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See Proposed Change To Tech Specs

SUBJECT: Forwards LAR 97-10,proposing revision of TS 3/4.3.2, "Engineering Safety Features Actuation Sys Instrumentation," to add limiting condition for operation & surveillance requirements for RHR pump trip on low RWST level.

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July 30, 1997

PG&E Letter DCL-97-135

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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 97-10
Revision of Technical Specification 3/4.3.2, "Engineered Safety Features Actuation System Instrumentation," to Add Refueling Water Storage Tank Level Instrumentation

Dear Commissioners and Staff:

Enclosed is an application for amendment to Facility Operating License Nos. DPR-80 and DPR-82. This license amendment request (LAR) proposes to revise Technical Specification (TS) 3/4.3.2, "Engineered Safety Features Actuation System Instrumentation," to add a limiting condition for operation and surveillance requirements for a residual heat removal (RHR) pump trip on low refueling water storage tank (RWST) level.

The addition of the RWST low-level trip logic to TS 3/4.3.2 provides additional assurance that it is available and capable of performing its intended function. Although the RWST level channels are included in TS 3.3.3.6, "Accident Monitoring Instrumentation," the controls in TS 3.3.3.6 are not adequate to assure that the RWST level channels can provide necessary signals to the automatic RHR pump trip logic when required. TS 3.3.3.6 was only intended to ensure that sufficient information is available for operators to monitor and assess RWST levels following an accident.

The proposed changes to TS 3/4.3.2 affect changes proposed in LAR 97-09, "Technical Specification Conversion," submitted on June 2, 1997. The changes in this LAR revises change number 02-29-M in Enclosures 2, 3A, and 3B of the 3/4.3 section of LAR 97-09, and adds change number 3.3-29 to Enclosures 5A, 6A, and 6B of the 3/4.3 section. These revisions will be included in a supplement to LAR 97-09.

A001

Administrative controls consistent with this LAR have been implemented. Therefore, the changes proposed in this LAR are not required to address an immediate safety concern. PG&E requests that the NRC assign a medium priority for review and approval of this LAR.

PG&E requests that the TS changes become effective immediately upon issuance of the license amendment, to be implemented within 30 days from the date of issuance.

Sincerely,

Gregory M. Rueger

cc: Edgar Bailey, DHS
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Enclosures

KEJ/2057

REVISION OF TECHNICAL SPECIFICATION 3/4.3.2 - REFUELING WATER STORAGE TANK LEVEL INSTRUMENTATION

A. DESCRIPTION OF AMENDMENT REQUEST

This license amendment request (LAR) proposes to change Technical Specification (TS) 3/4.3.2, "Engineered Safety Features Actuation System Instrumentation."

1. TS 3.3.2, Table 3.3-3, "Engineered Safety Features Actuation System Instrumentation," Functional Unit 9, "Residual Heat Removal Pump Trip on Refueling Water Storage Tank Level-Low," would be added.

   The associated limiting condition for operation (LCO) would require three channels to be operable. Action Statement 36 would be added to require that with one channel inoperable, the inoperable channel must be placed in cut-out within 6 hours and restored to operable status within 72 hours, otherwise be in Mode 3 (Hot Standby) within the next 6 hours and in Mode 5 (Cold Shutdown) within the next 30 hours. The channel cut-out function is similar to the bypass function provided for instrumentation in the reactor protection system in that it removes the channel from input to the trip logic and provides a control room alarm. This new LCO would be applicable in Modes 1 through 4.

2. TS 3.3.2, Table 3.3-4, "Engineered Safety Features Actuation System Instrumentation Trip Setpoints," Functional Unit 9, "Residual Heat Removal Pump Trip on Refueling Water Storage Tank Level-Low," would be added.

   A "Trip Setpoint" of 32.56 percent refueling water storage tank (RWST) level, corresponding to the measured RWST volume of 149,200 gallons used in accident analyses assumptions, would be added. "Allowable Values" of ±1.12 percent level, determined consistent with protection system methodology, would also be added.

3. TS 3.3.2, Table 4.3-2, "Engineered Safety Features Actuation System Instrumentation Surveillance Requirements," Functional Unit 9, "Residual Heat Removal Pump Trip on Refueling Water Storage Tank Level-Low," would be added.

The new surveillance requirements would include a once per shift channel check and 24 month refueling frequency channel calibrations and actuation logic tests. These surveillances would be required in to be current in Modes 1 through 4.

Changes to the TS requirements and associated Bases are noted in the marked-up copies of the current TS pages and the improved TS pages in the 3/4.3 section of LAR 97-09, as provided in Attachments B and D, respectively. The proposed new current and improved TS pages are provided in Attachment C and E, respectively.

B. BACKGROUND

The RWST provides borated water to the suction of the emergency core cooling system (ECCS) pumps and to the containment spray (CS) pumps. The ECCS pumps includes two residual heat removal (RHR), two safety injection (SI), and two centrifugal charging pumps (CCPs). Upon receipt of a SI signal, the ECCS pumps begin to draw water from the RWST. Upon receipt of a containment high-high pressure signal, the CS pumps will also begin drawing from the RWST.

The RWST low-level trip logic is designed to automatically trip both RHR pumps when RWST water volume decreases to 149,200 gallons above the centerline of the nozzle which supplies the ECCS pump during the injection phase of a loss of coolant accident (LOCA). This water volume is equivalent to a measured level of 32.56 percent and the RHR pump trip occurs when two of the three RWST level channels sense a decrease in level to this point. Emergency operating procedures then direct operators to manually realign the suction of the RHR pumps to the containment recirculation sump to begin recirculating water from containment. The suction paths of the CCPs, SI, and CS pumps remain aligned to the RWST and continue to draw water. After the RHR pumps are realigned to draw from the containment recirculation sump, operators realign the CCPs and SI pumps to take suction from the discharge of the RHR pumps. Operators stop the CS pumps when the RWST level decreases to 4 percent and, depending on plant conditions, may align an RHR pump to the CS header.

The RWST low-level trip of the RHR pumps is assumed in the design basis to ensure a continued supply of water for the ECCS pumps following a LOCA. The trip prompts operators to initiate the manual switchover to the containment recirculation sump and must occur with sufficient volume in the RWST to provide operators adequate time to perform switchover lineups before the RWST empties. The RWST low-level trip setpoint also ensures there is sufficient water transferred into

the containment recirculation sump to support RHR pump suction. Furthermore, there must also be sufficient borated water injected from the RWST to ensure the reactor remains shut down in the recirculation mode.

TS 3.3.3.6, "Accident Monitoring Instrumentation," provides requirements for RWST water level instrumentation to assure that sufficient information is available to monitor and assess RWST water level following an accident. Although the RWST low-level RHR pump trip logic is supplied by the instrumentation channels covered by TS 3.3.3.6, the TS does not apply to the RHR pump trip logic, and therefore does not assure its availability.

This condition was discovered by PG&E engineering in response to a question by an NRC resident inspector. In accordance with 10 CFR 50.72, 1-hour non-emergency reports were made on March 14 and 19, 1997. The reports identified that this condition was outside the design basis of the plant in that administrative controls did not require the availability of sufficient RWST level channels to meet the single active failure criteria and ensure the automatic tripping function of the RHR pumps during transfer to recirculation. Administrative controls were established to assure adequate availability of the channels and pump trip logic. Licensee Event Report 97-005 (PG&E letter DCL-97-062), describing this issue, was submitted on April 14, 1997.

C. JUSTIFICATION

The TS changes proposed in this LAR will provide additional assurance that the RWST level instrumentation is available and capable of performing its required function to generate an RHR pump trip on low RWST water level. 10 CFR 50.36(c)(2)(ii) requires that an LCO be established for a component that is a part of the primary success path and which actuates to mitigate a design basis accident. Since the RWST low-level trip of RHR pumps is assumed in the design basis accident analyses to ensure there is a continuous supply of water for the ECCS pumps, the RWST low-level trip logic must be included in the TS. The addition of the RWST low-level trip function to TS 3/4.3.2 is consistent with NUREG-1431, Revision 1, "Standard Technical Specifications - Westinghouse Plants."

D. SAFETY EVALUATION

An RHR pump trip is actuated when two of the three RWST level channels decrease to the RWST low-level setpoint of 32.56 percent measured level. TS 3.3.3.6, Table 3.3-10, Instrument 8, "Refueling Water Storage Tank Water Level," requires that a minimum of two RWST level channels be

operable to provide post-accident monitoring indication to control room operators. Although these same level channels provide the input to the RWST low-level RHR pump trip logic, TS 3.3.3.6 does not apply to the trip logic. This LAR adds LCO and surveillance requirements to TS 3.3.2, to provide three operable channels of RWST low-level instrumentation and RHR pump trip logic in plant operating Modes 1 through 4.

LCO and Applicability

This LAR adds "Residual Heat Removal Pump Trip on Refueling Water Storage Tank Level-Low" to the list of Functional Units in ESFAS Instrumentation Table 3.3-3. It was not listed as "automatic switchover to containment sump," as it is in NUREG-1431, Revision 1, since the RHR pump trip is the only automatic function of the switchover from the injection phase to the recirculation phase following a LOCA. Three channels are required to assure that the single failure of an RWST level channel will not either prevent a required RHR pump trip, or cause an unnecessary pump trip if a single failure of a channel were to occur.

Consistent with ECCS system operability requirements, the LAR requires that the level channels be operable in plant operating Modes 1 through 4. This function is not required to be operable in Modes 5 and 6 (Refueling) because there is adequate time for operators to evaluate unit conditions and respond by manually starting ECCS pumps and other equipment to mitigate the consequences of an abnormal condition or accident. System pressure and temperature are very low and many engineered safety features (ESF) components are not required to be operable or are administratively locked out or otherwise prevented from actuating to prevent inadvertent overpressurization of unit systems.

Action Statement

Action 36 was added to address the actions necessary with two of three channels operable. Action 36 provides that with one channel inoperable, within 6 hours place the inoperable channel in "cut-out." Additionally, the action allows 72 hours to restore the inoperable channel, or be in at least Mode 3 within the next 6 hours and in Mode 5 within the next 30 hours.

Each channel can be placed in the cut-out mode by a switch in the cable spreading room, initiating an annunciator alarm in the control room. The cut-out mode is similar to the "bypass" mode used on other ESF instrumentation. Like the bypass mode, when an RWST level-low channel is placed in cut-out, the input is removed from the trip logic. However, the RWST low-level instrumentation is not an intergral part of the plant protection system and remains an independent logic system associated with the control system for the RHR pumps. To change the feature's name

from "cut-out" to "bypass" would require plant procedures, drawings, and labeling changes.

A two-out-of-two trip logic is established when one channel is placed in the cut-out mode. The two-out-of-two logic is preferable to a one-out-of-two logic that would be established if an inoperable channel was placed in a tripped condition. With a one-out-of-two logic, the additional failure of one level channel in the low direction could trip running RHR pumps or prevent RHR pumps from starting when they would be required to operate. Although a single failure of a channel would not be required to be assumed when in an action statement, with a two-out-of-two logic, the additional failure of a channel in the high direction would prevent a pump trip. While this could impact the time available to operators to transfer to the recirculation mode, the consequences of this were determined to be less significant than the potential loss of RHR pumps during the injection phase.

This TS change establishes a 72 hour allowed outage time (AOT) for one RWST level channel to be placed in the cut-out mode. To establish this AOT, the probability of failure of an additional channel was reviewed and a comparison with the RHR pump 72 hour AOT was made. The probability of the failure of an additional level channel during the 72 hour period is judged to be very low based on extensive industry and Diablo Canyon Power Plant experience. In addition, the 72 hour AOT compares favorably to the 72 hour AOT for one RHR pump. The failure of the remaining RHR pump would result in the loss of ECCS following a LOCA. The failure of one of two remaining RWST level instruments could result in the loss of ECCS at the start of the recirculation mode, if the failure does not trip the channel and operators do not intervene to stop the RHR pumps before the RWST is depleted. The probability of the failure of an RWST level channel was found to be lower than the failure of an RHR pump. A review of the level instrument TS outage statistics dating back to January 1992 found that the overall availability for the six level channels (three per unit) was greater than 99 percent.

Setpoints and Allowable Values

The RWST low-level trip setpoint added to TS Table 3.3-4 is 32.56 percent measured level. This is equivalent to 149,200 gallons of water above the centerline of the nozzle, which supplies the ECCS pump and is used in design calculations. The setpoint assures that sufficient volume is injected by RHR into the RCS before the pumps are tripped. Additionally, the setpoint assures sufficient time for operators to perform equipment lineups necessary to transfer the ECCS from the injection phase to the recirculation phase.

A Monte Carlo statistical analysis was performed on the two-out-of-three pump trip logic to assure that the setpoint provides a 95 percent probability that the RHR pumps will trip after sufficient volume has been injected and with sufficient margin for switchover to the recirculation mode. A similar evaluation determined that the two-out-of-two pump trip logic in effect with one channel in cut-out would provide a trip after sufficient water volume had been injected. The additional uncertainty associated with a two-out-of-two trip logic could reduce the volume available for switchover. However, the limiting single failure assumed in the switchover analysis was the failure of an RHR pump to trip at the RWST low-level setpoint. Since it is not necessary to assume this single failure while in the TS action statement for one RWST level channel out of service, there is sufficient water available for switchover.

The allowable values were established using the methodology described in LAR 96-10, "Revision of Technical Specifications to Support Extended Fuel Cycles to 24 Months." The allowable values, which account for rack drift and rack measuring and test equipment, were determined to be ± 1.12 percent over an allowed 30 month surveillance interval.

An ESF response time was not added to TS Table 3.3-5 since one was determined to not be applicable. Response time was not factored into design analyses since the volume of water transferred from the RWST at the time the RWST low-level is achieved is not significant compared to the trip time of the RHR pumps.

Surveillance Requirements

Surveillance requirements were added to TS Table 4.3-2 to require a channel check once per shift. In addition, 24 month refueling frequency surveillances were added for channel calibrations and actuating logic tests. Each test is currently performed consistent with the TS Chapter 1 definitions.

A quarterly channel operational test, which would be required for most ESF instrumentation channels, was not included since the level channels were not designed to be tested in this manner in Modes 1 to 4. Similarly, the logic was not designed such that an actuating logic test could be performed in Modes 1 to 4. To perform a channel operational test in modes where the system is required to be operable would require either a significant plant modification or technicians to lift leads to inject a simulated signal.

The impact of channel drift over an allowed 30 month interval was accounted for in instrument uncertainty calculations and is reflected in the analysis which established the trip setpoint allowable values. Additionally, these channels were included in the SI system scope for the maintenance rule. A reliability assessment performed over a three year period did not identify any channel failures that would have been identified during the performance of a quarterly channel operational test. Continued channel reliability assessment is assured by the implementation of the maintenance rule and the refueling frequency channel calibrations and actuation logic tests. Therefore, based on the operating history of the channels and continued reliability assessment, the new surveillance requirements provide a high level of assurance that the channels remain operable.

E. NO SIGNIFICANT HAZARDS EVALUATION

PG&E has evaluated the proposed change for potential 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 in support of the NSHC conclusion:

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

This change assures the availability of the refueling water storage tank (RWST) low-level trip of the residual heat removal (RHR) pumps by establishing limits on the time that a channel can be out of service to 72 hours and establishing surveillance criteria to verify the operation of the logic. The RHR system is used to respond to loss of coolant accidents (LOCAs) and other (e.g., secondary side) accidents that could result in initiation of a safety injection signal, and is not a precursor to any of these events as evaluated in safety analyses. Under accident conditions the RWST serves as the source of water for the emergency core cooling system (ECCS) pumps and the containment spray pumps. The RWST and the RHR pump trip are accident mitigation components and are not precursors for any accident evaluated in the safety analyses.

The existing Technical Specification (TS) would allow one RWST level indication channel to be inoperable indefinitely, and has an allowed outage time (AOT) for two channels inoperable of up to seven days. Additionally, the existing TS does not apply to the RWST low-level RHR pump trip logic. The new TS provides controls that require that all three RWST low-level trip channels be maintained operable while the plant is in Modes 1 to 4, and provides for an AOT for one channel inoperable for up to 72 hours, if the inoperable channel is placed in the cut-out mode within 6 hours. By placing the inoperable channel in the cut-out mode, the possibility of a channel failure causing an RHR pump failure to start at the onset of an accident is precluded even with a single active failure. This assures that the consequences of an accident are not increased.

The change will have no affect on the probability of a physical failure of an RHR pump because it only ensures the presence of a pump trip signal when required. Therefore, there is no increase in the probability of failure of an RHR train to function as designed. This change will have no affect on the probability of any other ECCS equipment failure as it only affects the presence of a trip signal for the RHR pumps.

The new TS 3.3.2 item would provide controls that require that all three RWST level channels be maintained operable while the plant is in operating Modes 1 to 4 (power operation through hot shutdown). By maintaining the three channels operable, the RHR pump actuation/trip logic operability is assured so that the RHR and RWST can in all cases perform their intended accident mitigation functions following a design basis event as evaluated in the safety analyses.

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?*

The RHR system is used to respond to LOCAs and other (e.g., secondary side) accidents that could result in initiation of a safety injection signal. Under accident conditions the RWST serves as the initial source of water for injection by the RHR and other ECCS pumps, and is the source of water for the containment spray pumps. This change does not affect operation of the systems as it relates to their response to accident conditions. It provides additional assurance that the RHR pump trip logic will operate as designed by establishing administrative controls on the time the system is susceptible to a single failure. No new failure modes have been introduced.

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?*

The relevant margin of safety is based on the RHR pumps starting and then automatically stopping at the correct RWST water level. The new TS 3.3.2 item provides controls that require all three RWST level channels be maintained operable while the plant is in Modes 1 to 4. By maintaining the three channels operable, the capability of the RHR pump actuation/trip logic to survive a single active failure is assured. Therefore, the trip logic operability is assured and the margin is preserved. This change also provides additional assurances that the remaining water in the RWST at the time of switchover is consistent with that assumed in the Final Safety Analysis Report and Safety Evaluation Reports.

Therefore, the proposed change does not involve a significant 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 of 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.