March 26, 2008

Mr. John Conway
Senior Vice President – Station Generation
and Chief Nuclear Officer
Pacific Gas and Electric Company
Diablo Canyon Power Plant
P.O. Box 770000
San Francisco, CA 94177-0001

SUBJECT: DIABLO CANYON POWER PLANT, UNIT NOS. 1 AND 2 - ISSUANCE OF AMENDMENTS RE: TECHNICAL SPECIFICATION 3.5.4, "REFUELING WATER STORAGE TANK (RWST)" (TAC NOS. MD6895 AND MD6896)

Dear Mr. Conway:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 199 to Facility Operating License No. DPR-80 and Amendment No. 200 to Facility Operating License No. DPR-82 for the Diablo Canyon Power Plant, Unit Nos. 1 and 2, respectively. The amendments consist of changes to the Technical Specifications (TS) in response to your application dated October 2, 2007, as supplemented by letters dated February 8, and March 11, 2008.

The amendments revise TS 3.5.4, "Refueling Water Storage Tank (RWST)," and Surveillance Requirement 3.5.4.2, to increase the minimum required borated water volume from "≥ 400,000 gallons (81.5% indicated level)" to "≥ 455,300 gallons."

A copy of the related Safety Evaluation is enclosed. The Notice of Issuance will be included in the Commission's next regular biweekly *Federal Register* notice.

Sincerely,

/RA/

Alan Wang, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-275 and 50-323

Enclosures: 1. Amendment No. 199 to DPR-80
2. Amendment No. 200 to DPR-82
3. Safety Evaluation

cc w/encls: See next page

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ADAMS Accession Nos.: Pkg. ML080810013, Amendment ML080810015, License/TS Pgs ML080810017
*NLO w/comments

OFFICE	NRR/LPL4/PM	NRR/LPL4/LA	DIRS/ITSB/BC	DE/EICB/BC	DSS/SCVB/BC	OGC	NRR/LPL4/BC
NAME	AWang	JBurkhardt	JWaig	WKemper	RDennig	AHodgdon	THiltz
DATE	3/24/08	3/24/08	3/25/08	3/25/08	3/24/08	3/25/08 (*)	3/26/08

OFFICIAL RECORD COPY

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PACIFIC GAS AND ELECTRIC COMPANY

DOCKET NO. 50-275

DIABLO CANYON NUCLEAR POWER PLANT, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 199
License No. DPR-80

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Pacific Gas and Electric Company (the licensee), dated October 2, 2007, as supplemented by letters dated February 8, and March 11, 2008, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C.(2) of Facility Operating License No. DPR-80 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 199, are hereby incorporated in the license. Pacific Gas & Electric Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of its date of issuance and shall be implemented prior to Mode 4 entry following refueling outage 2R14.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Thomas G. Hiltz, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Facility
Operating License No. DPR-80
and Technical Specifications

Date of Issuance: March 26, 2008

PACIFIC GAS AND ELECTRIC COMPANY

DOCKET NO. 50-323

DIABLO CANYON NUCLEAR POWER PLANT, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 200
License No. DPR-82

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Pacific Gas and Electric Company (the licensee), dated October 2, 2007, as supplemented by letters dated February 8, and March 11, 2008, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C.(2) of Facility Operating License No. DPR-82 is hereby amended to read as follows:

   (2) Technical Specifications (SSER 32, Section 8)* and Environmental Protection Plan

   The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 200, are hereby incorporated in the license. Pacific Gas & Electric Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of its date of issuance and shall be implemented prior to Mode 4 entry following refueling outage 2R14.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Thomas G. Hiltz, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Facility
Operating License No. DPR-82
and Technical Specifications

Date of Issuance: March 26, 2008

ATTACHMENT TO LICENSE AMENDMENT NO. 199

TO FACILITY OPERATING LICENSE NO. DPR-80

AND AMENDMENT NO. 200 TO FACILITY OPERATING LICENSE NO. DPR-82

DOCKET NOS. 50-275 AND 50-323

Replace the following pages of the Facility Operating License Nos. DPR-80 and DPR-82, and Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Facility Operating License No. DPR-80

REMOVE	INSERT
3	3

Facility Operating License No. DPR-82

REMOVE	INSERT
3	3

Technical Specifications

REMOVE	INSERT
3.5-7	3.5-7

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 199 TO FACILITY OPERATING LICENSE NO. DPR-80

AND AMENDMENT NO. 200 TO FACILITY OPERATING LICENSE NO. DPR-82

PACIFIC GAS AND ELECTRIC COMPANY

DIABLO CANYON POWER PLANT, UNITS 1AND 2

DOCKET NOS. 50-275 AND 50-323

1.0 INTRODUCTION

By application dated October 2, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML072840049) (Reference 1), as supplemented by letters dated February 8, and March 11, 2008 (ADAMS Accession Nos. ML080170662 and ML080790519, respectively) (References 2 and 3), Pacific Gas and Electric Company (PG&E, the licensee) requested changes to the Technical Specifications (TS, Appendix A to Facility Operating License Nos. DPR-80 and DPR-82) for the Diablo Canyon Power Plant, Units 1and 2 (DCPP).

The proposed amendments would revise TS 3.5.4, “Refueling Water Storage Tank (RWST)," and Surveillance Requirement (SR) 3.5.4.2. Specifically, the proposed changes would revise TS 3.5.4 and SR 3.5.4.2, to increase the minimum required borated water volume from “≥ 400,000 gallons (81.5% indicated level)” to “≥ 455,300 gallons.”

The supplemental letters dated February 8, and March 11, 2008, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on December 31, 2007 (72 FR 74361).

2.0 REGULATORY EVALUATION

In Section 50.36, “Technical specifications,” of Title 10 of the *Code of Federal Regulations* (10 CFR), the Commission established its regulatory requirements related to the content of TS. Pursuant to 10 CFR 50.36(d), TS are required to include items in the following five specific categories related to station operation: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operation; (3) surveillance requirements; (4) design features; and (5) administrative controls.

As described in Section 3.1 of DCPP Final Safety Analysis Report Update (FSARU), the DCPP units are designed to comply with the Atomic Energy Commission (AEC) General Design Criteria (GDCs) for Nuclear Power Plant Construction Permits, published in July 1967. Appendix 3.1A of the DCPP FSARU provides a list of the GDCs published as Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants," in February 1971 and provides a summary discussion of the designs and procedures of DCPP that are intended to meet these criteria. The applicability of 10 CFR Part 50, Appendix A criteria to the proposed changes is described below:

- Criterion 16, "Containment design," insofar as it requires that the containment and its associated systems (e.g., penetrations) be provided to establish an essentially leak-tight barrier against the uncontrolled release of radioactivity to the environment and to assure that containment design conditions important to safety are not exceeded for as long as postulated accident conditions require. Appendix 3.1A of the DCPP FSARU states that the DCPP Units 1and 2 designs conform to the intent of Criterion 16.

- Criterion 38, "Containment heat removal," insofar as it requires that the reactor containment be provided with a system to reduce rapidly, consistent with the functioning of other associated systems, the containment pressure and temperature following any loss-of-coolant accident (LOCA), and maintain them at acceptably low levels. Appendix 3.1A of the DCPP FSARU states that the DCPP Units 1and 2 designs conform to the intent of Criterion 38.

- Criterion 50, "Containment design basis," insofar as it requires that the containment and its penetrations accommodate without exceeding the design leakage rate, and with sufficient margin, the calculated pressure and temperature conditions resulting from any LOCA. Appendix 3.1A of the DCPP FSARU states that the DCPP Units 1and 2 designs conform to the intent of Criterion 50.

Requirements for the design and analysis of emergency core cooling systems (ECCS) are specified in 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light water nuclear power reactors" and 10 CFR Part 50, Appendix K, "ECCS Evaluation Models." These regulations are in place to ensure adequate core cooling following a LOCA such that certain acceptance criteria are satisfied. This regulation requires that licensees design their ECCS systems to meet five criteria, one of which is to provide the capability of long-term cooling.

NRC GL 2004-02 (Reference 5) requested licensees to perform an analysis of the ECCS and containment spray system (CSS) recirculation functions in light of the information provided in the letter and, if appropriate, to take additional actions to ensure system functionality. The GL identified that previous guidance used to develop current licensing basis analyses does not adequately and completely model sump screen debris blockage and related effects.

In addition, the NRC staff's evaluation also used guidance from Regulatory Guide 1.82, Revision 3, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," November 2003.

3.0 BACKGROUND

NRC GL 2004-02 (Reference 5) requested that licensees provide information regarding the potential impact of debris blockage on emergency recirculation during design basis accidents. GL 2004-02 required that addressees provide by September 1, 2005, a description of and implementation schedule for all corrective actions, including any plant modifications, that are identified while responding to the GL. The GL requested that all licensees complete actions related to the GL by December 31, 2007, or provide justification for continued operation until the actions are completed. By letters dated January 18, 2007 (Reference 6), and April 17, 2007 (Reference 7), the NRC extended the December 31, 2007, completion date for Unit 2 to the 14th refueling outage (2R14), which began February 2008 and for Unit 1 to the15th refueling outage (1R15), currently scheduled to begin in January 2009. The licensee also plans to replace the steam generators (SGs) during those outages.

Among the corrective actions to respond to the GL is the installation of a new containment recirculation sump screen. The new sump screens are required to be fully submerged to prevent vortexing and air ingestion, during changeover from the injection mode to the recirculation mode for a large-break LOCA (LBLOCA). One of the compensatory actions the licensee committed to in its extension request was to replace the sump screens (only for Unit 1 because of the length of the extension). The Unit 1 replacement containment recirculation sump screen was installed in 1R14, which was completed in May 2007. The Unit 2 replacement screen will be installed during 2R14. The new containment recirculation sump screen must be fully submerged during a LBLOCA to meet current design requirements. After installation of the new sump screens in Unit 1, the licensee determined that the new screens would not be fully submerged during an LBLOCA . As a result, the licensee implemented another compensatory measure consistent with NRC Bulletin 2003-01 (Reference 8) and GL 2004-02 and administratively increased the RWST minimum borated water volume for the new Unit 1 containment recirculation sump screen prior to startup from the 1R14 refueling outage,

4.0 TECHNICAL ANALYSES

4.1 Description of RWST

The RWST supplies borated water to the chemical and volume control system during abnormal operating conditions (boration flow path) to the refueling cavity during refueling, and to the ECCS and the CSS during accident conditions. During accident conditions, it provides containment cooling and depressurization, core cooling, and replacement inventory, and is a source of negative reactivity for reactor shutdown.

During the initial phase of ECCS injection, the ECCS pumps take suction from the RWST and inject into the cold legs of the reactor coolant system (RCS). When the RWST has drained to the low-level setpoint, the residual heat removal (RHR) pump suctions are realigned to the containment recirculation sump for recirculation of the sump water to the RCS.

4.2 Scope of RWST Level Review

This License Amendment Request proposes a change to the minimum required RWST borated water inventory. As the new sump screens require that the sump screens be fully submerged to

prevent vortexing and air ingestion during changeover from the injection mode to the recirculation mode for an LBLOCA, the scope of this review was limited to the increase in RWST inventory needed to submerge the new sump screens and what effects, if any, it would have on the containment and ECCS analyses. The NRC staff reviewed the analyses to determine the minimum increased inventory in the RWST needed to submerge the new sump screens to assure that the ECCS is operable with the new screens using the current licensing basis assumptions. The GL request the licensee to verify the plant's compliance with the regulatory requirements listed in the Applicable Regulatory Requirements section of the GL once its licensing basis has been updated to reflect the results of the mechanistic analysis requested in the GL. Compliance with those regulations was extended to the 14th refueling outage (2R14) for Unit 2, which began February 2008, and until the 15th refueling outage (1R15) for Unit 1.

4.3 RWST Minimum Inventory

As discussed in the DCPP FSARU Section 6.3, the minimum volume that will be maintained in the RWST provides a sufficient amount of borated water to meet the following requirements:

- Provide adequate coolant during the injection phase to meet ECCS design objectives;
- Increase the boron concentration of reactor coolant and recirculation water to a point that ensures no return to criticality with the reactor at cold shutdown and all control rods, except the most reactive rod cluster control assembly, inserted into the core;
- Fill the containment sump to permit the initiation of recirculation; and
- Fulfill spray requirements.

In Section 4.0 of Enclosure 1 to the letter dated October 2, 2007, the licensee stated that the TS requirements for RWST borated water temperature and boron concentration remain unchanged. Since borated water inventory in the RWST is proposed to be increased, there is no adverse effect on the requirements to have adequate coolant during the injection phase, increase the boron concentration of reactor coolant and recirculation water to a point that ensures no return to criticality with the reactor at cold shutdown, and fulfill spray requirements.

The licensee performed two calculations to support the required RWST minimum inventory. The first calculation (N-227, Revision 4 (Attachment 1 to Reference 2)) supports the present TS SR 3.5.4.2 to verify that RWST borated water volume is ≥ 400,000 gallons (81.5 percent indicated level). The calculation shows that the corresponding sump flood level is 93.02 feet. The calculation was later revised to show that a minimum RWST level of 90 percent would be required to increase the sump flood level to 93.41 feet to ensure full submergence of the containment sump screen that is being installed in Unit 1 during 1R14. However, the as-built containment sump screen in Unit 1 was found to be slightly higher. A second calculation (STA-255, Revision 2, (Attachment 2 to Reference 2)) was performed by the licensee to determine the additional RWST inventory needed to increase the post-LOCA sump level from 93.41 feet to 93.6 feet to ensure the installed sump is fully submerged under the worst case

LBLOCA condition. The calculation determined that the corresponding level in the RWST is 93.6 percent and the associated borated water volume is 455,300 gallons. The second calculation is a simplified version, which considers the results of the first calculation to determine the additional inventory needed in the RWST for full submergence of the newly installed containment sump screen in Unit 1.

The methodology, basis, and assumptions are documented in the first calculation. The calculation appropriately included possible sources of water including RCS, accumulators, RWST and spray additive tank, and consideration of the loss of a quantity of water to the containment atmosphere as vapor, water in transit to the sump, RCS shrinkage due to cooling, liquid condensation and pooling on containment surfaces, filling of dry CSS, and RWST leakage. The calculation was subjected to a technical review by an outside organization, with comments and resolutions documented within the calculation. As expected, the results of the calculation show that switchover to recirculation for LBLOCA occurs earlier than for other breaks. However, the results also indicate that sump submergence at switchover to recirculation is approximately 1/2 inch higher than for small breaks, leaving the possibility that the sump screen may not be fully submerged for small breaks when switchover occurs.

The licensee's justification for acceptance of this potential condition is provided under Section 3f, "Head loss and vortexing," of the enclosure to the licensee's letter dated February 1, 2008 (Reference 4), portions of which are quoted verbatim below:

> Large-break LOCA Vortexing
>
> The most limiting large-break LOCA conditions occur at the initiation of switchover to cold-leg recirculation. At this time, the highest RHR pump suction flow is experienced, and the sump water level is just covering the strainers. Water level will continue to rise due to the continued operation of the CS [containment spray], SI [safety injection] and centrifugal charging pumps. As a part of the acceptance testing of the DCPP strainers, a vortexing test was performed on a full size screen module to examine the limiting case. A test module was tested in a pool at full flow conditions. Testing was conducted with the water depth over the strainers similar to the plant configuration. No vortexing or air entrainment was observed during testing.
>
> At the conclusion of the Test 3-S-ECE with a fully debris-laden front sector, the pool water level and flow rate were reduced. No vortexing or air ingestion was observed. At the conclusion of a rear module head loss test, the water level was lowered. Vortexing was first observed after a 39-inch drop in the water level (only 9.5 inches was submerged of the 48.5-inch high module). The plant strainers are designed such that they are completely submerged under water at the start of recirculation after large-break LOCA. This is considered a fully-submerged screen configuration.
>
> Small-break LOCA Vortexing
>
> The small-break LOCA evaluation required the evaluation of a number of different conditions due to the design of the strainers. Since the small-break

LOCA scenarios may result in a partially-submerged strainer, additional evaluation of the strainer system was conducted. Partial submergence of the strainers results in a condition where an air-water interface would exist within the upper plenum and descending elbows in the front strainer assemblies. The presence of the air-water interface, when coupled with flow direction changes and descending elbow, was considered to be highly susceptible to vortexing. As a result, a separate set of small-break LOCA-specific tests was performed to evaluate susceptibility.

The testing performed evaluated the vortexing at expected flow rates on a full-sized plenum and descending elbows. This testing confirmed vortexing under the postulated conditions, and a set of flow straighteners was added to reduce the tendency to vortex and to eliminate air entrainment as a concern. The modifications were tested in the same mockup with successful results. These tests established that the performance of the DCPP strainers at water levels representative of a small-break LOCA would not result in conditions which would entrain excessive amounts of air into the suctions of the RHR pumps.

The licensee performed calculations with potential losses of water due to vaporization, water in transit, RCS shrinkage, liquid condensation and pooling, filling spray system pipes, and RWST leakage, conservatively estimated to show that the containment sump screen will be submerged at the start of recirculation after LBLOCA, once the proposed change is implemented. The testing performed indicates that vortexing or air entrainment would not occur at the highest RHR pump suction flow. Based on testing for small-break LOCA (SBLOCA), a set of flow straighteners was added to reduce the tendency to vortex and to eliminate air entrainment as a concern. Post-modification testing indicated successful results. Based on a review of the information provided, the NRC staff finds that the proposed increase in the RWST inventory will result in fully submerged screens at the initiation of recirculation for LBLOCA. The NRC also concludes that the new sump screen does not need to be fully submerged during SBLOCA. Testing performed on the screen confirmed that there are no adverse effects on the operation of the pumps due to the new sump screen during a SBLOCA.

4.4 Containment Analysis

As discussed in Section 4.0 of Enclosure 1 to the licensee's application dated October 2, 2007, the RWST serves as a source of borated cooling water to the CSS and the ECCS during accident conditions. The CSS reduces the containment ambient temperature and pressure. The CSS, in conjunction with the spray additive system (SAS), also helps to limit offsite radiation levels following postulated LOCA by removing airborne iodine from the containment atmosphere. The ECCS consists of the safety injection pumps (SIPs) and centrifugal charging pumps (CCPs) referred to as "high-head pumps" and RHR pumps referred to as "low-head pumps." As stated in Section 6.3 of the DCPP FSARU, the primary function of the ECCS following a LOCA is to remove the stored and fission product decay heat from the reactor core to prevent fuel rod damage to the extent that such damage may impair effective core cooling. The ECCS also provides shutdown capability for a LOCA by means of shutdown chemical (boron) injection. As described in the DCPP FSARU Sections 6.2 and 6.3, the operation of the ECCS and CSS following a LOCA is divided into two distinct phases: injection and recirculation.

4.4.1 Injection Phase

The CSS pumps draw borated water from the RWST, mix it with sodium hydroxide (NaOH) solution from the spray additive tank and spray it into containment atmosphere through spray nozzles mounted high above the operating deck. The ECCS pumps draw borated water from RWST and discharge into the cold legs of the RCS. The operation of the ECCS during the injection mode terminates any reactivity increase following the postulated accidents, accomplishes initial cooling of the core, and replenishes coolant lost from the primary system. The injection mode of the ECCS will continue until the RWST low level is reached at which time the RHR pumps are automatically tripped. The operator then manually changes system alignment to the recirculation mode, until which time the SIPs and CCPs will continue to draw water from the RWST and inject into the RCS. Containment spray flow will continue until the RWST low-low level is reached, at which time the CSS pumps are manually tripped and isolated.

4.4.2 Recirculation Phase

During the recirculation phase, the RHR system provides long-term core cooling. This function is accomplished by aligning the RHR system to take suction from the containment sump and cool the water in the residual heat exchanger. The cooled water is pumped back to the RCS to absorb more decay heat. The RCS can be supplied simultaneously from the RHR pumps and from a portion of the discharge from the residual heat exchanger that is directed to the charging pumps and SIPs that return the water to the RCS. If containment spray is used in the recirculation phase, spray is provided by the RHR pumps and piping that connects RHR pump discharge to the containment spray header.

As stated in Section 4.0 of Enclosure 1 to the licensee's letter dated October 2, 2007, the events for which the RWST provides mitigation and for which the RWST parameters are limiting are LBLOCA, SBLOCA, and steam line breaks. The licensee has determined that LBLOCA is the limiting accident with respect to the design of the containment recirculation sump screen. At the time of initiation of switchover to cold-leg recirculation, the highest RHR pump suction flow will occur for LBLOCA and the sump water level is just covering the strainers. The licensee stated that the screen must be fully submerged to prevent vortexing and air ingestion during changeover from the injection mode to the cold-leg recirculation mode for an LBLOCA. For SBLOCA, the new sump screen does not need to be fully submerged.

Available RWST volume is not an explicit assumption in analyses for other than LOCA events since the required volume for those events is much less than that required for a LOCA. The minimum required deliverable volume is dependent on the LOCA and containment analysis, and the containment recirculation sump and sump screen design. The TS requirements for RWST borated water temperature and boron concentration remain unchanged. Except for RWST inventory, the initial containment design parameters used for containment post-accident containment analysis remain the same. A higher RWST inventory could potentially increase the injection period slightly compared to the present analysis. During the injection phase of post-accident operation, the ECCS pumps water from the RWST into the reactor vessel at a lower temperature than that of the water in the vessel. This water can therefore adsorb heat from the core until saturation temperature is reached. Likewise, the entire heat capacity of the spray from the RWST temperature to the containment atmosphere temperature is available for

energy absorption. A slightly longer period of operation in injection mode will have no adverse effect on the results of the existing containment analysis. Therefore, the results of the existing containment analyses for short-term post-accident operation will bound the new condition with the higher RWST boron water inventory. The long-term cooling is also unaffected because the higher RWST inventory will provide full submergence of the containment sump screen, thus assuring ECCS systems to operate as designed. The component cooling water, which removes containment heat during recirculation via the RHR heat exchangers, is unaffected by the proposed change.

The NRC staff concludes that the proposed change will continue to meet the requirements of GDCs 16, 38, and 50. GDC 16 is satisfied since the proposed change would not result in pressure and temperatures exceeding the containment design limits and, therefore, the containment will remain "essentially leak-tight." GDCs 38 and 50 are satisfied since the increased RWST inventory will have no adverse effect on the previously analyzed containment pressures and temperatures. Based on the information provided by the licensee, the NRC staff also concludes that the proposed amendment will have no adverse impact on long term core cooling and, therefore, the proposed amendment is acceptable with respect to the requirements of 10 CFR 50.46.

4.5 Instrument Uncertainties Associated with SR 3.5.4.2

The NRC staff requested additional information on the performance of SR 3.5.4.2, in particular, how the uncertainties were determined and applied in the surveillance. The Unit 1 containment recirculation sump screen was replaced during the Unit 1 refueling outage (1R14). The proposed SR 3.5.4.2 RWST minimum required borated water volume of 455,300 gallons was administratively implemented at that time. Because of the narrow margin between the proposed SR limit and the RWST high-level alarm, a high-accuracy Heise gauge was installed during 1R14 to verify RWST level. The Heise gauge will be replaced during the Unit 1 1R15 with new level transmitters (LT-920, -921, and -922) with digital readout at the transmitter; the Unit 2 level transmitters will be replaced during the Unit 2 2R14 when the Unit 2 containment recirculation sump screen will be replaced.

The Heise gauge uncertainty is calculated as follows:

$$CU = B \pm \sqrt{\left\{PMA^2 + SCA^2 + \mathrm{Re}\,adabilty^2\right\}}$$

Where:

Bias Error (B)	= 0.0361 psi [pounds per square inch]
Process Measurement Allowance (PMA)	= ± 0.0726 psi
Sensor Calibration Accuracy (SCA)	= ± 0.3130 psi
Readability	= ± 0.0100 psi

Therefore the uncertainty associated with use of the Heise gauge is the following:

$$CU = B \pm \sqrt{\left\{PMA^2 + SCA^2 + \mathrm{Re}\,adabilty^2\right\}}$$

$$CU = 0.0361 \pm \sqrt{\{0726^2 + 0..0313^2 + 0.01^2\}}$$

$$CU = 0.0361 + \sqrt{\{0726^2 + 0..0313^2 + 0.01^2\}} = + 0.1158 \text{ psi,}$$

$$CU = 0.0361 - \sqrt{\{0726^2 + 0..0313^2 + 0.01^2\}} = -0.0797 \text{ psi, or } 0.38\%$$

The replacement level transmitter digital indicator uncertainty is calculated as follows:

$$CU = B \pm \sqrt{\{PMA^2 + SCA^2 + SMTE^2 + SD^2 + STE^2 + SPE^2 + \text{Re}\,adabilty^2\}}$$

Where

Bias Error (B)	= ± 0.25 inches
Process Measurement Allowance (PMA)	= ± 2.00 inches
Sensor Calibration Accuracy (SCA)	= ± 1.47 inches
Sensor Measuring and Test Equipment (SMTE)	= ± 0.90 inches
Sensor Drift (SD)	= ± 2.00 inches
Sensor Temperature Effect (STE)	= ± 0.37 inches
Sensor Pressure Effect (SPE)	= 0
Readability of Indicator on Sensor/transmitter	= 0

Therefore, the uncertainty for the digital indicator for LT-920, -921, and -922 is the following:

$$CU = B \pm \sqrt{\{PMA^2 + PMA^2 + SCA^2 + SMTE^2 + SD^2 + STE^2 + SPE^2 + \text{Re}\,adabilty^2\}}$$

$$CU^{\pm} = \pm 0.25 \pm \sqrt{2^2 + 0 + 1.47^2 + 0.9^2 + 2^2 + 0.37^2 + 0 + 0} = \pm 3.58 INWC \text{, or } \pm 0.61\%$$

The licensee stated the above calculations are consistent with the current setpoint methodology contained in WCAP-11082, Revision 6, which was submitted in PG&E Letter DCL-03-111, "License Amendment Request 03-12, Revision to Technical Specifications 3.3.1, 'RTS Instrumentation,' and 3.3.2, 'ESFAS Instrumentation,'" dated September 12, 2003. WCAP-11082, Revision 6 was approved by the NRC for DCPP by Amendment No. 178 to Facility Operating License No. DPR-80 and Amendment No. 180 to Facility Operating License No. DPR-82 in its December 2, 2004, letter, "Issuance of Amendment Re: Revised Technical Specifications 3.3.1 'Reactor Trip System (RTS) Instrumentation' and 3.3.2, 'Engineered Safety Features Actuation System (ESFAS) Instrumentation' (TAC Nos. MC0893 and MC0894).

The proposed SR 3.5.4.2 requires verification that the RWST borated water volume is ≥ 455,300 gallons. This value represents the minimum volume required by the TS. Allowance for instrument uncertainty is not included in the proposed SR. The acceptance criteria reflecting an allowance for instrument uncertainty will be maintained in the TS 3.5.4.2 Bases. To ensure that the SR 3.5.4.2 requirement is met, the minimum RWST level must be maintained ≥ 94 percent using the temporary installed Heise gauge for Unit 1, or ≥ 94.25 percent using the

local digital readout on the new level transmitters on Unit 2. These acceptance criteria will be included in the TS 3.5.4.2 Bases. While the SR is only performed once every 7 days, the RWST level changes can be observed by plant operators using installed instrumentation in the control room. In addition, a plant process computer alarm will inform the operators when the SR limit with uncertainties is being approached. As noted earlier, the setpoint methodology is unchanged and is not used in the determination of the TS-required RWST volume. While the NRC staff did review the uncertainty calculation for the SR for the required RWST volume to determine if it was reasonable, it did not use this review for the approval of the amendment. The NRC staff concluded that the proposed changes to specify only the required RWST volume in the SR while providing the SR acceptance criteria with uncertainties in the Bases along with the other RWST volume checks will assure that sufficient water is in the RWST and, therefore, the proposed TS changes are acceptable.

4.6 TS Changes

The NRC has concluded that the review for this amendment can be limited to the RWST inventory analysis as the current accident analyses and the following current licensing basis assumptions have not changed as part of this request:

1. An LBLOCA remains the limiting break size for any event that results in SI initiation, including inadvertent ECCS actuation which results in delivery of RWST water to the RCS. However, the events for which the RWST provides mitigation and for which the RWST parameters are limiting are LBLOCA, SBLOCA, and steam line breaks. The licensee has determined that for the new sump screens, the LBLOCA remains the limiting accident with regards to its design. For SBLOCA, the new sump screens do not need to be fully submerged to be operable (see Section 4.3). The feedwater line break and SG tube rupture also involve SI but the RWST parameters are less significant to the analysis results.

2. Available RWST volume is not an explicit assumption in analyses for other than LOCA events since the required volume for those events is much less than that required for a LOCA. Insufficient water in the RWST could result in insufficient borated water inventory in the containment recirculation sump when the changeover from the injection mode to the recirculation mode occurs following a design-basis LOCA. The minimum required deliverable volume is dependent on the LOCA and containment analyses, and the containment recirculation sump and sump screen design. The LOCA and containment analyses are unchanged (see Section 4.4). The new containment recirculation sump screen design requires that the screen be fully submerged to prevent vortexing and air ingestion during changeover from the injection mode to the cold-leg recirculation mode for an LBLOCA. The proposed minimum RWST borated water volume was established to ensure that this design requirement is met. The licensee has stated that the new screens provide almost four times as much screen area and would meet the current licensing bases with the current RWST volume if there was sufficient volume in the RWST to submerge the new sump screens. Therefore, the current ECCS analyses are still valid with regard to the minimum required RWST volume except for the increased volume needed to submerge the new screens.

3. The TS requirements for RWST borated water temperature and boron concentration remain unchanged.

4. The calculated maximum containment flood level is based on the RWST water level associated with the RWST high-level alarm setpoint. Although the containment water level would be higher due to the proposed change, the resultant level would be less than the calculated maximum containment flood level. Therefore, the proposed change has no impact on the qualification of equipment above the maximum containment flood level.

5. The proposed change is bounded by the current analysis for post-LOCA sump pH (potential of hydrogen). The calculation for minimum post-LOCA sump pH assumes the maximum RWST borated water volume. The calculation for the maximum post-LOCA sump pH assumes the TS minimum RWST borated water volume.

6. The licensee stated that the increase in RWST inventory is enveloped by the volume already considered in the seismic analysis of the RWST. Therefore, the proposed change will have no impact on the seismic qualification of the RWST.

7. The current setpoint methodology is unchanged for the verification of the minimum RWST volume SR (as discussed in Section 4.5).

TS 3.5.4, “Refueling Water Storage Tank (RWST),” SR 3.5.4.2 currently states: “Verify RWST borated water volume is ≥ 400,000 gallons (81.5% indicated level).” The proposed change would revise SR 3.5.4.2 to state: “Verify RWST borated water volume is ≥ 455,300 gallons.”

The 400,000 gallons and 455,300 gallons represent the current and proposed contained borated water volumes in the RWST. Based on review of the calculations performed by the licensee, which were provided with the licensee’s letter dated February 1, 2008 (Reference 4), the NRC staff concludes that the revised inventory will provide full submergence of the new containment sump screen for LBLOCA accidents and, therefore, is acceptable.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the California State official was notified of the proposed issuance of the amendments. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration and there has been no public comment on such finding as

published in the *Federal Register* on December 31, 2007 (72 FR 74361). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

8.0 REFERENCES

1. PG&E letter DCL-07-093, License Amendment Request 07-02, “Revision to Technical Specification (TS) 3.5.4, ‘Refueling Water Storage Tank (RWST),’” dated October 2, 2007 (ADAMS Accession No. ML072840049).

2. PG&E letter DCL-08-012, Response to Request for Additional Information on License Amendment Request 07-02, “Revision to Technical Specification (TS) 3.5.4, ‘Refueling Water Storage Tank (RWST),’” dated February 8, 2008 (ADAMS Accession No. ML080170662).

3. PG&E letter DCL-08-022, Response to Request for Additional Information on License Amendment Request 07-02, “Revision to Technical Specification (TS) 3.5.4, ‘Refueling Water Storage Tank (RWST),’” dated March 11, 2008 (ADAMS Accession No. ML080790519).

4. PG&E letter DCL-08-002, Supplemental Response to Generic Letter 2004-02, “Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors,” dated February 1, 2008 (ADAMS Accession No. ML080420438).

5. NRC Generic Letter 2004-02, “Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors,” dated September 13, 2004 (ADAMS Accession No. ML042360586).

6. NRC Letter "Diablo Canyon Power Plant, Unit No. 2 - Generic Letter 2004-02, ‘Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors,’ Extension Request Approval” (TAC No. MD3586), dated January 18, 2007 (ADAMS Accession No. ML070090657).

7. NRC Letter "Diablo Canyon Power Plant, Unit No. 1 - Generic Letter 2004-02, ‘Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors,’ Extension Request Approval” (TAC No. MD4584), dated April 12, 2007 (ADAMS Accession No. ML071010537).

8. NRC Bulletin 2003-01, “Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized Water Reactors," dated June 9, 2003 (ADAMS Accession No. ML031600259).

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