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PG&E Letter DCL-15-107

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

10 CFR 50.90

Diablo Canyon Units 1 and 2
Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82

License Amendment Request 15-07, Revision of Reactor Coolant System Minimum Flow Specified in Technical Specification 3.4.1, "RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits"

Dear Commissioners and Staff:

Pursuant to 10 CFR 50.90, Pacific Gas and Electric Company (PG&E) hereby requests approval of the enclosed proposed amendment to Facility Operating License Numbers DPR-80 and DPR-82 for Units 1 and 2 of the Diablo Canyon Power Plant (DCPP) respectively.

The proposed change is necessary to correct a non-conservative Technical Specification (TS) value for Unit 1. DCPP TS 3.4.1, "RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits," contains the required reactor coolant system (RCS) flows for each unit. The Unit 1 RCS flow specified in TS 3.4.1 Table 3.4.1-1 for 100 percent power is 359,000 gallons per minute (gpm). However, the TS value is less than the 359,200 gpm RCS minimum measured flow (MMF) value specified in the Updated Final Safety Analyses Report (UFSAR) Table 4.1-1, "Reactor Design Comparison." The UFSAR RCS MMF value represents the RCS flow value used in the reactor core DNB safety analyses. This issue has been entered in the DCPP corrective action program and the actual Unit 1 RCS flow value has been verified to be within the limits required by the applicable safety analyses.

In order to resolve this nonconservative TS value, the proposed change would revise the RCS flow requirements in DCPP TS 3.4.1 to be consistent with TS 3.4.1 in NUREG-1431, "Standard Technical Specifications Westinghouse Plants." The proposed change to the RCS flow requirements in TS 3.4.1 would also be consistent with the Nuclear Regulatory Commission (NRC) approved TSTF-339-A, Revision 2, "Relocate TS Parameters to COLR," and NRC approved WCAP-14483-A, "Generic Methodology for Expanded Core Operating Limits Report."

The proposed change would delete the current DCPP Unit 1 and Unit 2 TS 3.4.1 RCS Flow Tables 3.4.1-1 and 3.4.1-2, and would add the DCPP Unit 1 and 2 RCS thermal design flow values of 350,800 gpm and 354,000 gpm, respectively, to the requirements of TS 3.4.1. In addition, the proposed change would add the RCS MMF values of 359,200 gpm and 362,500 gpm to the DCPP Unit 1 and Unit 2 Core Operating Limits Reports (COLR), respectively. Consistent with the standard Westinghouse TS, the proposed change would also include a reference to the RCS COLR flow requirements in the TS 3.4.1 Limiting Condition for Operation and Surveillance Requirements. Due to the elimination of RCS flow Tables 3.4.1-1 and 3.4.1-2, a reference to these tables is also deleted from Figure 2.1.1-1, "Reactor Core Safety Limit."

As such, the proposed change would resolve the nonconservative TS value for Unit 1 and serve to make the DCPP Unit 1 and Unit 2 TS more consistent with the standard TS in NUREG-1431.

The Enclosure provides a detailed description and technical evaluation of the proposed changes, including PG&E's determination that the proposed changes involve no significant hazards.

Attachment 1 provides the markup of the proposed TS change.

Attachment 2 provides a revised version of TS pages.

Attachment 3 provides marked-up TS Bases to reflect the change to TS 3.4.1.

Attachment 4 provides the marked-up COLR pages to reflect the change to TS 3.4.1.

PG&E requests approval of this license amendment request by no later than September 24, 2016. PG&E requests the license amendments be made effective upon NRC issuance, and to be implemented within 120 days from the date of issuance.

PG&E makes no regulatory commitments (as defined by NEI 99-04) in this letter. This letter includes no revisions to existing regulatory commitments.

In accordance with site administrative procedures and the Quality Assurance Program, the proposed amendment has been reviewed by the Plant Staff Review Committee.

Pursuant to 10 CFR 50.91, PG&E is sending a copy of this proposed amendment to the California Department of Public Health.

If you have any questions or require additional information, please contact Hossein Hamzehee at 805-545-4720.

I state under penalty of perjury that the foregoing is true and correct.

Executed on September 16, 2015.

Sincerely,

Barry S. Allen
Vice President, Nuclear Services

kjse/4328/50386872
Enclosure
cc: Diablo Distribution
cc/enc: Marc L. Dapas, NRC Region IV
Thomas R. Hipschman, NRC, Senior Resident Inspector
Siva P. Lingam, NRR Project Manager
Gonzalo L. Perez, Branch Chief, California Department of Public Health

Evaluation of the Proposed Change

License Amendment Request 15-07
Revision of Reactor Coolant System Minimum Flow Specified in Technical Specification 3.4.1, "RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits"

ATTACHMENTS:

1. Technical Specification Pages Markups
2. Revised Technical Specification pages
3. Technical Specification Bases Pages Markups (For Information Only)
4. Core Operating Limit Report Pages Markups (For Information Only)

EVALUATION

1. SUMMARY DESCRIPTION

The proposed change is necessary to correct a nonconservative Unit 1 Technical Specification (TS) value. Diablo Canyon Power Plant (DCPP) TS 3.4.1, "RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits," contains the required reactor coolant system (RCS) flows for each unit. The Unit 1 RCS flow specified in TS 3.4.1 Table 3.4.1-1 for 100 percent power is 359,000 gallons per minute (gpm). However, the TS value is less than the 359,200 gpm RCS minimum measured flow (MMF) value specified in the Updated Final Safety Analyses Report (UFSAR) Table 4.1-1, "Reactor Design Comparison." The UFSAR RCS MMF value represents the RCS flow value used in the reactor core DNB safety analyses. This issue has been entered in the DCPP corrective action program and the actual Unit 1 RCS flow value has been verified to be within the limits required by the applicable safety analyses.

In order to resolve this nonconservative TS value, the proposed change would revise the RCS flow requirements in DCPP TS 3.4.1 "RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits," to be consistent with TS 3.4.1 in NUREG-1431, "Standard Technical Specifications Westinghouse Plants," (Reference 1). The proposed change to the RCS flow requirements in TS 3.4.1 would also be consistent with the Nuclear Regulatory Commission (NRC) approved TSTF-339-A, Revision 2, "Relocate TS Parameters to COLR," (Reference 2) and NRC approved WCAP-14483-A, "Generic Methodology for Expanded Core Operating Limits Report," (Reference 3).

The proposed change would delete the current DCPP Unit 1 and Unit 2 TS 3.4.1 RCS Flow Tables 3.4.1-1 and 3.4.1-2 and would add the DCPP Unit 1 and Unit 2 RCS thermal design flow (TDF) values of 350,800 gpm and 354,000 gpm, respectively, to the requirements of TS 3.4.1. In addition, the proposed change would add the RCS MMF values of 359,200 gpm and 362,500 gpm to the DCPP Unit 1 and Unit 2 Core Operating Limits Reports (COLRs), respectively. Consistent with the standard Westinghouse TS, the proposed change would also include a reference to the COLR RCS flow requirements in the TS 3.4.1 Limiting Condition for Operation (LCO) and Surveillance Requirements (SR). Due to the elimination of RCS flow Tables 3.4.1-1 and 3.4.1-2, a reference to these tables is also deleted from Figure 2.1.1-1, "Reactor Core Safety Limit."

As such, the proposed change would resolve the nonconservative TS value for Unit 1 and serve to make the DCPP Unit 1 and Unit 2 TS more consistent with the standard TS in NUREG-1431.

2. DETAILED DESCRIPTION

Specification 2.0, "SAFETY LIMITS (SL)"

Figure 2.1.1-1, "REACTOR CORE SAFETY LIMIT," provides the SL resulting from the combination of THERMAL POWER, RCS highest loop average temperature, and pressurizer pressure. Figure 2.1.1-1 contains a note associated with the "Acceptable Operation" region specified in the figure. The Figure 2.1.1-1 note states:

> "*When operating in the reduced RTP region of Technical Specification LCO 3.4.1 (Table 3.4.1-1 for Unit 1 and Table 3.4.1-2 for Unit 2) the restricted power level must be considered 100% for this Figure."

The proposed change would delete TS 3.4.1 Table 3.4.1-1 for Unit 1 and Table 3.4.1-2 for Unit 2 and revise the SL to be consistent with TS 3.4.1 in NUREG-1431. The DCPP TS 3.4.1 would then only specify the RCS flows required for 100 percent reactor thermal power (RTP) consistent with the applicable DCPP safety analyses. Therefore, the note associated with Figure 2.1.1-1 which references the reduced RTP levels contained in TS 3.4.1 Tables 3.4.1-1 and 3.4.1-2 is no longer required. As such, the proposed change includes deleting the note associated with Figure 2.1.1-1.

TS 3.4.1, "RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits"

The proposed change would revise the DCPP Unit 1 and 2 RCS Flow requirements in TS 3.4.1 as follows:

The current DCPP TS 3.4.1 LCO requirement Part c. states:

> "RCS total flow rate within limits shown on Table 3.4.1-1 for Unit 1 and Table 3.4.1-2 for Unit 2."

The proposed change would revise the TS 3.4.1 LCO Part c. requirement to be consistent with the corresponding TS 3.4.1 in NUREG-1431 as follows:

> "For Unit 1, RCS total flow rate ≥ 350,800 gpm and greater than or equal to the limit specified in the Unit 1 COLR, and for Unit 2, RCS total flow rate ≥ 354,000 gpm and greater than or equal to the limit specified in the Unit 2 COLR."

The RCS flows retained in the TS 3.4.1 LCO requirements correspond to the DCPP Unit 1 and Unit 2 RCS TDF. Consistent with WCAP-14483-A, the analytical TDF values noted above, which are valid for a maximum steam generator tube plugging level of 10 percent, are the RCS flow rates that will be

retained in the TS to assure that a lower flow rate than that reviewed by the NRC would not be used.

In addition, consistent with TS 3.4.1 in NUREG-1431, the proposed change would also include the requirement to meet the RCS flow limit specified in the COLR. Therefore, the proposed change includes the addition of the DCPP RCS MMF values of 359,200 gpm (Unit 1) and 362,500 gpm (Unit 2) to the COLR for each unit. The RCS MMF flow rates specified in the COLR are higher flow values than the TDF retained in TS 3.4.1, which conservatively account for flow measurement uncertainty and/or bias. The proposed MMF values to be included in the COLR are based on the values currently assumed in the applicable DCPP safety analyses.

Consistent with WCAP-14483-A, including these higher RCS total flow rates in the COLR allows the value to be changed without prior NRC approval. However, changes to these RCS flow values will be in accordance with the methodology specified in the COLR. Specifically the RCS flow values would be revised in accordance with WCAP-9272-P-A, "Westinghouse Reload Safety Evaluation Methodology," (Reference 4). WCAP-9272-P-A is specified in DCPP Unit 1 and 2 TS 5.6.5, "Core Operating Limits Report (COLR)," Part b. Part b. of TS 5.6.5 states:

> "The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:"

WCAP-9272-P-A is listed as item 2 under Part b. of TS 5.6.5. Furthermore, DCPP TS 5.6.5 Part d states the following:

> "The COLR, including any midcycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC."

Therefore, any future changes to the COLR are required to be provided to the NRC.

The current DCPP TS 3.4.1 Tables 3.4.1-1 (for Unit 1) and 3.4.1-2 (for Unit 2) contain the RCS flow requirements for RTP levels from 90 percent power to 100 percent RTP. These tables are referenced in the current DCPP TS 3.4.1 LCO Part c. for the RCS flow requirements. The proposed change would delete these tables from TS 3.4.1.

The TS 3.4.1 tables proposed for deletion contain the following RCS flow requirements:

DCPP Unit 1

Table 3.4.1-1 (page 1 of 1) Reduction in Percent RATED THERMAL POWER for Reduced RCS Flow Rate Unit 1	
RCS total Flow [(a)] (10^4 GPM)	Acceptable Operating Region [(b)] (% RTP)
≥ 35.9	≤ 100%
≥ 35.6	≤ 98%
≥ 35.2	≤ 96%
≥ 34.8	≤ 94%
≥ 34.5	≤ 92%
≥ 34.1	≤ 90%

(a) For RCS Total Flow < 341,000 GPM, entry into LCO 3.4.1 Condition A is required.

(b) When operating in the restricted power limits, the restricted power level shall be considered 100% RTP for Figure 2.1.1-1.

DCPP Unit 2

Table 3.4.1-2 (page 1 of 1) Reduction in Percent RATED THERMAL POWER for Reduced RCS Flow Rate Unit 2	
RCS Total Flow [(a)] (10^4 GPM)	Acceptable Operating Region [(b)] (% RTP)
≥ 36.3	≤ 100%
≥ 35.9	≤ 98%
≥ 35.5	≤ 96%
≥ 35.2	≤ 94%
≥ 34.8	≤ 92%
≥ 34.4	≤ 90%

(a) For RCS Total Flow < 344,000 GPM, entry into LCO 3.4.1 Condition A is required.

(b) When operating in the restricted power limits, the restricted power level shall be considered 100% RTP for Figure 2.1.1-1.

The proposed change also includes revising the DCPP TS 3.4.1 SRs 3.4.1.3 and 3.4.1.4 to be consistent with the proposed change to the LCO requirement of TS 3.4.1 and consistent with the corresponding NUREG-1431 SRs.

The current DCPP SR 3.4.1.3 states:

> "Verify RCS total flow rate is within limits."

The proposed change would revise SR 3.4.1.3 to state:

> "For Unit 1, verify RCS total flow rate ≥ 350,800 gpm and greater than or equal to the limit specified in the Unit 1 COLR, and for Unit 2, verify RCS total flow rate ≥ 354,000 gpm and greater than or equal to the limit specified in the Unit 2 COLR."

The current DCPP SR 3.4.1.4 states:

> "Verify measured RCS total flow rate is within limits."

The proposed change would revise SR 3.4.1.4 to state:

> "For Unit 1, verify measured RCS total flow rate ≥ 350,800 gpm and greater than or equal to the limit specified in the Unit 1 COLR, and for Unit 2, verify measured RCS total flow rate ≥ 354,000 gpm and greater than or equal to the limit specified in the Unit 2 COLR."

The proposed changes to SR 3.4.1.3 and SR 3.4.1.4 make the SRs consistent with the proposed changes to the TS 3.4.1 LCO requirement and with the corresponding SRs in the standard TS in NUREG-1431.

3. TECHNICAL EVALUATION

System Description

The RCS consists of four similar heat transfer loops connected in parallel to the reactor pressure vessel, which are located inside the containment. Each loop contains a reactor coolant pump, steam generator, and associated piping and valves. The system also includes a pressurizer, a pressurizer relief tank, interconnecting piping, and instrumentation necessary for operation.

During operation, the RCS transfers heat generated in the core to the steam generators where the steam that drives the turbine-generator is produced. Borated pressurized water circulates in the RCS at a flowrate and temperature consistent with the reactor core thermal-hydraulic performance requirements. The water also acts as a neutron moderator and reflector, and as a solvent for the boric acid neutron absorber used as chemical shim control.

The RCS pressure boundary provides a barrier against the release of radioactivity generated within the reactor, and is designed to ensure a high degree of integrity throughout plant life.

RCS pressure is controlled by the pressurizer in which water and steam are maintained in equilibrium by electrical heaters or water sprays. Steam can be formed (by the heaters) or condensed (by the pressurizer spray) to minimize reactor coolant pressure variations. Spring-loaded safety valves and power-operated relief valves are mounted on the pressurizer and discharge to the pressurizer relief tank where the steam is condensed and cooled by mixing with water.

The RCS flow rate normally remains constant during an operational fuel cycle with all pumps running. The minimum RCS flow limit corresponds to that assumed for DNB. Flow rate indications from the plant computer or RCS flow rate indicators are averaged to determine a value for comparison to the limit. A lower RCS flow will cause the DNB limits to be approached.

Current Licensing Basis and Current Licensing Basis Acceptance Criteria

The RCS flow requirements of the current DCPP Unit 1 and 2 TS 3.4.1, "RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits," were established by DCPP License Amendment Request (LAR) 90-15, "Revision of Technical Specifications 2.1 and 3/4.2.3 - Implementation of Power-Dependent RCS Flow Rate Limits," submitted by DCPP Letter DCL-90-299, dated December 21, 1990 (Reference 5). The NRC subsequently approved this LAR in License Amendment 60 for Unit 1 and Amendment 59 for Unit 2 (Reference 6).

The flow versus power Tables (3.4.1-1 and 3.4.1-2) were added to TS 3.4.1 due to issues in the 1990s associated with potentially violating the RCS flow limit when coming out of a refueling outage because the required RCS flow calorimetric was being negatively impacted by hot leg streaming effects with implementation of low leakage core designs. Since DCPP no longer uses the RCS flow calorimetric method and instead uses the elbow tap method to determine RCS flow, DCPP does not require the RCS flow versus power tables in TS 3.4.1 any longer. Thus, the RCS flow requirements in DCPP Unit 1 and Unit 2 TS 3.4.1 can be revised to conform to the format and presentation of the RCS flow requirements in TS 3.4.1 in NUREG-1431. In addition, the description of the RCS flow calorimetric in the DCPP TS 3.4.1 Bases has been deleted.

Non-conservative Unit 1 TS value

The nonconservative TS was identified during a review of UFSAR Table 4.1-1, which compared that table to TS Table 3.4.1-1 and found that they were not consistent on the exact value of minimum RCS flow required at full power. Table 3.4.1-1 would allow Unit 1 to operate at 100 percent power with 359,000 gpm, while UFSAR Table 4.1-1 specifies 359,200 gpm. Unit 2 did not have the same condition. RCS total flow requirements ensure that minimum DNB limits will be met for each of the transients analyzed in the safety analyses. The deficiency was entered in the corrective action program and the most recent surveillance of RCS flow rate (STP I-1A, Routine Shift Checks Required by Licenses, Section 12.4) was reviewed and the data showed that RCS total flow was 369,631 gpm, which is greater than the UFSAR safety analysis and TS minimum required total flow rates. Based on this, an operability determination concluded that the Unit 1 fuel was capable of performing its function.

To ensure recognition should RCS flow fall below the minimum required value, STP I-1A for Unit 1 was revised to explicitly verify that total flow was greater than or equal to 359,200 gpm. Since these shift checks are required to be performed on a nominal 12-hour interval (with a maximum interval of 15 hours), there is reasonable expectation that RCS total flow has remained above the minimum requirement since the condition was identified.

System Safety Analysis Basis

The RCS total flow rate values specified in TS 3.4.1 LCO Part c. would be replaced by the TDF values of 350,800 gpm and 354,000 gpm for Units 1 and 2, respectively.

The NRC Safety Evaluation Report for WCAP-14483-A requires that the NRC-approved analysis flow must be retained in the TS:

> "...the staff recommended that if RCS flow rate were to be relocated to the COLR, the minimum limit for RCS total flow based on a staff approved analysis (e.g., maximum tube plugging) should be retained in the TS to assure that a lower flow rate than reviewed by the staff would not be used."

Therefore, the analytical TDF values noted above, which are valid for a maximum steam generator tube plugging level of 10 percent, are the RCS flow rates that will be retained in the TS to ensure that a lower flow rate than that reviewed by the staff would not be used. The retention of the TDF values in the TS is appropriate as these values rarely change. The minimum RCS flow rates specified in the COLR will then be defined as higher values that conservatively account for flow measurement uncertainty and/or bias. The minimum RCS flow values included in the COLR may change based on changes to the safety analyses performed for core reloads and are therefore appropriate for inclusion in the COLR.

The TDF values of 350,800 gpm and 354,000 gpm for Units 1 and 2, respectively, which are discussed above, were used in the following Non-LOCA safety analyses:

- Uncontrolled rod cluster control assembly (RCCA) bank withdrawal from a subcritical condition (UFSAR 15.2.1); the analysis bounds both DCPP units and the RCS flow is a fraction of the Unit 1 TDF corresponding to two reactor coolant loops operating
- Loss of external electrical load and/or turbine trip (UFSAR 15.2.7), for the peak RCS pressure analysis and the peak main steam system (MSS) pressure analysis
- Loss of normal feedwater (UFSAR 15.2.8)
- Loss of offsite power to the station auxiliaries (UFSAR 15.2.9)
- Spurious operation of the safety injection system at power pressurizer overfill analysis (UFSAR 15.2.15.2)
- Rupture of a main steam line at hot zero power (FSAR 15.4.2.1); also bounds accidental depressurization of the MSS (UFSAR 15.2.14)

- Major rupture of a main feedwater pipe (UFSAR 15.4.2.2)
- Single reactor coolant pump locked rotor (FSAR 15.4.4), for the peak RCS pressure/peak clad temperature analysis; the analysis bounds both DCPP units and the RCS flow is the Unit 1 TDF
- RCCA ejection (UFSAR 15.4.6); the analysis bounds both DCPP units; the RCS flow for the beginning of cycle zero power case is a fraction of the Unit 1 TDF corresponding to two reactor coolant loops operating

Of the events listed above that use the TDF, explicit thermal-hydraulic DNB analyses are performed only for the uncontrolled RCCA bank withdrawal from subcritical and rupture of a main steam line at hot zero power events. Other DNB-related events are evaluated using the Improved Thermal Design Procedure (ITDP) (Reference 7), for which the MMF values are used in the analysis, i.e., 359,200 gpm and 362,500 gpm, for Unit 1 and Unit 2, respectively. These ITDP events are:

- Uncontrolled RCCA bank withdrawal at power (UFSAR 15.2.2)
- RCCA misoperation (UFSAR 15.2.3)
- Partial loss of forced reactor coolant flow (UFSAR 15.2.5)
- Loss of external electrical load and/or turbine trip (UFSAR 15.2.7), for the DNB analysis
- Excessive heat removal due to feedwater system malfunctions (UFSAR 15.2.10)
- Sudden feedwater temperature reduction (UFSAR 15.2.11)
- Excessive load increase incident (UFSAR 15.2.12)
- Accidental depressurization of the RCS (UFSAR 15.2.13)
- Spurious operation of the safety injection system at power DNB analysis (UFSAR 15.2.15.1)
- Complete loss of forced reactor coolant flow (UFSAR 15.3.4)
- Single RCCA withdrawal at full power (UFSAR 15.3.5)
- Rupture of a main steam line at full power (UFSAR 15.4.2.3)
- Single reactor coolant pump locked rotor (UFSAR 15.4.4), for the rods in DNB analysis

<u>System Summary/Conclusion</u>

The proposed change resolves the nonconservative Unit 1 TS value for RCS flow and revises the DCPP TS to be more consistent with the TS 3.4.1 in

NUREG-1431. The proposed change makes the RCS total flow requirements in the TS and COLR consistent with the applicable safety analyses. The proposed change is acceptable because it maintains the appropriate RCS flow limits in the TS and COLR to ensure the assumptions of the applicable safety analyses (listed above) are met. Changes to the RCS flow values retained in the TS are subject to NRC prior review and approval. As discussed above, changes to the RCS flow values in the COLR must be in accordance with TS 5.6.5, "Core Operating Limits Report (COLR)," and are subject to NRC review.

4. REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

Section 182a of the Atomic Energy Act requires that applicants for nuclear power plant operating licenses include TS as part of the facility operating license. The Commission's regulatory requirements related to the content of TS are set forth in 10 CFR 50.36. Pursuant to 10 CFR 50.36, TS are required to include items in the five specific categories related to station operation: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operation (LCOs); (3) surveillance requirements (SRs); (4) design features; and (5) administrative controls.

However, the rule does not specify the particular requirements to be included in a plant's TS. Under 10 CFR 50.36(c)(2)(ii), a limiting condition for operation must be included in TS for any item meeting one of the following four criteria:

Criterion 1: Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.

Criterion 2: A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Criterion 3: A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Criterion 4: A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

The proposed change maintains the applicable RCS flow requirements (i.e., the required process variables) in the TS in accordance with Criterion 2 of the regulation. The RCS flow requirements for each unit continue to be specified in the TS LCO and continue to be verified by the TS SRs as required by the regulation.

4.2 Precedent

ML063540114, "Millstone Power Station, Unit No. 3 - Issuance of Amendment Re: Cycle-Specific Parameter Technical Specification Change (TAC NO. MC2634)."

The Safety Evaluation for Amendment 236 to Facility Operating License No. NPF-49 states:

"3.3 Relocation of the RCS Total Flow Rate Requirement to the COLR

The licensee proposed relocation of the RCS total flow rate requirement from the TSs to the COLR as a means of providing operating and analysis flexibility from cycle to cycle consistent with WCAP-14483-A. In conjunction with this change, the licensee's proposal also includes the addition of the 'RCS total flow rate' to TS 6.9.1.6.a to identify it as an item included in the COLR. The RCS total flow rate minimum value, however, will remain in the TS (TS 3/4.2.3.1) in order to assure that an RCS total flow rate is not lower than that approved by the NRC. Retaining the minimum flow rate in the TS will require any reduction in the flow rate below the listed value to be reviewed by the NRC in a license amendment. This change is based on reasoning presented by the NRC staff in Reference 4:

> Although some plants operate with lower steam generator tube plugging levels and thus higher RCS flow rates than those assumed in the safety analyses, a change in RCS flow is an indication of a physical change to the plant which should be reviewed by the NRC staff. Because of this, the staff recommended that if RCS flow rate were to be relocated to the COLR, the minimum limit for RCS total flow based on a staff approved analysis (e.g., maximum tube plugging) should be retained in the TS to assure that a lower flow rate than reviewed by the staff would not be used.

The NRC staff finds that these changes are consistent with the approved changes identified in WCAP-14483-A for relocating these parameter values to the COLR. Additionally, the licensee states that 'For the MPS3 TS, the RCS flow rate is not included with pressurizer pressure and RCS average temperature (TS 3.2.5) requirements as it exists in the industry standard NUREG-1431, TS 3.4 REACTOR COOLANT SYSTEM. However, this is only an administrative difference and the proposed change to TS 3/4.2.3 agrees with the intent of TSTF-339 for relocating parameters to the COLR consistent with WCAP-14483.' MPS3 TSs include pressurizer pressure and RCS average temperature requirements in TS 3/4.2.5, 'DNB Parameters,' and RCS flow rate requirements in TS 3/4.2.3, 'RCS Flow Rate and Nuclear Enthalpy Rise Hot Channel Factor.' Although this is different from the Standard Technical Specifications, NRC staff agrees that this is only an administrative difference and does not detract from the content of the specifications..."

4.3 No Significant Hazards Consideration Determination

PG&E has evaluated whether or not a significant hazards consideration is involved with the proposed amendment 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.

The proposed change revises the DCPP Unit 1 and Unit 2 RCS flow requirements in TS 3.4.1, "RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits," to be more consistent with TS 3.4.1 in NUREG-1431 and with the applicable DCPP safety analyses. The proposed RCS flow values will ensure the assumptions of the safety analyses continue to be met.

As such, the proposed change does not affect the design or function of any plant structures, systems, and components (SSCs). Thus, the proposed change does not affect plant operation, design features, or any analysis that verifies the capability of an SSC to perform a design function. As the proposed change is consistent with the RCS flow assumptions of the safety analyses, the proposed change does not affect any previously evaluated accidents in the UFSAR. In addition, the proposed change does not affect any SSCs, operating procedures, and administrative controls which have the function of preventing or mitigating any accident previously evaluated in the UFSAR.

The proposed change will not alter any accident analyses assumptions discussed in the UFSAR and will continue to assure the DCPP units operate within the assumptions of the applicable safety analyses described in the UFSAR.

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

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

Response: No.

The proposed change revises the DCPP Unit 1 and Unit 2 RCS flow requirements in TS 3.4.1, "RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits," to be more consistent with TS 3.4.1 in NUREG-1431 and with the applicable DCPP safety analyses. The proposed RCS flow values will ensure the assumptions of the safety analyses continue to be met.

The proposed change does not change any system functions or maintenance activities. The change does not involve physical alteration of the plant, that is, no new or different type of equipment will be installed. The proposed change involves no physical plant modification or changes in plant operation, therefore no new failure modes are created. As such, the proposed change does not create new failure modes or mechanisms that are not identifiable during testing, and no new accident precursors are generated.

Therefore, the proposed change does not create the possibility of a new or different accident from any accident previously evaluated.

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

Response: No.

The margin of safety is established through equipment design, operating parameters, and the setpoints at which automatic actions are initiated. The proposed change does not physically alter safety-related systems, nor does it affect the way in which safety-related systems perform their functions. The setpoints at which protective actions are initiated are not altered by the proposed change. Therefore, sufficient equipment remains available to actuate upon demand for the purpose of mitigating an analyzed event. The proposed RCS flow value changes are consistent

with the plant safety analyses. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above evaluation, PG&E concludes that the proposed change does not involve a 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.

4.4 Conclusions

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 compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5. ENVIRONMENTAL CONSIDERATION

PG&E has evaluated the proposed amendment and has determined that 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.

6. REFERENCES

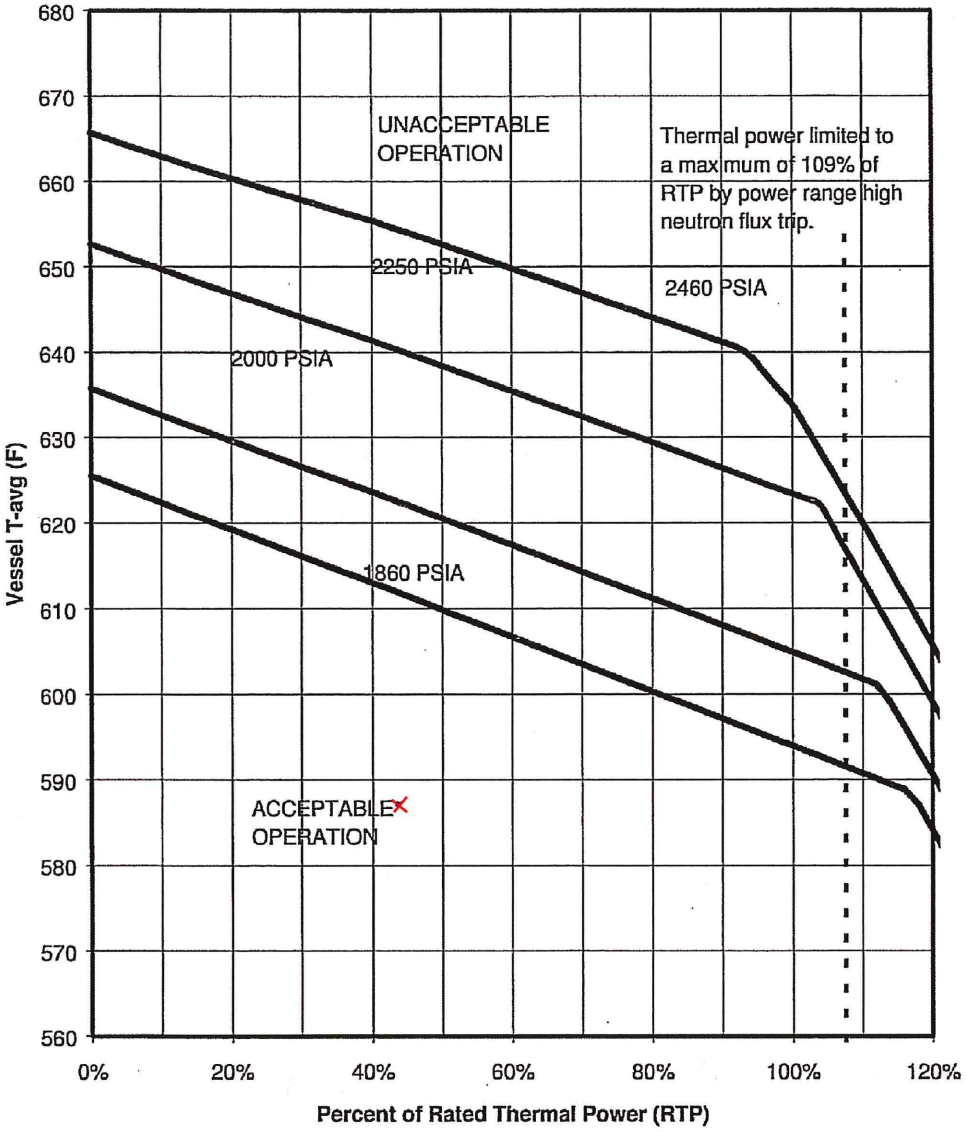
1. NUREG-1431, "Standard Technical Specifications Westinghouse Plants," Revision 4.0, April 2012
2. TSTF-339-A, Revision 2, "Relocate TS Parameters to COLR," June 13, 2000
3. WCAP-14483-A, "Generic Methodology for Expanded Core Operating Limits Report," January 1999
4. WCAP-9272-P-A, "Westinghouse Reload Safety Evaluation Methodology," July 1985
5. PG&E Letter DCL-90-299, License Amendment Request 90-15, "Revision of Technical Specifications 2.1 and 3/4.2.3 - Implementation of Power-Dependent RCS Flow Rate Limits," dated December 21, 1990
6. License Amendment 60 for Unit 1 and 59 for Unit 2, dated March 12, 1991

7. WCAP-8567-P-A, "Improved Thermal Design Procedure," February 1989

Enclosure
Attachment 1
PG&E Letter DCL-15-107

Technical Specification Pages Markups

UNITS 1 & 2



~~*When operating in the reduced RTP region of Technical Specification LCO 3.4.1 (Table 3.4.1-1 for Unit 1 and Table 3.4.1-2 for Unit 2) the restricted power level must be considered 100% for this Figure.~~

Figure 2.1.1-1
REACTOR CORE SAFETY LIMIT

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.1 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits

LCO 3.4.1 RCS DNB parameters for pressurizer pressure, RCS average temperature, and RCS total flow rate shall be within the limits specified below:

a. Pressurizer pressure is greater than or equal to the limit specified in the COLR;

b. RCS average temperature is less than or equal to the limit specified in the COLR; and

c. ~~RCS total flow rate within limits shown on Table 3.4.1-1 for Unit 1 and Table 3.4.1-2 for Unit 2.~~

For Unit 1, RCS total flow rate ≥ 350,800 gpm and greater than or equal to the limit specified in the Unit 1 COLR, and for Unit 2, RCS total flow rate ≥ 354,000 gpm and greater than or equal to the limit specified in the Unit 2 COLR.

APPLICABILITY: MODES 1.

Pressurizer pressure limit does not apply during:

a. THERMAL POWER ramp > 5% RTP per minute; or

b. THERMAL POWER step > 10% RTP.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more RCS DNB parameters not within limits.	A.1 Restore RCS DNB parameter(s) to within limit.	2 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 2.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.1.1	Verify pressurizer pressure is greater than or equal to the limit specified in the COLR.	In accordance with the Surveillance Frequency Control Program
SR 3.4.1.2	Verify RCS average temperature is less than or equal to the limit specified in the COLR.	In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.1.3	~~Verify RCS total flow rate is within limits.~~	In accordance with the Surveillance Frequency Control Program
SR 3.4.1.4	~~Verify measured RCS total flow rate is within limits.~~	In accordance with the Surveillance Frequency Control Program

For Unit 1, verify RCS total flow rate ≥ 350,800 gpm and greater than or equal to the limit specified in the Unit 1 COLR, and for Unit 2, verify RCS total flow rate ≥ 354,000 gpm and greather than or equal to the limit specified in the Unit 2 COLR.

For Unit 1, verify measured RCS total flow rate ≥ 350,800 gpm and greater than or equal to the limit specified in the Unit 1 COLR, and for Unit 2, verify measured RCS total flow rate ≥ 354,000 gpm and greater than or equal to the limit specified in the Unit 2 COLR.

Table 3.4.1-1 (page 1 of 1)

Reduction in Percent RATED THERMAL POWER for Reduced RCS Flow Rate

Unit 1

RCS total Flow [a] (10^4 GPM)	Acceptable Operating Region [b] (% RTP)
≥ 35.9	≤ 100%
≥ 35.6	≤ 98%
≥ 35.2	≤ 96%
≥ 34.8	≤ 94%
≥ 34.5	≤ 92%
≥ 34.1	≤ 90%

(a) For RCS Total Flow < 341,000 GPM, entry into LCO 3.4.1 Condition A is required.

(b) When operating in the restricted power limits, the restricted power level shall be considered 100% RTP for Figure 2.1.1-1.

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Table 3.4.1-2 (page 1 of 1)
Reduction in Percent RATED THERMAL POWER for Reduced RCS Flow Rate
Unit 2

RCS Total Flow[a] (10^4 GPM)	Acceptable Operating Region[b] (% RTP)
≥ 36.3	≤ 100%
≥ 35.9	≤ 98%
≥ 35.5	≤ 96%
≥ 35.2	≤ 94%
≥ 34.8	≤ 92%
≥ 34.4	≤ 90%

(a) For RCS Total Flow < 344,000 GPM, entry into LCO 3.4.1 Condition A is required.

(b) When operating in the restricted power limits, the restricted power level shall be considered 100% RTP for Figure 2.1.1-1.

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Enclosure
Attachment 2
PG&E Letter DCL-15-107

Revised Technical Specification Pages

Remove Page	Insert Page
2.0-2	2.0-2
3.4-1	3.4-1
3.4-1a	3.4-1a
3.4-2	3.4-2
3.4-3	3.4-3

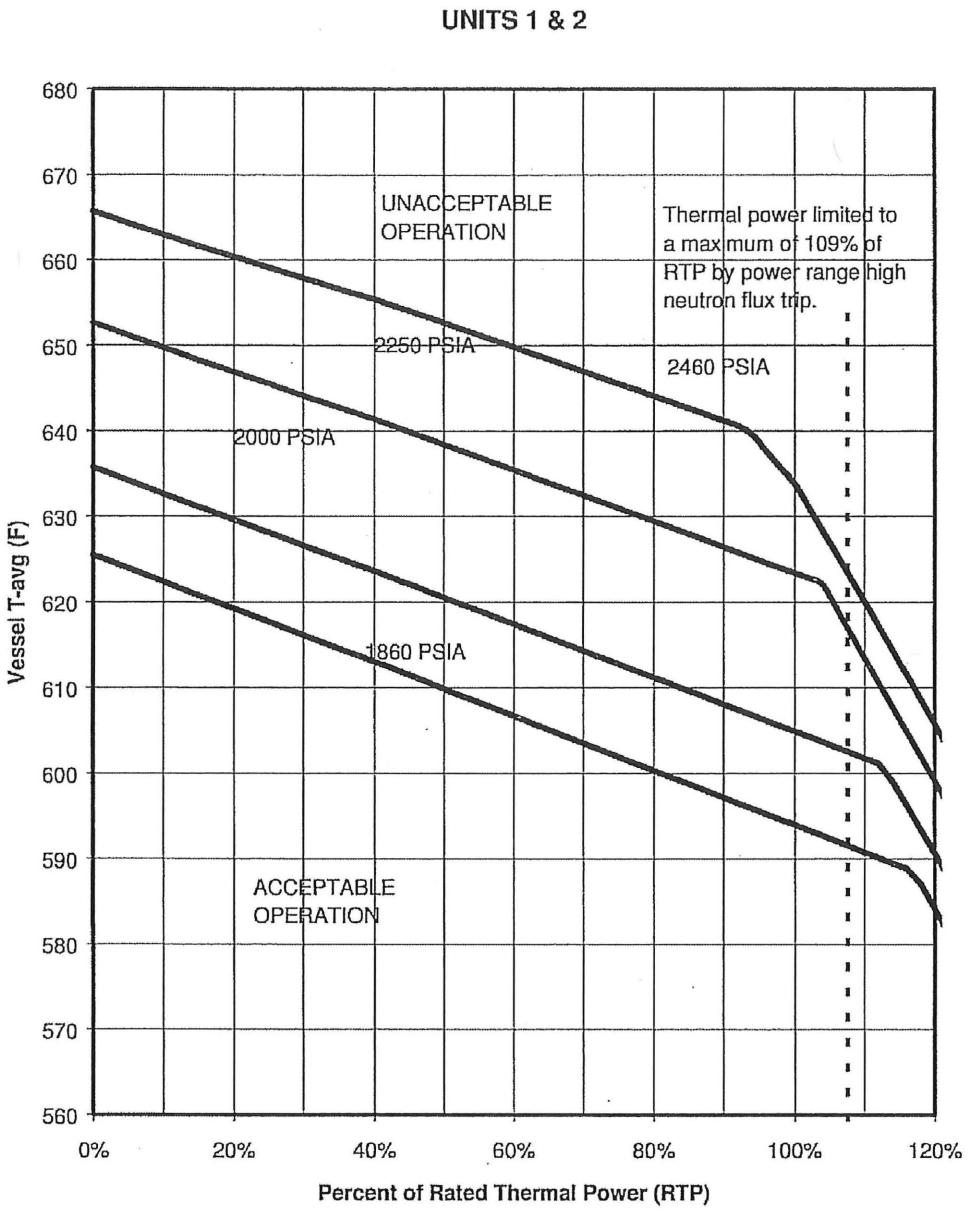

Figure 2.1.1-1
REACTOR CORE SAFETY LIMIT

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.1 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits

LCO 3.4.1 RCS DNB parameters for pressurizer pressure, RCS average temperature, and RCS total flow rate shall be within the limits specified below:

a. Pressurizer pressure is greater than or equal to the limit specified in the COLR;

b. RCS average temperature is less than or equal to the limit specified in the COLR; and

c. For Unit 1, RCS total flow rate ≥ 350,800 gpm and greater than or equal to the limit specified in the Unit 1 COLR, and for Unit 2, RCS total flow rate ≥ 354,000 gpm and greater than or equal to the limit specified in the Unit 2 COLR.

APPLICABILITY: MODES 1.

----------NOTE----------
Pressurizer pressure limit does not apply during:

a. THERMAL POWER ramp > 5% RTP per minute; or

b. THERMAL POWER step > 10% RTP.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more RCS DNB parameters not within limits.	A.1 Restore RCS DNB parameter(s) to within limit.	2 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 2.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.1.1	Verify pressurizer pressure is greater than or equal to the limit specified in the COLR.	In accordance with the Surveillance Frequency Control Program
SR 3.4.1.2	Verify RCS average temperature is less than or equal to the limit specified in the COLR.	In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.1.3	For Unit 1, verify RCS total flow rate ≥ 350,800 gpm and greater than or equal to the limit specified in the Unit 1 COLR, and for Unit 2, verify RCS total flow rate ≥ 354,000 gpm and greater than or equal to the limit specified in the Unit 2 COLR.	In accordance with the Surveillance Frequency Control Program
SR 3.4.1.4	For Unit 1, verify measured RCS total flow rate ≥ 350,800 gpm and greater than or equal to the limit specified in the Unit 1 COLR, and for Unit 2, verify measured RCS total flow rate ≥ 354,000 gpm and greater than or equal to the limit specified in the Unit 2 COLR.	In accordance with the Surveillance Frequency Control Program

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Enclosure
Attachment 3
PG&E Letter DCL-15-107

Technical Specification Bases Pages Markups

(For Information Only)

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.1 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits

BASES

BACKGROUND

These Bases address requirements for maintaining RCS pressure, temperature, and flow rate within limits assumed in the safety analyses. The safety analyses (Ref. 1) of normal operating conditions and anticipated operational occurrences assume initial conditions within the normal steady state envelope. The limits placed on RCS pressure, temperature, and flow rate ensure that the minimum departure from nucleate boiling ratio (DNBR) will be met for each of the transients analyzed.

The RCS pressure limit is consistent with operation within the nominal operational envelope. Pressurizer pressure indications are averaged to come up with a value for comparison to the limit. A lower pressure will cause the reactor core to approach DNB limits.

The RCS coolant average temperature limit is consistent with full power operation within the nominal operational envelope. Indications of temperature are averaged to determine a value for comparison to the limit. A higher average temperature will cause the core to approach DNB limits.

is consistent with

The RCS flow rate normally remains constant during an operational fuel cycle with all pumps running. The minimum RCS flow limit ~~corresponds to~~ that assumed for DNB analyses ~~and is variable with reactor thermal power down to 90% RTP as shown on Tables 3.4.1-1 and 3.4.1-2~~. Flow rate indications from the plant computer or RCS flow rate indicators are averaged to come up with a value for comparison to the limit. A lower RCS flow will cause the DNB limits to be approached.

Operation for significant periods of time outside the limits on RCS flow, pressurizer pressure and average RCS temperature increases the likelihood of a fuel cladding failure if a DNB limited event were to occur.

are consistent with

APPLICABLE SAFETY ANALYSES

The requirements of this LCO ~~represent~~ the initial conditions for DNB limited transients analyzed in the plant safety analyses (Ref. 1). The safety analyses have shown that transients initiated ~~from~~ the limits of this LCO will result in meeting the DNBR correlation limit ~~(Ref. 2 and 3)~~. This is the acceptance limit for the RCS DNB parameters.

consistent with

Changes to the unit that could impact these parameters must be assessed for their impact on the DNBR criterion. The analyzed transients include loss of coolant flow events and dropped or stuck rod events. A key assumption for the analysis of these events is that the core power distribution is within the limits of LCO 3.1.6, "Control Bank

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Insertion Limits"; LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD)"; and LCO 3.2.4, "QUADRANT POWER TILT RATIO (QPTR)."

The pressurizer pressure limit and RCS average temperature limit specified in the COLR correspond to the analytical limits used in the safety analyses with allowance for measurement uncertainty.

The RCS DNB parameters satisfy Criterion 2 of 10 CFR 50.36 (c)(2)(ii).

LCO

This LCO specifies limits on the monitored process variables-pressurizer pressure, RCS average temperature, and RCS total flow rate to ensure the core operates within the limits assumed in the safety analyses. The pressurizer pressure and RCS average temperature variables are contained in the COLR to provide operating and analysis flexibility from cycle to cycle. Operating within these limits will result in meeting the DNBR criterion in the event of a DNB limited transient.

RCS total flow limits are provided for a RTP range of 90% to 100% on Tables 3.4.1-1 and 3.4.1-2 for Unit 1 and Unit 2 respectively.

The RCS total flow rate limit allows for a measurement error of 2.4% flow. Both the precision flow calorimetric method and the cold leg elbow tap method used to measure RCS flow meet the 2.4% flow uncertainty allowance.

The precision flow calorimetric method normalizes the RCS flow rate indicators to a precision flow calorimetric performed at the beginning of cycle. Potential fouling of the feedwater venturi, which might not be detected, could bias the result from the precision flow calorimetric in a non-conservative manner. A bias error of 0.1% for undetected fouling of the feedwater venturi is included in the measurement error analysis.

Any fouling that might significantly bias the feedwater flow rate input to the flow calorimetric measurement greater than 0.1% can be detected by monitoring and trending various plant performance parameters. If detected, either the effect of the fouling shall be quantified and compensated for in the RCS flow rate measurement or the venturi shall be cleaned to eliminate the fouling.

(continued)

BASES

LCO

The numerical values for pressure, temperature, and flow rate specified in the COLR are given for the measurement location and have been adjusted for instrument error.

Use of the cold leg elbow tap method to measure RCS flow at approximately 100% RTP at the beginning of cycle ~~results in~~ a measurement uncertainty ~~of ± 2.3% flow using~~ the control board RCS flow rate indicators (which bounds the use of the plant process computer). This method is based on the utilization of twelve RCS cold leg elbow taps correlated to the four baseline precision heat balance measurements during Cycles 1 and 2 for each unit. Correlation of the flow indication channels with the flow calorimetric measurements performed during Cycles 1 and 2 is ~~documented~~ in WCAP-15113, Revision 1. ~~Use~~ of the cold leg elbow tap method provides an alternative to performance of a precision flow calorimetric to measure RCS flow and was approved by the NRC in amendments 161/162.

~~The LCO numerical value for flow rate has not been adjusted for instrument error.~~

APPLICABILITY

In MODE 1, the limits on pressurizer pressure, RCS coolant average temperature, and RCS flow rate must be maintained during steady state operation in order to ensure the DNBR criteria will be met in the event of an unplanned loss of forced coolant flow or other DNB limited transient. In all other MODES, the power level is low enough that DNB is not a concern.

(continued)

No Change
Included for Information only

BASES

APPLICABILITY (continued)

A Note has been added to indicate the limit on pressurizer pressure is not applicable during short term operational pressure transients such as a THERMAL POWER ramp increase > 5% RTP per minute or a THERMAL POWER step increase > 10% RTP. These conditions represent short term perturbations where actions to control pressure variations might be counterproductive. Also, since they represent transients initiated from power levels < 100% RTP, an increased DNBR margin exists to offset the temporary pressure variations.

Another set of limits on DNB related parameters is provided in SL 2.1.1, "Reactor Core SLs." Those limits are less restrictive than the limits of this LCO, but violation of a Safety Limit (SL) merits a stricter, more severe Required Action. Should a violation of this LCO occur, the operator must check whether or not an SL may have been exceeded.

ACTIONS

A.1

RCS pressure and RCS average temperature are controllable and measurable parameters. With one or both of these parameters not within LCO limits, action must be taken to restore parameter(s).

RCS total flow rate is not a controllable parameter and is not expected to vary during steady state operation. If the indicated RCS total flow rate is below the LCO limit, power must be reduced, as required by Required Action B.1, to restore DNB margin and reduce the potential for violation of the accident analysis limits.

The 2 hour Completion Time for restoration of the parameters provides sufficient time to adjust plant parameters, to determine the cause for the off normal condition, and to restore the readings within limits, and is based on plant operating experience.

B.1

If Required Action A.1 is not met within the associated Completion Time, 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 2 within 6 hours. In MODE 2, the reduced power condition reduces the potential for violation of the accident analysis limits. The Completion Time of 6 hours is reasonable to reach the required plant conditions in an orderly manner.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.4.1.1

The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

SR 3.4.1.2

The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

SR 3.4.1.3

The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program. The term "indicated RCS total flow," above, is used to distinguish between the "measured RCS total flow" determined in SR 3.4.1 .4.

SR 3.4.1.4

SR 3.4.1.4 has two surveillance requirements, one for the CHANNEL CALIBRATION of the RCS flow indicators and the other for measurement of RCS total flow rate. Measurement of RCS total flow rate ~~by performance of a precision flow calorimetric or~~ by using the cold leg elbow tap methodology allows the installed RCS flow instrumentation to be normalized and verifies the actual RCS flow rate is greater than or equal to the minimum required RCS flow rate.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.4.1.4 (continued)

The second part of this surveillance is the routine CHANNEL CALIBRATION of the RCS flow indication instrumentation. The routine calibration of the flow instrumentation ensures that the channels are within the necessary range and accuracy for proper flow indication.

The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. FSAR, Section 15.
2. ~~Diablo Canyon Power Plant Unit 1 Cycle 9 Reload Safety Evaluation, August 1995.~~
3. ~~Diablo Canyon Power Plant Unit 2 Cycle 8 Reload Safety Evaluation, Rev.1, April 1996.~~
4. ~~FSAR, Table 4.1-1.~~
5. WCAP-15113, Revision 1, "RCS Flow Measurement Using Elbow Tap Methodology at Diablo Canyon Units 1 and 2," April, 2002.

2

Enclosure
Attachment 4
PG&E Letter DCL-15-107

Core Operating Limits Report Pages Markups

(For Information Only)

2.8 Axial Flux Difference (TS 3.2.3)

2.8.1 The Axial Flux Difference (AFD) Limits are provided in Figure 2.

2.9 Boron Concentration (TS 3.9.1)

The refueling boron concentration of the Reactor Coolant System, the refueling canal, and the refueling cavity shall be maintained within the more restrictive of the following limits:

2.9.1 A k_{eff} of 0.95 or less, with the most reactive control rod assembly completely withdrawn, or

2.9.2 A boron concentration of greater than or equal to 2000 ppm.

2.10 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limit (TS 3.4.1)

2.10.1 Pressurizer pressure is greater than or equal to 2175 psig.

2.10.2 RCS average temperature is less than or equal to 581.7°F.

NOTE: The DNB RCS T_{AVG} limit is based on the slightly lower and bounding value associated with Unit 1 in order to have the same surveillance limits for both Unit 1 and Unit 2.

2.10.3 RCS total flow rate is greater than or equal to 359,200 gpm.

3. TABLES

3.1 Table 1, "F_Q Margin Decreases in Excess of 2% Per 31 EFPD"

3.2 Table 2A, "Load Follow W(Z) Factors at 150 and 3,000 MWD/MTU as a Function of Core Height"

3.3 Table 2B, "Load Follow W(Z) Factors at 12,000 and 20,000 MWD/MTU as a Function of Core Height"

4. FIGURES

4.1 Figure 1, "Control Bank Insertion Limits Versus Rated Thermal Power"

4.2 Figure 2, "AFD Limits as a Function of Rated Thermal Power"

5. RECORDS

None

6. REFERENCES

6.1 NF-PGE-13-87, "Diablo Canyon Unit 1 Cycle 19 Reload Evaluation and Core Operating Limits Report," November 2013

6.2 WCAP-12473-A (Non-Proprietary), "BEACON Core Monitoring and Operations Support System," August 1994

6.3 Westinghouse Nuclear Safety Advisory Letter NSAL-02-14, "Steam Line Break During Mode 3 for Westinghouse NSSS Plants," Revision 2, August 4, 2005

2.8 Axial Flux Difference (TS 3.2.3)

2.8.1 The Axial Flux Difference (AFD) Limits are provided in Figure 2.

2.9 Boron Concentration (TS 3.9.1)

The refueling boron concentration of the Reactor Coolant System, the refueling canal, and the refueling cavity shall be maintained within the more restrictive of the following limits:

2.9.1 A k_{eff} of 0.95 or less, with the most reactive control rod assembly completely withdrawn, or

Pressure, Temperature, and Flow

2.9.2 A boron concentration of greater than or equal to 2000 ppm.

2.10 RCS ~~Pressure and Temperature~~ Departure from Nucleate Boiling (DNB) Limit (TS 3.4.1)

2.10.1 Pressurizer pressure is greater than or equal to 2175 psig.

2.10.2 RCS average temperature is less than or equal to 581.7°F.

NOTE: The DNB RCS T_{AVG} limit is based on the slightly lower and bounding value associated with Unit 1 in order to have the same surveillance limits for both Unit 1 and Unit 2.

2.10.3 RCS total flow rate is greater than or equal to 362,500 gpm.

3. TABLES

3.1 Table 1, "F_Q Margin Decreases in Excess of 2% Per 31 EFPD"

3.2 Table 2A, "Load Follow W(Z) Factors at 150 and 4,000 MWD/MTU as a Function of Core Height"

3.3 Table 2B, "Load Follow W(Z) Factors at 12,000 and 20,000 MWD/MTU as a Function of Core Height"

4. FIGURES

4.1 Figure 1, "Control Bank Insertion Limits Versus Rated Thermal Power"

4.2 Figure 2, "AFD Limits as a Function of Rated Thermal Power"

5. RECORDS

None

6. REFERENCES

6.1 NF-PGE-14-52, Revision 2, "Unit 2 Cycle 19 Reload Evaluation and Core Operating Limits Report – Revision 2," October 22, 2014

6.2 WCAP-12473-A (Non-Proprietary), "BEACON Core Monitoring and Operations Support System," August 1994

6.3 Westinghouse Nuclear Safety Advisory Letter NSAL-02-14, Revision 2, "Steam Line Break During Mode 3 for Westinghouse NSSS Plants," August 4, 2005