEF VALVES; PRESSURIZER SAFETY VALVE LOOP SEAL TEMPERATURE

1.0 DESCRIPTION

This letter is a request to amend Facility Operating Licenses DPR-80 and DPR-82 for Diablo Canyon Power Plant (DCPP) Units 1 and 2, respectively.

The proposed changes would credit automatic actuation of the Class 1 power operated relief valves (PORVs), instead of the pressurizer safety valves (PSVs), to limit reactor coolant system (RCS) pressure changes for the spurious operation of the safety injection (SI) system at power event and other design basis accidents. The proposed changes would also allow PSV loop seal temperatures to be less than the lower design temperature during plant heatup and cooldown in Mode 3, and in Mode 4 when any RCS cold leg temperature is greater than the low temperature overpressure protection (LTOP) arming temperature specified in the pressure temperature limits report (PTLR), provided at least one Class 1 PORV is available and capable of providing automatic pressure relief. This would allow gradual stabilization of the loop seal temperatures, and avoid having to partially drain the loop seals to establish the proper PSV inlet temperature.

PG&E intends to upgrade the Instrument Class II portion of the automatic actuation circuitry for the Class 1 PORVs during refueling outages 1R12 and 2R11 for DCPP Units 1 and 2, scheduled to begin in February 2004 and February 2003, respectively.

2.0 PROPOSED CHANGE

The proposed changes would revise the following technical specifications (TS):

TS 3.4.10, Applicability, would be revised by adding the following Note: "2. The pressurizer safety valve loop seal temperature may be less than the lower design limit during plant heatup and cooldown in MODE 3, and in MODE 4 when any RCS cold leg temperature is > LTOP arming temperature specified in the PTLR, provided at least one Class 1 PORV is available and capable of providing automatic pressure relief."

TS 3.4.11, Condition A, would be revised to read "One or more PORVs inoperable solely due to excessive seat leakage."

TS 3.4.11, Condition B would be revised to read "One PORV inoperable for reasons other than excessive seat leakage."

TS 3.4.11, Condition E would be revised to read "Two Class 1 PORVs inoperable for reasons other than excessive seat leakage."

TS 3.4.11, Surveillances, would be revised by adding new surveillance requirements SR 3.4.11.4, "Perform a COT on each required Class 1 PORV, excluding actuation," with a Frequency of 92 days, and SR 3.4.11.5, "Perform CHANNEL CALIBRATION for each required Class 1 PORV actuation channel," with a Frequency of 24 months. A COT is a channel operational test.

Changes to the TS are noted in the marked-up copies of the current TS pages provided in Enclosure 2. Revised TS pages are provided in Enclosure 3. Proposed TS Bases pages are provided for information in Enclosure 4. Upon approval of these proposed changes, the TS Bases will be revised in accordance with TS 5.5.14, "Technical Specification (TS) Bases Control Program." Required changes to the Final Safety Analysis Report (FSAR) Update to reflect the revised analysis for the spurious operation of the SI system at power event, and to allow credit for automatic operation of the PORVs for other design basis accidents, will be made in accordance with 10 CFR 50.59.

3.0 BACKGROUND

3.1 PORVs and spurious operation of the SI system at power.

The spurious operation of the SI system at power event is analyzed to assure that the primary and secondary pressure limits are not exceeded and that the departure from nucleate boiling ratio (DNBR) limits are met. The current analysis takes credit for operation of the PSVs to relieve a RCS overpressure condition. No credit is taken for automatic operation of the PORVs, since part of the automatic actuation circuitry is Instrument Class II. The PORV function would limit pressurizer pressure to a value below the fixed high pressure reactor trip setpoint, and as a result limit undesirable opening of the PSVs. The analysis is discussed in FSAR Update Section 15.2.15.

In December 1997, Westinghouse informed PG&E that a review of the FSAR Update analysis for a spurious operation of the SI system at power event identified that a temperature coefficient used for PSV modeling was treated incorrectly. The Westinghouse review determined the temperature coefficient defined in WCAP-11677, "Pressurizer Safety Relief Valve Operation for Water Discharge During a Feedwater Line Break," January 1988, Appendix A is not a constant as previously treated, but rather varies with temperature. Previously, it was concluded that PSV operability would be maintained for a water relief temperature above 600°F. With the temperature coefficient correctly treated as a variable,

the water temperature must remain above 613°F in order to justify stable PSV operation. The current FSAR Update spurious operation of the SI system at power event analysis achieved a final water temperature of 603°F before operator termination of the SI at 16 minutes. As a result, the PSVs could relieve water at a temperature low enough such that they might not properly reseat during the termination of the spurious operation of the SI system at power event. Significant PSV leakage could be considered equivalent to a small break loss-of-coolant accident, which is a Condition III event. This is contrary to FSAR Update section 15.2, which states that Condition II faults (or events) do not propagate to cause a more serious fault. In addition, PG&E determined that operator action cannot be reliably completed in less than 16 minutes, as originally assumed. PG&E reported this condition in LER 1-98-001, dated February 23, 1998 (DCL-98-023), "Reactor Coolant System Outside Design Basis for Inadvertent Emergency Core Cooling System Actuation at Power Due to Non-Conservative Assumptions for Pressurizer Safety Valve Operation." Compensatory measures were established to limit SI flow into the RCS.

PG&E submitted a license amendment request (LAR) (PG&E letter DCL-99-071 dated May 21, 1999), requesting review and approval of a revised analysis for the spurious operation of the SI system at power event crediting automatic actuation of the PORVs, instead of the PSVs, to limit RCS pressure. After discussions with the NRC staff regarding the proposed LAR, PG&E withdrew the request pending review of other options.

Subsequent to those discussions, PG&E initiated actions to upgrade the Instrument Class II portion of the PORV automatic actuation circuitry to enable crediting automatic actuation of the PORVs for the spurious operation of the SI system at power event. PG&E plans to implement these modifications during refueling outages 2R11 (Unit 2) and 1R12 (Unit 1), scheduled to begin in February 2003 and February 2004, respectively.

3.2 PSV loop seal temperature.

Loop seals are provided in the PSV inlet piping to maintain PSV body temperature below the vendor recommended limits. This prevents PSV seat leakage that can result from spring relaxation with increased temperature. However, the water in the loop seals must be maintained at a minimum temperature to allow it to flash to steam when a PSV lifts. Because of the low density and low mass flow rate, PSV steam relief imposes minimal loading on the discharge piping ensures acceptable pipe stresses. Conversely, if cooler water is maintained in the loop seals, it

may not flash completely, and a water and steam mixture could be discharged when the PSV lifts. Because of the higher density and higher mass flow rate, PSV relief of water and steam could impose increased loading and could result in unacceptably high pipe stresses on the discharge piping which could render the PSVs inoperable.

In November 1982, a Westinghouse piping analysis identified that the PSV loop seals needed to be at an elevated temperature to reduce downstream pipe loads during a PSV discharge. Therefore, loop seal insulation was designed and installed, and loop seal temperatures were verified during initial startup testing to meet the minimum value of 260°F established by Westinghouse to assure PSV operability.

During subsequent operation of the plant, DCPP and the nuclear industry experienced PSV seat leakage and setpoint drift. PG&E determined that a predominant factor for PSV setpoint drift was high nozzle loading which resulted from thermal expansion of the inlet piping containing the loop seals. A corrective action was to modify the loop seal insulation to decrease valve body and pipe support temperature while maintaining the minimum loop seal temperature.

Local temperature instrumentation was installed because of a concern regarding the potential loss of the loop seals as a result of PSV leakage. This instrumentation was used to ensure the loop seals were still present and that the PSVs remained operable. The instrumentation did not provide for remote continuous temperature monitoring.

In 1998, as part of the continuing evaluation of temperature data, it was noted that loop seal temperatures for one of the Unit 1 PSVs and two of the Unit 2 PSVs were consistently below the minimum loop seal temperature requirement of 260°F specified in the RCS design criteria memorandum. An assessment was done to substantiate that the lower loop seal temperatures did not impact PSV operability, and validated a new lower limit of 217°F. Periodic monitoring was initiated to verify adequate loop seal temperatures, and the operators were given instructions to immediately restore any loop seal temperature that dropped below this limit.

During this period, PG&E's focus was on maintaining minimum loop seal temperatures when the RCS was at steady state operating conditions. However, on December 11, 1998, while investigating low PSV loop seal

temperatures during a forced outage (LER 2-1998-005-00, dated December 31, 1998), PG&E engineers recognized that the minimum loop seal temperatures could also be exceeded during the heatup following a unit shutdown. PG&E engineers determined from a review of previous heatup data that on several occasions the loop seal temperatures were below 217°F. PG&E reported this condition in LER 2-1998-006-00, dated January 19, 1999, and provided supplemental information in LER 2-1998-006-01, dated July 23, 1999. Controls were initiated to ensure that the loop seal temperature requirements would be met for all modes of applicability. Those controls require monitoring of loop seal minimum temperature prior to increasing RCS cold leg temperature above the LTOP arming temperature, and partial draining of the loop seals during heatup and cooldown, if required, in order to establish the proper PSV inlet temperature.

4.0 TECHNICAL ANALYSIS

4.1 Credit for automatic PORV actuation to mitigate the spurious operation of the SI system at power event.

Two separate spurious operation of the SI system at power cases are analyzed to assure that the RCS pressure limits are not exceeded, and that the DNBR limits are met, respectively. The event is discussed in FSAR Update Section 15.2.15. The current case that evaluates pressurizer overfill takes credit for operation of the PSVs to relieve the RCS overpressure condition. No credit is taken for automatic operation of the PORVs since part of the automatic actuation circuitry is currently Instrument Class II. Since the PORV function would limit undesirable opening of the PSVs, the automatic actuation circuitry will be upgraded so that the PORVs can be credited for accident mitigation.

The spurious operation of the SI system at power case that verifies that the DNBR limits are met, already assumes normal operation of the pressurizer PORVs and sprays. This assumption conservatively minimizes the RCS pressure during the event and leads to more limiting DNBR results. Therefore, the minimum DNBR case remains bounding and was not reanalyzed.

PORV design and safety functions

The pressurizer is equipped with three PORVs (two Class 1 and one Class II). The purpose of the PORVs is to limit RCS pressure to below the high pressure reactor trip setpoint and to prevent the actuation of the PSVs for all design transients up to and including a 95 percent step load decrease with steam dump actuation. In addition, the PORVs are relied upon to perform the following safety-related functions: (1) mitigation of a steam generator tube rupture accident, (2) LTOP of the reactor vessel during heatup and cooldown, and (3) RCS pressure control for plant cooldown. Automatic actuation of the PORVs is also credited in addition to the PSVs in the mitigation of an anticipated transient without scram event.

The PORVs are air-operated and controlled by solenoid valves that are energized to open, spring-to-close. The control power is vital 125 Vdc which is backed up by station batteries, while the indication power is 125 Vac. Each PORV is powered from a separate vital bus. The PORVs fail closed on loss of air pressure to the actuator. Instrument air is supplied to all three PORVs. For the Class 1 PORVs (PCV-455C and PCV-456) normal instrument air is backed up by nitrogen accumulators. Each PORV has a corresponding remotely operated block valve that can be isolated if excessive leakage develops or if the PORV fails to close.

Currently, part of the automatic control circuitry for the Class 1 PORVs downstream of the reactor protection system (Eagle 21 process protection system) is Instrument Class II, i.e., Instrument Class II Hagan Model 118 bistable comparator modules in the control racks actuate the PORV auxiliary relays. To allow credit to be taken for the Class 1 PORVs for safety related functions, the automatic actuation circuitry will be upgraded to actuate the Class 1 PORV auxiliary relays directly from the Eagle 21 process protection system (Eagle partial trip (EPT) card outputs will actuate the PORV actuation and interlock relays). The EPT cards will be reconfigured to support an energize-to-trip function. Separation and isolation requirements will be maintained in implementation of the new design. See Figure 1.

Similar to the current design, two pressure protection channels will control each Class 1 PORV. One pressure channel provides input for an open permissive signal (> 2185 psig) serving as an interlock that blocks automatic opening of the PORV when the pressure is below the setpoint. In the absence of the low pressure interlock condition, the second pressure channel opens the PORV at the nominal high pressure setpoint of 2335 psig.

Proposed TS changes

TS 3.4.11 requires that each PORV and associated block valve be operable in Modes 1, 2, and 3. The proposed changes would add two new surveillance requirements, SR 3.4.11.4 and SR 3.4.11.5. SR 3.4.11.4 would require that a COT be performed on each required Class 1 PORV, excluding actuation, with a Frequency of 92 days. This surveillance would verify and, as necessary, adjust the PORV lift setpoint. PORV actuation could depressurize the RCS and is not required to verify the setpoint. SR 3.4.11.5 would require that a channel calibration be performed on the automatic actuation circuitry for the Class 1 PORVs at a frequency of 24 months. This would demonstrate that each channel responds and the valve opens within the required range and accuracy to a known input. The proposed frequencies are consistent with those for similar surveillance requirements for reactor trip system and engineered safety feature actuation system instrumentation. The surveillance requirements are similar to those for the PORVs in TS 3.4.12.

The proposed changes to TS 3.4.11 Conditions A, B, and E reflect that credit is taken for the automatic actuation of the Class 1 PORVs to mitigate the consequences of an accident. They are similar to changes approved in Amendment 137 to Facility Operating License No. NPF-30 for the Callaway Plant, Unit 1.

The upgrade of the automatic actuation circuitry and the proposed changes to the TS ensure that the Class 1 PORVs are operable and able to mitigate the consequences of the spurious operation of the SI system at power event, and other design basis accidents. Credit for automatic actuation of the PORVs for other design basis accidents will be evaluated in accordance with 10 CFR 50.59.

<u>Analysis of pressurizer overfill due to spurious operation of the SI system</u>

The spurious operation of the SI system at power event was analyzed for potential pressurizer overfill using a RETRAN02/Mod005.2 computer code model of DCPP. The analysis takes credit for the automatic actuation of the Class 1 PORVs, instead of the PSVs, to prevent water relief from the PSVs. The code simulates the neutron kinetics, RCS, pressurizer, pressurizer relief and safety valves, pressurizer spray, steam generator, steam generator safety valves, and the effect of the SI system. The program computes pertinent plant variables including temperatures, pressures, and power level. The RETRAN analysis has been verified to be consistent with the applicable restrictions and conditions of the latest NRC safety evaluation report for RETRAN and the SER condition responses in PG&E letter DCL-95-220, "License Amendment Request

95-06: Request for Emergency Review and Approval of Change to Technical Specification 3.7.1.1, Table 3.7-2 - Increase in Setpoint Tolerances for Main Steam Safety Valves," dated September 30, 1995.

The pressurizer overfill cases model the long-term plant response and the operator actions taken to terminate the event before the liquid relief capability of the PSV is challenged. The operator recovery actions for the mitigation of the spurious operation of the SI system at power event are provided in the plant emergency operating procedures (EOPs). These operator actions include making a pressurizer PORV available, stopping all but one centrifugal charging pump (CCP), throttling the charging flow, and re-establishing RCS letdown flow. Simulator demonstration runs verified that these operator recovery actions could be completed within the times assumed in the analysis as discussed below:

Make pressurizer PORV available

One of the first recovery actions which the EOPs describe is to verify a pressurizer PORV is available for pressure relief. The operator is directed to open an associated block valve as necessary to make a PORV available. The pressurizer overfill evaluation assumes that the operator makes a PORV available within 11 minutes of the initiation of the event.

Stop all but one CCP

The EOPs provide direction that, in the event of a reactor trip or SI, the non-safety related positive displacement charging pump (PDP) is not needed and is to be secured. The pressurizer overfill evaluation conservatively assumes that the PDP is operating when a spurious operation of the SI system at power event occurs, since this maximizes the pressurizer fill rate. The operators are assumed to stop the PDP within nine minutes of the event initiation.

Once the operators have identified that SI is unnecessary, the EOPs direct the operators to stop all but one CCP, and throttle the CCP flow as necessary to minimize the potential for pressurizer overfill while maintaining adequate RCP seal injection flow. The operators are assumed to stop all but one CCP within 14 minutes, and require one additional minute to throttle the charging flow.

- Restore instrument air and re-establish RCS letdown

The SI signal causes a Phase A containment isolation and an isolation of instrument air to containment. In order to establish RCS letdown and terminate the spurious operation of the SI system at power event, the EOPs direct the operators to restore instrument air to containment. The operators are assumed to restore instrument air to containment within 21 minutes of the event. The EOPs then direct the operators through a series of steps, which allow them to establish RCS letdown and stabilize the pressurizer level. The operators are assumed to establish RCS letdown and terminate the event within 26 minutes.

Three different cases were evaluated to bound the potential impact of the plant control systems operation on the spurious operation of the SI system at power event and the potential for pressurizer overfill.

Case 1

Case 1 assumes that the pressurizer pressure control system malfunctions such that the sprays, backup heaters, and proportional heaters all remain on during the event. In addition, both Class 1 PORVs are assumed to be unavailable. Case 1 establishes the limiting time available for the operators to open a pressurizer PORV block valve and make a PORV available, before the liquid relief capability of the PSV is challenged. The PSV capability is defined as a maximum of three openings under liquid relief conditions with the liquid temperature remaining greater than 613°F.

Case 2

Case 2 assumes that the pressurizer pressure control system malfunctions such that the sprays, backup heaters, and proportional heaters all remain on during the event. This case causes the earliest filling of the pressurizer and the earliest initiation of liquid relief through the pressurizer PORV. This case evaluates that the backup nitrogen accumulators provide adequate PORV relief capacity to allow termination of the spurious operation of the SI system at power event without challenging the liquid relief capability of the PSV.

Case 3

Case 3 assumes there is a loss of instrument air such that the pressurizer sprays are not operable. The pressurizer heaters remain on during the event. This case causes the earliest pressure increase to the PORV lift setpoint. The analyses of Cases 2 and 3 establish the bounding

conditions for evaluating the potential impact of the pressurizer control systems. The results of these analyses include the time at which the pressurizer fills and the relative number of steam relief and liquid relief PORV cycles that occur during a spurious operation of the SI system at power event.

The assumptions for the RETRAN pressurizer overfill analysis are:

(1) Initial operating conditions:

The initial pressurizer pressure is assumed to be 2190 psia, which is 60 psi lower than the nominal value. The pressurizer pressure control system is also assumed to control to a reduced setpoint of 2190 psia when it is operable. This lower RCS pressure results in increased emergency core cooling system (ECCS) injection flow during the transient and maximizes the challenges to the PSVs and PORVs.

The initial pressurizer level is assumed to be 67.4 percent, which bounds the pressurizer level uncertainty of 6.1 percent.

The initial RCS Tavg is assumed to be the minimum value of 568.6°F, which bounds the RCS temperature uncertainty of 8°F. This conservatively maximizes the initial RCS mass, and minimizes the RCS volumetric shrinkage after the reactor trip.

(2) Pressurizer heaters:

Both the backup and proportional pressurizer heaters are assumed to remain on even after the normal control setpoint is reached to conservatively maximize the pressurizer liquid volume and decrease the time to fill the pressurizer with liquid.

(3) Reactor trip / turbine load

The reactor trip occurs coincident with the SI actuation, which results in an immediate turbine trip. There is no credit taken for heat removal via the steam dump system to the condenser or atmosphere. Only the main steam safety valves are assumed to be operable, with a maximum three percent setpoint drift and three percent accumulation, consistent with TS. Main feedwater is lost coincident with the reactor/turbine trip. One motor-driven auxiliary feedwater (AFW) pump delivers the minimum flow of 410 gpm to two steam generators. The AFW fluid temperature is a maximum value of 100°F. The minimum heat transfer from the primary coolant loop to the secondary system leads to a conservatively early pressurizer fill condition.

(4) Moderator and doppler coefficients of reactivity:

Similar to the DNBR analysis, the pressurizer overfill analysis assumes a positive beginning-of-life moderator temperature coefficient and low absolute value doppler power coefficient. Since the reactor trip occurs immediately for the pressurizer overfill case, these reactivity coefficients have a negligible impact on the results.

(5) Reactor decay heat

Conservative core residual heat generation is assumed based on long-term operation at the initial power level preceding the trip. The ANSI/ANS 5.1 -1973 decay heat standard with a 2σ uncertainty was used for calculation of residual decay heat levels.

(6) Pressurizer PORVs

The pressurizer PORV lift setpoint is assumed to be a minimum value of 2298 psia. The pressurizer PORV delay and stroke time are minimized. The PORV valve area is assumed to increase/decrease linearly as the valve strokes open and closed. These assumptions conservatively maximize the number of PORV open cycles during the spurious operation of the SI system at power event. The backup nitrogen accumulators are assumed to be capable of providing for a maximum of 150 PORV cycles.

(7) ECCS injection flow

Two trains of ECCS pumps are assumed to provide the maximum injection flow versus RCS pressure. The refueling water storage tank fluid temperature is assumed to be 35°F to maximize the ECCS fluid density, and mass injection rate.

<u>Results</u>

The sequence of events for each of the three pressurizer overfill cases are listed in Table 1. The transient responses are shown in Figures 2 through 4.

Case 1

The spurious SI signal occurs at one second. This generates a concurrent reactor trip signal from full power conditions followed by a turbine trip signal one second later. The pressurizer pressure and pressurizer level initially decrease as the RCS power and temperature

reduce from full power conditions to hot no load conditions. The initiation of the ECCS injection flow then rapidly increases the pressure until the pressurizer spray valves open enough to maintain the pressurizer pressure relatively constant. The pressurizer level continues to increase due to ECCS injection flow and pressurizer spray flow until the pressurizer fills. The water solid RCS then experiences a rapid pressure increase to the pressurizer safety valve lift setpoint. The Case 1 analysis evaluation is considered complete when the fourth liquid relief of the PSV begins at 726 seconds. This establishes the limiting time available for the operators to unblock a pressurizer PORV to prevent challenging the liquid relief capability of the PSV.

Case 2

The first part of each spurious operation of the SI system at power case is essentially identical as the plant experiences the spurious SI actuation, reactor trip, and turbine trip from full power conditions. The plant response for Case 2 is identical to Case 1 up to the time that the pressurizer becomes water solid. For Case 2, the RCS pressure increases only to the pressurizer PORV lift setpoint where it is maintained relatively constant as the PORV continues to cycle and relieve liquid. As the operator actions decrease the ECCS injection flow, the PORV begins cycling less frequently. By the time the spurious operation of the SI system at power event is terminated at 30 minutes, the PORV has cycled a total of 45 times.

Case 3

In Case 3, the pressurizer sprays are not available such that after the reactor trip the RCS pressure continues increasing to the pressurizer PORV lift setpoint. The pressurizer PORV continues to cycle and relieve steam as the pressurizer level increases due to the ECCS injection flow. Without the pressurizer sprays, the RCS pressure is maintained near the PORV setpoint and the pressurizer fills later than Case 1. Once the pressurizer becomes water solid, the PORV begins relieving liquid. Due to the greater mass flow rate, the PORV cycles at a slightly faster rate when relieving liquid than when relieving steam. Similar to Case 2, the PORV begins cycling less frequently as operator actions decrease the ECCS injection flow. By the time the spurious operation of the SI system at power event is terminated at 26 minutes, the PORV has cycled a total of 93 times.

Conclusions

Case 1 establishes that for the limiting spurious operation of the SI system at power event, the operators have a minimum time of about 726 seconds or 12.1 minutes to make a pressurizer PORV available to prevent challenging the PSV liquid relief capability. These results conservatively bound the 11 minutes assumed for the operators to manually unblock a pressurizer PORV.

Cases 2 and 3 establish that with the worst case control system operation, the operators have adequate time to terminate a spurious operation of the SI system at power event prior to exceeding the 150 pressurizer PORV cycles provided by the backup nitrogen accumulators. The mitigation function of the Class 1 PORVs ensures that the spurious SI event can be terminated prior to challenging the ability of the PSVs to relieve liquid.

The RETRAN analysis demonstrates that the Class 1 PORVs can be expected to mitigate the consequences of a spurious operation of the SI system at power event, and that there is sufficient time for the operators to take action and open a PORV block valve(s) if it is closed.

Therefore, based on the above, PG&E believes there is reasonable assurance that the health and safety of the public will not be adversely affected by the proposed use of the PORVs to mitigate the consequences of a spurious operation of the SI system at power event.

4.2 PSV low loop seal temperatures.

The three PSVs are currently required to be operable in Modes 1, 2, and 3, and portions of Mode 4 above the LTOP arming temperature. Mode 3 and portions of Mode 4 are conservatively included, although the design basis accidents in these modes may not require all three safety valves for protection.

The TS limiting condition for operation is not applicable in Mode 4 when any RCS cold leg temperature is equal to or less than the LTOP arming temperature, or in Mode 5, because LTOP is provided by the PORVs. Overpressure protection is not required in Mode 6 with the reactor vessel head closure bolts fully de-tensioned.

The proposed change would allow PSV loop seal temperatures to be less than the lower design temperature during plant heatup and cooldown in Mode 3, and in Mode 4 when any RCS cold leg temperature is greater than the LTOP arming temperature specified in the PTLR, provided at

least one Class 1 PORV is available and capable of providing automatic pressure relief. The only planned activity that would remove a PORV from service in Modes 3 and 4 is a functional test following transition from the LTOP mode of operation, to the normal mode of operation in Mode 4. However, this test contains a precaution that only one PORV be tested at a time. The test closes the block valve, manually strokes the PORV, then reopens the block valve. Additionally, the test is accomplished in a very short period of time. In Mode 3 all PORVs are required to be operable.

The effect of low loop seal water temperatures is of concern only if the PSVs lift. For the PSVs to lift, there needs to be a significant heat (power) input or mass increase to the RCS. The following events were evaluated for the potential to challenge the PSVs (if the PORVs fail to relieve pressure) in Modes 3 and 4:

- Steam line break
- Steam generator tube rupture (SGTR)
- Loss of main feedwater
- Spurious operation of the SI system
- Inadvertent closure of one main steam isolation valve (MSIV)
- Inadvertent closure of all MSIVs
- Uncontrolled rod cluster control assembly withdrawal
- Uncontrolled boron dilution

Events that do not result in an SI actuation cannot cause the RCS mass to increase. These events can only increase the RCS pressure due to a heat input that causes thermal expansion of the RCS liquid. These heat input events are: uncontrolled rod cluster control assembly withdrawal, uncontrolled boron dilution, loss of feedwater, and inadvertent closure of one or all MSIVs. In Modes 3 and 4, the potential heat input into the RCS is significantly reduced and the secondary liquid mass and heat capacity are greatly increased. Therefore, these events generate relatively minor RCS overpressure conditions, which are well within the relief capability of a single PORV.

A steam line break, SGTR, or a spurious operation of the SI system also could result in an SI and a resultant mass increase into the RCS. These events require SI termination to limit the RCS overpressure condition. The evaluation discussed in the previous section demonstrates that the PORV relief capacity is adequate for mitigating the limiting Mode 1 spurious operation of the SI system at power event, in which the core decay heat and injection flow are both maximized. Therefore, the PORVs can mitigate the less limiting mass increase events in Modes 3 and 4.

Based on the above, PG&E believes there is reasonable assurance that the health and safety of the public will not be adversely affected by allowing a plant heatup or cooldown to continue with the PSV loop seal temperature below the lower design limit provided at least one Class 1 PORV is available and capable of automatic pressure relief.

5.0 REGULATORY ANALYSIS

5.1. No Significant Hazards Consideration

PG&E has evaluated whether or not a significant hazards consideration is involved with the proposed amendment(s), by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. *Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?*

Response: No.

Part of the instrumentation for automatic control of the Class 1 power operated relief valves (PORVs) during power operation is Instrument Class II. The automatic actuation circuitry will be upgraded to eliminate the Class II actuation circuitry, by providing output from the reactor protection system directly to the Class 1 PORVs. This upgrade does not adversely affect the ability of the Class 1 PORVs to function to mitigate a reactor coolant system (RCS) overpressure condition, and would not increase the probability of a spurious opening of a PORV.

The spurious operation of the safety injection (SI) system at power event is analyzed to assure that the RCS pressure limits are not exceeded, and that the departure from nucleate boiling ratio (DNBR) limits are met. The event is discussed in Final Safety Analysis Report (FSAR) Update Section 15.2.15. The current pressurizer overfill analysis takes credit for operation of the pressurizer safety valves (PSVs) to relieve a RCS overpressure condition. No credit is taken in the current analysis for automatic operation of the PORVs, which function to limit undesirable opening of the PSVs, since part of the automatic actuation circuitry is currently Instrument Class II. The current analysis that verifies that the DNBR limits are met remains bounding and was not reanalyzed.

The spurious operation of the SI system at power event was reanalyzed for pressurizer overfill using a RETRAN02/Mod005.2 computer code model of Diablo Canyon Power Plant. The analysis credits for automatic actuation of upgraded Class 1 PORVs to prevent water relief from the

PSVs. Use of the Class 1 PORVs to perform any new safety related function would be evaluated in accordance with 10 CFR 50.59.

The RETRAN analysis demonstrates that the Class 1 PORVs can be expected to mitigate the consequences of a spurious operation of the SI system at power event, and that there is sufficient time for the operators to take action and open a PORV block valve(s) if closed.

Crediting the PORVs in the pressurizer overfill case for the spurious operation of the SI system at power event does not increase the probability of the occurrence of the transient since the automatic opening of the PORVs for RCS pressure control is not an initiator for the event. This change allows for the acceptance criteria to be met for the spurious operation of the SI system at power event, ensuring that the consequences of this event remain within acceptable levels.

The probability of a spurious operation of the SI system at power event is not affected by this proposed change and the above analysis demonstrates that the PORVs will adequately function in the automatic mode to mitigate the consequences of the transient. As such, there are no changes in the type or amount of any effluent released offsite as a result of this change.

The proposed change would allow the PSV loop seal temperatures to be less than the lower design temperature during plant heatup and cooldown in Mode 3, and in Mode 4 when any RCS cold leg temperature is greater than the low temperature overpressure protection (LTOP) arming temperature specified in the pressure temperature limits report (PTLR), provided at least one Class 1 PORV is available and capable of providing automatic pressure relief. An evaluation of the applicable events in these modes indicates one Class 1 PORV is capable of preventing water relief from the PSVs and maintaining the reactor coolant pressure below 110 percent of its design value.

Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. *Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?*

Response: No

The proposed changes would allow for automatic actuation of the Class 1 PORVs to be credited instead of the PSVs for the spurious operation of the SI system at power event. The proposed changes also allow the PSV

loop seal temperatures to be less than the lower design temperature during plant heatup and cooldown in Mode 3, and in Mode 4 when any RCS cold leg temperature is greater than the LTOP arming temperature specified in the PTLR, provided at least one Class 1 PORV is available and capable of providing automatic pressure relief. Operation of the PORVs would prevent water relief from the PSVs, reducing the potential for a PSV not to properly reseat, and keep reactor coolant pressure below 110 percent of its design value. No new system interactions have been created, such that there is no increase in the possibility of a new or different kind of accident.

Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. *Does the change involve a significant reduction in a margin of safety?*

Response: No.

The proposed changes would allow for automatic actuation of the Class 1 PORVs to be credited instead of the PSVs for the spurious operation of the SI system at power event. The proposed changes allow the PSV loop seal temperatures to be less than the lower design temperature during plant heatup and cooldown in Mode 3, and in Mode 4 when any RCS cold leg temperature is greater than the LTOP arming temperature specified in the PTLR, provided at least one Class 1 PORV is available and capable of providing automatic pressure relief.

The spurious operation of the SI system at power event is analyzed to assure that the RCS pressure limits are not exceeded, and that the DNBR limits are met. The current pressurizer overfill analysis takes credit for operation of the PSVs to relieve a RCS overpressure condition. No credit is taken in the current analysis for automatic operation of the PORVs, since part of the PORV automatic actuation circuitry is currently Instrument Class II. Since the PORV function would limit undesirable opening of the PSVs, the automatic actuation circuitry will be upgraded so that the PORVs can be credited for accident mitigation. This change would specifically allow for automatic actuation of the upgraded Class 1 PORVs to be credited instead of the PSVs in the accident analysis for the pressurizer overfill case.

A reanalysis for pressurizer overfill takes credit for the upgraded PORVs and shows that they can be expected to mitigate the consequences of a spurious operation of the SI system at power event, and that there is sufficient time for the operators to take action and open a PORV block

valve(s) if closed. The current DNBR analysis remains bounding and was not reanalyzed.

The Class 1 PORVs will actuate to prevent water relief from the PSVs and keep reactor coolant pressure below 110 percent of its design value for a spurious operation of the SI system at power event. The conservative acceptance criteria for the current FSAR Update design analysis will continue to be met, and the margins of safety established in previous accident and transient analysis are not altered. The Class 1 PORVs will also provide overpressure protection during the period when the PSV loop seal temperature is less than the design limit.

Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

Based on the above, PG&E concludes that the proposed amendments present no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

General Design Criterion 10 - Reactor design. *The reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences.*

General Design Criterion 15 - Reactor coolant system design. *The reactor coolant system and associated auxiliary, control, and protection systems shall be designed with sufficient margin to assure that the design conditions of the reactor coolant pressure boundary are not exceeded during any condition of normal operation, including anticipated operational occurrences.*

As discussed in FSAR Update Section 15.2.15, the spurious operation of the SI system at power event is analyzed to assure that the RCS pressure limits are not exceeded, and that the DNBR limits are met. The current analysis that verifies the DNBR limits are met remains bounding and is not impacted by the proposed changes.

The pressurizer overfill reanalysis demonstrated that the upgraded PORVs can prevent water relief from the PSVs, and keep reactor coolant pressure below 110 percent of its design value. It also showed that there

is sufficient time for the operators to take action and open a closed PORV block valve(s) to ensure at least one PORV is available.

Based on the above, the applicable regulatory requirements/criteria continue to be met.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in accordance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

PG&E has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve: (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7.0 REFERENCES

7.1 PG&E Letter DCL-99-006, "Licensee Event Report 2-1998-006-00, "Technical Specification 3.4.2.2 Not Met Due to Pressurizer Safety Valves Low Loop Seal Temperatures," dated January 19, 1999.

7.2 PG&E Letter DCL-99-087, "Licensee Event Report 2-1998-006-01, "Technical Specification 3.4.2.2 Not Met Due to Pressurizer Safety Valves Low Loop Seal Temperatures," dated July 23, 1999.

7.3 PG&E Letter DCL-99-071, "License Amendment Request (LAR) 99-01, Unreviewed Safety Question – Spurious Operation of the Safety Injection System at Power," dated May 21, 1999.

7.4 PG&E Letter DCL-99-0161, "Withdrawal of License Amendment Request 99-01, Unreviewed Safety Question – Spurious Operation of the Safety Injection System at Power," dated December 31, 1999.

7.5 PG&E Letter DCL-98-023, Licensee Event Report 1-98-001, "Reactor Coolant System Outside Design Basis for Inadvertent Emergency Core Cooling System Actuation at Power Due to Non-Conservative Assumptions for Pressurizer Safety Valve Operation," dated February 23, 1998

7.6 License Amendment 137 to Facility Operating License NPF-30 for the Calloway Plant, Unit 1, dated September 25, 2000.

Table 1 – Sequence of Events – Pressurizer Overfill Analysis

Analysis	Action	Time (secs)
Case 1	Reactor trip/ safety injection	1
	Pressurizer fills	517
	PSV opens	580
	PSV potentially challenged (fourth liquid relief)	726
Case 2	Reactor trip/ safety injection	1
	Pressurizer fills	517
	PORV opens	529
	Transient terminated	1560
Case 3	Reactor trip/ safety injection	1
	PORV opens	63
	Pressurizer fills	778
	Transient terminated	1560

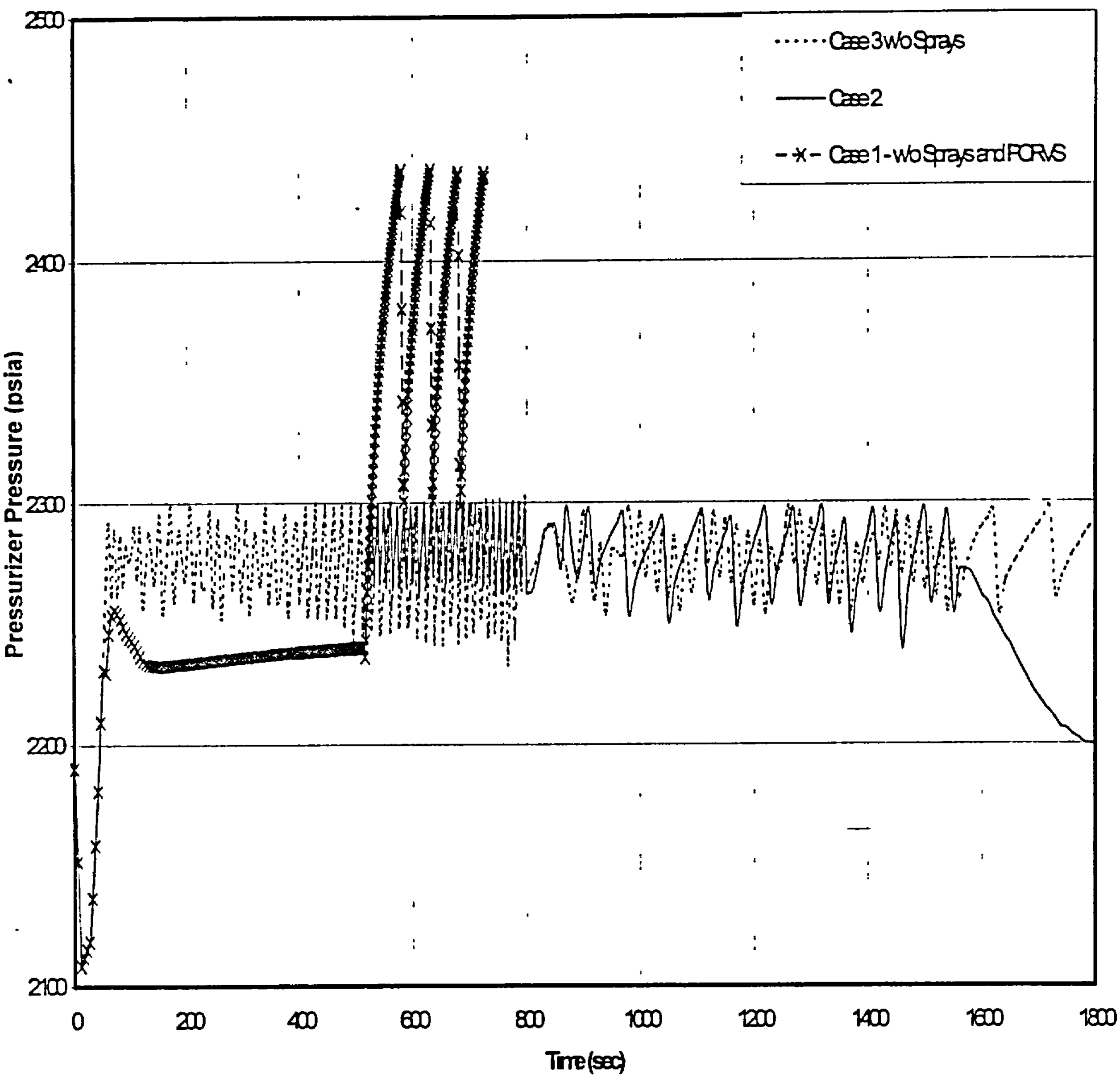


Figure 2: Pressurizer Overfill Analysis – Pressurizer Pressure

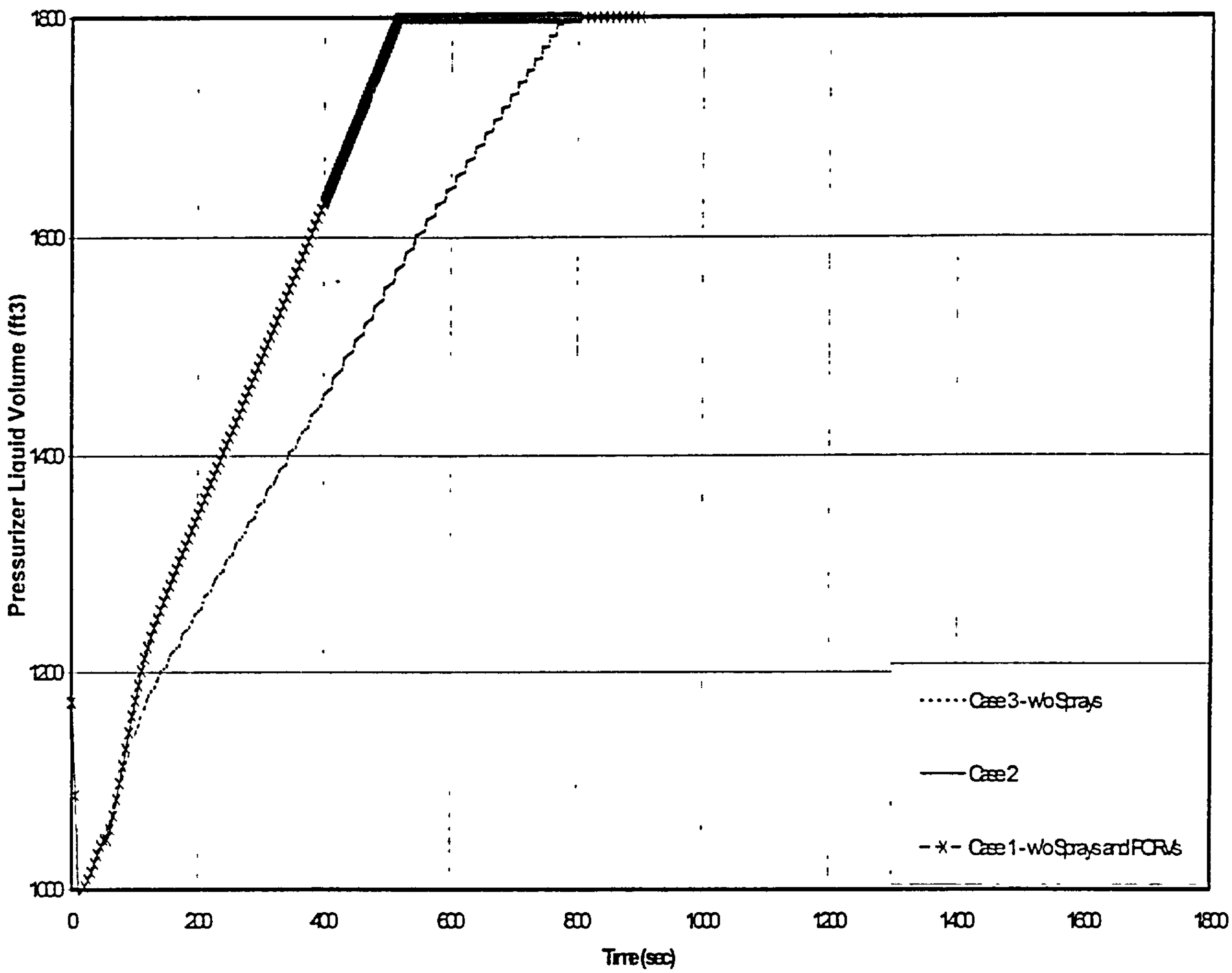


Figure 3: Pressurizer Overfill Analysis – Pressurizer Liquid Volume

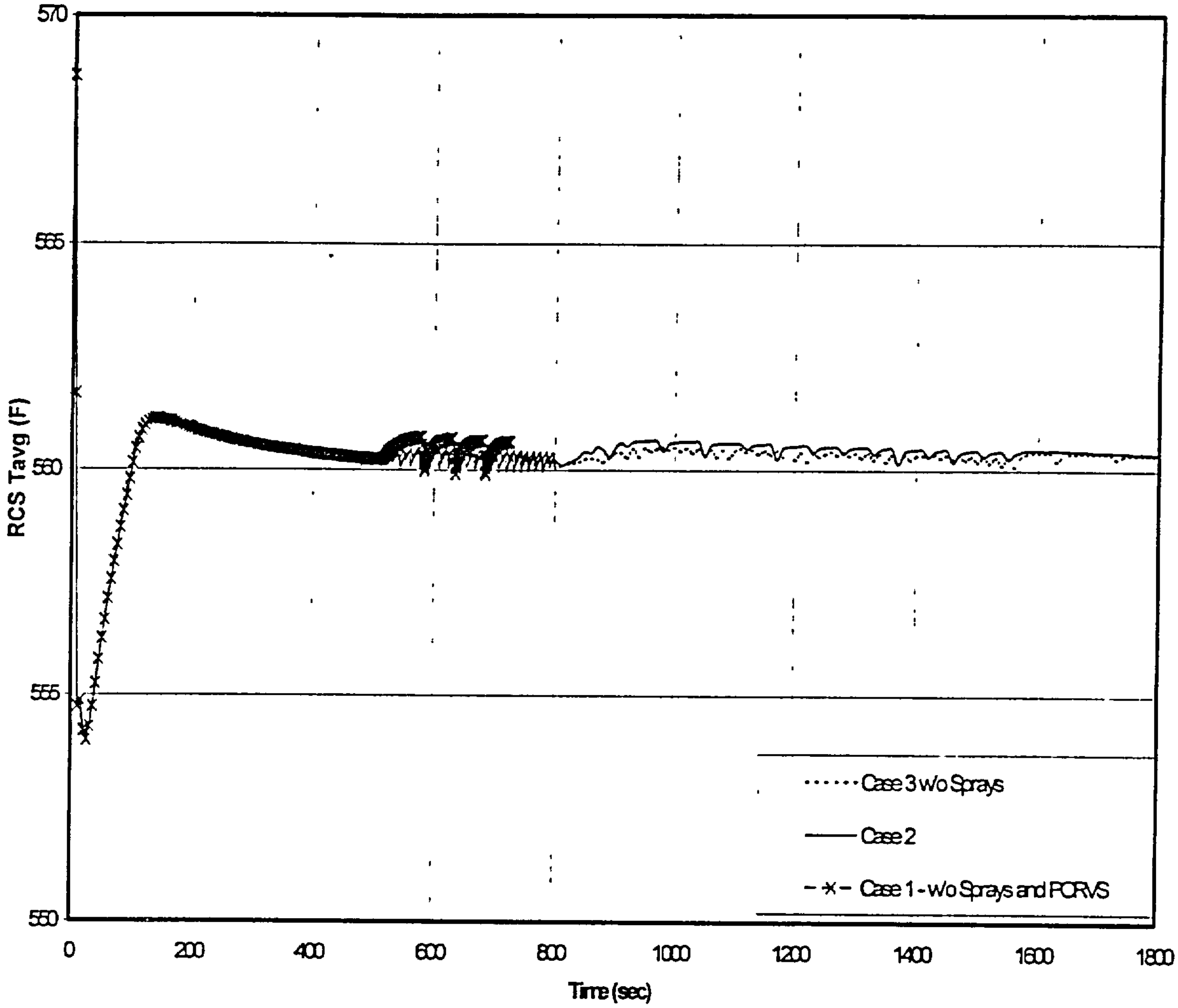


Figure 4: Pressurizer Overfill Analysis – RCS Average Temperature

Proposed Technical Specification Pages (mark-up)

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.10 Pressurizer Safety Valves

LCO 3.4.10 Three pressurizer safety valves shall be OPERABLE with lift settings $\geq$ 2460 psig and $\leq$ 2510 psig.

APPLICABILITY: MODES 1, 2, and 3,
MODE 4 with all RCS cold leg temperatures > Low Temperature Overpressure Protection (LTOP) arming temperature specified in the PTLR.

-----NOTES-----

1. The lift settings are not required to be within the LCO limits during MODES 3 and 4 for the purpose of setting the pressurizer safety valves under ambient (hot) conditions. This exception is allowed for 54 hours following entry into MODE 3 provided a preliminary cold setting was made prior to heatup.

INSERT 1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A One pressurizer safety valve inoperable.	A.1 Restore valve to OPERABLE status.	15 minutes
B. Required Action and associated Completion Time not met. OR Two or more pressurizer safety valves inoperable.	B.1 Be in MODE 3. AND B.2 Be in MODE 4 with any RCS cold leg temperatures $\leq$ LTOP arming temperature specified in the PTLR.	6 hours 12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.10.1	Verify each pressurizer safety valve is OPERABLE in accordance with the Inservice Testing Program. Following testing, lift settings shall be within ± 1%.	In accordance with the Inservice Testing Program

INSERT 1

2. The pressurizer safety valve loop seal temperature may be less than the lower design limit during plant heatup and cooldown in MODE 3, and in MODE 4 when any RCS cold leg temperature is > LTOP arming temperature specified in the PTLR, provided at least one Class I PORV is available and capable of providing automatic pressure relief.

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.11 Pressurizer Power Operated Relief Valves (PORVs)

LCO 3.4.11 Each PORV and associated block valve shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

-----NOTES-----

1. Separate Condition entry is allowed for each PORV.
2. LCO 3.0.4 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more PORVs inoperable ~~and capable of being manually cycled.~~ solely due to excessive seat leakage	A.1 Close and maintain power to associated block valve.	1 hour
B. One PORV inoperable ~~and not capable of being manually cycled.~~ for reasons other than excessive seat leakage.	B.1 Close associated block valve. AND B.2 Remove power from associated block valve. AND B.3 Restore the Class I PORV to OPERABLE status.	1 hour 1 hour 72 hours
C. One block valve inoperable.	-----NOTE----- Required Actions do not apply when block valve is inoperable solely as result of complying with Required Actions B.2 or E.3. ---------- C.1 Place associated PORV in manual control. AND	1 hour

(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. (continued)	C.2	If the block valve is associated with a Class I PORV: Restore block valve to OPERABLE status.	72 hours
		<u>OR</u>	
	C.3	If the block valve is associated with the non-Class I PORV: Close the block valve and remove its power.	72 hours
D. Required Action and associated Completion Time of Condition A, B, or C not met.	D.1	Initiate action to restore Class I PORV and/or associated block valves(s) to OPERABLE status.	Immediately
	<u>AND</u>		
	D.2	Be in MODE 3.	6 hours
	<u>AND</u>		
	D.3	Be in MODE 4.	12 hours
E. Two Class I PORVs inoperable ~~and not capable of being manually cycled~~. for reasons other than excessive seat leakage.	E.1	Initiate action to restore Class I PORVs to OPERABLE status.	Immediately
	<u>AND</u>		
	E.2	Close associated block valves.	1 hour
	<u>AND</u>		
	E.3	Remove power from associated block valves.	1 hour
	<u>AND</u>		
	E.4	Be in MODE 3.	6 hours
	<u>AND</u>		
	E.5	Be in MODE 4.	12 hours

(continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.11.1	-------------------------NOTE------------------------- Not required to be performed with block valve closed in accordance with the Required Actions of this LCO. --- Perform a complete cycle of each block valve.	92 days
SR 3.4.11.2	-------------------------NOTE------------------------- Required to be performed during MODES 3 or 4. --- Perform a complete cycle of each PORV.	In accordance with the IST Plan.
SR 3.4.11.3	Demonstrate OPERABILITY of the safety related nitrogen supply for the Class I PORVs.	24 months
~~SR 3.4.11.4~~	~~Not Used~~	

INSERT 2

INSERT 2

SR 3.4.11.4	Perform a COT on each required Class 1 PORV, excluding actuation.	92 days
SR 3.4.11.5	Perform CHANNEL CALIBRATION for each required Class 1 PORV actuation channel.	24 months

Proposed Technical Specification Pages (retyped)

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.10 Pressurizer Safety Valves

LCO 3.4.10 Three pressurizer safety valves shall be OPERABLE with lift settings ≥ 2460 psig and ≤ 2510 psig.

APPLICABILITY: MODES 1, 2, and 3,
MODE 4 with all RCS cold leg temperatures > Low Temperature Overpressure Protection (LTOP) arming temperature specified in the PTLR.

-----------------------------------NOTES-----------------------------------

1. The lift settings are not required to be within the LCO limits during MODES 3 and 4 for the purpose of setting the pressurizer safety valves under ambient (hot) conditions. This exception is allowed for 54 hours following entry into MODE 3 provided a preliminary cold setting was made prior to heatup.

2. The pressurizer safety valve loop seal temperature may be less than the lower design limit during plant heatup and cooldown in MODE 3, and in MODE 4 when any RCS cold leg temperature is > LTOP arming temperature specified in the PTLR, provided at least one Class 1 PORV is available and capable of providing automatic pressure relief.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One pressurizer safety valve inoperable.	A.1 Restore valve to OPERABLE status.	15 minutes
B. Required Action and associated Completion Time not met. OR Two or more pressurizer safety valves inoperable.	B.1 Be in MODE 3. AND B.2 Be in MODE 4 with any RCS cold leg temperatures ≤ LTOP arming temperature specified in the PTLR.	6 hours 12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.10.1	Verify each pressurizer safety valve is OPERABLE in accordance with the Inservice Testing Program. Following testing, lift settings shall be within ± 1%.	In accordance with the Inservice Testing Program

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.11 Pressurizer Power Operated Relief Valves (PORVs)

LCO 3.4.11 Each PORV and associated block valve shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

------------------------------------NOTES------------------------------------

1. Separate Condition entry is allowed for each PORV.
2 LCO 3.0.4 is not applicable.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more PORVs inoperable solely due to excessive seat leakage.	A.1	Close and maintain power to associated block valve.	1 hour
B. One PORV inoperable for reasons other than excessive seat leakage.	B.1	Close associated block valve.	1 hour
	<u>AND</u>		
	B.2	Remove power from associated block valve.	1 hour
	<u>AND</u>		
	B.3	Restore the Class I PORV to OPERABLE status.	72 hours
C. One block valve inoperable.	--------------NOTE-------------- Required Actions do not apply when block valve is inoperable solely as result of complying with Required Actions B.2 or E.3. ------------------------------------		1 hour
	C.1	Place associated PORV in manual control.	
	<u>AND</u>		(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. (continued)	C.2	If the block valve is associated with a Class I PORV: Restore block valve to OPERABLE status.	72 hours
		<u>OR</u>	
	C.3	If the block valve is associated with the non-Class I PORV: Close the block valve and remove its power.	72 hours
D. Required Action and associated Completion Time of Condition A, B, or C not met	D.1	Initiate action to restore Class I PORV and/or associated block valves(s) to OPERABLE status.	Immediately
	<u>AND</u>		
	D.2	Be in MODE 3.	6 hours
	<u>AND</u>		
	D.3	Be in MODE 4.	12 hours
E. Two Class I PORVs inoperable for reasons other than excessive seat leakage.	E.1	Initiate action to restore Class I PORVs to OPERABLE status.	Immediately
	<u>AND</u>		
	E.2	Close associated block valves.	1 hour
	<u>AND</u>		
	E.3	Remove power from associated block valves.	1 hour
	<u>AND</u>		
	E.4	Be in MODE 3.	6 hours
	<u>AND</u>		
	E.5	Be in MODE 4.	12 hours

(continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.11.1	---------------------------NOTE--------------------------- Not required to be performed with block valve closed in accordance with the Required Actions of this LCO. -- Perform a complete cycle of each block valve.	92 days
SR 3.4.11.2	---------------------------NOTE--------------------------- Required to be performed during MODES 3 or 4. -- Perform a complete cycle of each PORV.	In accordance with the IST Plan.
SR 3.4.11.3	Demonstrate OPERABILITY of the safety related nitrogen supply for the Class I PORVs.	24 months
SR 3.4.11.4	Perform a COT on each required Class 1 PORV, excluding actuation.	92 days
SR 3.4.11.5	Perform CHANNEL CALIBRATION for each required Class 1 PORV actuation channel.	24 months

Changes to Technical Specification Bases Pages (mark-up)

(For Information Only)

BASES (continued)

APPLICABILITY

In MODES 1, 2, and 3, and portions of MODE 4 above the LTOP arming temperature, OPERABILITY of three valves is required because the combined capacity is required to keep reactor coolant pressure below 110% of its design value during certain accidents. MODE 3 and portions of MODE 4 are conservatively included, although the listed accidents may not require the safety valves for protection.

The LCO is not applicable in MODE 4 when any RCS cold leg temperature is ≤ LTOP arming temperature specified in the PTLR, or in MODE 5 because LTOP is provided. Overpressure protection is not required in MODE 6 with reactor vessel head closure bolts fully de-tensioned.

The Note allows entry into MODES 3 and 4 with the lift settings outside the LCO limits. This permits testing and examination of the safety valves at high pressure and temperature near their normal operating range, but only after the valves have had a preliminary cold setting. The cold setting gives assurance that the valves are OPERABLE near their design condition. Only one valve at a time will be removed from service for testing. The 54 hour exception is based on 18 hour outage time for each of the three valves. The 18 hour period is derived from operating experience that hot testing can be performed in this time frame.

INSERT 1

ACTIONS

A.1

With one pressurizer safety valve inoperable, restoration must take place within 15 minutes. The Completion Time of 15 minutes reflects the importance of maintaining the RCS Overpressure Protection System. An inoperable safety valve coincident with an RCS overpressure event could challenge the integrity of the pressure boundary.

B.1 and B.2

If the Required Action of A.1 cannot be met within the required Completion Time or if two or more pressurizer safety valves are inoperable, the plant must be brought to a MODE in which the requirement does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 4 with any RCS cold leg temperatures ≤ LTOP arming temperature specified in the PTLR within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. With any RCS cold leg temperature at or

(continued)

INSERT BASES 1

The pressurizer safety valve loop seal temperature may be less than the lower design limit during plant heatup and cooldown in Mode 3, and in Mode 4 when any RCS cold leg temperature is greater than the LTOP arming temperature specified in the PTLR, provided at least one Class I PORV is available and capable of providing automatic pressure relief. The PORVs will minimize challenges to the pressurizer safety valves and act to mitigate accidents in those modes that could result in overpressurization of the RCS.

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.11 Pressurizer Power Operated Relief Valves (PORVs)

BASES

BACKGROUND

The pressurizer is equipped with two types of devices for pressure relief: pressurizer safety valves and PORVs. The PORVs are air operated valves that are controlled to open when the pressurizer pressure increases above their actuation setpoint and to close when the pressurizer pressure decreases. The PORVs may also be manually operated from the control room.

DCPP design includes three air operated pressurizer PORVs. Two of these PORVs have been designated as "Class I". These two valves provide the reactor vessel low temperature overpressure protection, ~~and they~~ provide the means to depressurize the RCS following a steam generator tube rupture (SGTR). These functions must be accomplished under accident analyses assumptions such as loss of offsite power. Consequently, a Class I nitrogen backup system to the non-safety related air supply is provided for the two Class I PORVs. The identification of Class I is used to make a distinction between these two PORVs that must provide a safety-related function as opposed to the third remaining PORV that is designated as non-Class I. TS 3.4.12 for LTOP applies to the two Class I PORVs but not to the non-Class I PORV. INSERT 2

The non-Class I PORV is an element of the DCPP design for 100% load rejection without reactor trip. This valve is associated with plant transients as compared to accident mitigation. Although mitigation is not its primary purpose, the valve may be used for those functions also, although not credited for operation.

The three PORVs are the same design. The PORV that is not designated as Class I may be used, when instrument air is available, to control RCS pressure similarly to the Class I PORVs. However, two Class 1 PORVs satisfy the function, with redundancy, therefore continued operation with the non-Class I PORV unavailable for RCS pressure control is allowed as long as the block valve or PORV can be closed to maintain the RCS pressure boundary. However, the plant capability to sustain a 100% load rejection without reactor trip would be compromised.

Block valves, which are normally open, are located between the pressurizer and the PORVs. The three MOV block valves are the same design. The block valves are used to isolate the PORVs in case of excessive seat leakage or a stuck open PORV. Block valve closure is accomplished manually using controls in the control room. A stuck

(continued)

INSERT BASES 2

Mitigate the consequences of a spurious operation of the safety injection system at power event, and

BASES

BACKGROUND (continued)

open PORV is, in effect, a small break loss of coolant accident (LOCA). As such, block valve closure terminates the RCS depressurization and coolant inventory loss.

The PORVs may be manually cycled and are equipped with circuitry for automatic actuation. ~~No credit is taken for PORV automatic actuation in the FSAR analyses for MODE 1, 2 or 3 transients where PORV operation may have a beneficial effect. Therefore, the PORVs may be OPERABLE in either manual operation or the automatic mode.~~ The automatic mode is the preferred configuration, as this provides pressure relieving capability without reliance on operator action.

The PORVs and their associated block valves may be used by plant operators to depressurize the RCS to recover from certain transients if normal pressurizer spray is not available. Additionally, the series arrangement of the PORVs and their block valves permits performance of surveillances on the block valves during power operation.

The PORVs may also be used for feed and bleed core cooling in the case of multiple equipment failure events that are not within the design basis, such as a total loss of feedwater.

The PORVs, their block valves, and their controls are powered from the vital buses that normally receive power from offsite power sources, but are also capable of being powered from emergency power sources in the event of a loss of offsite power. The PORV block valves are all powered from separate vital busses.

The plant has three PORVs, each having a relief capacity of 210,000 lb/hr at 2335 psig. The functional design of the PORVs is based on maintaining pressure below the Pressurizer Pressure - High reactor trip setpoint up to and including the design step-load decrease. In addition, the PORVs minimize challenges to the pressurizer safety valves and the two Class I PORVs are used for low temperature overpressure protection (LTOP). See LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System."

APPLICABLE SAFETY ANALYSES

Plant operators employ the PORVs to depressurize the RCS in response to certain plant transients if normal or auxiliary pressurizer spray is not available. For the Steam Generator Tube Rupture (SGTR) event, the safety analysis assumes manual operator actions to mitigate the event. A loss of offsite power is assumed to accompany the event, and thus, normal pressurizer spray is unavailable to reduce RCS pressure. For the SGTR event, the PORVs are assumed to be used for RCS depressurization, which is one of the steps performed to equalize the primary and secondary pressures in order to terminate the

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

primary to secondary break flow and the radioactive releases from the affected steam generator.

~~Automatic actuation of the PORVs is not assumed in any design basis accidents during MODES 1, 2, and 3.~~ INSERT 3

Pressurizer PORVs satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The LCO requires the PORVs and their associated block valves to be OPERABLE ~~for manual~~ operation to mitigate the effects associated with an SGTR. INSERT 4

INSERT 5

By maintaining the PORVs and their associated block valves OPERABLE, the single failure criterion is satisfied. The block valves are available to isolate the flow path through either a failed open PORV or a PORV with excessive seat leakage. Satisfying the LCO helps minimize challenges to fission product barriers. ~~Note, however, that operability of the PORVs (as indicated by the surveillances) only requires that the PORVs be capable of being manually cycled to perform their safety function and that they need not be capable of automatic actuation since that is not a safety function.~~

APPLICABILITY

In MODES 1, 2, and 3, the PORVs are required to be OPERABLE to mitigate a SGTR and spurious operation of the safety injection system at power event and the block valves are required to be OPERABLE to limit the potential for a small break LOCA through the flow path. The most likely cause for a PORV small break LOCA is a result of a pressure increase transient that causes the PORV to open. Imbalances in the energy output of the core and heat removal by the secondary system can cause the RCS pressure to increase to the PORV opening setpoint. The most rapid increases will occur at the higher operating power and pressure conditions of MODES 1 and 2. PORV OPERABILITY in MODES 1, 2, and 3 will also minimize challenges to the pressurizer safety valves.

Pressure increases are less prominent in MODE 3 because the core input energy is reduced, but the RCS pressure is high. Therefore, the LCO is applicable in MODES 1, 2, and 3. OPERABILITY of the PORVs requires them to be capable of both manual and automatic operation. ~~Automatic operation is not assumed in accident analyses and therefore is not a required safety function. LCO 3.4.11 is not applicable in MODE 4 when both pressure and core energy are decreased and the pressure surges become much less significant.~~ The PORV setpoint is reduced for LTOP in MODES 4, 5, and 6 with the reactor vessel head in place and the reactor vessel head closure bolts not fully de-tensioned. LCO 3.4.12 addresses the PORV requirements in these MODES.

(continued)

INSERT BASES 3

For the spurious operation of the safety injection system at power event (a Condition II event), the safety analysis credits operator actions from the main control room to terminate flow from the charging pump(s) and to open a PORV block valve (assumed to be initially closed) and assure the availability of at least one PORV for automatic pressure relief. Analysis results indicate that water relief through the pressurizer safety valves, which could result in a Condition II event degrading into a Condition III event if the safety valves do not reseat, is precluded if operator actions are taken within the times assumed in the analysis to assure at least one PORV is available for automatic pressure relief and to reduce charging pump flow. The assumed operator action times conservatively bound the times measured during simulator exercises. Therefore, automatic PORV operation is an assumed safety function in MODES 1, 2, and 3. The PORVs are equipped with automatic actuation circuitry and manual control capability. The PORVs are considered OPERABLE in either the automatic or manual mode, as long as the automatic actuation circuitry is OPERABLE and the PORVs can be made available for automatic pressure relief by timely operator actions to open the associated block valves (if closed) and assure the PORV handswitches are in the automatic position. The automatic mode is the preferred configuration, as this provides the required pressure relieving capability without reliance on operator action.

INSERT BASES 4

This LCO also requires the PORVs and their automatic actuation circuitry to be OPERABLE, in conjunction with the capability to manually open their associated block valves and assure the availability of the PORVs for automatic pressure relief, to mitigate the effects associated with the spurious operation of the safety injection system at power event. The PORVs are considered OPERABLE in the automatic or manual mode, as long as the automatic actuation circuitry is OPERABLE and the PORVs can be made available for automatic pressure relief by timely operator actions to open the associated block valves (if closed) and assure the PORV handswitches are in the automatic position. The automatic mode is the preferred configuration, as this provides the required pressure relieving capability with reliance on operator actions.

INSERT BASES 5

An OPERABLE block valve may be either open and energized, or closed and energized, with the capability to be cycled, since the required safety functions of the block valve are accomplished by manual operation to cycle the block valve. Although typically open to allow PORV operation, the block valve may be OPERABLE when closed to isolate the flow path of an inoperable PORV because of excessive seat leakage. Isolation of an OPERABLE PORV does not render that PORV or block valve inoperable, provided the automatic pressure relief function remains available with timely operator actions to open the associated block valve, if closed, and assure the PORV handswitch is in the automatic position.

BASES (continued)

ACTIONS

Note 1 has been added to clarify that all pressurizer PORVs are treated as separate entities, each with separate Completion Times (i.e., the Completion Time is on a component basis). The exception for LCO 3.0.4, Note 2, permits entry into MODES 1, 2, and 3 to perform cycling of the PORVs or block valves to verify their OPERABLE status, in the event that testing was not satisfactorily performed in lower MODES.

of automatic pressure relief or capable

A.1

PORVs may be inoperable and capable of being manually cycled, (e.g., excessive seat leakage). In this condition, either the PORVs must be restored or the flow path isolated within 1 hour. The associated block valves is required to be closed but power must be maintained to the associated block valves, since removal of power would render the block valve inoperable. ~~No credit is given for automatic PORV operation in Reference 2 analyses for MODE 1, 2, and 3 transients. As such, the PORVs are considered OPERABLE in either manual control or in the automatic mode. Although a PORV may be designated inoperable, it may be able to be manually opened and closed, and therefore, able to perform its function. PORV isolation may be necessary due to seat leakage, instrumentation problems, automatic control problems, or other causes that do not prevent manual use and do not create a possibility for a small break LOCA.~~ For these reasons, the block valve may be closed but the ACTION requires power be maintained to the valve. This Condition is only intended to permit operation of the plant for a limited period of time not to ~~exceed~~ the next refueling outage (MODE 6) so that maintenance can be performed on the PORVs to eliminate the problem condition. Normally, the PORVs should be available for automatic mitigation of overpressure events and should be returned to OPERABLE and automatic actuation status prior to entering startup (MODE 2).

INSERT 6

extend beyond

Quick access to the PORV for pressure control can be made when power remains on the closed block valve. The Completion Time of 1 hour is based on plant operating experience that has shown that minor problems can be corrected or closure accomplished in this time period.

B.1, B.2, and B.3

If one PORV is inoperable and not capable of being manually cycled, it must be either restored or isolated by closing the associated block valve and removing the power to the associated block valve. The Completion Time of 1 hour is reasonable, based on challenges to the PORVs during this time period, and provides the operator adequate time to correct the situation.

for Required Actions B.1 and B.2

of automatic pressure relief or not capable

(continued)

INSERT BASES 6

Credit for automatic PORV operation is taken in the safety analysis. However, the PORVs are considered OPERABLE in either the manual or automatic mode, as long as the automatic actuation circuitry is OPERABLE and the PORV can be made available for automatic pressure relief by timely operator actions. Although a PORV may be designated inoperable, it may be available for automatic pressure relief and capable of being manually opened and closed, and therefore able to perform its required safety functions. PORV inoperability solely due to excessive seat leakage does not prevent automatic and manual use and does not create the possibility for a small break LOCA.

BASES

ACTIONS

B.1, B.2, and B.3 (continued)

If the inoperable PORV cannot be restored to OPERABLE status, it must be isolated within the specified time. Because at least one Class I PORV remains OPERABLE, an additional 72 hours is provided to restore the inoperable PORV to OPERABLE status if it is Class I. If the valve is the non-Class I PORV, there is no required Completion Time. If the Class I PORV cannot be restored within this additional time, the plant must be brought to a MODE in which the LCO does not apply as required by Condition D.

C.1, C.2, and C.3

If one PORV block valve is inoperable, then it is necessary to either restore the block valve to OPERABLE status within the Completion Time of 1 hour or place the associated PORV in manual control. The PORV control switch has three positions; open, close, and auto. Placing the PORV in manual control, if required in ACTION C, is accomplished by positioning the switch out of the auto control mode. The prime importance for the capability to close the block valve is to isolate a stuck open PORV. Therefore, if the block valve cannot be restored to OPERABLE status within 1 hour, the Required Action is to place the associated PORV in manual control.

This action is taken to avoid the potential for a stuck open PORV if the valve were to open under automatic control at a time that the block valve is inoperable. The Completion Time of 1 hour is reasonable, based on the small potential for challenges to the system during this time period, and provides the operator time to correct the situation. If the inoperable block valve is associated with a Class 1 PORV, the operator is permitted a Completion Time of 72 hours to restore the inoperable block valve to OPERABLE status. The time allowed to restore the Class I PORV block valve is based upon the Completion Time for restoring an inoperable Class I PORV in Condition B, since the PORVs are not capable of mitigating a SGTR or spurious operation of the safety injection system at power event when inoperable ~~and not capable of being manually cycled~~. If the block valve is restored within the Completion Time of 72 hours, the PORV will be transferred to the automatic mode of operation. If the block valve cannot be restored within this additional time, the plant must be brought to a MODE in which the LCO does not apply as required by Condition D.

If the inoperable block valve is associated with the non-Class I PORV, the block valve may be closed and the power removed. The 72 hour Completion Time for closing the block valve is the same applied in Required Action C.2. This recognizes that some restoration work may be required since the block valve is inoperable.

(continued)

BASES

ACTIONS

C.1, C.2, and C.3 (continued)

Restoration of the non-class I PORV block valve to OPERABLE status is not required because the non-Class I PORV is not required is not required to be available, although having the valve closed impairs the load rejection design capability. Therefore, once the block valve has been closed per Required Action C.3, Completion Time requirements of Condition D do not apply.

If the block valve can not be placed in the closed position, per Required Action C.3, Condition D applies and the unit must be taken to MODE 4 until the block valve is restored or closed.

The Required Actions are modified by a Note stating that the Required Actions do not apply if the sole reason for the block valve being declared inoperable is as a result of power being removed to comply with other Required Actions. In this event, the Required Actions for inoperable PORV(s) (which require the block valve power to be removed once it is closed) are adequate to address the condition. While it may be desirable to also place the PORV(s) in manual control, this may not be possible for all causes of Condition B or E entry with PORV(s) inoperable and not capable of bring manually cycled (e.g., as a result of failed control power fuse(s) or control switch malfunction(s)).

D.1, D.2, and D.3

If the Required Action of Condition A, B, or C is not met, then the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 4 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. In MODES 4, 5, and 6 with the reactor vessel head closure bolts not fully de-tensioned, maintaining Class I PORV OPERABILITY is required by LCO 3.4.12.

E.1, E.2, E.3, E.4, and E.5

For reasons other than excessive seat leakage

If more than one Class I PORV is inoperable ~~and not capable of being manually cycled~~, it is necessary to either restore at least one valve, within the Completion Time of 1 hour, or isolate the flow path by closing and removing the power to the associated block valves. The Completion Time of 1 hour is reasonable, based on the small potential for challenges to the system during this time and provides the operator time to correct the situation. If one Class I PORV is restored and one Class I PORV remains inoperable, then the plant will be in Condition B with the time clock started at the original declaration of having two

(continued)

BASES

ACTIONS

F.1, F.2, F.3, and F.4 (continued)

inoperable PORV(s) (which require the block valve power to be removed once it is closed) are adequate to address the condition. ~~While it may be desirable to also place the PORV(s) in manual control, this may not be possible for all causes of Condition B or E entry with PORV(s) inoperable and not capable of bring manually cycled (e.g., as a result of failed control power fuse(s) or control switch malfunction(s)).~~

G.1, G.2 and G.3

If the Required Actions of Condition F are not met, then the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 4 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. In MODES 4, 5, and 6 with the reactor vessel head closure bolts not fully de-tensioned, maintaining Class I PORV OPERABILITY is required by LCO 3.4.12.

SURVEILLANCE REQUIREMENTS

SR 3.4.11.1

Block valve cycling verifies that the valve(s) can be closed if needed. The basis for the Frequency of 92 days is the ASME O & M Code, Part 10 (Ref. 3).

The Note modifies this SR by stating that it is not required to be performed with the block valve closed in accordance with the Required Action of this LCO. Opening the block valve in this condition increases the risk of an unisolable leak from the RCS since the PORV is already inoperable.

SR 3.4.11.2

SR 3.4.11.2 requires a complete cycle of each PORV. Operating a PORV through one complete cycle ensures that the PORV can be manually actuated for mitigation of an SGTR. Operating experience has shown that these valves usually pass the surveillance when performed at the required Inservice Testing Program frequency. The frequency is acceptable form a reliability standpoint.

The Note modifies this SR to allow entry into an operation in Mode 3 prior to performing the SR. This allows the surveillance to be performed in MODE 3 or 4.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.11.2 (continued)

The Note that modified this SR to allow entry into and operation in MODE 3 prior to performing the SR. This allows the test to be performed in MODE 3 under operating temperature and pressure conditions, prior to entering MODE 1 or 2. In accordance with Reference 4, administrative controls require this test be performed in MODE 3 or 4 to adequately simulate operating temperature and pressure effects on PORV operation.

SR 3.4.11.3

Verifying OPERABILITY of the safety related nitrogen supply for the Class I PORVs may be accomplished by:

a. Isolating and venting the normal air supply, and

b. Verifying that any leakage of the Class I backup nitrogen system is within its limits, and

c. Operating the Class I PORVs through one complete cycle of full travel.

Operating the solenoid nitrogen control valves and check valves on the nitrogen supply system and operating the Class I PORVs through one complete cycle of full travel ensures the nitrogen backup supply for the Class I PORV operates properly when called upon. The Frequency of 24 months is based on a typical refueling cycle and the Frequency of the other Surveillances used to demonstrate Class I PORV OPERABILITY.

SR 3.4.11.4

~~Not Used~~ INSERT 7

REFERENCES

1. Not Used.
2. FSAR, Section 15.2.
3. ASME, Code for Operation and Maintenance of Nuclear Power Plants, 1987, with 1988 Addenda, Part 10.
4. Generic Letter 90-06, "Resolution of Generic Issue 70, 'Power-Operated Relief Valve and Block Valve Reliability,' and generic issue 94, 'Additional Low-Temperature Overpressure Protection for Light-Water Reactors,' Pursuant to 10 CFR 50.54(f)," June 25, 1990.

INSERT BASES 7

Performance of a COT is required on each required Class I PORV to verify and, as necessary, adjust its lift setpoint. PORV actuation could depressurize the RCS and is not required.

SR 3.4.11.5

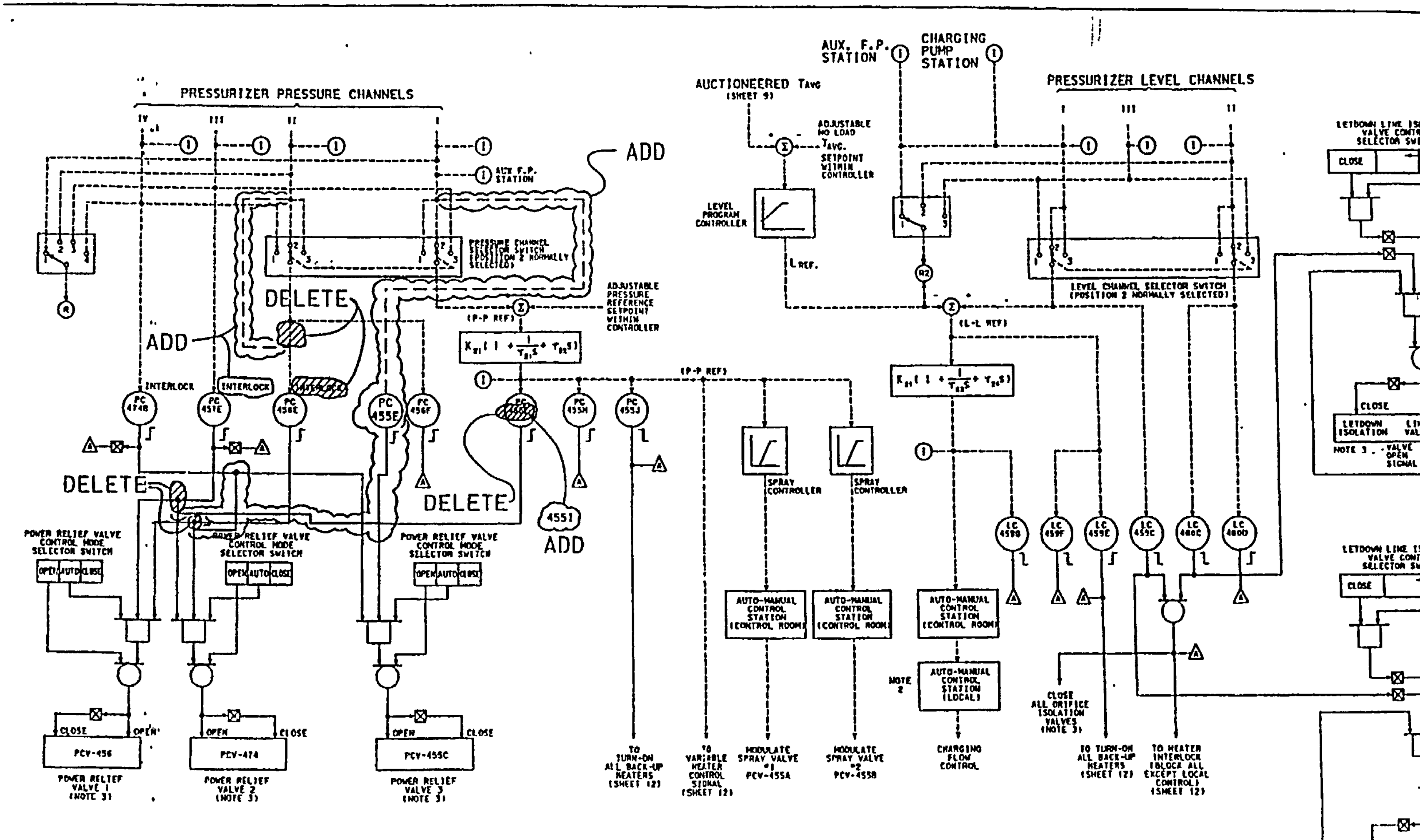
Performance of a CHANNEL CALIBRATION on each required Class I PORV actuation channel is required every 24 months to adjust the whole channel so that it responds and the valve opens within the required range and accuracy to known input.

INSERT BASES 7

Performance of a COT is required on each required Class I PORV to verify and, as necessary, adjust its lift setpoint. PORV actuation could depressurize the RCS and is not required.

SR 3.4.11.5

Performance of a CHANNEL CALIBRATION on each required Class I PORV actuation channel is required every 24 months to adjust the whole channel so that it responds and the valve opens within the required range and accuracy to known input.



DRAWING No. 495851 SHEET No. 1	DCN No. DC1-SJ-049569 REV. No. 0
REV. No. X 1	SHEET No. 27 of 108
PREPARED BY: RFP [signature] DATE: 10/3/01	SKETCH No. SK-495851-1
APPROVED BY: [illegible] DATE: 10-5-01	REV. No. 0 SHEET No. 1 of 1

Figure 1

DCN No. DC1-SJ-049569, Rev 0, Sheet 27 of 108 (typical)