Pacific Gas and Electric Company®

James R. Becker
Site Vice President and
Station Director

Diablo Canyon Power Plant
Mail Code 104/5/502
P. O. Box 56
Avila Beach, CA 93424

805.545.3462
Internal: 691.3462
Fax: 805.545.4234

April 3, 2008

PG&E Letter DCL-08-023

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

Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
License Amendment Request 08-02
Revision to Technical Specifications 3.7.5, "Auxiliary Feedwater System" and 3.7.6, "Condensate Storage Tank and Fire Water Storage Tank"

Dear Commissioners and Staff:

In accordance with 10 CFR 50.90, enclosed is an application for amendment to Facility Operating License Nos. DPR-80 and DPR-82 for Units 1 and 2 of the Diablo Canyon Power Plant (DCPP), respectively. The enclosed License Amendment Request (LAR) proposes to revise Technical Specification (TS) 3.7.5, "Auxiliary Feedwater System," to remove Surveillance Requirement 3.7.5.6, and revise TS 3.7.6, "Condensate Storage Tank (CST) and Fire Water Storage Tank (FWST)," to remove the FWST level requirements, revise the CST level requirements, and revise TS 3.7.6 to be consistent with the NUREG-1431 Standard Technical Specifications.

The proposed changes are made as a result of a design change to the CST that enables the CST to provide the entire required usable volume of safety grade water to remove decay and sensible heat from the Reactor Coolant System (RCS). The changes to the CST are being made by Pacific Gas and Electric Company (PG&E) under 10 CFR 50.59, and NRC approval of the changes to the CST is not being requested. The DCPP Unit 2 CST was upgraded during the Unit 2 Fourteenth Refueling Outage in 2008, and the DCPP Unit 1 CST is planned to be upgraded during the Unit 1 Fifteenth Refueling Outage scheduled to begin in January 2009. When upgraded, the CST for each unit has sufficient water available to meet the RCS heat removal design bases.

As part of the steam generator (SG) replacement program at DCPP, revised CST minimum storage volume calculations have been performed to incorporate the impact of the replacement SGs, and the 2006 design change in Unit 2 to a T_{cold}

A001
A006
NRR

upper head design. The revised CST minimum storage usable volume calculations are being performed by PG&E under 10 CFR 50.59, and NRC review of the calculations is not being requested.

This LAR proposes a change to TS 3.7.5, "Auxiliary Feedwater (AFW) System," and TS 3.7.6, "CST and FWST." A change to TS 3.7.5, "AFW System," and TS 3.7.6, "CST and FWST," has also been proposed in PG&E Letter DCL-07-097, "License Amendment Request 07-04, Proposed Technical Specifications Change to Relocate Surveillance Test Intervals to a Licensee-Controlled Program (Risk Informed Technical Specifications Initiative 5b)," dated October 15, 2007. If approved prior to approval of this LAR, new TS markups will be provided.

The purpose for the proposed changes to TS 3.7.5 and TS 3.7.6 is to allow PG&E to refurbish the FWST and replace portions of the Fire System piping while online, and to provide greater flexibility for future operation of the FWST. Internal inspection of the FWST found degradation in the lining, and therefore the steel tank is susceptible to accelerated corrosion at these locations. Additionally, fire water lines around the fire pumps have been found to be more susceptible to corrosion due to more frequent water flow than has occurred in the stagnant portions of the fire water system. Although the FWST and fire water piping remain fully capable of performing their required function, FWST refurbishment and replacement of fire water piping are being performed to ensure continued reliability of the fire water system over plant life. To minimize the possibility that a similar system repair would be needed in the future, all boundary valves will also be replaced. The scope of work proposed is expected to take approximately 90 days to perform.

PG&E currently plans to refurbish the FWST, and replace the suction and recirculation piping for Fire Water Pumps 0-1 and 0-2 under 10 CFR 50.59 starting in April 2009. Without the requested TS changes, both DCPP Units 1 and 2 would need to be shut down to accomplish the FWST refurbishment and piping replacement. When the FWST is inoperable, TS 3.7.6 Condition A is entered, and TS 3.7.6 Required Action A.2 requires the FWST level to be restored within limit with a Completion Time of 7 days. If the TS 3.7.6 Condition A Completion Time of 7 days is not met, TS 3.7.6 Condition B requires the units to be in Mode 3 in 6 hours, and in Mode 4 without reliance on SG for heat removal in 18 hours. In order to support performing the FWST refurbishment at power, PG&E plans to perform design changes to the CST that would establish a greater volume of usable water in the DCPP Unit 1 and Unit 2 seismically qualified CSTs.

Enclosure 1 contains a description of the proposed changes, the supporting technical analyses, and the no significant hazards consideration determination. Enclosures 2 and 3 contain marked-up and retyped (clean) TS pages, respectively.

Enclosure 4 provides the marked-up TS Bases changes for information only. TS Bases changes are provided for information only and will be implemented pursuant to TS 5.5.14, "Technical Specifications Bases Control Program," at the time this amendment is implemented.

PG&E has determined that this LAR does not involve a significant hazard consideration as determined per 10 CFR 50.92. Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of this amendment.

The changes in this LAR are not required to address an immediate safety concern. PG&E requests approval of this LAR no later than April 1, 2009, to support modifications to the FWST which is currently scheduled to begin in April 2009. PG&E requests the license amendment(s) be made effective upon NRC issuance, to be implemented within 90 days from completion of the upgrade of the CST for DCPP Unit 1.

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

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

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

Executed on April 3, 2008.

Sincerely,

James R. Becker
Site Vice President and Station Director

kjse/4328
Enclosures
cc: Gary W. Butner, Acting Branch Chief, California Department of Public Health
Elmo E. Collins, NRC Region IV
Michael S. Peck, NRC, Senior Resident Inspector
Diablo Distribution
cc/enc: Alan B. Wang, Project Manager, Office of Nuclear Reactor Regulation

EVALUATION

1.0 DESCRIPTION

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

The proposed changes would revise the Operating Licenses to revise Technical Specification (TS) 3.7.5, "Auxiliary Feed Water System (AFW)," to remove Surveillance Requirement (SR) 3.7.5.6, and revise TS 3.7.6, "Condensate Storage Tank (CST) and Fire Water Storage Tank (FWST)," to remove the FWST level requirements, revise the CST level requirements, and revise TS 3.7.6 to be consistent with the NUREG-1431 Standard Technical Specifications. The proposed changes are made as a result of a design change to the CST that enables the CST to provide the entire required usable volume of safety grade water to remove decay and sensible heat from the Reactor Coolant System (RCS). The changes to the CST are being made by Pacific Gas and Electric Company (PG&E) under 10 CFR 50.59, and NRC approval of the changes to the CST is not being requested.

2.0 PROPOSED CHANGES

The proposed change to TS 3.7.5 is to remove SR 3.7.5.6.

The proposed changes to TS 3.7.6 are as follows:

The title is revised from, "CST and FWST," to "CST."

The Limiting Condition for Operation (LCO) is revised from, "The CST level shall be ≥ 41.3% and the FWST level shall be ≥ 22.2% for one unit operation and ≥ 41.7% for two unit operation," to, "The CST shall be OPERABLE."

Condition A is revised from, "CST or FWST level not within limit," to, "CST inoperable."

Required Action A.2 is revised from, "Restore CST or FWST level to within limit," to, "Restore CST to OPERABLE status."

Surveillance Requirement (SR) 3.7.6.1 is revised from, "Verify the CST level is ≥ 41.3%," to, "Verify the CST water volume is ≥ 200,000 gallons for Unit 1 and ≥ 166,000 gallons for Unit 2."

SR 3.7.6.2 is removed.

The TS 3.7.4, "10% Atmospheric Dump Valves (ADVs)," Bases Background and Applicable Safety Analyses sections are updated to remove the reference to the FWST as a source of cooling water for the AFW system. The TS 3.7.5 Bases Background section is updated to remove the reference to capability to align to the FWST and the SR section is updated to remove the section for SR 3.7.5.6. The TS 3.7.6 Bases are updated to remove the reference to the FWST, to incorporate the revised required CST volume for each unit, to include the basis for the Unit 2 volume, and to remove the section for SR 3.7.6.2. The TS Bases changes are included for information only.

The proposed TS changes are noted on the marked-up TS pages provided in Enclosure 2. The proposed retyped TS pages are provided in Enclosure 3. The revised TS Bases is contained for information only in Enclosure 4.

3.0 BACKGROUND

3.1 Auxiliary Feedwater System

The AFW System automatically supplies feedwater to the steam generators (SGs) to remove decay heat from the RCS upon the loss of normal feedwater supply. The AFW System is discussed in the Final Safety Analysis Report (FSAR), Section 6.5. The AFW pumps take normal suction through valve MU-671 in the single suction line from the CST, and are capable of being aligned to the FWST and pump to the SG secondary side via separate and independent connections to the main feedwater (MFW) piping for each SG outside containment. The SG functions as a heat sink for core decay heat. The heat load is dissipated by releasing steam to the atmosphere from the SGs via the main steam safety valves (MSSVs) or atmospheric dump valves. If the main condenser is available, steam may be released via the condenser steam dump valves and recirculated to the CST.

The AFW System consists of two motor-driven AFW pumps and one steam turbine-driven pump configured into three trains. Each motor-driven pump provides 100 percent of flow capacity, and the turbine-driven pump provides 200 percent of the required capacity to the SGs, with 100 percent capacity defined as the flow required to 2 SGs during the AFW design basis accident analysis (loss of normal feedwater flow). Each motor-driven AFW pump is powered from an independent Class 1E power supply and feeds two SGs, although each pump has the capability to be manually realigned to feed other SGs. The steam turbine-driven AFW pump receives steam from two main steam lines upstream of the main steam isolation valves. Each of the steam feed lines will supply 100 percent of the requirements of the turbine-driven AFW pump.

The AFW System is capable of supplying feedwater to the SGs during normal unit startup, shutdown, and hot standby conditions. The AFW System is designed to supply sufficient water to the SG(s) to remove decay heat with SG pressure at the setpoint of the MSSVs. Subsequently, the AFW System supplies sufficient water to cool the unit to residual heat removal (RHR) entry conditions, with steam released through the atmospheric dump valves.

The turbine-driven AFW pump supplies a common header capable of feeding all SGs with vital alternate current powered control valves. One turbine-driven pump at full flow is sufficient to remove decay heat and cool the unit to RHR entry conditions. Thus, the requirement for diversity in motive power sources for the AFW System is met.

The AFW System (both the one turbine-driven and two motor-driven AFW pumps) actuates automatically upon actuation of the anticipated transient without scram mitigating system actuation circuitry. The motor-driven pumps are additionally actuated by: (1) safety injection, (2) an associated bus transfer to the diesel generator signal, (3) a trip of both main feedwater pumps, or (4) SG water level low-low in one of four SGs. The turbine-driven pump is additionally actuated by 12 kilovolt bus undervoltage or SG low-low level in two of four SGs via the engineered safeguards features actuation system.

SR 3.7.5.6 verifies that the FWST is capable of being aligned to the AFW pump suctions. This assures that this additional supply of required AFW is available from the seismically qualified FWST should it be needed for a natural circulation cooldown. The 24-month frequency of SR 3.7.5.6 is based on engineering judgment, and is consistent with the ASME Code for Operation and Maintenance of Nuclear Power Plants, 2001 Edition including 2002 and 2003 Addenda, and 10 CFR 50.55a(b)(3)(vi). A similar SR is not required to assure proper CST alignment since the AFW system is used for startup, and an AFW pump is tested each month.

The limiting event for AFW supply is the volume required to hold a unit in Mode 3 for one hour, followed by an 8-hour natural circulation cooldown to RHR entry conditions at 25°F per hour. The CST seismic volume alone is insufficient for this limiting event and thus the FWST, as required by TS 3.7.6, provides the additional volume required. The FWST has a seismically-qualified flowpath to the AFW pumps suction to withstand an assumed seismic failure of any single valve (valve jammed shut). Therefore valves MU-0-1557, MU-1-297, and MU-2-298 are maintained in their normal positions. If these valves are required to be out-of-position due to maintenance activities, then the TS 3.7.6 Action A is entered.

3.2 Condensate Storage Tank

When the main steam isolation valves are open, the preferred means of RCS heat removal is to discharge steam to the condenser by the nonsafety grade path of the condenser dump valves. The condensed steam is returned to the CST by the condensate pumps. This has the advantage of conserving condensate while minimizing releases to the environment. However, when the main steam isolation valves are closed due to a steam line isolation signal or when the condenser is not available (e.g. loss-of-offsite power), RCS heat removal is accomplished with the SGs relieving to atmosphere. The CST, supplemented by the FWST, provides a safety grade source of water to the SGs for removing decay and sensible heat from the RCS. The CST provides a passive flow of water, by gravity, to the AFW System (LCO 3.7.5), which pumps feedwater to the SGs. The steam produced in the SGs is released to the atmosphere by the MSSVs or the atmospheric dump valves if the main steam isolation valves are closed. The AFW pumps operate with a continuous recirculation to the CST.

A description of the CST is provided in the FSAR Section 9.2.6. The condensate storage facilities consist of a CST for each unit and a common transfer tank located outside the auxiliary building. The CST is a vertical carbon steel tank with a reinforced concrete wall, 40-feet in diameter and 47-feet high. The CST has a floating roof to minimize oxygen absorption by the stored water. The CST capacity is based on supplying the normal makeup and rejection requirements of the steam plant, and providing a source of feedwater for the AFW system. The capacity of each CST is 425,000 gallons, which includes a minimum reserve of 164,678 usable gallons for auxiliary feed pump operation and a drainable but not usable volume of approximately 13,000 gallons. The reserve of 164,678 usable gallons for auxiliary feedwater pump operation is based on the TS 3.7.6 required level of 41.3 percent which corresponds to approximately 210-inches of tank level above the vortex suppression cage. The capacity of the transfer tank is 150,000 gallons.

The CST is used for condensate makeup and rejection. The Unit 1 CST also serves as a source of water to the auxiliary boiler. Makeup water to other plant systems can be supplied from the CSTs by use of the makeup water transfer pump. A gravity flowline is also provided to allow water to flow between the transfer tank and condensate tank when required. In an emergency, water can be supplied from other sources through a hose bib connected to the CST hydrazine recirculation line.

The Units 1 and 2 CSTs are crosstied through a 4-inch line with normally closed double valves. The crosstie line nozzles on each tank are 19 feet above the AFW suction pipe nozzles, thereby ensuring that failure of the crosstie line cannot reduce the condensate storage capacity for SG makeup from the AFW pumps. The suction lines for the AFW pumps for the two units are not crosstied but do have two sources of water (the CST and the raw water storage reservoir).

Because the CST is a principal component for removing residual heat from the RCS, it is designed to withstand earthquakes and other natural phenomena, including missiles that might be generated by natural phenomena. The CST is designed to Seismic Category I to ensure availability of the feedwater supply following a seismic event. Feedwater is also available from alternate sources such as from the other unit (if CST water inventory is not required for that unit), the main condenser hotwells (using the condensate pumps), the FWST, the fire water transfer tank, the main condenser hotwells (using portable fire pumps), the raw water storage reservoirs, Diablo Canyon Creek, and the Pacific Ocean (via the auxiliary saltwater system).

The connections for all consumers of CST inventory, except the supply line to the AFW pumps, are made at approximately 19 feet, and are above the 164,678 (usable) gallon level to ensure this reserve is maintained. The connections for all consumers of CST inventory, except the supply line to the AFW pumps, are not Seismic Category I, and thus their integrity following a seismic event cannot be assured. Therefore, CST level above the 164,678 (usable) gallon level is not credited as a safety grade source.

The water in the CSTs is sampled periodically to determine chemical quality. In addition, the activity level of the water is checked and if SG leakage is suspected, the frequency of the activity samples of water will be increased.

The water level in each CST is displayed on a Design Class I local indicator and redundant Design Class I recorders in the control room. High, low, and low-low water levels are alarmed in the control room. The low-level alarm annunciates at 50.4 percent when the tank level is approaching the minimum limit of approximately 41.3 percent as stated in the TS 3.7.6. The purpose of the low-low level alarm (10 percent) is to notify the operator that the AFW supply is running low and that an alternate water supply must be aligned. The alarm provides the operator with at least a 20 minute supply of water for the auxiliary feed pumps at a net flowrate of 880 gallons per minute (gpm).

The current TS 3.7.6 CST and FWST inventory requirements are based on PG&E Letter DCL-90-271, "License Amendment Request 90-11, Revision of Fire Protection License Conditions, Relocation of Fire Protection Technical Specifications, and Clarification of AFW Water Sources," dated November 15, 1990, which was approved by the NRC in

Amendment 75 to Facility Operating License No. DPR-80 and Amendment 74 to Facility Operating License No. DPR-82, for DCPP Units 1 and 2 respectively in an NRC Letter, "Issuance of Amendments for Diablo Canyon Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. M79423 and M79424)," dated January 13, 1993. These amendments added an additional water source for the AFW system to be available from the FWST (57,922 gallons when one unit is operating, and 115,844 gallons when two units are operating), and additional requirements for a FWST flowpath being capable of being aligned to the AFW pump suction to TS 3.7.1.3. The TS 3.7.1.3 changes were made to ensure the TS contained the seismically qualified water storage required to meet the natural circulation cooldown scenario identified in the NRC letter titled, "Natural Circulation Cooldown (Generic Letter No. 81-21)," dated May 5, 1981.

3.3 Fire Water Storage Tank

A description of the FWST (FWST 0-1) is provided in the FSAR Sections 1.2.2.10.1, 6.5.2.1.1, and Table 9.2-9. The two units share a common FWST, raw water storage reservoir, and fire pumps. The FWST supplements the CST as a safety grade source of water to the SGs for removing decay and sensible heat from the RCS. The FWST provides a passive flow of water, by gravity, to the AFW System, which pumps feedwater to the SGs.

The FWST 0-1 and transfer storage tank are a vertical dual compartment tank, 33- and 40-feet in diameter respectively, and 51-feet high. The FWST capacity is 300,000 gallons. The transfer tank surrounds the FWST, and is 40 feet in diameter. The FWST TS 3.7.6 usable volume, required to supplement the CST as a safety grade source of water, is 115,844 gallons (equivalent to greater than or equal to 41.7 percent indicated level) for two units operating, and 57,922 gallons (equivalent to greater than or equal to 22.2 percent indicated level) for one unit operating. This is based on holding the unit in Mode 3 for one hour, followed by an 8-hour natural circulation cooldown to RHR entry conditions at 25°F per hour. The FWST is made of carbon steel, and the outer transfer storage tank is made of carbon steel with a reinforced concrete wall.

FWST 0-1 is designed to withstand earthquakes and other natural phenomena, including missiles that might be generated by natural phenomena. The FWST is designed to Seismic Category I to ensure availability of the feedwater supply.

To satisfy insurance carrier requirements and provide fire suppression to nonpower block site facilities, PG&E installed an additional fire water storage tank, FWST 0-2, two fire pumps, and fire water loop piping south of the power block. This fire water loop was provided with manual cross-connect valves to the yard loop around the power block, to provide reliability, flexibility and additional capability. Equipment Control Guideline (ECG) 18.1, "Fire Suppression Systems/Fire Suppression Water Systems," contains actions to control FWST 0-1. ECG 18.1 Action A.2 for the FWST 0-1 inoperable, requires provision of an alternate backup pump or supply. The FWST 0-2 supply is used as the alternate backup supply to satisfy ECG 18.1 Action A.2. FWST 0-2 provides a nominal minimum 470,000 gallons of water to automatic, water suppression systems, hydrants, and manual water hose reels to suppress fires. The FWST 0-2 volume is not credited for meeting TS AFW supply requirements.

3.4 Applicable Safety Analyses

The CST and FWST provide cooling water to remove decay heat and to cooldown the unit(s) following natural circulation cooldown due to a loss-of-offsite power (LOOP), control room or cable spreading room fire, large feedwater line break coincident with a LOOP, feedwater/AFW connection line break, loss-of-coolant accident (LOCA), and station blackout events as described in the accident analysis sections in FSAR Chapters 6 and 15.

Natural Circulation Cooldown at Reduced Cooldown Rate Due to LOOP

The limiting event for AFW supply, i.e., CST and FWST minimum tank volumes, is a natural circulation cooldown at a reduced cooldown rate due to LOOP event using seismically qualified water sources. This event is postulated in NRC Generic Letter (GL) 81-21, "Natural Circulation Cooldown." With a LOOP, the reactor coolant pumps are not available to pump RCS flow, and the RCS cooldown is performed using natural circulation in the RCS. In addition, with a LOOP the condensate pumps are not available resulting in loss of the condenser vacuum requiring steam relief through the main steam safety valves or atmospheric dump valves. The main feedwater pumps are not available resulting in the need to use the AFW System. GL 81-21 also identified the loss of reactor coolant pumps as a potentially limiting event, however, a LOOP event requires more AFW supply. GL 81-21 identified that during a natural circulation cooldown, the potential for void formations in the upper vessel head region can occur. GL 81-21 recognized that a significant steam void in the vessel creates an undesirable challenge to operators and that reactor vessel voiding during controlled natural circulation cooldowns should be avoided.

GL 81-21 requested that licensees provide:

- A demonstration (e.g. analysis and/or test) that controlled natural circulation cooldown from operating conditions to cold shutdown conditions, conducted in accordance with plant procedures, would not result in reactor vessel voiding;

- Verification that supplies of condensate-grade auxiliary feedwater are sufficient to support plant cooldown methods; and

- A description of PG&E's training program and the provisions of PG&E's procedures (e.g. limited cooldown rate, response to rapid change in pressurizer level) that deal with prevention or mitigation of reactor vessel voiding.

PG&E provided the requested information in response to GL 81-21 in PG&E Letter, "Natural Circulation Cooldown - Voiding," dated December 7, 1981. The letter and Safety Evaluation Report issued by the NRC on October 5, 1984, which addressed PG&E's response to GL 81-21 concluded that there is reasonable assurance that steam formation in the upper head of the reactor vessel during natural circulation cooldown will not occur based on the review of the Westinghouse study applicable to DCPP, the training program for natural circulation cooldown, and the existence of sufficient condensate supply.

For this event, it is assumed there is a LOOP where a unit is held in hot standby (Mode 3) for 1 hour followed by an 8-hour natural circulation cooldown from no load temperature of 547°F to the RHR entry conditions of 350°F at a reduced cooldown rate of 25°F per hour. The normal cooldown rate is 50°F per hour. However, a reduced cooldown rate of 25°F per hour is necessary for this event to maintain subcooling in the reactor vessel upper head region during the natural circulation cooldown since the DCPP original design operates with the upper vessel head temperature near the vessel outlet temperature (T_{hot} upper head design). The reduced RCS cooldown rate while on natural circulation increases the cooldown period until RHR entry conditions are reached, and the RHR system can be used to remove further decay heat.

Originally it was determined that 222,600 gallons are required to perform a worst case natural circulation cooldown at 25°F per hour for this event. The 222,600 gallons is a usable volume that is available to the AFW pumps. This value was submitted to the NRC by PG&E in response to GL 81-21. The 222,600 gallons volume exceeds the current usable volume of the seismically qualified portion of the CST. The combined inventory of the CST (164,678 useable gallons) and the FWST (57,922 gallons of water for one unit operation, and 115,844 gallons of water for two unit operation) at the minimum TS 3.7.6 levels envelopes this volume. A subsequent calculation was performed to support the uprating of Unit 1 to 3411 MWt which determined that 216,900 gallons are required for this event. However, a change to the TS 3.7.6 minimum required levels in the CST and FWST to reflect this reduction in minimum required volume was not requested.

Natural Circulation Cooldown at Normal Cooldown Rate Due to LOOP

This event is the original Westinghouse design basis event for the CST required usable storage volume. For this event, it is assumed there is a LOOP event where a unit is held in hot standby (Mode 3) for two hours followed by a 4-hour natural circulation cooldown from no load temperature of 547°F to the RHR entry conditions of 350°F at the normal cooldown rate of 50°F per hour. A cooldown rate of 50°F per hour can be performed while maintaining subcooling in the reactor vessel upper head region if a plant operated with the upper vessel head temperature near the vessel inlet temperature (T_{cold} upper head design). For this event, a calculation performed to support the uprating of Unit 1 to 3411 MWt determined that 183,063 gallons are required for this event.

Control Room or Cable Spreading Room Fire

The 10 CFR 50 Appendix R analysis for a fire in the control room or cable spreading room has assumed operator action times for decay heat removal. The analysis credits operator action within 8 hours to align the raw water reservoir to the AFW system pump suction prior to depletion of the CST to maintain decay heat removal. During this 8-hour period, the unit would be maintained in hot standby conditions with steam discharge to the atmosphere. For this event, a calculation performed to support the uprating of Unit 1 to 3411 MWt determined that 155,076 gallons are required.

Large Feedwater Line Break Coincident With LOOP

The large feedwater line break coincident with a LOOP is an accident requiring CST volume. This accident is not a limiting event for AFW supply. Single failures that also affect this event in terms of AFW supply include the failure of the diesel generator powering the motor-driven AFW pump to the unaffected SG (requiring additional steam to drive the remaining AFW pump turbine) or the failure of the steam driven AFW pump (requiring a longer time for cooldown using only one motor-driven AFW pump). These failures are not usually the limiting failures in terms of consequences for these events.

A double-ended rupture of a main feedwater pipe downstream of the main feedwater line check valve is analyzed as described in FSAR Section 15.4.2.2. The initial power rating assumed in the feedline break analysis is 102 percent of the Nuclear Steam Supply System design rating. A reactor trip is assumed to occur when the affected SG reaches the low-low level trip setpoint (adjusted for errors). Although the AFW System would allow delivery of AFW to 2 intact loops automatically in 1 minute, no AFW flow is assumed until 10 minutes after the break. At this time, it is assumed that the operator has isolated the AFW System from the break, and flow from 1 motor-driven AFW pump of 410 gpm commences. The AFW flow is split between two of the three unaffected SGs. The analysis demonstrates that the reactor coolant remains subcooled, assuring that the core remains covered with water, and no bulk boiling occurs in the hot leg.

Feedwater/AFW Connection Line Break

Another type of feedwater line break requiring condensate volume is a break in either the main feedwater or AFW line near where the two join. This break is not a limiting event for AFW supply. This break has the potential for dumping condensate until terminated by operator action, since the Emergency Feedwater Actuation System would not detect a difference in pressure between the SGs for this break location. This loss of condensate inventory is partially compensated for by the retention of SG inventory.

LOCA

The LOCAs do not impose any supply or flow requirements on the AFW supply that are in excess of those required by the other accidents. AFW supply is not credited for large LOCAs. Small LOCAs cause relatively slow rates of decrease in RCS pressure and liquid volume. The principal contribution from the AFW supply following a small LOCA is essentially the same as the system's function during hot shutdown or following a spurious safety injection signal which trips the reactor. Maintaining a water level inventory in the secondary side of the SGs provides a heat sink for removing decay heat and establishes the capability for providing a buoyancy head for natural circulation. The AFW supply may be used to assist in system cooldown and depressurization following a small LOCA while bringing the reactor to a cold shutdown condition.

Station Blackout

The loss of all alternating current (AC) power is postulated as resulting from accident conditions wherein not only onsite and offsite AC power is lost, but also emergency AC power is lost as an assumed common mode failure. This is referred to as a station blackout. Battery power for operation of protection circuits is assumed available. In the event of a complete station blackout with direct current power available, decay heat removal would continue to be ensured through the availability of one double capacity steam-driven AFW pump. To meet the requirements of 10 CFR 50,.63 Station Blackout Rule, PG&E followed the guidelines in Regulatory Guide 1.155, and its supplementary document NUMARC 87-00, Revision 0. Under these regulatory guidelines, DCPP is not required to assume a complete loss of onsite AC power. Instead the availability of at least one of the three emergency diesel generators per unit at all times is assumed. In addition, per the DCPP licensing basis, it is not required to take the DCPP units to cold shutdown, but instead, it is required to maintain the DCPP units at hot standby for four hours. Therefore, the demands on the CST to meet the Station Blackout Rule are not as severe as those for natural circulation cooldown. Although the complete loss of all onsite power is not assumed as part of the DCPP licensing basis, the Emergency Procedures include instructions to deal with such a situation. The CST was not designed to meet the required cooldown volume by itself for a complete loss of all onsite power and the cooldown may require an additional source of water to be aligned to the AFW supply through the makeup water system.

3.5 Conversion of DCPP Unit 2 to T_{cold} Upper Head Design

DCPP Unit 2 has implemented a upper head temperature reduction design change under 10 CFR 50.59, which modified the reactor internals such that the unit now has a T_{cold} upper head design instead of the original T_{hot} upper head design. This modification was performed to reduce the susceptibility of the upper head metal to primary water stress corrosion cracking. The modification was performed during the Unit 2 Thirteenth Refueling Outage in Spring 2006 by removing plugs installed in holes through the core barrel flange, and machining new holes in the upper internals upper support plate directly above the core barrel flange holes to provide a direct flowpath from the core barrel cold leg inlet region to the upper head region. This modification revised DCPP Unit 2 from a T_{hot} upper head design to a T_{cold} upper head design. There are currently no plans to revise the DCPP Unit 1 T_{hot} upper head design to T_{cold} because of plans to replace the Unit 1 reactor head.

With the DCPP Unit 2 T_{cold} upper head design, the upper head fluid temperature is lower at the start of the cooldown, and the plant can be cooled down and depressurized to RHR system operating conditions without upper head voiding if the appropriate cooldown rate and subcooling limits are maintained. With the T_{cold} upper head design a cooldown rate of up to 50°F per hour can be used, and this cooldown rate has been incorporated into DCPP Unit 2 Emergency Operating Procedure

(EOP) E-0.2, "Natural Circulation Cooldown." As a result, for DCPP Unit 2, the CST inventory requirements can be based on a natural circulation cooldown at the normal cooldown rate. Specifically, it can be assumed the unit is held in hot standby (Mode 3) for two hours followed by a 4-hour natural circulation cooldown from no load temperature of 547°F to the RHR entry conditions of 350°F at the normal cooldown rate of 50°F per hour. The required CST usable volume for this natural circulation cooldown is 163,058 gallons.

3.6 Upgrade to CST

An upgrade was implemented to the DCPP Unit 2 CST in the Unit 2 Fourteenth Refueling Outage (2R14) and an upgrade is planned for DCPP Unit 1 CST in the Unit 1 Fifteenth Refueling Outage (1R15). The CST upgrade attaches four new Seismic Category I seismically qualified stainless steel plenums (i.e., funnel that is attached to the interior of the CST carbon steel liner). For the CST upgrade, 3 of the plenums are installed around the existing 4-inch diameter nozzles, and 1 plenum is installed around the existing 12-inch diameter nozzle.

Each plenum is closed at the bottom and sides and open at the top, so as to allow water to enter from the top of the plenum into the nozzle. With the CST upgrade, the four nozzles connect to non-seismic qualified Design Class II piping line that have their suction levels in the CST effectively elevated due to the installed plenums. With the plenums installed, in the event of a design basis seismic event, and postulated failure of the nonseismic piping attached to the CST, the CST will be drained down to a higher level than before the plenums' installation. This will increase the seismically qualified CST inventory reserved for the AFW pumps from 164,678 usable gallons to 220,600 usable gallons.

As part of the CST upgrade, the existing CST low-level alarm setpoint of 50.4 percent is revised to 60.8 percent, which is 24 inches above the top of the new plenums. The level setpoint which closes condenser hot well makeup valve (LCV-8) on low condensate storage tank level is also revised from 50.4 percent to 60.8 percent, which prevents diversion of CST water to the condenser hotwell below this level. Additional changes to the CST include the replacement of the CST floating roof and application of a new interior coating. The changes to the CST are being performed by PG&E under 10 CFR 50.59, and NRC review of these changes is not being requested.

3.7 Revised CST Minimum Storage Volume Calculations

As part of the SG replacement program at DCPP, revised CST minimum storage volume calculations have been performed to incorporate the impact of the replacement SGs. The original Westinghouse Model 51 SGs are being replaced with new Westinghouse Model Delta 54 SGs. The SG replacements are being performed for DCPP Unit 2 during 2R14 in 2008, and are currently scheduled to be performed for DCPP Unit 1 during 1R15 scheduled to start in January 2009. A comparison of the physical characteristics between the original SGs and the replacement SGs was provided to the NRC in Enclosure 1 of PG&E Letter DCL-07-089, "Response to Request for Additional Information on License Amendment Request 07-01, 'Revision to Technical Specifications to Support Steam Generator Replacement,'" dated September 28, 2007. The revised CST minimum storage volume calculations were performed by PG&E under 10 CFR 50.59, and NRC review of the calculations is not being requested.

The significant assumptions for the CST minimum volume calculation are contained in Table 1. Calculations were performed for DCPP Unit 1 and Unit 2, and the results are contained in Table 2.

The results of three cases performed for Unit 1 are provided: (1) a natural circulation cooldown at reduced cooldown rate (1 hour at hot standby followed by an 8-hour cooldown to RHR entry conditions at a cooldown rate of 25°F per hour), (2) natural circulation cooldown at normal cooldown rate (2 hours at hot standby followed by a 4-hour cooldown to RHR entry conditions at a cooldown rate of 50°F per hour), and (3) control room or cable spreading room fire where the unit is held at hot standby for 8 hours. The limiting CST required usable volume for DCPP Unit 1 is 196,881 usable gallons for the natural circulation cooldown at reduced cooldown rate case.

The results of two cases performed for Unit 2 are provided: (1) a natural circulation cooldown at normal cooldown rate (2 hours at hot standby followed by a 4-hour cooldown to RHR entry conditions at a cooldown rate of 50°F per hour), and (2) a control room or cable spreading room fire where the unit is held at hot standby for 8 hours. The results for a natural circulation cooldown at reduced cooldown rate are not provided for DCPP Unit 2 because they are no longer applicable for the DCPP Unit 2 T_{cold} upper head design. The limiting CST required usable volume for DCPP Unit 2 is 163,058 gallons for the natural circulation cooldown at normal cooldown rate case. It is noted that the assumption that the plant is maintained at hot standby for 2 hours is conservative because the EOPs do not require that the plant be maintained in hot standby for 2 hours prior to the cooldown being performed. Step 16 of Unit 2 EOP E-0.2 requires an evaluation of the required cooldown rate considering the available CST volume.

The design for the upgrade to the CSTs for DCPP Unit 1 and Unit 2 has included allowance for a small leakage volume of 2260 gallons based on a total allowed leakage rate of 1 gpm through the new plenums. Postmodification testing following the CST upgrades will verify that the plenums leakage is less than 1 gpm. Since this leakage during draining of the CST will potentially not be available to the AFW pumps, this leakage will be added to the required CST usable volume. With addition of the leakage allowance for the CST plenums, the CST required usable volume for DCPP Unit 1 is 199,141 gallons (196,881 plus 2260 gallons) and for DCPP Unit 2 is 165,308 gallons (163,058 plus 2260 gallons). These required values are rounded up to provide some small additional margin. The resulting CST required usable volume to be used for the basis for TS 3.7.6 is greater than or equal to 200,000 gallons for DCPP Unit 1, and greater than or equal to 166,000 gallons for DCPP Unit 2.

Table 1

CST Minimum Usable Storage Volume Calculation Assumptions

Item	Assumption
Offsite Power	Loss of offsite power
Initial Core Power	102 percent of 3411 Megawatt core thermal power until reactor trip plus 2 second delay time
Residual heat	After reactor trip plus 2 second delay, based on 102 percent of core thermal power output
Stored energy	From fuel, fuel cladding, and primary and secondary system water and metal
Heat Removal	Steam through main steam safety valves and atmospheric dump valves
Upper head temperature	Vessel T_{hot} - Unit 1, Vessel T_{cold} - Unit 2
Steam generator model	Westinghouse Model Delta 54
Initial steam generator mass	10 percent less than low-low level water masses
Steam generator tube plugging	0 percent, bounds 0 percent to 10 percent
Feedwater	From auxiliary feedwater pumps, main feedwater pumps not available due to loss of offsite power
Reactor coolant pumps	Tripped
Final steam generator level	Maintained at lower narrow range level tap (the calculation results submitted by PG&E in response to GL 81-21 in the PG&E Letter dated December 7, 1981, were conservatively based on the final steam generator level being restored to no-load level conditions that is not necessary)
Auxiliary feedwater temperature	Maximum, 100°F

Table 2 CST Minimum Storage Volume Calculation Results		
Event Hot Standby Time/ Cooldown Time (hours)	**Unit 1 Required Volume (gallons)**	**Unit 2 Required Volume (gallons)**
Natural circulation cooldown at reduced cooldown rate 1/8	196,881	N/A
Natural circulation cooldown at normal cooldown rate 2/4	163,037	163,058
Control Room or Cable Spreading Room Fire 8/0	140,584	140,703

3.8 Purpose for Proposed Amendments

The FWST is a carbon steel vinyl lined tank, constructed as a tank within a tank (the transfer tank surrounds the FWST). Internal inspection of the tank found degradation in the lining, and therefore the steel tank is susceptible to accelerated corrosion in those locations. Should through wall leakage develop, the fire water would contaminate the contents of the outer transfer tank. Additionally, fire water lines around the fire pumps have been found to be more susceptible to corrosion due to more frequent water flow than has occurred in the stagnant portions of the fire water system. Through wall leaks or significant corrosion affects have previously required correction in pump discharge, pump test recirculation, and minimum flow recirculation lines. Although the FWST and fire water piping remain fully capable of performing their required function, FWST refurbishment and replacement of fire water piping are being performed to ensure continued reliability of the fire water system over plant life. To minimize the possibility that a similar system repair would be needed in the future, all boundary valves will also be replaced. The scope of work proposed is expected to take approximately 90 days to perform.

PG&E currently plans to refurbish the FWST 0-1, and replace the suction and recirculation piping for Fire Water Pumps 0-1 and 0-2 under 10 CFR 50.59 starting in April 2009. Without the requested TS changes, both DCPP Units 1 and 2 would need to be shut down to accomplish the FWST refurbishment and piping replacement. When the FWST is inoperable, TS 3.7.6 Condition A is entered, and TS 3.7.6 Required Action A.2 requires the FWST level to be restored within limit with a Completion Time of 7 days. If the TS 3.7.6 Condition A Completion Time of 7 days is not met, TS 3.7.6 Condition B requires the units to be in Mode 3 in 6 hours and in Mode 4, without reliance on SG for heat removal, in 18 hours.

In order to support performing the FWST refurbishment at power, PG&E plans to perform design changes to the CSTs under 10 CFR 50.59 that would establish a greater volume of seismically-qualified water in the DCPP Unit 1 and Unit 2 CSTs. The DCPP Unit 2 CST was upgraded during the 2R14 outage in 2008 and the DCPP Unit 1 CST is planned to be upgraded during the 1R15 outage in the spring of 2009. When upgraded, the CST for each unit has enough water available to meet the limiting scenario in terms of tank inventory, a natural circulation cooldown due to LOOP, as described in GL 81-21.

The proposed changes to TS 3.7.5 and TS 3.7.6 will allow PG&E to refurbish the FWST and replace portions of the Fire System piping while online and will provide greater flexibility for future operation of the FWST. In addition, with the changes to TS 3.7.6 for the increased CST required volume, the upgraded CST for each unit is solely capable of providing the required safety grade AFW cooling water without the need for additional cooling water from the FWST.

4.0 TECHNICAL ANALYSIS

4.1 Technical Specification Changes

With the upgrades to the CST for DCPP Units 1 and 2, the CST for each unit is able to provide the required usable volume of safety grade water for the limiting events that provide the basis for the CST tank volume. FWST volume will no longer be required to supplement the CST volume for these liming events. The proposed changes to SR 3.7.6.1 will ensure that the CST contains the required usable volume for each unit.

TS 3.7.6 LCO

Since FWST volume will no longer be needed to supplement the CST volume, the TS 3.7.6 LCO is revised to remove the requirement for a required FWST level, remove the requirement for a required CST tank level, and to state, "The CST shall be OPERABLE." The title of TS 3.7.6 is revised to, "CST," consistent with the change to the TS 3.7.6 LCO. This change is consistent with TS LCO 3.7.6 contained in NUREG-1431, "Standard Technical Specifications Westinghouse Plants," Revision 3, dated June 2004, which applies to plants that only rely on the CST for required safety grade volume for heat removal. The required CST volume for operability is specified in TS 3.7.6, SR 3.7.6.1. A sufficient quantity of water will continue to be supplied to the AFW pumps to remove heat from the RCS in the event of a loss of normal feedwater to the SGs. Reliance on only the CST to provide the safety grade source of cooling water is beneficial for system reliability because use of the FWST water requires manual realignment of the fire water system to the AFW system. This change has no impact on the method by which the AFW system performs its functions or the required AFW system pump flowrate to be provided.

TS 3.7.6 Condition A and TS 3.7.6 Required Action A.2

Consistent with the changes to LCO 3.7.6, TS 3.7.6 Condition A, is revised from, "CST or FWST level not within limit," to, "CST inoperable," and TS 3.7.6 Required Action A.2, is revised from, "Restore CST or FWST level to within limit," to, "Restore CST to OPERABLE status." The FWST volume will no longer be required to supplement the CST volume and therefore a Condition and Required Action for FWST level is no longer required in TS 3.7.6. These changes are consistent with Condition A and Required Action A.2 contained in NUREG-1431 which applies to plants that only rely on the CST for required safety grade volume for heat removal.

SR 3.7.6.1

SR 3.7.6.1 is revised to replace the tank indicated level with a water volume in gallons, and to add specific volume requirements for Unit 1 and Unit 2. The use of a volume in gallons instead of a tank indicated level is consistent with TS SR 3.7.6.1 contained in NUREG-1431, which allows the use of the number of gallons as the basis for the surveillance, and is consistent with the NUREG-1431 SR 3.5.4.2 for the Refueling Water Storage Tank (RWST), which uses, "RWST borated water volume," for the surveillance. The use of, "water volume," instead of, "level," in SR 3.7.6.1 has previously been approved for Wolf Creek Generating Station in Amendment 123 to Facility Operating License No. NPF-42 in the NRC letter, "Conversion to Improved Technical Specifications for Wolf Creek Generating Station - Amendment No. 123 to Facility Operating License No. NPF-42 (TAC No. M98738)," dated March 31, 1999, based on the Wolf Creek application dated May 15, 1997. Wolf Creek SR 3.7.6.1 states, "Verify the CST contained water volume is $\geq$ 281,000 gal."

The use of a volume instead of level in SR 3.7.6.1 still ensures that the required usable safety grade CST inventory will be available as required by the CST inventory calculations. The use of a volume instead of a tank level in SR 3.7.6.1 allows changes to be made to the CST tank and level instrumentation without requiring a TS change for changes (e.g., internal tank modifications, level instruments, transmitters) that would impact the tank indicated level associated with the required CST volume. Even though the required CST tank indicated level will no longer be specified in TS 3.7.6, the required CST tank indicated level equivalent to the required usable volume will still be contained in the TS 3.7.6 Bases LCO section upon implementation of the amendment. The draft TS 3.7.6 Bases in Enclosure 4 does not contain the value for the percent indicated level because it will be determined in part based on the as-built drawings following completion of the CST upgrade. Also, the required CST tank indicated level is contained in Surveillance Test Procedure (STP) I-1A, "Routine Shift Checks Required by Licenses," because the required CST volume is verified through use of a CST level indicator. The value used for the indicated level in the STP must contain an allowance for instrument uncertainties and tank unusable volume in order to ensure the TS required CST usable volume is available. For example, to verify current TS SR 3.7.6.1, STP I-1A currently states, "Verify the condensate storage tank contains $\geq$ 46% level [41.3%] as indicated by LI 148 or LR 100." In this example, an indicated level of 46 percent is verified to ensure the TS 3.7.6 required CST level of 41.3 percent is met since level instrument uncertainties are considered in the performance of the surveillance.

The required CST level is greater than or equal to 200,000 gallons for Unit 1, and is greater than or equal to 166,000 gallons for Unit 2. As specified in the TS 3.7.6 LCO Bases, this volume is a usable volume, and includes volume that is available to the AFW pumps. The revised CST minimum storage volume for each unit has been determined from plant specific calculations performed to support the SG replacement program at DCPP and incorporate the design of the replacement Westinghouse Model Delta 54 SGs and the design change in Unit 2 to a T_{cold} upper head design. The significant assumptions for the CST minimum volume calculation are contained in Table 1 in Section 3.7.

For Unit 1, the limiting event for CST required tank volume is the natural circulation cooldown at reduced cooldown rate. Other accidents and fire scenarios require less CST inventory. The basis for this event is the response to GL 81-21. For this event, it is assumed there is 1 hour at hot standby conditions followed by an 8-hour cooldown to RHR entry conditions at a cooldown rate of 25°F per hour. The limiting CST required tank volume for DCPP Unit 1 is 196,881 gallons. The design for the upgrade to the CSTs for DCPP Unit 1 and Unit 2 has included allowance for a small leakage volume of 2,260 gallons based on a total allowed leakage rate of 1 gpm through the new plenums. Since this leakage during draining of the CST will potentially not be available to the AFW pumps, this leakage is added as part of the required CST usable volume. With addition of the leakage allowance for the CST plenums, the CST required usable volume for DCPP Unit 1 is 199,141 gallons. This required value is rounded up to provide some small additional margin, resulting in a CST required usable volume of greater than or equal to 200,000 gallons for DCPP Unit 1.

For Unit 2, the limiting event for CST required tank volume is the natural circulation cooldown at normal cooldown rate. The natural circulation cooldown at reduced cooldown rate event is not applicable to Unit 2 due to the T_{cold} upper head design which allows cooldown rates at 50°F per hour to be performed without creating a void in the upper head. Other accidents and fire scenarios require less CST inventory. The basis for this event is the original Westinghouse design basis requirements for the CST required volume. For this event, it is assumed there are 2 hours at hot standby conditions followed by a 4-hour cooldown to RHR entry conditions at a cooldown rate of 50°F per hour. Current Unit 2 EOP E-0.2 allows cooldown rates of up to 50°F per hour for a natural circulation cooldown. The use of a 2-hour period at hot standby conditions is conservative since a 1-hour period can be supported. The limiting CST required tank volume for DCPP Unit 2 is 163,058 gallons. With addition of the leakage allowance for the CST plenums, the CST required usable volume for DCPP Unit 2 is 165,308 gallons. This required value is rounded up to provide some small additional margin, resulting in a CST required usable volume of greater than or equal to 166,000 gallons for DCPP Unit 2.

With the upgrades to the CST as described in Section 3.6, the CST will have the seismic capacity to provide a safety grade usable volume of greater than or equal to 200,000 gallons for DCPP Unit 1, and greater than or equal to 166,000 gallons for DCPP Unit 2.

With the change, the overall quantity of water required by TS 3.7.6 to be available for the AFW pumps is reduced from 222,600 gallons to 200,000 gallons when only Unit 1 is operating, from 222,600 gallons to 166,000 gallons when only Unit 2 is operating, and from 445,200 (164,678 from each CST and 115,844 from FWST) to 366,000 gallons when both units are operating. This reduction in minimum available AFW supply is acceptable based on revised plant-specific CST minimum storage volume calculations which incorporate the design of the replacement Westinghouse Model Delta 54 SGs and the design change in Unit 2 to a T_{cold} upper head design.

<u>SR 3.7.6.2</u>

Based on the proposed TS 3.7.6 LCO revision to remove the requirement for a required FWST level, SR 3.7.6.2, which verifies the FWST level for one unit operation and two unit operation, can be removed. The FWST volume will no longer be required to supplement the CST volume, and therefore a surveillance to verify FWST level is no longer required in TS 3.7.6. This change is consistent with the SRs contained in NUREG-1431 which applies to plants that only rely on the CST for required safety grade volume for heat removal.

TS 3.7.5 SR 3.7.5.6

The capability to align the FWST to the AFW system is no longer required to be contained in the TS. Therefore, current TS 3.7.5 SR 3.7.5.6, which verifies the FWST is capable of being aligned to the AFW system by cycling each FWST valve in the flowpath necessary for realignment through at least one full cycle, is not required and can be removed. This change is consistent with the SRs for TS 3.7.5 contained in NUREG-1431 which do not contain a surveillance for the FWST valves. The function of the FWST and associated valves and piping is not being revised as part of this TS change, and the FWST and associated valves and piping will continue to be available to provide a backup source of water to the CST if needed. ECG 18.1, "Fire Suppression Systems/Fire Suppression Water Systems," 18.1.d, requires that a FWST supply with a minimum contained volume of 270,000 gallons be functional for fire suppression. This ECG requirement is not being revised as part of the proposed TS changes.

4.2 Summary/Conclusion

The proposed changes would revise TS 3.7.5, "Auxiliary Feedwater System," to remove SR 3.7.5.6 and revise TS 3.7.6, "Condensate Storage Tank (CST) and Fire Water Storage Tank (FWST)," to remove the FWST level requirements, revise the CST level requirements, and revise TS 3.7.6 to be consistent with the NUREG-1431 Standard Technical Specifications. The proposed changes reflect a design change to the CST that enables the CST to provide the entire required usable volume of safety grade water to remove decay and sensible heat from the RCS.

The proposed required CST water volume for Unit 1 of greater than or equal to 200,000 gallons, and for Unit 2 of greater than or equal to 166,000 gallons is a usable volume and represents volume that is available to the AFW pumps. The proposed CST minimum storage volume for each unit has been determined from plant-specific calculations performed to support the SG replacement program at DCPP, and incorporate the design of the replacement Westinghouse Model Delta 54 SGs and the design change in Unit 2 to a T_{cold} upper head design. The proposed volumes include potential leakage from the CST plenums and a small amount of margin. The changes have no impact on the method by which the AFW system performs its functions or the required AFW system pump flowrate to be provided. With the changes, a sufficient quantity of water will continue to be supplied to the AFW pumps to remove heat from the RCS in the event of a loss of normal feedwater to the SGs.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

PG&E has evaluated whether or not a significant hazards consideration is involved with the proposed amendment 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 changes would revise TS 3.7.5, "Auxiliary Feedwater System," to remove SR 3.7.5.6, and revise TS 3.7.6, "Condensate Storage Tank (CST) and Fire Water Storage Tank (FWST)," to remove the FWST level requirements, revise the CST level requirements, and revise TS 3.7.6 to be consistent with the NUREG-1431 Standard Technical Specifications. The proposed changes reflect a design change to the CST that enables the CST to provide the entire required source of usable volume of safety grade water to the AFW System pumps to remove decay and sensible heat from the Reactor Coolant System (RCS).

The CST and AFW System pumps are not accident initiators, and are credited to mitigate accidents and events. The changes have no impact on the method by which the CST or AFW system performs its functions or the required AFW system pump flowrate to be provided. With the changes, a sufficient quantity of water will continue to be supplied by the CST to the AFW pumps to remove heat from the RCS in the event of a loss of normal feedwater to the SGs, and thus the FWST volume is no longer required to be contained in the TS.

With the change, the overall quantity of water required by TS 3.7.6 to be available for the AFW pumps is reduced. This reduction in available AFW supply is acceptable based on revised plant-specific CST minimum storage volume calculations, which incorporate the design of the replacement Westinghouse Model Delta 54 Steam Generators, and the design change in Unit 2 to a T_{cold} upper head design.

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 CST and AFW pumps are not accident initiators, and are credited to mitigate accidents and events. The changes have no impact on the method by which the CST or AFW system performs its functions or the required AFW system pump flowrate to be provided.

The increase in the available CST volume enables the CST for each unit to provide the required volume for the limiting natural circulation cooldown event without reliance on the FWST. The FWST will no longer need to be manually transferred to the AFW System pump suction when CST inventory is depleted following a natural circulation cooldown event.

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 accident analyses credit CST inventory to meet RCS design pressure, containment design pressure, 10 CFR 100 dose limits, and 10 CFR 50.36 peak cladding temperature limits. The increase in the TS 3.7.6 available CST volume enables the CST for each unit to provide the required volume for the limiting natural circulation cooldown event without reliance on the FWST. The CST volume for the natural circulation cooldown event is greater than that required to mitigate accidents. Thus the CST will provide the entire required source of usable volume of safety grade water to the AFW System pumps to remove decay and sensible heat from the RCS.

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 presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of no significant hazards consideration is justified.

5.2 <u>Applicable Regulatory Requirements/Criteria</u>

The limiting event for AFW supply is a natural circulation cooldown at a reduced cooldown rate due to LOOP event using seismically-qualified water sources. This event is postulated in NRC GL 81-21. With a LOOP, the reactor coolant pumps are not available to pump RCS flow, and the RCS cooldown is performed using natural circulation in the RCS. GL 81-21 identified that during a natural circulation cooldown, the potential for void formation in the upper vessel head region can occur. GL 81-21 recognized that a significant steam void in the vessel creates an undesirable challenge to operators, and that reactor vessel voiding during controlled natural circulation cooldowns should be avoided.

Revised AFW System supply calculations have been performed as part of the SG replacement program at DCPP to determine the minimum required AFW supply. In addition, these analyses address the conditions identified in GL 81-21. The requested changes to TS 3.7.5 and TS 3.7.6 ensure that this minimum required AFW supply is available.

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.

6.0 ENVIRONMENTAL CONSIDERATION

PG&E has evaluated the proposed amendment and has determined that the proposed amendment does not involve: (1) a significant hazards consideration, (2) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (3) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7.0 REFERENCES

7.1 References

1. NRC Generic Letter 81-21, "Natural Circulation Cooldown," dated May 5, 1981.
2. PG&E Letter, "Natural Circulation Cooldown - Voiding," dated December 7, 1981.
3. NRC Letter, "Natural Circulation Cooldown - Upper Head Voiding (Generic Letter 81-21)," dated October 5, 1984.

4. PG&E Letter DCL-07-089, "Response to Request for Additional Information on License Amendment Request 07-01, 'Revision to Technical Specifications to Support Steam Generator Replacement,'" dated September 28, 2007.
5. NUREG-1431, "Standard Technical Specifications Westinghouse Plants," Revision 3, dated June 2004.
6. PG&E Letter DCL-90-271, "License Amendment Request 90-11, Revision of Fire Protection License Conditions, Relocation of Fire Protection Technical Specifications, and Clarification of AFW Water Sources," dated November 15, 1990.
7. Amendment 75 to Facility Operating License No. DPR-80 and Amendment 74 to Facility Operating License No. DPR-82 for Diablo Canyon Power Plant Units 1 and 2, "Issuance of Amendments for Diablo Canyon Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. M79423 and M79424)," dated January 13, 1993.
8. Amendment 123 to Facility Operating License No. NPF-42 for Wolf Creek Generating Station, "Conversion to Improved Technical Specifications for Wolf Creek Generating Station - Amendment No. 123 to Facility Operating License No. NPF-42 (TAC No. M98738)," dated March 31, 1999.

7.2 Precedent

The proposed use of, "water volume," in SR 3.7.6.1, instead of, "level," as the basis for the surveillance has previously been approved for TS SR 3.7.6.1 for Wolf Creek Generating Station in Amendment 123 to Facility Operating License No. NPF-42 in the NRC letter, "Conversion to Improved Technical Specifications for Wolf Creek Generating Station - Amendment No. 123 to Facility Operating License No. NPF-42 (TAC No. M98738)," dated March 31, 1999, based on the Wolf Creek application dated May 15, 1997.

Proposed Technical Specification Changes (marked-up)

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.7.5.1	Verify each AFW manual, power operated, and automatic valve in each water flow path, and in both steam supply flow paths to the steam turbine driven pump, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
SR 3.7.5.2	-----NOTE----- Not required to be performed for the turbine driven AFW pump until 24 hours after ≥ 650 psig *in the steam generator.* -----	
	Verify the developed head of each AFW pump at the flow test point is greater than or equal to the required developed head.	In accordance with the Inservice Test Program.
SR 3.7.5.3	-----NOTE----- Not applicable in MODE 4 when steam generator is relied upon for heat removal. -----	
	Verify each AFW automatic valve that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	24 months
SR 3.7.5.4	-----NOTES----- 1. Not required to be performed for the turbine driven AFW pump until 24 hours after ≥ 650 psig in the steam generator. 2. Not applicable in MODE 4 when generator is relied upon for heat removal. -----	
	Verify each AFW pump starts automatically on an actual or simulated actuation signal.	24 months
SR 3.7.5.5	Not used.	
SR 3.7.5.6	Verify the FWST is capable of being aligned to the AFW system by cycling each FWST valve in the flow path necessary for realignment through at least one full cycle.	24 months

3.7 PLANT SYSTEMS

3.7.6 Condensate Storage Tank (CST) ~~and Fire Water Storage Tank (FWST)~~

LCO 3.7.6 The CST ~~level~~ shall be OPERABLE ~~≥ 41.3% and the FWST level shall be ≥ 22.2% for one unit operation and ≥ 41.7% for two unit operation~~.

APPLICABILITY: MODES 1, 2, and 3,
MODE 4 when steam generator is relied upon for heat removal.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CST ~~or FWST level not within limit~~. inoperable	A.1 Verify by administrative means OPERABILITY of backup water supply. AND A.2 Restore CST ~~or FWST level to within limit~~. to OPERABLE status	4 hours AND Once per 12 hours thereafter 7 days
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4, without reliance on steam generator for heat removal.	6 hours 18 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.6.1	Verify the CST ~~level~~ water volume is ≥ ~~41.3%~~ 200,000 gallons for Unit 1 and ≥ 166,000 gallons for Unit 2.	12 hours
~~SR 3.7.6.2~~	~~Verify the FWST level is ≥ 22.2% for one unit operation and ≥ 41.7% for two unit operation.~~	~~12 hours~~

Proposed Technical Specification Changes (retyped)

Remove Page	**Insert Page**
3.7-12	**3.7-12**
3.7-13	**3.7-13**

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.7.5.1	Verify each AFW manual, power operated, and automatic valve in each water flow path, and in both steam supply flow paths to the steam turbine driven pump, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
SR 3.7.5.2	-----------------------------NOTE----------------------------- Not required to be performed for the turbine driven AFW pump until 24 hours after ≥ 650 psig in the steam generator. --- Verify the developed head of each AFW pump at the flow test point is greater than or equal to the required developed head.	In accordance with the Inservice Test Program.
SR 3.7.5.3	-----------------------------NOTE----------------------------- Not applicable in MODE 4 when steam generator is relied upon for heat removal. --- Verify each AFW automatic valve that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	24 months
SR 3.7.5.4	-----------------------------NOTES----------------------------- 1. Not required to be performed for the turbine driven AFW pump until 24 hours after ≥ 650 psig in the steam generator. 2. Not applicable in MODE 4 when generator is relied upon for heat removal. --- Verify each AFW pump starts automatically on an actual or simulated actuation signal.	24 months
SR 3.7.5.5	Not used.	

3.7 PLANT SYSTEMS

3.7.6 Condensate Storage Tank (CST)

LCO 3.7.6 The CST shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
MODE 4 when steam generator is relied upon for heat removal.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CST inoperable.	A.1 Verify by administrative means OPERABILITY of backup water supply.	4 hours <u>AND</u> Once per 12 hours thereafter
	<u>AND</u>	
	A.2 Restore CST to OPERABLE status.	7 days
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours
	<u>AND</u>	
	B.2 Be in MODE 4, without reliance on steam generator for heat removal.	18 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.6.1	Verify the CST water volume is ≥ 200,000 gallons for Unit 1 and ≥ 166,000 gallons for Unit 2.	12 hours

Changes to Technical Specification Bases Pages
(For information only)

B 3.7 PLANT SYSTEMS

B 3.7.4 10% Atmospheric Dump Valves (ADVs)

BASES

BACKGROUND

The 10% ADVs (PCV-19, PCV-20, PCV-21 and PCV-22) provide a method for cooling the unit to residual heat removal (RHR) entry conditions should the preferred heat sink via the 40% steam dump valves to the condenser not be available, as discussed in the FSAR, Section 15 (Ref 1). This is done in conjunction with the Auxiliary Feedwater System providing cooling water from the Condensate storage tank (CST) ~~and firewater storage tank (FWST)~~. The ADVs may also be required to meet the design cooldown rate during a normal cooldown when steam pressure drops too low for maintenance of a vacuum in the condenser to permit use of the 40% steam dump valves.

One ADV line for each of the four steam generators is provided. Each ADV line consists of one ADV and an associated manual block valve.

The ADVs are provided with upstream manual block valves to permit their being tested at power, and to provide an alternate means of isolation. The ADVs are equipped with pneumatic controllers to permit control of the cooldown rate.

The ADVs are normally provided with a non-Class I pressurized supply of air. With a loss of pressure in the normal air supply the backup non-Class 1 nitrogen supply, automatically supplies to operate the ADVs. With the loss of both the normal air supply and the backup nitrogen supply, the normal supplies are blocked and the Class I backup air bottle system is activated. With the backup air bottle system activated, control of the valves is remote manual via the Class I control circuit from the Control Room. The bottled air supply is sized to provide sufficient pressurized gas to operate the ADVs for the time required for Reactor Coolant System cooldown to RHR entry conditions. In addition, handwheels are provided for local manual operation.

APPLICABLE SAFETY ANALYSES

The design basis of the ADVs is established by the capability to cool the unit to RHR entry conditions at the maximum allowable rate of 100°F per hour. The ADVs support the AFW cooldown function from normal zero-load temperature in the RCS to a hot-leg temperature of 350°F (which is the maximum temperature allowed for placing the RHR system in service). Various cooldown rates are applicable depending upon the event and the assumed available equipment. These rates vary from a high of 100°F/hr for the SGTR event to 25°F/hr for a natural circulation cooldown event utilizing the cooling water supply available in the CST ~~and FWST~~.

(continued)

B 3.7 PLANT SYSTEMS

B 3.7.5 Auxiliary Feedwater (AFW) System

BASES

BACKGROUND

The AFW System automatically supplies feedwater to the steam generators to remove decay heat from the Reactor Coolant System upon the loss of normal feedwater supply. The AFW pumps take normal suction through valve MU-671 on the single suction line from the condensate storage tank (CST) (LCO 3.7.6) (this valve must remain open for the applicable accident analysis assumptions to be valid) ~~and are capable of being aligned to the firewater storage tank (FWST) (LCO 3.7.6)~~ and pump to the steam generator secondary side via separate and independent connections to the main feedwater (MFW) piping outside containment. The steam generators function as a heat sink for core decay heat. The heat load is dissipated by releasing steam to the atmosphere from the steam generators via the main steam safety valves (MSSVs) (LCO 3.7.1) or atmospheric dump valves (LCO 3.7.4). If the main condenser is available, steam may be released via the condenser steam dump valves and recirculated to the CST.

The AFW System consists of two motor driven AFW pumps and one steam turbine driven pump configured into three trains. Each motor driven pump provides 100% of AFW flow capacity, and the turbine driven pump provides 200% of the required capacity to the steam generators, with 100% capacity defined as the flow required to two steam generators during the AFW design basis accident analysis (loss of normal feedwater flow (Ref. 1). The pumps are equipped with recirculation lines to prevent pump operation against a closed system. Each motor driven AFW pump is powered from an independent Class 1E power supply and feeds two steam generators, although each pump has the capability to be manually realigned to feed other steam generators. The steam turbine driven AFW pump receives steam from two main steam lines upstream of the main steam isolation valves. Each of the steam feed lines will supply 100% of the requirements of the turbine driven AFW pump.

The AFW System is capable of supplying feedwater to the steam generators during normal unit startup, shutdown, and hot standby conditions.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.5.6

This SR verifies that the FWST is capable of being aligned to the AFW pump suctions. This assures that this additional supply of required AFW is available from the seismically qualified FWST should it be needed for a natural circulation cooldown.

Since there is insufficient volume in the CST alone for long-term cooling needs, the NRC required in SSER 8 that the FWST have a seismically-qualified flow path to the AFW Pumps suction to withstand an assumed seismic failure of any single valve (valve jammed shut). This means that valves MU-0-1557 and MU-1-297 and MU-2-298 should be maintained in their normal positions. If these valves are required to be out of position due to maintenance activities, then these activities should be treated as if entering the LCO action for TS 3.7.6.

The 24 month frequency, based on engineering judgement, is consistent with References 2 and 4.

A similar SR is not required for the CST alignment since the AFW system is used for startup and an AFW pump is tested each month. This operation and the pump tests assure proper valve alignment.

REFERENCES

1. FSAR, Section 6.5 and Section 15.2.8.
2. ASME Code for Operation and Maintenance of Nuclear Power Plants, 2001 Edition including 2002 and 2003 Addenda.
3. DCM S-3B.
4. 10 CFR 50.55a(b)(3)(vi).

B 3.7 PLANT SYSTEMS

B 3.7.6 Condensate Storage Tank (CST) ~~and Fire Water Storage Tank (FWST)~~

BASES

BACKGROUND

The CST ~~supplemented by the FWST~~ provides a safety grade source of water to the steam generators for removing decay and sensible heat from the Reactor Coolant System (RCS). The CST ~~and FWST~~ provides a passive flow of water, by gravity, to the Auxiliary Feedwater (AFW) System (LCO 3.7.5). The steam produced is released to the atmosphere by the main steam safety valves or the atmospheric dump valves if the main steam isolation valves are closed. The AFW pumps operate with a continuous recirculation to the CST.

When the main steam isolation valves are open, the preferred means of heat removal is to discharge steam to the condenser by the nonsafety grade path of the condenser dump valves. The condensed steam is returned to the CST by the condensate pumps. This has the advantage of conserving condensate while minimizing releases to the environment.

Because the CST ~~and FWST are the~~ **is a** principal component~~s~~ for removing residual heat from the RCS, ~~they are~~ **it is** designed to withstand earthquakes and other natural phenomena, including missiles that might be generated by natural phenomena. The CST ~~and FWST are~~ **is** designed to Seismic Category I to ensure availability of the feedwater supply. Feedwater is also available from alternate sources as described in the FSAR.

A description of the CST is found in the FSAR, Section 9.2.6 (Ref. 1).

APPLICABLE SAFETY ANALYSES

Replace with Insert 1 →

The CST ~~and FWST~~ provides cooling water to remove decay heat and to cool down the unit following all events in the accident analysis as discussed in the FSAR, Chapters 6 and 15 (Refs. 2 and 3, respectively). ~~The limiting event for AFW supply, i.e., CST and FWST minimum volumes, is based on a loss of offsite power which assumes a reduced Reactor Coolant System (RCS) cooldown rate and requires seismically qualified water sources. The lower RCS cooldown rate on natural circulation increases the cooldown period until the residual heat removal (RHR) system can be used to remove further decay heat. The extended cooldown time thus requires more AFW supply than can be provided by the seismically qualified portion of the CST.~~

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Other **non-limiting** events **for AFW supply** requiring condensate volume are:

1) the large feedwater line break coincident with a loss of offsite power. Single failures that also affect this event include the following:

   a. Failure of the diesel generator powering the motor driven AFW pump to the unaffected steam generator (requiring additional steam to drive the remaining AFW pump turbine); and

   b. Failure of the steam driven AFW pump (requiring a longer time for cooldown using only one motor driven AFW pump).

   These are not usually the limiting failures in terms of consequences for these events.

and,

2) a break in either the main feedwater or AFW line near where the two join. This break has the potential for dumping condensate until terminated by operator action, since the Emergency Feedwater Actuation System would not detect a difference in pressure between the steam generators for this break location. This loss of condensate inventory is partially compensated for by the retention of steam generator inventory.

Insert 2

The CST ~~and FWST~~ satisf~~y~~**ies** Criteria 2 and 3 of 10 CFR 50.36(c)(2)(ii).

LCO

~~To satisfy Hosgri analysis assumptions, the CST and FWST must contain sufficient cooling water to remove decay heat following a reactor trip from 102% RTP, and then to cool down the RCS to RHR entry conditions, assuming a coincident loss of offsite power and the most adverse single failure. In doing this, they must retain sufficient water to ensure adequate net positive suction head with an open flow path to the AFW pumps during cooldown, as well as account for any losses from the steam driven AFW pump turbine.~~

~~The flow path from the FWST must be maintained in a configuration to withstand an assumed seismic failure of any single valve (valve jammed shut). This means valves MU-0-1557 and MU-1-297 and MU-2-298 must be maintained in their normal positions. They can be manipulated briefly to verify their function. If they are out of normal position due to maintenance, then the LCO action applies.~~

(continued)

BASES

LCO (continued)

The CST ~~level~~ **volume** required is ~~equivalent to~~ **for** a usable volume of **greater than or equal to 200,000 gallons (x.x % indicated level) for Unit 1 and greater than or equal to 166,000 gallons (x.x % indicated level) for Unit 2** ~~≥ 41.3% indicated level (164,678 gallons)~~. ~~The FWST level required is equivalent to a usable volume of ≥ 41.7% indicated level (115,844 gallons) for two units operating and ≥ 22.2% indicated level (57,922 gallons) for one unit operating.~~ The~~se levels~~ **volume for Unit 1 is** ~~are~~ based on holding the unit in MODE 3 for 1 hour, followed by a natural circulation cooldown to RHR entry conditions at 25°F/hour. **The volume for Unit 2 is based on holding the unit in MODE 3 for 2 hours, followed by a natural circulation cooldown to RHR entry conditions at 50°F/hour**. **These bases are** ~~This basis is~~ established in Reference 4 **and exceed the volume required by the accident analyses**.

The OPERABILITY of the CST ~~and FWST~~ **for each unit** is determined by maintaining the tank ~~levels~~ **volume (equivalent indicated level)** at or above the minimum required ~~levels~~ **volume**.

APPLICABILITY

In MODES 1, 2, and 3, and in MODE 4, when steam generator is being relied upon for heat removal, the CST ~~and FWST~~ **is** ~~are~~ required to be OPERABLE.

In MODE 5 or 6, the CST ~~or FWST~~ **is** ~~are~~ not required because the AFW System is not required.

ACTIONS

A.1 and A.2

If the CST ~~or FWST level~~ is not **OPERABLE** ~~within limits~~, the OPERABILITY of the backup supply should be verified by administrative means within 4 hours and once every 12 hours thereafter. OPERABILITY of the backup feedwater supply must include verification that that the flow paths from the backup water supply to the AFW pumps are OPERABLE, and that the backup supply has the required volume of water available. The CST ~~or FWST~~ must be restored to OPERABLE status within 7 days, because the backup supply may be performing this function in addition to its normal functions. The 4 hour Completion Time is reasonable, based on operating experience, to verify the OPERABILITY of the backup water supply. Additionally, verifying the backup water supply every 12 hours is adequate to ensure the backup water supply continues to be available. The 7 day Completion Time is reasonable, based on an OPERABLE backup water supply being available, and the low probability of an event occurring during this time period requiring the CST. **The seismically-qualified Fire Water Storage Tank and alternate** ~~Alternate~~ non-seismically qualified water sources are **examples of back-up water supplies** ~~also~~ available to supply water to supplement the CST ~~or FWST~~ volume.

(continued)

BASES

ACTIONS (continued)

B.1 and B.2

If the CST ~~or FWST~~ cannot be restored to OPERABLE status within the associated Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours, and in MODE 4, without reliance on the steam generator for heat removal, within 18 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.6.1

This SR verifies that the CST contains the required volume of cooling water. The 12 hour Frequency is based on operating experience and the need for operator awareness of unit evolutions that may affect the CST inventory between checks. Also, the 12 hour Frequency is considered adequate in view of other indications in the control room, including alarms, to alert the operator to abnormal deviations in the CST level~~s~~.

~~SR 3.7.6.2~~

~~This SR verifies that the FWST contain the required volume of cooling water. The 12 hour Frequency is based on operating experience and the need for operator awareness of unit evolutions that may affect the FWST inventory between checks. Also, the 12 hour Frequency is considered adequate in view of other indications in the control room, including alarms, to alert the operator to abnormal deviations in the FWST levels.~~

REFERENCES

1. FSAR, Section 9.2.6 and 9.5.1.
2. FSAR, Chapter 6.
3. FSAR, Chapter 15.
4. DCM S-3B.

TS Bases 3.7.6 Markup Inserts

Insert 1

The limiting event for AFW supply, i.e., CST minimum tank volume, is based on a natural circulation cooldown due to a loss of offsite power using seismically-qualified water sources. The cooldown is performed from hot standby conditions to residual heat removal (RHR) system conditions where the RHR system can be used to remove further decay heat. The rate at which the cooldown can be performed in order to prevent voiding in the upper head depends on the operating temperature in the vessel upper head region. When the cooldown time is extended, more seismically-qualified AFW supply is required. Unit 1 operates with the upper head temperature near vessel outlet temperature (T_{hot} upper head design). Unit 2 operates with the upper head temperature near the vessel inlet temperature (T_{cold} upper head design). For Unit 1 with a T_{hot} upper head design, the analysis for CST minimum required storage assumes the unit is held in MODE 3 for 1 hour followed by an 8-hour cooldown to RHR entry conditions at a reduced cooldown rate of 25°F/hour. For Unit 2 with a T_{cold} upper head design, the analysis for CST minimum required storage assumes the unit is held in MODE 3 for 2 hours followed by a 4-hour cooldown to RHR entry conditions at a cooldown rate of 50°F/hour.

Insert 2

To satisfy accident analysis assumptions, the CST must contain sufficient cooling water to remove decay heat following a reactor trip from 102% RTP, and then to cool down the RCS to RHR entry conditions, assuming a coincident loss of offsite power and the most adverse single failure. In doing this, it must retain sufficient water to ensure adequate net positive suction head with an open flow path to the AFW pumps during cooldown, as well as account for any losses from the steam-driven AFW pump turbine, or before isolating AFW to a broken line.