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October 14, 2008
PG&E Letter DCL-08-090

U. S. Nuclear Regulatory Commission
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Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2

Nine-Month Response to NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems"

References: 1. NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems" dated January 11, 2008.

2. PG&E Letter DCL-08-032, "Three-Month Response to NRC Generic Letter 2008-01, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems,'" dated April 10, 2008.

The Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 2008-01 (Reference 1) to request that each licensee evaluate the licensing basis, design, testing, and corrective action programs for the emergency core cooling systems, residual heat removal system (RHRS), and containment spray system, to ensure that gas accumulation is maintained less than the amount that challenges operability of these systems, and that appropriate action is taken when conditions adverse to quality are identified.

GL 2008-01 requested that each licensee submit a written response in accordance with 10 CFR 50.54(f) within nine months of the date of the GL to provide the information below:

(a) A description of the results of evaluations that were performed pursuant to the requested actions;

(b) A description of all corrective actions, including plant, programmatic, procedure, and licensing basis modifications that were determined to be necessary to assure compliance with the quality assurance criteria in Sections III, V, XI, XVI, and XVII of Appendix B to 10 CFR Part 50 and the licensing basis and operating license as those requirements apply to the subject systems; and,

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(c) A statement regarding which corrective actions were completed, the schedule for completing the remaining corrective actions, and the basis for that schedule.

In summary, Pacific Gas and Electric Company (PG&E) has concluded that the subject systems/functions at the Diablo Canyon Power Plant (DCPP) are in compliance with the Technical Specification definition of Operability, i.e., capable of performing their intended safety function, and that DCPP is currently in compliance with 10 CFR 50, Appendix B, Criterion III, V, XI, XVI and XVII, with respect to the concerns outlined in GL 2008-01 regarding gas accumulation in the accessible portions of these systems/functions. As committed in Reference 2, PG&E will complete its assessments of those inaccessible portions of these systems/functions during the next Unit 1 refueling outage and provide a supplement to this report with those results within 90 days from completion of that outage.

During the piping isometric drawing reviews performed in August 2008, PG&E identified a long horizontal section of the RHRS discharge piping inside containment that exceeds the piping walkdown screening criteria of 14 times the pipe diameter. There is an existing vent in this section of the RHRS discharge piping. PG&E will perform a confirmatory walkdown to verify as-built piping configuration for this section of the RHRS discharge piping. PG&E will complete its assessments of this section of piping during Unit 2 Refueling Outage Fifteen, and provide a supplement to this report with those results within 90 days from completion of that outage.

The enclosure to this letter contains the PG&E nine-month response to NRC GL 2008-01.

New commitments are summarized in the enclosure.

If there are any questions or if additional information is needed, please contact Mr. Stan Ketelsen at 805-545-4720.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on October 14, 2008.

Sincerely,

James R. Becker
Site Vice President and Station Director

MJRm/50037662
Enclosure:

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, NRC Project Manager, NRR

Enclosure
PG&E Letter DCL-08-090

Nine-Month Response to NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems"

Nine-Month Response to NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems"

This enclosure contains the Pacific Gas and Electric Company (PG&E) nine-month response to NRC Generic Letter (GL) 2008-01 "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," dated January 11, 2008. In GL 2008-01, the NRC requested "that each addressee evaluate its ECCS, DHR system, and containment spray system licensing basis, design, testing, and corrective actions to ensure that gas accumulation is maintained less than the amount that challenges operability of these systems, and that appropriate action is taken when conditions adverse to quality are identified."

The following information is provided in this response:

(a) A description of the results of evaluations that were performed pursuant to the requested actions (see Section A of this enclosure),

(b) A description of the corrective actions determined necessary to assure compliance with the quality assurance criteria in Sections III, V, XI, XVI, and XVII of Appendix B to 10 CFR Part 50 and the licensing basis and operating license with respect to the subject systems (see Section B of this enclosure), and

(c) A statement regarding which corrective actions have been completed, the schedule for the corrective actions not yet complete, and the basis for that schedule (see Section B of this enclosure).

The following systems were determined to be in the scope of GL 2008-01 for Diablo Canyon Power Plant (DCPP):

- emergency core cooling system (ECCS)
- residual heat removal system (RHRS)
- containment spray system (CSS)

ECCS consists of the high, intermediate, and low head injection systems. The portion of the RHRS performing the low head injection function is included in ECCS. Similarly, the portion of the chemical and volume control system performing the high head injection function is included in ECCS. DCPP's safety injection (SI) system performs the intermediate head injection function.

References to ECCS pumps refer to the two centrifugal charging pumps (CCPs), the two safety injection pumps (SIPs), and the two residual heat removal pumps (RHRPs).

Background

In 1998, PG&E identified gas accumulation in the Unit 2 RHRS cross-tie piping to the suction of the CCPs and SIPs. The gas accumulation was attributed to less than adequate fill and vent operations performed as part of system return to service activities following an earlier refueling outage. In 2004, gas accumulation was again identified in the same RHRS cross-tie piping location. Several instances occurred at this location over several months in both units. Investigation of the event included an evaluation of possible mechanisms for gas intrusion and accumulation. The investigation concluded that continuous hydrogen degassing from the reactor coolant pump (RCP) seal return line was occurring during power operation and was accumulating in the CCP miniflow recirculation lines. The gas was transported to the CCP/SIP cross-tie piping when the CCP miniflow recirculation line was operated while switching operating pumps or during pump testing.

As a result of the earlier evaluations, the following major actions were taken for resolution of the above gas intrusion issues:

- PG&E performed comprehensive piping isometric drawing reviews to evaluate all ECCS piping for the potential for gas accumulation and transport to the suction of the ECCS pumps.

- From the drawing reviews, PG&E performed field evaluations of known or suspected gas accumulation locations to help determine appropriate actions to minimize the impact of gas accumulation.

- PG&E reviewed and revised system venting procedures to ensure appropriate accumulated gas removal following system breaches and during normal operation.

- PG&E implemented procedures to provide instructions and controls for performing ultrasonic testing (UT) of ECCS piping to detect gas accumulation.

- PG&E developed engineering calculations to determine allowable system-specific void sizes for gas detection, gas removal and system operability determination efforts.

System modifications were performed to minimize gas accumulation or to facilitate periodic gas removal. Initially, based on the 1998 experience, a hard piped vent was added to the CCP/SIP cross-tie piping in each unit to facilitate immediate venting. After the 2004 experience, the vent was replaced with a void header to divert gas away from the active flow path to minimize the introduction of gas into the SIP and CCP suction lines. Also, the CCP miniflow recirculation line connection to the RCP seal return line was configured in each unit to provide

a "P-trap" to eliminate gas accumulation that could be transported to the CCP and SIP suction lines.

PG&E concludes that the subject systems are operable in their current state based on past efforts to address gas accumulation and the evaluations performed for this GL. System modifications already performed by PG&E as described above, coupled with comprehensive routine UT and venting, provide adequate assurance that gas accumulation has negligible impact on the functionality of the subject systems during all modes of operation.

As a result of the evaluations for this GL, the enclosure identifies several planned equipment modifications to be implemented at DCPP. The modifications are intended to:

- Provide additional and improved barriers to gas intrusion sources,
- Improve existing gas removal capabilities, and
- Permit venting of accumulated gas in the unlikely event that existing and additional barriers to gas intrusion sources should all fail.

A. EVALUATION RESULTS

1. Licensing basis evaluation

PG&E has further reviewed the DCPP licensing basis with respect to gas accumulation in the ECCS, RHRS, and CSS, as requested in GL 2008-01. This review included the Technical Specifications (TS), TS Bases, Updated Final Safety Analysis Report (UFSAR), Equipment Control Guidelines and Bases, responses to NRC generic communications, regulatory commitments, and License Conditions.

1.1 Summary of the results of the review of these documents

The above documents and regulatory commitments were evaluated for compliance with applicable regulatory requirements. No immediate changes were determined to be needed to address weaknesses or deficiencies in meeting regulatory requirements or commitments.

The DCPP TS have the following surveillance requirement (SR):

SR 3.5.2.3 Verify ECCS piping is full of water.

This surveillance is performed on a 31-day frequency.

The DCPP TS Bases state the following:

> "With the exception of the operating CCP, the ECCS pumps are normally in a standby, non-operating mode. As such, flow path piping has the potential to develop voids and pockets of entrained gases. Maintaining the piping from the ECCS pumps to the RCS full of water ensures that the system will perform properly, injecting its full capacity into the RCS upon demand. This will also prevent water hammer, pump cavitation, gas binding, and pumping of noncondensible gas (e.g., air, nitrogen, or hydrogen) into the reactor vessel following an SI signal or during shutdown cooling.
>
> The 31-day Frequency takes into consideration the gradual nature of gas accumulation in the ECCS piping and the procedural controls governing system operation.
>
> The intent of the SR is to assure the ECCS piping is adequately vented. Different means of verification, as alternates to venting the accessible system high points, can be employed to provide this assurance, such as ultrasonic testing the vent lines of the ECCS pump casings and accessible high point vents."

PG&E performs TS SR 3.5.2.3 to verify ECCS suction and discharge piping is adequately vented. DCPP does not have similar TS SRs for the RHRS (non ECCS functions) and CSS.

ECCS, RHRS, and CSS testing requirements are described in the testing evaluation of this response.

The DCPP UFSAR does not specify piping fill requirements. Therefore no changes to the UFSAR are required.

1.2 Summary of the changes to licensing basis documents (corrective actions)

PG&E has not made any changes to DCPP licensing basis documents as a result of evaluations performed for this GL response.

1.3 Items that have not been completed

TS improvements are being addressed by the Technical Specifications Task Force (TSTF) to provide an approved TSTF traveler for making changes to individual licensee's TS related to the potential for unacceptable gas accumulation. The development of the TSTF traveler relies on the results of the evaluations of a large number of licensees to address the various plant designs. PG&E is continuing to support the industry and NEI Gas Accumulation Management Team activities regarding the resolution of generic TS changes via the TSTF traveler process. Within twelve (12) months of NRC approval of the traveler, PG&E will evaluate its applicability to DCPP, and evaluate adopting the Traveler to either supplement or replace the current TS requirements.

2. Design evaluation

PG&E reviewed the DCPP design basis with respect to gas accumulation in the ECCS, RHRS, and CSS. This review included design basis documents, design guidelines, Design Criteria Memoranda, design change packages, calculations, engineering evaluations, and vendor technical requirements.

2.1 Results of the review of the design basis documents

Design drawing details support fill and vent activities and periodic venting of gas accumulation during normal plant operations. Drawings and procedures provide guidance for evaluating on-line maintenance including details of flushing capability to preclude gas intrusion into system piping that cannot be vented during refill operations.

PG&E utilizes a detailed design review issue checklist to ensure that fill and vent requirements are addressed for design changes. PG&E considers both hydraulic conditions and water hammer. PG&E requires independent verification of all design changes issued for plant modifications.

PG&E developed engineering calculations and revisions to existing calculations in support of evaluations performed for piping susceptible to gas intrusion within the subject systems.

PG&E has procedures and supporting design basis calculations for evaluating past operability to ensure that the ECCS is in compliance with the TS requirements for subsystem operability by verifying that each system is sufficiently full of water.

Specific mission times are not part of the design basis for ECCS operation to evaluate gas accumulation. Pump operability is assumed in the long term after a design basis event with any degassing effects having no impact on system operability. Realignment of the ECCS pumps from injection mode to long term containment sump recirculation modes are included in the design basis requirements addressing gas intrusion and or accumulation.

DCPP does not employ keep-full systems to automatically maintain the subject systems in a filled and vented configuration. The subject systems are not designed to have voided piping as part of their design, except for the following:

- RHRPs' suction piping from the containment recirculation sump, and
- CSS pump discharge piping downstream of the outboard containment isolation valves to the CSS spray ring riser and header inside containment.

PG&E determined that the RHRS suction piping at the containment recirculation sump is acceptable since the containment recirculation sump isolation valve is first opened to flood the suction piping and vent gas in the piping prior to operation of the RHR pumps.

PG&E has determined that the fill time of the CSS dry header inside containment is acceptable and not susceptible to water hammer or other adverse effects.

PG&E has determined that ECCS realignments during design basis events are acceptable for system operability with a system that is kept sufficiently full. PG&E provided information to the NRC regarding containment sump strainer performance (including debris laden suction geometry, vortexing, and flashing) under separate correspondence as a supplemental response to Generic Letter 2004-02.

PG&E design and operating procedures control DCPP design features and water level set points to prevent vortex effects that could potentially ingest gas into the system during design basis events. PG&E also utilizes restrictions in maximum flow rates to help prevent vortex effects during shutdown cooling operations at reduced reactor coolant system (RCS) inventory. PG&E does not have specific leakage acceptance criteria for leakage between high pressure and low pressure systems in relation to gas intrusion. A leakage criterion used for boundary valve testing controls the allowable leakage reducing the potential for gas intrusion.

Completed and future modifications to the subject systems to minimize gas intrusion impacts at DCPP are discussed in Section 2.5 below.

2.2 Results of review of the new applicable gas volume acceptance criteria for each piping segment in each system where gas can accumulate where no acceptance criteria previously existed, corrective actions, and schedule for completion of corrective actions

2.2.1 Evaluation per the PWROG program

(a) Pump suction piping

The interim allowable gas accumulation in the pump suction piping is based on limiting the gas entrainment to the pump after a pump start. A PWROG program established interim pump gas ingestion

limits to be employed by the member utilities. The interim criteria address pump mechanical integrity only, and are as follows:

	Single-Stage	***Multi-Stage***	***Multi-Stage***
		Stiff Shaft	Flexible Shaft
Steady-State	2%	2%	2%
Transient*	5% for 20 sec.	20% for 20 sec.	10% for 5 sec.
$Q_{B.E.P.}$ Range	70%-120%	70%-140%	70%-120%
Pump Type (transient data)	WDF	CA	RLIJ, JHF
* The transient criteria are based on pump test data and vendor supplied information.			

DCPP procedures provide assurance that the volume of gas in the pump suction piping for the subject systems is limited such that pump gas ingestion is within the above PWROG program established interim criteria.

These conservative criteria have been applied in support of system operability until further data supports a change. These values, used in conjunction with other factors such as required net positive suction head (NPSH), duration of gas flow, and transients for which the system is credited, provide a basis for system operability.

(b) Pump discharge piping, which is susceptible to pressure pulsation after a pump start.

A joint Owner's Group program (PWROG and BWROG) evaluated pump discharge piping gas accumulation. Gas accumulation in the piping downstream of the pump to the first closed isolation valve, or the RCS pressure boundary isolation valves, will result in amplified pressure pulsations after a pump start. The subsequent pressure pulsation may cause relief valves in the subject systems to lift, or result in unacceptable pipe loads, i.e., axial forces that are greater than the design rating of the axial restraint(s). The joint Owner's Group Program establishes a method to determine the limit for discharge line gas accumulation to be utilized by the member utilities.

The method uses plant specific information for piping restraints and relief valve set points in the subject systems to determine the acceptable gas volume accumulation such that relief valve lifting in the subject systems does not occur and pipe loading is within acceptable limits, i.e., axial forces that are less than the design rating of the axial restraint(s).

PG&E has implemented this methodology for DCPP and established the applicable limits for gas accumulation in the discharge piping of the subject systems. DCPP procedures provide assurance that any gas in the subject systems discharge piping is limited to within the acceptance criteria determined by the DCPP-specific application of the joint Owner's Group program method.

(c) Pump discharge piping, which is not susceptible to water hammer or pressure pulsation following a pump start.

1. The PWROG methodology for CSS evaluates the piping response as the CSS header is filled and compares the potential force imbalances with the weight of the discharge piping. The net force resulting from the pressurization of the CSS header during the filling transient is a small fraction of the dead weight of the filled piping, and therefore the filling transient is well within the margin of the pipe hangers.

   The DCPP CSS discharge header piping was evaluated using the PWROG methodology described above. Using this methodology it was determined that the force imbalances on the CSS discharge header piping are well within the margin of the pipe hangers.

2. A PWROG methodology has been developed to assess when a significant gas-water water hammer could occur during switchover to hot leg injection. The methodology concludes that: If the upstream valve has an opening time of approximately 10 seconds and the downstream path to the RCS is only restricted by check valve(s), no significant water hammer would occur, i.e., none of the relief valves in the subject systems would lift, and none of the piping restraints would be damaged.

   The DCPP ECCS flow path for switchover to hot leg injection has an upstream valve that has an opening time of approximately 10 seconds and the downstream path to the RCS is only restricted by check valves. Therefore, consistent with the PWROG program methodology, no significant water hammer will occur i.e., none of the relief valves in the subject systems would lift, or none of the piping restraints would be damaged.

d) RCS allowable gas ingestion

The PWROG qualitatively evaluated the impact of noncondensible gases entering the RCS on the ability on the post accident core cooling functions of the RCS. This evaluation assumed that five

cubic feet of noncondensible gas at 400 psig was present in the high head safety injection (HHSI) and intermediate head safety injection (IHSI) systems' discharge piping concurrent with five cubic feet of noncondensible gas at 100 psig in the low head safety injection (LHSI) system discharge piping. The qualitative evaluation concluded that these quantities of gas will not prevent the ECCS from performing its core cooling function.

PG&E procedures provide assurance that gas accumulation in the DCPP LHSI system cold leg and hot leg piping is verified to be less than 5 cubic feet of noncondensible gas at 100 psig at any location. PG&E procedures also provide assurance that gas accumulation in the DCPP HHSI cold leg piping and IHSI injection system cold leg and hot leg piping is verified to be less than 5 cubic feet of noncondensible gas at 400 psig at any location.

2.2.2 DCPP-Specific evaluation

Based on the above PWROG generic acceptance criteria, PG&E developed additional limiting criteria for DCPP:

(a) Pump suction void acceptance criteria

Potential gas accumulation in the pump suction is evaluated to ensure that the gas is either vented into a void header away from the active ECCS flow path, or is vented to the refueling water storage tank (RWST). Gas that cannot be directly vented or similarly diverted (hereafter referred to as "unventable") is conservatively evaluated to ensure that the void volume is less than two percent of the cross-sectional area within piping, and less than 0.5 cubic feet within individual components under stagnant conditions. These screening criteria limit the void fraction entering the pump to significantly less than the PWROG pump suction void criterion as specified in Section 2.2.1(a) above.

All ECCS pumps have an available NPSH that is greater than twice the required NPSH at the time of pump start. Nominal RWST water level provides a significant static pressure to the suction of the ECCS pumps at the initiation of ECCS injection. Any gas trapped in the piping will be flushed out within the first minute of the actuation of the ECCS pumps. Therefore, with the availability of more than twice the required NPSH, ECCS pump operation will not be affected.

DCPP manually aligns the ECCS suction from the RWST to the sump during cold leg recirculation alignment switchover. During the cold leg switchover, the RHR pump is automatically tripped from the RWST. The RHR pump suction isolation valve from the sump

is opened, and then CCW cooling is manually aligned to the RHR heat exchanger prior to the restart of an RHR pump. Any gas trapped in this suction line will rise into the sump due to a combination of the following: the sump is located above the RHR pump suction piping, the suction isolation valve is in a vertical riser above the suction piping, and about 30 seconds will lapse between the initiation of the opening of the RHR suction valve from the sump and the restart of the RHR pump. Therefore, RHR pump operation will not be challenged under these circumstances.

The existing void header removes accumulated gas in the CCPs' suction to minimize gas ingestion by the pumps during all modes of operation. There is no gas intrusion source for the SIP suction. PG&E performs gas intrusion UT in these portions of the SIP and CCP piping every 31 days.

(b) Pump discharge void acceptance criteria at DCPP

Potential gas accumulation in the pump discharge is evaluated based on the PWROG void criteria in Sections 2.2.1(b), 2.2.1(c), and 2.2.1(d) above. The following more restrictive void acceptance criteria are utilized in DCPP evaluations:

1. Water hammer impact due to void pulsation

   Void pulsation is not credible in the HHSI system due to the charging pump shutoff head being higher than RCS pressure. Since the system is feeding forward under all possible operational conditions, void pulsation will not occur.

   For the safety injection system (SIS), a restrictive criterion will be imposed of whichever of the following is limiting:

   - No more than two cubic feet of gas void at 400 psig, or
   - A maximum void fraction based on flow area of 20 percent, or
   - A peak pressure pulsation less than the relief valve pressure setpoint.

   This criterion was determined to be acceptable per the PWROG criterion in Section 2.2.1(b) and 2.2.1(d) above. However, any components in the system such as valve bonnets, which could trap more than 0.2 cubic feet gas void have been evaluated to ensure that water hammer impact is minimal.

For the RHRS, a restrictive criterion will be imposed of whichever of the following is limiting:

- No more than four cubic feet of gas void at 100 psig, or A maximum void fraction based on flow area of 20 percent, whichever is limiting, or
- A peak pressure pulsation less than the relief valve pressure setpoint.

This criterion was determined to be acceptable per the PWROG criterion in Section 2.2.1(b) and 2.2.1(d) above. However, components that could potentially trap more than 0.4 cubic feet of gas have been evaluated for water hammer impact.

2. Water hammer impact due to sudden momentum exchange on piping elbows or components

   A void fraction criterion of 20 percent is specified to ensure that the ECCS injection flow pattern will not develop into a plug flow regime, which could result in a sudden momentum exchange as water, preceded by a gas pocket, impinges upon a piping elbow. A void fraction less than 20 percent defines the bubbly flow regime while more than 60 percent defines the plug flow regime. To ensure the flow pattern in subject system piping remains in the bubbly flow regime, horizontal piping lengths and slopes that can potentially trap gas that could result in a void fraction greater than 20 percent were identified, walked down, and evaluated to ensure the criterion is met.

3. Allowable RCS gas ingestion

   A two cubic foot gas void criterion was imposed for the HHSI system and was determined to be acceptable per the PWROG methodology in Section 2.2.1(d) above. However, any components in the HHSI system such as valve bonnets that can trap more than 0.2 cubic feet of gas have been evaluated to ensure DCPP is bounded by the PWROG evaluation.

   A two cubic foot gas void criterion was imposed for the IHSI system and was determined to be acceptable per the PWROG methodology in Section 2.2.1(d) above. Any components in the IHSI system that can trap more than 0.2 cubic feet of gas have been evaluated to ensure DCPP remains bounded by the industry evaluation. This evaluation criterion is consistent with that addressing void pulsation concerns.

A four cubic foot gas void criterion was imposed for the LHSI system and was determined to be acceptable per the PWROG methodology in Section 2.2.1(d) above. Any components in the LHSI system that can trap more than 0.4 cubic feet of gas have been evaluated to ensure DCPP remains bounded by the industry evaluation. This evaluation criterion is consistent with that addressing void pulsation concerns.

2.3 Summary of the review of the design basis documents, corrective actions, and schedule for completion of corrective actions

PG&E has reviewed the design bases documents per the above DCPP-specific void criteria and evaluation methodology.

No corrective actions were identified as a result of the review of the design basis documents.

2.4 Results of the system piping and instrumentation diagram (P&ID) reviews and isometric drawing reviews to identify all system vents and high points

The system P&IDs and isometric drawings for the subject systems were reviewed to identify vents and high points. Specifically, the following flow paths were reviewed:

- High Head Safety Injection flow path
    - RWST to Charging Pump suction
    - Charging Pump to RCS cold legs
- Safety Injection flow path
    - RWST to SIP suction
    - SIP to RCS cold legs
- Residual Heat Removal injection and recirculation flow path
    - RWST to RHR Pump suction
    - Containment sump to RHR Pump suction
    - RHR Pump discharge to RCS cold legs
    - RHR Pump discharge to CCP suction, SIP suction, and containment spray ring motor-operated isolation valve
- Containment Spray flow path
    - RWST to Containment Spray Pump suction

- Containment Spray Pump discharge to the motor-operated isolation valves

Each flow path was reviewed line by line to identify system vents and high points. The reviewed lines were highlighted on P&IDs and isometric drawings. The system high points included branch lines, valve bodies, pump casings, heat exchangers, and improperly sloped piping. In addition, pipe diameter transitions in horizontal lines with potential to trap gas such as pipe reducers and orifices were listed.

Screening criteria were applied to the system high points to "screen out" locations that could only accumulate insignificant amounts of gas. Accordingly, the following piping and components were screened out from further evaluation:

- Horizontal discharge lines shorter than fourteen times the nominal pipe size.
- Valves that are two inches in nominal size or smaller.
- Pipe tees in horizontal lines with descending branch lines.
- Pipe tees in vertical lines with descending branch lines.
- Reducers in vertical lines.

Each high point that did not screen out was reviewed to determine if it could be effectively vented with an existing system vent. Horizontal line slope, horizontal line local high point information, and vent orientation details were obtained from previous field walkdowns when available.

Analytical assessments were performed for the unventable high points to determine if the quantity of unventable gas could adversely impact system function. Physical walkdowns and/or analytical assessments were performed for those high points warranting additional consideration. As identified in PG&E's three-month response to NRC GL 2008-01, PG&E will perform any necessary confirmatory walkdowns of inaccessible piping in the DCPP Unit 1 containment during Unit 1 Refueling Outage Fifteen (1R15), currently scheduled to begin in January 2009.

2.5 Identification of new vent valve locations, modifications to existing vent valves, or utilization of existing vent valves, based on the drawing review, and summary of corrective actions, and schedule for completion of corrective actions

PG&E has completed the following plant modifications based on the results of past plant walkdowns and evaluations pertaining to gas intrusion/accumulation concerns:

- A void header has been installed at the high point of the charging pumps suction piping near the RHR pump discharge to the ECCS pumps suction cross-tie piping. This plant modification was completed during Unit 1 Refueling Outage Thirteen (1R13) in 2005 and Unit 2 Refueling Outage Thirteen (2R13) in 2006. New vent valves with hard piping to closed drains were previously installed in this location to address gas accumulation/intrusion concerns during Unit 1 Refueling Outage Ten (1R10) in 2000 and Unit 2 Refueling Outage Nine (2R9) in 1999. However, gas accumulation events occurred after installation of these vent valves. As a corrective action, a void header was later designed and installed. Operating experience since void header installation has proven the effectiveness of the void header in each unit.

- The charging pump miniflow recirculation piping was modified to tie into the bottom of the RCP seal return line. This modification created a piping P-trap configuration to prevent gas accumulation in the charging pump miniflow recirculation line. This plant modification was completed during the thirteenth refueling outages for Units 1 and 2.

- High point vents were installed downstream of the charging pump suction isolation valve during 1R10 and 2R9.

- Vents were added in the RHR cold leg injection lines inside containment upstream of the second off check valves during Unit 1 Refueling Outage Eleven (1R11) and Unit 2 Refueling Outage Eleven (2R11) to allow proper venting of accumulated gas due to potential leakage pass the check valves. Insulation was modified near two of these vents to facilitate UT inspection in November 2006 for both units.

As a result of the evaluations performed to address GL 2008-01 concerns, PG&E will perform the following additional plant modifications[1] to further reduce the potential for gas accumulation/intrusion impacts on the subject systems:

- PG&E will add an additional valve to the accumulator fill line to provide additional protection against back leakage. This modification will be performed during Unit 2 Refueling Outage Fifteen (2R15), currently scheduled for October 2009, and Unit 1 Refueling Outage Sixteen (1R16), currently scheduled for October 2010.

[1] The GL evaluations identified the piping sections requiring vents. The DCPP design change process will be utilized to determine the exact number and the specific locations of the vents.

- PG&E will replace air operated valves in the SI test lines with manual valves. An additional valve will also be added in series in each test loop. These changes will provide a more reliable isolation for test lines, decreasing the probability of inter system leakage, which could result in gas intrusion. These modifications will be performed during 2R15 and 1R16.

- PG&E will add a void header on the RHRPs' suction high point from the RCS hot leg to address gas accumulation from the RHR heat exchangers. This modification will direct accumulated gas within the RHR heat exchangers' U-tubes into the header. PG&E will install the void header in 2R15 and 1R16.

- PG&E will add a new high point vent on each SI cold leg injection line upstream of the horizontally oriented flow orifices to minimize gas accumulation should a leakage path from the accumulators develop. Installation of these vents is scheduled for 2R15, and 1R16.

- PG&E will add new high point vents on each accumulator surge line to facilitate venting after accumulator fill prior to placing accumulators in service. Installation of the vents is scheduled for 2R15 and 1R16.

- PG&E will add a new vent on the Unit 2 RHRPs' suction header from the RWST between a check valve and a descending elbow to remove gas accumulation originating from the RHR heat exchangers via the RHRPs' miniflow recirculation lines. A similar Unit 1 modification is not necessary due to a different piping configuration. The installation of this new vent is scheduled for 2R15.

PG&E concludes that the subject systems are operable in their current state based on past efforts to address gas accumulation and the evaluations performed for this GL. Past system modifications coupled with comprehensive routine UT and venting, provide adequate assurance that gas accumulation has negligible impact on the functionality of the subject systems during all modes of operation.

The planned modifications resulting from the GL 2008-01 evaluations are intended to further reduce the potential for gas accumulation/intrusion impacts on the subject systems. The modifications will:

- Provide additional and improved barriers to gas intrusion sources.

- Improve existing gas removal capabilities.

- Permit venting of accumulated gas in the unlikely event that existing and additional barriers to gas intrusion sources all fail.

2.6 Results of the system confirmation walkdowns that have been completed for the portions of the systems that require venting to ensure that they are sufficiently full of water.

DCPP Unit 1 and Unit 2 piping spools were fabricated, installed, and inspected to a construction specification with explicit elevation, slope, and alignment tolerances. The specified as-built tolerances are plus or minus one degree variance in inclining lines and a one eighth inch spool alignment deviation based on 10 feet straight edge. Pipe slopes have been confirmed to be within the specified tolerances; measurements of all suction piping and a sampling of the discharge piping within the subject systems for DCPP Unit 1 and Unit 2 have confirmed this as-built configuration.

Walkdowns inside containment of piping sections susceptible to gas intrusion/accumulation have been performed for DCPP Unit 2. As identified in PG&E's 3-month response to NRC GL 2008-01, PG&E will perform any necessary confirmatory walkdowns of inaccessible piping in the DCPP Unit 1 containment during 1R15.

Outside containment walkdowns of identified critical piping sections have been completed.

Voids within the CSS downstream of the containment isolation valves and RCS hot leg injection piping downstream of its isolation valves were evaluated per the PWROG methodology in Section 2.2.1(c) above and it was concluded that these piping sections could be excluded from the piping walk down scope.

2.7 Identification of new vent valve locations, modifications to existing vent valves, or utilization of existing vent valves, that resulted from the confirmatory walkdowns, summary of corrective actions and schedule for completion of corrective actions (includes walkdowns that have been completed, and the walkdowns not yet complete)

Based on the walkdowns and evaluations performed for this GL response, all completed and future modifications to the subject systems to minimize gas intrusion impacts at DCPP are discussed in Section 2.5 above.

Walkdowns have been completed for DCPP Unit 1 and Unit 2 suction and discharge piping located outside containment that was identified to be

susceptible to gas intrusion/accumulation that can potentially impact plant operability.

Documentation of previous walkdowns has been reviewed to determine its adequacy for use in responding to GL 2008-01. Additional walkdowns of piping sections identified in the recent drawing reviews that were not walked down previously or whose documentation were deemed inadequate for GL 2008-01 evaluation purposes have been completed for DCPP Unit 1 and Unit 2 outside containment. No additional plant modifications outside containment beyond that already identified in the drawing reviews are required as a result of the outside containment walkdowns performed to address GL 2008-01 concerns.

Planned inside containment walkdowns for DCPP Unit 2 were completed during 2R14 (February 4 to April 10, 2008). During the piping isometric drawing reviews performed in August 2008, PG&E identified a long horizontal section of the RHRP discharge piping inside containment that exceeds the piping walkdown screening criteria of 14 times the pipe diameter. There is an existing vent in this section of the RHRP discharge piping. PG&E will perform a confirmatory walkdown to verify as-built piping configuration for this section of the RHRP discharge piping. PG&E will complete its assessments of this section of piping during 2R15, and provide a supplement to this report with those results within 90 days from completion of that outage.

As a result of inside containment walkdowns to be performed for DCPP Unit 1 during 1R15, PG&E will make additional modifications, if required, by 1R16.

2.8 Results of review of the fill and vent activities and procedure reviews for each system (Note that routine periodic surveillance testing is addressed in the "Testing Evaluation" section)

Following outages and significant maintenance activities, operating procedures are used to refill the subject systems. These procedures, coupled with surveillance test procedures, provide the means to fill and vent the subject systems as well as purge air and other noncondensible gases from associated piping and components. In addition, venting and UT procedures are used to verify acceptable filling of systems and to monitor the effectiveness of maintaining systems full of water per TS requirements. Venting activities for the subject systems are controlled by approved procedures. No new procedures are required to control venting of the subject systems.

A review was performed for procedures used to vent the subject system piping susceptible to void formation attributable to fill and vent activities, or due to component malfunction. As discussed in Section 2.5 above, additional vents will be added that will improve the effectiveness of fill and

vent processes. With the exception of these additions, procedures provide for adequate fill and vent of the subject system piping and components using existing vents.

The fill and vent procedures were evaluated to determine if the sequence of steps was effective and whether or not adequate acceptance criteria were provided. In each case, the sequence of steps was found to be effective. As a result of the reviews, acceptance criteria for some venting activities will be clarified, and venting termination guidance in some operating procedures will be enhanced. All procedure changes were documented in the corrective action program.

The fill and vent procedures were reviewed to determine if venting of instrument lines was included. It was found that instrumentation line venting for the RHRS was addressed in the fill and vent for that system. The fill and vent procedures for the other systems will be revised to include guidance for addressing instrumentation lines.

The application of fill and vent procedures to system restoration following maintenance during plant operation in Modes 1 through 4 was evaluated. The procedures were found to be generic rather than specific to any maintenance activity. Rather than developing specific individual procedures to address numerous maintenance activities, the method described below was credited to address this situation.

At DCPP, all work within the boundaries of the subject systems is controlled by work orders (WOs). Each WO that breaches a system during Modes 1 through 4 is controlled using a clearance.

The work control process was modified to direct Operations personnel not to clear ECCS or CSS components (system breach type clearances) until an engineering evaluation has been completed. The purpose of this evaluation is to ensure that any voids introduced during maintenance are either determined to be acceptable or adequately vented prior to returning the component to service.

DCPP uses vacuum refill for the RCS when coming out of an outage, but does not use vacuum refill for fill and vent for maintenance activities of the subject systems.

PG&E evaluated its practices for dynamic venting and void removal by fluid flow in the subject systems. DCPP calculations provide documented verification that dynamic venting provides adequate flow for gas removal from the subject systems.

PG&E also reviewed fill and vent procedures to ensure that appropriate validation methods provide adequate assurance that systems are sufficiently full of water. These methods include dynamic venting and UT.

2.9 Identification of procedure revisions or new procedures resulting from the fill and vent activities and procedure reviews that need to be developed, summary of corrective actions, and schedule for completion of corrective actions

The following actions will be completed by October 11, 2009:

- PG&E will clarify the acceptance criteria for venting activities in periodic surveillance venting procedures, and will enhance venting termination guidance in operating procedures.
- PG&E will revise fill and vent procedures to include guidance for addressing instrumentation lines.
- PG&E will revise the clearance procedure to require engineering to perform a gas accumulation evaluation prior to any Mode 1 through 4 ECCS or CSS system breaches.

2.10 Results of review of potential gas intrusion mechanisms into each system for each piping segment that is vulnerable to gas intrusion

PG&E has identified the following credible gas sources and potential gas intrusion flow paths for the subject systems:

- RCP seal return flow path

  As RCS fluid passes through the RCP seals into the RCP seal return line, its pressure drops more than 2200 psi resulting in degassing. A void header was installed during 1R13 and 2R13 to remove gas from the active ECCS flow path. PG&E routinely monitors and vents void headers as necessary, per DCPP plant procedures. Plant operation since the void header installation have proven the void header to be effective. This gas intrusion flow path no longer challenges ECCS operation.

- Leakage from the accumulators

  Tie-in points from the accumulators into the ECCS and RHRS have been identified to ensure venting capability should a leakage path develop resulting in degassing from the accumulators. All piping segments within these systems at the tie-in points have been evaluated by drawing reviews. PG&E performed plant walkdowns inside the DCPP Unit 2 containment during 2R14. Unit 1 walkdowns are scheduled for 1R15.

- Gas accumulated in the RHR heat exchangers

During the mid-loop operation coming out of outages, gas can be ingested into the RHRP suction due to vortexing within the tie-in line from the RCS hot leg loop 4 and accumulate in the RHR heat exchanger. During surveillance testing of the RHRP at normal plant operation, some of the trapped gas within the RHR heat exchanger U-tubes can be ingested into the process fluid and be transported to high points within the RHRP miniflow recirculation flow path. As previously discussed, PG&E will install a void header in the RHRP suction piping during 2R15 and 1R16 to remove any gas from the active ECCS flow path to ensure that RHRP operability will not be challenged.

Evaluations of piping segments within the RHRP miniflow recirculation flow path and directly linked to this flow path have been performed to ensure current system operability.

PG&E has determined the following gas sources and potential gas intrusion flow paths to not be credible:

- Vortexing in volume control tank (VCT)

  Upon receiving the "S" signal in an accident, the charging pump suction valve from the RWST automatically opens, and then the VCT suction isolation valve is closed to isolate the VCT. The upper limit for the VCT hydrogen cover gas is set such that the charging pumps preferentially draw down the RWST whenever both RWST and VCT are aligned to the charging pump suction. Therefore, gas intrusion from the VCT is not credible.

- Vortexing in RWST

  The DCPP licensing basis requires a minimum remaining water volume above the RWST vortex cage with margin at completion of manual switchover to the containment recirculation sump. Operators are trained and tested to meet this requirement. The ECCS pumps no longer take suction from the RWST after completion of manual switchover; therefore, gas intrusion from the RWST to the ECCS pumps' suction is not credible.

  The containment spray pump continues to deplete RWST inventory after switchover completion until the RWST low-low alarm setpoint is reached signaling the completion of the RWST mission time. Operators secure the containment spray pumps at this point. The containment spray pumps have been analyzed to complete their required function before unacceptable vortexing within the RWST can occur.

- Containment recirculation sump strainer geometry

  Strainer performance testing addressing debris laden strainer geometry and vortexing has been performed. ECCS realignments during design basis events were evaluated and determined to be acceptable for system operability with a system that is kept sufficiently full.

  Containment sump strainer performance, including debris laden suction geometry, vortexing and flashing has been evaluated and the results provided to NRC under separate correspondence addressing the supplemental response to GL 2004-02.

2.11 Ongoing industry programs

Ongoing industry programs are planned in the following areas, which may impact the conclusions reached for DCPP during the GL 2008-01 design evaluations relative to gas accumulation. The activities will be monitored to determine if additional changes to the DCPP design may be required or desired to provide additional margin.

- Gas transport in pump suction piping

  The PWROG has initiated testing to provide additional knowledge relative to gas transport in large diameter piping. One program performed testing of gas transport in 6-inch and 8-inch piping. Another program will perform additional testing of gas transport in 4-inch and 12-inch low temperature systems and 4-inch high temperature systems. This program will also integrate the results of the 4-inch, 6-inch, 8-inch and 12-inch testing.

- Pump acceptance criteria

  Long-term industry tasks were identified that will provide additional tools to address GL 2008-01 with respect to pump gas void ingestion tolerance limits.

3. Testing evaluation

3.1 Results of periodic venting or gas accumulation surveillance procedures reviews

To identify gas accumulation, UT is periodically performed for subject system piping outside containment. Piping inside containment is not tested during operation unless precursors (e.g., tank level fluctuations) indicate that gas accumulation may be occurring.

The CSS is not included in the periodic testing since the design of the system precludes gas accumulation that can affect CSS pump operation or result in water hammer. Suction piping evaluations determined that the piping slopes upward from the pump to the RWST. Hence, any gas would travel up the pipe and dissipate in the RWST.

UT provides a consistent process to identify and quantify gas accumulation. During plant operation, implementation of periodic venting procedures is able to detect the presence of gas and compare the accumulated gas quantity to acceptance criteria for each vent point in the procedure. Instances of gas accumulation detected in the subject systems during plant operation are entered into the corrective action program and evaluated.

Periodic venting procedures specify vent points that are used to ensure the subject system piping is sufficiently full of water for each system. PG&E verified that surveillance tests do not inherently precondition prior to performing the periodic venting procedures.

Specific precursors indicative of gas accumulation (e.g., unplanned safety injection accumulator level reductions) will be formally documented in a Gas Intrusion Program (GIP) administrative control procedure. Actions to be taken for each precursor indication will be specified to verify that subject system piping is sufficiently full of water.

The GIP administrative procedure will provide the controls to manage all aspects of gas accumulation and mitigation during plant operations and maintenance. The key elements of the program include minimization and prevention of gas intrusion, gas intrusion precursors, system fill and vent, inspection and testing, void evaluations, training of personnel and continuous program improvement.

3.2 Identification of procedure revisions, or new procedures resulting from the periodic venting or gas accumulation surveillance procedures review that need to be developed

PG&E will modify quarterly pump, relay, and valve tests either via scheduling or content to preclude preconditioning prior to performing periodic void surveillance testing by October 11, 2009.

PG&E will develop an administrative procedure that establishes the requirements of the GIP by October 11, 2009. The procedure will include precursors indicative of gas accumulation and actions to be taken for each precursor indication.

3.3 Results of review of how procedures address the manual operation of the RHRS in its decay heat removal mode of operation

During normal operation, the RHRS is pressurized at approximately 60 psig from the RWST static pressure. Once the RCS pressure is decreased to approximately 350 psig, the RHR isolation valves from the RCS are then opened without starting the RHR pump to warm up the piping by draining water to the liquid hold-up tank (LHUT) at a flow rate less than 100 gpm. Since the RHR suction and discharge both connect to the RCS, the entire RHRS is pressurized to RCS pressure. Any postulated pre-existing void in the system will be compressed based on the ratio of the above pressures. Once the system has been warmed up, the RHR pump is then turned on. Under these conditions, the void volume would no longer challenge pump operation.

DCPP monthly surveillance procedures check the RHRP suction piping high point outside of the containment using UT. Should any void be detected, the water level is recorded and the gas is vented. Then void size monitored and past operability determinations are made. Historically, system operability has not been challenged at this location.

During startup after a plant outage, the RCS is typically vacuum refilled to minimize gas presence in the system. In order to vacate the gas from the steam generator U-tubes, the RCS water level is reduced for mid-loop operation. During mid-loop operation, the RHRP continues taking suction from the hot leg to cool the core. Since the water level in the hot leg is reduced, a void could be ingested into the suction piping. This potential ingested void is expected to be significantly less than one percent by volume to the pump; therefore, RHRP operation will not be affected. However, these small entrained voids will accumulate in the high point in the RHR heat exchanger inverted U-tubes. Upon completion of the RCS fill, a full flow check valve test is performed prior to entering Mode 4 from Mode 5. This test will dynamically flush out the gas left in the RHR heat exchanger. However, in some cases when a full flow check valve test has to be performed prior to the RCS vacuum refill, the gas left in the RHR heat exchanger due to mid-loop operation will remain. After outages, gas is often detected at the RHRP suction piping high point due to sweeping the gas from the RHR heat exchanger through the RHRP miniflow recirculation line.

Similar to the above, draining of the RHR heat exchanger for maintenance will allow gas admission into the inverted U-Tubes. The gas will be flushed through to the open reactor vessel during core reload and subsequent startup sequence.

PG&E will procedurally require that dynamic venting be performed for each unit to flush out any gas from the RHR heat exchanger after each RCS vacuum refill operation. Required procedure revisions will be implemented by October 11, 2009.

3.4 Summary of the results of the procedure reviews performed to determine that gas intrusion does not occur as a result of inadvertent draining due to valve manipulations specified in the procedures, system realignments, or incorrect maintenance procedures

PG&E determined that any gas present in the RHRP suction would rise into the containment recirculation sump upon switchover to the long term sump recirculation alignment. In the past, CCP switchover from the injection alignment to the long term sump recirculation alignment resulted in void accumulation at the pump suction header. Installation of the void vent header has eliminated this concern. Other than these issues, DCPP experience with periodic void testing to date has not identified other testing, maintenance, or operational procedures that inadvertently cause draining due to valve alignments.

During normal operations, ECCS or CSS maintenance activities that can induce a void by breaching the system are evaluated for voiding by engineering prior to maintenance via clearance and work control procedures.

3.5 Description of how gas voids are documented, dispositioned, and trended, if found in any of the subject systems

Gas voids found during periodic testing are documented in the corrective action program. Void size is determined by UT and a calculation based on pipe routing. Post venting UT is not normally performed as fluid flow from the vent is confirmed. All voids that are found are vented after sizing data are taken. Voids found during periodic testing are trended to determine frequency of development and possible sources.

PG&E will revise existing RHRS pump testing procedures to monitor and vent (as appropriate) identified void-susceptible locations by October 11, 2009.

4. Corrective actions evaluation

4.1 Summary of the results of the reviews regarding how gas accumulation is addressed (corrective action program)

PG&E's corrective action program is used to document gas intrusion/accumulation issues as potential nonconforming conditions.

Existing procedures for the subject systems require documentation in the corrective action program to be initiated, and the Shift Foreman notified, if the acceptance criteria specified in the procedures are exceeded. As part of PG&E's corrective action program, condition reports related to plant equipment are evaluated for potential impact on operability and

reportability. This ensures that issues involving gas intrusion/accumulation are properly prioritized and evaluated.

4.2 Items that have not been completed, summary of corrective action program changes, and schedule for completion of corrective actions

No changes to PG&E's corrective action program are being made as a result of GL 2008-01 evaluations of the corrective action program.

5. Conclusion

Based upon the above, PG&E has concluded that DCPP is in conformance with its commitments to 10 CFR 50, Appendix B, Criteria III, V, XI, XVI, and XVII relative to gas intrusion/accumulation in the subject systems.

B. SUMMARY OF CORRECTIVE ACTIONS AND SCHEDULE

The bases for the schedule of these corrective actions are described in the Evaluation sections above. No corrective actions identified as a result of the evaluations performed for this GL have been completed as of the date of this submittal. None of these commitments are required to restore regulatory compliance.

Commitment	Date
PG&E is continuing to support the industry and NEI Gas Accumulation Management Team activities regarding the resolution of generic TS changes via the TSTF traveler process. Within 12 months of NRC approval of the Traveler, PG&E will evaluate its applicability to DCPP, and evaluate adopting the Traveler to either supplement or replace the current TS requirements.	12 months after NRC approval of TSTF Traveler
As identified in PG&E's 3-month response to NRC GL-2008-01, PG&E will perform any necessary confirmatory walkdowns of inaccessible piping in the DCPP Unit 1 containment during Unit 1 Refueling Outage Fifteen (1R15), currently scheduled to begin in January 2009.	1R15
As a result of inside containment walkdowns to be performed for DCPP Unit 1 during 1R15, PG&E will make additional modifications, if required, by 1R16.	1R16
PG&E will replace air operated valves in the SI test lines with manual valves. An additional valve will also be added in series in each test loop. These changes will provide a more reliable isolation for test lines, decreasing the	2R15 / 1R16

probability of inter system leakage which could result in gas intrusion. These modifications will be performed during 2R15 and 1R16.	
PG&E will add an additional valve to the accumulator fill line to provide additional protection against back leakage. This modification will be performed during 2R15 and 1R16.	2R15 / 1R16
PG&E will add a void header on the RHR pump suction high point from the RCS hot leg to address gas accumulation from the RHR heat exchangers. This modification will direct accumulated gas within the RHR heat exchangers' U-tubes into the header. PG&E will install the void header in 2R15 and 1R16.	2R15 / 1R16
PG&E will add a new vent on the Unit 2 RHRPs' suction header from the RWST between a check valve and a descending elbow to remove gas accumulation originating from the RHR heat exchangers via the RHRPs' miniflow recirculation lines. Unit 1 modification is not necessary due to different piping configuration. The installation of this new vent is scheduled for 2R15.	2R15
PG&E will add a new high point vent on each SI cold leg injection line upstream of the horizontally oriented flow orifices to minimize gas accumulation should a leakage path from the accumulators develop. Installation of these vents is scheduled for Unit 2 refueling outage fifteen (2R15), currently scheduled for October 2009, and Unit 1 Refueling Outage Sixteen (1R16), currently scheduled for October 2010.	2R15 / 1R16
PG&E will add new high point vents on each accumulator surge line to facilitate venting after accumulator fill prior to placing accumulators in service. Installation of the vents is scheduled for 2R15 and 1R16.	2R15 / 1R16
PG&E will clarify the acceptance criteria for venting activities in periodic surveillance venting procedures, and will enhance venting termination guidance in operating procedures.	10/11/09
PG&E will revise fill and vent procedures to include guidance for addressing instrumentation lines.	10/11/09
PG&E will revise the clearance procedure to require engineering to perform a gas accumulation evaluation prior to any Mode 1 through 4 ECCS and CSS system breaches.	10/11/09

PG&E will modify quarterly pump, relay, and valve tests either via scheduling or in content to preclude preconditioning prior to performing periodic void surveillance testing by October 11, 2009.	10/11/09
PG&E will develop an administrative procedure that establishes the GIP by October 11, 2009. The procedure will include precursors indicative of gas accumulation and actions to be taken for each precursor indication.	10/11/09
PG&E will require that dynamic venting be performed for each unit to flush out any gas from the RHR heat exchanger after each RCS vacuum refill operation by October 11, 2009.	10/11/09
PG&E will revise existing RHR pump testing procedures to monitor and vent (as appropriate) identified void-susceptible locations by October 11, 2009.	10/11/09
During the piping isometric drawing reviews performed in August 2008, PG&E identified a long horizontal section of the RHRP discharge piping inside containment that exceeds the piping walkdown screening criteria of 14 times the pipe diameter. There is an existing vent in this section of the RHRP discharge piping. PG&E will perform a confirmatory walkdown to verify as-built piping configuration for this section of the RHRP discharge piping. PG&E will complete its assessments of this section of piping during 2R15, and provide a supplement to this report with those results within 90 days from completion of that outage.	2R15