Enclosure
PG&E Letter DCL-97-074

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

License Amendment Request
No. 97-05

Pursuant to 10 CFR 50.90, Pacific Gas and Electric Company hereby applies to amend its Diablo Canyon Power Plant Facility Operating License Nos. DPR-80 and DPR-82 (Licenses). The proposed changes revise Technical Specification (TS) 3/4.7.3.1, "Plant Systems - Vital Component Cooling Water System."

Information on the proposed TS change is provided in Attachments A, B, and C. The change has been reviewed and does not involve a significant hazards consideration as defined in 10 CFR 50.92 or an unreviewed environmental question. Further, there is reasonable assurance that the proposed change will not adversely affect the health and safety of the public.

Sincerely,

Greg Rueger

Gregory M. Rueger

Subscribed and sworn to before me
this 22 day of May, 1997
State of California
County of San Luis Obispo

Dana Lopez

Notary Public

DANA LOPEZ
COMM. #1096594
NOTARY PUBLIC CALIFORNIA
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REVISION OF TECHNICAL SPECIFICATION 3/4.7.3.1, "PLANT SYSTEMS - VITAL COMPONENT COOLING WATER SYSTEM"

A. DESCRIPTION OF AMENDMENT REQUEST

This license amendment request (LAR) proposes to change Technical Specification (TS) 3/4.7.3.1 as follows:

1. New action statements will be added to TS 3.7.3.1 to address inoperability of the component cooling water (CCW) surge tank pressurization system.

2. New CCW surge tank pressurization system surveillance requirements will be added to TS 4.7.3.1.

The associated TS Bases will be appropriately revised.

The proposed changes are provided in the marked up copies of the TS pages in Attachment B. The proposed new TS pages are provided in Attachment C.

B. BACKGROUND

The component cooling water system (CCWS) is a closed cooling water system which removes heat from potentially radioactive primary system and auxiliary system equipment during normal operations and accident conditions. The CCWS consists of three CCW pumps which provide flow to three supply headers (two for vital equipment, and one for non-vital equipment), two CCW heat exchangers, and a common surge tank. The equipment on the vital headers is needed during emergency and accident conditions to remove heat from the core and the containment atmosphere. Equipment on the non-vital header is either non-vital or is not immediately required during emergency or accident conditions.

There are five containment fan cooler units (CFCUs) for each unit. They remove heat from containment by transferring the heat to cooling coils cooled by the CCWS vital headers. The CFCUs are required to remove heat following a design basis loss-of-coolant accident (LOCA) or main steam line break (MSLB) to assure that containment integrity is maintained. During an evaluation of the CCWS, PG&E identified that during a design basis LOCA, coincident with a loss of offsite power (LOOP) or a degraded offsite power supply, the CCW in the CFCU cooling coils could boil. This condition was not in accordance with Final

Safety Analysis Report (FSAR) Update, Revision 10, Section 9.2.2.2.7, which stated that localized boiling would not occur in the CFCUs during a limiting design basis accident. This condition was reported in Licensee Event Report (LER) 1-96-005-01.

Boiling of the CCW in the CFCUs could occur as a result of a design basis LOCA (maximum double-ended guillotine break) with a concurrent LOOP. Following the LOCA with a concurrent LOOP, the engineered safety feature (ESF) loads, including the CFCUs and CCW pumps, are disconnected from the vital buses to allow the emergency diesel generators (EDGs) to start and reach rated speed and voltage. When the CCW pumps are de-energized they rapidly come to a stop. The CCW flow also stops rapidly due to hydraulic resistance, and the pressure of the CCW in the CFCUs decreases as the flow stops. Due to the inertia of the fans, the de-energized CFCU fans coast down slowly, maintaining a flow of air and steam over the CFCU cooling coils. This results in continued heat addition to the stagnant CCW in the CFCUs. After 10 seconds, the EDGs reach rated speed and voltage. The first CFCU fans restart on slow speed approximately 22 seconds after the accident increasing the heat addition rate into the stagnant CCWS. The CCW pumps then restart between 26 and 30 seconds after the accident. Whenever the CCW pumps are operating, system flow resistance provides sufficient pressure to ensure that no boiling occurs in the CFCUs. However, when CCW flow is lost following a LOCA (but with the CFCU fans coasting down), boiling of the CCW in the CFCU cooling coils may occur due to the added heat and the reduced pressure in the CCWS. When the CCW pumps are subsequently restarted, water hammer may occur as the steam voids collapse. The water hammer could be severe enough to result in rupture of the CCW piping.

The Diablo Canyon Power Plant (DCPP) licensing basis requires the postulation of a LOOP only at the initiation of an event. As was reported in LER 1-96-005-01, if the 230 kV offsite power source is degraded at the time of the LOCA, this could lead to double sequencing of ESF loads. Double sequencing means that, during an accident the ESF loads would be started, stopped, and restarted as follows: Upon initiation of the LOCA, the ESF loads would immediately transfer to, and restart on, the 230 kV source. Thirty seconds later, as designed, the remaining balance of plant loads would transfer to the 230 kV source. This sequence could cause a 230 kV degraded voltage condition and actuate the ESF second level undervoltage relays (SLURs). Actuation of the SLURs would cause the ESF loads to be disconnected from the vital buses and to be restarted on the EDGs i.e., double sequencing.

As a result of double sequencing, the CFCU fans will have operated for approximately 50 seconds prior to losing power when the SLURs cause the vital busses to transfer to the EDGs. This results in the CCW inventory in the CFCU coils being at an elevated temperature when power is lost to the CCW pumps and CFCU fans. Because the CFCU fans continue to coast down and the CCW inventory is at a higher temperature, the potential for boiling prior to the startup of the CCW pumps is increased relative to the case where double sequencing does not occur. Additionally, the containment temperature is higher 50 seconds after the LOCA than at the start of the LOCA, which further increases the heat transfer into the CFCU coils.

Boiling in the CFCU coils was predicted for the design basis double guillotine LOCA with concurrent LOOP described above. Using the NRC Standard Review Plan limited displacement pipe break methodology (Ref. NUREG-0800, "Standard Review Plan," Section 6.2.1.3, "Mass and Energy Release Analysis for Postulated Loss-of-Coolant Accidents"), PG&E determined that CFCU boiling would not occur following a LOCA with concurrent LOOP. PG&E had previously used the limited displacement pipe break methodology in the FSAR reactor cavity analysis (Ref. FSAR Section 6.2.1.3.6.3, originally approved by Safety Evaluation Report No. 7 dated May 26, 1978).

The limited displacement pipe break, as reported in LER 1-96-005-01, reduces the break flow which results in the containment temperature increasing more slowly than for the design basis LOCA. As a result, the CCW pumps reload onto the EDGs before the containment atmosphere temperature reaches the saturation temperature of the CCW in the CFCUs. Using this approach, PG&E demonstrated that the CCWS would have been capable of performing its safety function in the event of a realistically modeled LOCA with a concurrent LOOP. However, PG&E was not able to demonstrate with reasonable certainty, using conservative criteria, that the CCW and CFCU systems were operable in the past when the 230 kV system was degraded.

Although the CFCUs and CCWS meet operability criteria when the 230 kV system is not degraded, PG&E installed the CCW surge tank pressurization system to restore the CCWS to its original design and licensing basis. It should be noted that the CCW surge tank pressurization system is common to both CCWS vital headers (through the surge tank vapor space) and protects both headers. The CCW surge tank pressurization system was designed to ensure that a minimum pressure of 17 psig is maintained in the surge tank at the initiation of a design basis accident. This minimum pressure is sufficient to ensure that

boiling will not occur in the CFCUs, assuming the worst case accident conditions with a concurrent LOOP. PG&E placed the CCW surge tank pressurization system under administrative control. The administrative controls include action statements for both 230 kV operable and degraded conditions.

C. JUSTIFICATION

Implementation of CCW surge tank pressurization system TS would ensure that the CCWS is maintained within its original design and licensing basis.

D. SAFETY EVALUATION

The addition of the CCW surge tank pressurization system provides assurance that boiling in the CFCUs will not occur as a result of a design basis accident with a concurrent LOOP. Sufficient pressure is maintained in the surge tank to provide sufficient static head in the CFCUs to prevent boiling until the CCW pumps are re-energized using the EDGs. After the CCW pumps restart, the dynamic head developed by the flow through the system is sufficient to maintain the fluid in the CFCUs in a sub-cooled condition.

If the pressurization system is not available, it has been shown that with a limited displacement LOCA break size, determined using the methodology of NUREG-0800 concurrent with a LOOP, boiling in the CFCUs will not occur prior to the restart of the CCW pumps on the EDGs.

As stated earlier, the DCPP licensing basis requires postulation of a LOOP only at the initiation of an event. The assumption of a design basis accident with a non-concurrent LOOP is beyond the licensing basis of DCPP. However, if such a LOOP were to occur and the CCW surge tank remained pressurized, boiling would not occur. If the CCW surge tank were not pressurized, then it is possible that boiling and void formation could occur for both limited displacement pipe breaks and double guillotine LOCAs and MSLBs with a non-concurrent LOOP.

A probabilistic risk assessment (PRA) analysis was used to determine a risk acceptable allowed outage time (AOT) for the CCW surge tank pressurization system based on the licensing and non-licensing (non-concurrent LOOP) basis scenarios discussed above.

The AOT was determined by equating the added risk of having the CCW surge tank pressurization system out-of-service (OOS) to a value of

"acceptable" increase in risk. The level of "acceptable" increase in risk used was set at 1.0E-07 as suggested in the Electric Power Research Institute (EPRI) Probabilistic Safety Assessment Applications Guide (Ref. EPRI TR-105396, August 1995) when considering added core damage probability which leads to an increase in the large, early release (outside containment) frequency.

The PRA analysis conservatively assumed that:

- Large (>6 inches), medium (between 2 and 6 inches), and small (less than 2 inches) LOCA initiating events result in containment conditions for a period of 24 hours which, in conjunction with a subsequent failure or degradation of the 230 kV power supply to the vital busses, fail the CCWS leading to core damage.

- MSLBs inside containment result in containment conditions for a period of one hour which, in conjunction with a subsequent failure or degradation of the 230 kV power supply to the vital busses, fail the CCWS leading to core damage.

- Failure of the CCWS, in addition to leading to core damage leads to a large early release outside containment.

The PRA analysis assumed as best estimates that:

- The probability of 230 kV becoming degraded over a 24 hour period is based on data at DCPP from August 1, 1995, to the present, that indicates 230 kV is degraded approximately 1.2 times per year. After completion of installation of new 230 kV transformers with automatic load tap changers in 1998, the occurrences of degraded 230 kV will drop to zero.

- The probability of a loss of 230 kV over a 24 hour period is based on a combination of DCPP and industry experience, and is estimated to occur at a frequency of 0.15 events per year.

Based on the above, the PRA determined that a risk acceptable AOT for the CCW surge tank pressurization system being OOS is 14 hours. After installation of the new 230 kV transformers in 1998, the calculated risk acceptable AOT will increase to 93 hours. The PRA calculated AOT included the risk associated with the "double sequencing" condition discussed above. Therefore, it is inclusive of the licensing and non-licensing basis scenarios as well as degraded offsite power supply conditions.

Although the PRA analysis indicated an AOT of 14 hours (93 hours after 1998) was "risk acceptable," PG&E has conservatively established an AOT for the CCW surge tank pressurization system of 12 hours. The 12 hour AOT should be sufficient to restore the CCW surge tank pressurization system to operable status and it minimizes the period of operation without the system.

If the CCW surge tank pressurization system is inoperable with the 230 kV system degraded, flashing could occur under accident conditions which could render both trains of the CCWS inoperable unless double sequencing of the CCW pumps is prevented. In that case, within one hour, either CCW surge tank pressure or the 230 kV system would be restored or actions would be taken to prevent double sequencing. To prevent double sequencing, the vital bus transfer to startup cutout switches would be opened to force the vital busses to transfer directly to the EDGs, effectively causing the vital busses to respond as if a LOOP occurred. Once the cutout switches are opened or either the 230 kV system or the CCW surge tank pressurization system are returned-to-service, the one hour action statement would be exited. If the above actions were not completed within one hour, the plant would be shut down.

Surveillance requirements will be added for the CCW surge tank pressurization system to verify: (1) at least once per 12 hours that the surge tank is pressurized to 17 psig or greater, and (2) at least once per refueling interval that system leakage does not exceed 2.0 standard cubic feet per minute (scfm). The 12 hour pressure verification surveillance is consistent with 12 hour surveillances for other safety-related equipment, e.g., verification of accumulator pressure and volume, emergency core cooling system valve positions, condensate storage tank volume, etc. The refueling interval frequency for the system leak test is consistent with frequencies (currently 18 months and proposed for 24 months) for other safety-related equipment such as reactor coolant system isolation valve leak rate tests and verification of 10 percent atmospheric dump valve operation with backup air bottles. Also a refueling interval frequency is appropriate based on the low leakage measured when the surge tanks were initially pressurized (less than 1 scfm) and the low makeup requirements that have been observed in the one year (approximately) that the pressurization systems have been in service on Units 1 and 2. If necessary, the system leak test may be performed in any mode including Mode 1 (Power Operation).

CONCLUSION

The CCW surge tank pressurization system has been added to ensure that the CCWS is capable of performing its design basis function following a double guillotine LOCA with a concurrent LOOP. PG&E has demonstrated that, for a limited displacement pipe break LOCA concurrent with a LOOP, the CCWS remains capable of performing its design basis function without the CCW surge tank pressurization system. A PRA of both licensing and non-licensing basis (non-concurrent LOOP) scenarios has conservatively established an AOT of 12 hours consistent with an "acceptable" risk increase equal to 1.0E-07 as suggested by EPRI methodology. An AOT of 12 hours should allow sufficient time to restore the CCW surge tank pressurization system to operable status while minimizing the period of operation without the system. If the CCW surge tank pressurization system becomes inoperable with the 230 kV system degraded, the plant would be shutdown within one hour unless the pressurization system is returned to service or the electrical system is reconfigured to prevent double sequencing.

E. NO SIGNIFICANT HAZARDS EVALUATION

PG&E has evaluated the no significant hazards considerations (NSHC) involved with the proposed amendment, focusing on the three standards set forth in 10 CFR 50.92(c) as set forth below:

> *"The commission may make a final determination, pursuant to the procedures in paragraph 50.91, that a proposed amendment to an operating license for a facility licensed under paragraph 50.21(b) or paragraph 50.22 or for a testing facility involves no significant hazards considerations, if operation of the facility in accordance with the proposed amendment would not:*
>
> *(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or*
>
> *(2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or*
>
> *(3) Involve a significant reduction in a margin of safety."*

The following evaluation is provided for the NSHCs.

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

   The component cooling water (CCW) surge tank pressurization system is designed to mitigate the consequences of an accident, and cannot initiate an accident.

   The proposed changes to the Technical Specifications (TS) incorporate requirements for the CCW surge tank pressurization system to assure that the consequences of an accident are not increased. The CCW surge tank pressurization system was installed to restore the component cooling water system to its original design and licensing basis. The design of the CCW surge tank pressurization system ensures that a minimum pressure of 17 psig is maintained in the surge tank at the initiation of a design basis loss of coolant accident. This minimum pressure is sufficient to ensure that boiling will not occur in the containment fan cooler units (CFCUs), assuming the worst case accident conditions with a concurrent loss of offsite power (LOOP).

   Therefore, the addition of these new requirements does 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?*

   The CCW surge tank pressurization system is designed to mitigate the consequences of an accident, and cannot initiate an accident.

   The proposed TS changes incorporate requirements for the CCW surge tank pressurization system. Installation of the of the CCW surge tank pressurization system provides assurance that boiling in the CFCUs will not occur, assuming the worst case accident, with a concurrent LOOP.

   Therefore, addition of these requirements does 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?*

The proposed changes to the TS incorporate requirements for the CCW surge tank pressurization system to assure that the consequences of an accident are not increased. The design of the CCW surge tank pressurization system ensures that a minimum pressure of 17 psig is maintained in the surge tank at the initiation of a design basis accident. The minimum pressure is sufficient to ensure that boiling will not occur in the CFCUs, assuming the worst case accident conditions with a concurrent LOOP.

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

F. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

Based on the above safety evaluation, PG&E concludes that the changes proposed by this LAR satisfy the NSHC standards of 10 CFR 50.92(c), and accordingly a no significant hazards finding is justified.

G. ENVIRONMENTAL EVALUATION

PG&E has evaluated the proposed changes and determined the changes do 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 changes meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed change is not required.