SOUTHERN CALIFORNIA
EDISON®
An EDISON INTERNATIONAL® Company

Ross T. Ridenoure
Senior Vice President and CNO
San Onofre Nuclear Generating Station

GL 2008-01

December 22, 2009

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

Subject: **Docket Nos. 50-361 and 50-362**
Response to Request for Additional Information on the Response to NRC Generic Letter 2008-01
San Onofre Nuclear Generating Station, Units 2 and 3

References: See Enclosure 1

Dear Sir or Madam:

Southern California Edison (SCE) provided its response to Generic Letter (GL) 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," in letters dated October 14, 2008, February 12, 2009, and June 17, 2009 (References 5, 6, and 7, respectively). The Nuclear Regulatory Commission (NRC) staff concluded that additional information is needed to support its review.

Enclosure 1 to this letter provides responses to the Request for Additional Information (RAI) documented in the NRC's e-mail dated October 23, 2009 (Reference 9). NRC staff agreed by phone on November 3, 2009, that SCE may extend the response submittal date to December 31, 2009.

Enclosure 2 provides the Summary of Corrective Actions and Schedule from Reference 5, Attachment 2, Section B. Corrective Action 6 is revised per RAI Response 1, and one new Corrective Action from RAI Response 8 is added. SCE considers these Corrective Actions to be regulatory commitments. No other Corrective Actions from Reference 5 are changed by this letter.

If you have any questions or require additional information, please contact Ms. Linda T. Conklin at (949) 368-9443.

Mail Stop D45
P.O. Box 128
San Clemente, CA 92672
(949) 368-6255 PAX 86255
Fax: (949) 368-6183
Ross.Ridenoure@sce.com

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

Executed on 12-22-09
(Date)

Senior VP & CNO
SCE

Enclosures:
1. Response to Request for Additional Information on the Response to NRC Generic Letter 2008-01
2. Summary of Corrective Actions and Schedule

cc: E. E. Collins, Regional Administrator, NRC Region IV
R. Hall, NRC Project Manager, San Onofre Units 2 and 3
G. G. Warnick, NRC Senior Resident Inspector, San Onofre Units 2 and 3

Response to Request for Additional Information on the Response to NRC Generic Letter 2008-01

NRC Item 1

In Reference 5, the licensee states that, "SCE will track the TSTF evaluation as a Corrective Action resulting from the Generic Letter evaluation, which will be completed no later than 1 year after NRC approval of the TSTF." Clarify the schedule for submitting a possible license amendment resulting from this evaluation.

SCE Response

Following NRC approval of the Technical Specification Task Force (TSTF) traveler related to GL 2008-01, SCE will evaluate adopting the TSTF to either supplement or replace current Technical Specification or Licensee Controlled Specification requirements and submit the license amendment, if appropriate, no later than 1 year after NRC approval of the TSTF. See Enclosure 2, revised Corrective Action 6.

NRC Item 2

Provide a discussion of the methods used to determine the volume of voids that have been vented, for use in the Corrective Action Program. Include consideration of the uncertainty in the volume.

SCE Response

Nitrogen gas is released and accumulates in the Low Pressure Safety Injection (LPSI) and High Pressure Safety Injection (HPSI) headers as a result of nitrogen-saturated water from the Safety Injection Tanks (SITs) that leaks past the Safety Injection check valves, and depressurizes in the lower pressure headers.

The eight (8) SIT levels are monitored several times a week by Maintenance and Systems Engineering. When tank leakage is identified, the engineer determines the tank leak rate and calculates the resulting gas void volume prior to venting, using the Emergency Core Cooling System (ECCS) Piping Gas Void Calculation procedure (Reference 22). The procedure is based on the assumption that the gas in solution is released in accordance with Henry's Law and establishes the relationship between the SIT leakage and resulting gas void. Back-leakage of 95 gallons of nitrogen-saturated water at SIT pressure, when depressurized to static Refueling Water Storage Tank (RWST) head-pressure, will result in the release of the allowable 5.23 ft^3 nitrogen gas volume as determined by transient analysis (Reference 23). With the 31-day Technical Specification surveillance requirement described below, this equates to an allowable back-leakage of slightly higher than 3 gallons per day. Based on general guidance provided in the Systems Engineering Handbook (Reference 26) relative to performance monitoring and trending, the system engineer generates a Notification (in the Corrective Action Program) to capture and evaluate tank leakage when the leakage is equal to or greater than 2 gallons per day.

Subsequent to the Nine-Month GL Response (Reference 5), SCE has been utilizing ultrasonic testing (UT) measurements to determine the actual void volume in selected Safety Injection headers. The UT data shows that the calculated volume based on SIT leak rate is highly conservative, compared to the actual volume measured by UT (References 28 and 29).

The Safety Injection headers are vented at a 31-day frequency, in order to verify that the ECCS piping is full of water per Technical Specification 3.5.2 (Reference 30), using the Safety Injection Monthly Tests procedure (Reference 27). Operability is maintained by ensuring that the void volume in the header remains lower than the design gas void volume acceptance criteria. The header venting frequency is increased if it is determined that the design gas void acceptance criteria will be exceeded prior to the next venting surveillance. Any change in venting frequency, determined either by the tank leak rate or by UT, is communicated to Operations and documented in a Notification. The monthly test procedure (Reference 27) also requires that the operator write a Notification if a vent time of 5 seconds is exceeded at a vent location. The time to vent is not used as a means to quantify the void volume; rather, this provides defense-in-depth to the volume quantification performed prior to venting using either tank level or UT.

SCE is currently replacing the San Onofre Nuclear Generating Station (SONGS) Unit 2 Safety Injection tilt disc check valves in the ongoing U2C16 outage, and the Unit 3 check valves are scheduled to be replaced in the U3C16 outage, scheduled for October, 2010. The new swing check valves have soft seats that have a better seating capability at low differential pressure, which are expected to significantly minimize gas migration.

NRC Item 3

GL 2008-01 (Reference 3) discussed the loss of high pressure safety injection (HPSI) pumps at Oconee in 1997 as an example of failure of a subject system. This was caused by a failure of level transmitters associated with the letdown storage tank that is commonly referred to as the volume control tank (VCT). The VCT was not identified in SCE's reply to the GL (Reference 5). Either identify the VCT as a part of the subject systems or provide a justification for its exclusion.

SCE Response

The volume control tank (VCT) was not identified in the Nine-Month GL Response (Reference 5), as the VCT does not interface directly with the subject system pumps. Combustion Engineering (CE) was the Nuclear Steam Supply System vendor for

SONGS Units 2 and 3. The ECCS pumps in the SONGS Units 2 and 3 CE design do not take suction from the VCT.

Depending on the mode of operation, the Low Pressure Safety Injection (LPSI) and Containment Spray (CS) pumps take suction from the Refueling Water Storage Tank (RWST), the Containment Emergency Sump (CES), or the Reactor Coolant System (RCS); and the High Pressure Safety Injection (HPSI) pumps take suction from the RWST or the CES. The potential for vortexing when taking suction from either the RWST or the CES was addressed in the Design Evaluation section of Attachment 2 of the Nine-Month GL Response (Reference 5); the potential for vortexing while taking suction from the RCS during mid-loop operations is addressed in RAI Item 4c below.

NRC Item 4; divided into three sub-items for response clarity

NRC Item 4a

Describe the monitoring of pump operation in all modes and specialized monitoring of appropriate plant parameters during shutdown operation, including reduced inventory and mid-loop operations. Describe the methods used, such as monitoring level indication and system pressures.

SCE Response

During power operation, Low Pressure Safety Injection (LPSI), High Pressure Safety Injection (HPSI) and Containment Spray (CS) pump suction pressures, and seal cooling flow are verified prior to pump start using the Safety Injection System Removal/Return To Service Operation, Safety Injection System Operation, and Containment Spray System Operation procedures, respectively (References 14, 15, and 16). Upon starting the pumps, discharge pressure, flow and motor current are monitored by indication in the control room by the Nuclear Control Operators, as described in the Routine Equipment Operations procedure (Reference 17).

During shutdown operation, including reduced inventory and mid-loop operation, either the LPSI or the CS pumps can serve as Shutdown Cooling (SDC) pumps, and be aligned to cool the RCS. During this evolution, RCS level and SDC flow are monitored and maintained in order to meet system operating guidelines outlined in the Shutdown Cooling System Operation procedure (Reference 18), and Draining the Reactor Coolant System to a Reduced Inventory Condition procedure (Reference 19). The guidelines provide the minimum flow in order to ensure adequate cooling, and maximum flow in order to preclude vortexing. See Item 4c below for additional detail on the RCS and SDC guidelines related to vortexing. RCS level and SDC flow are monitored in the control room. Additional parameters that are monitored are motor current, pressurizer pressure, and RCS inlet/outlet temperatures.

NRC Item 4b

Clarify how often the Safety Injection Tanks' water makeup volumes and water makeup rates are monitored and trended.

SCE Response

Safety Injection Tank (SIT) levels are monitored once a shift in the control room per the Once a Shift Surveillance (Modes 1 - 4) procedure (Reference 20). If it is determined that the level has decreased to 79.2 % of narrow range, has increased to 82.9% of narrow range, or has increased equal to or greater than 0.7% since the previous boron sample was taken, then the affected SIT is monitored twice a shift. If the level is determined to be outside of the narrow range level band of 77.9% and 84.1%, then the surveillance is deemed unsatisfactory, and actions will be taken to return the SIT to operable status in 72 hours, per Technical Specification requirements (Reference 21).

The SIT inventory levels are monitored several times a week by Maintenance and Systems Engineering once SIT leakage is identified, using Enabling Tools (ET) trending software. ET allows the engineer to view current and historical trend data to determine overall systems trends. The engineer determines the tank leak rate using the Emergency Core Cooling System (ECCS) Piping Gas Void Calculation procedure (Reference 22). Using the critical void volume determined in the Transient Analysis calculation (Reference 23), the tank leak rate is used to determine the time needed to reach a critical void size. This is used to determine if additional venting is needed to ensure continued operability of the ECCS. See Item 2 above for additional detail.

NRC Item 4c

For reduced inventory and mid-loop operations, justify that the water level is sufficient to prevent vortexing due to suction from the RCS.

SCE Response

In 2001, SDC system vortex testing was performed by varying the RCS level and LPSI pump discharge flow. The testing observed suction pressure, pump vibration/noise level, and motor current. Based on the testing and previous SDC events, a correlation was made between RCS level and flow at which vortex formation occurs. Margin was applied to the correlation, and guidelines were implemented in the Draining the Reactor Coolant System to a Reduced Inventory procedure (Reference 19) and the Shutdown Cooling System Operation procedure (Reference 18). These guidelines prescribe the maximum SDC flow at each RCS level, for operation with each of the potential SDC pump configurations: 1 LPSI pump, 2 LPSI pumps, 1 CS pump, and 2 CS pumps. For example, with single LPSI pump operation, the maximum flow prescribed is 5500 gpm with RCS level above the Top of Hot Leg, reduced in steps with step reductions in the RCS level, to a maximum flow of 2700 gpm at the minimum 19" RCS hot leg level.

NRC Item 5

Although training was not specifically addressed in the GL (Reference 3), the NRC staff considers it to be a necessary element of implementing procedures and taking other actions in response to the issues identified in the GL. Provide a brief description of training, as it relates to SCE's response to GL2008-01.

SCE Response

When station operating procedures are modified, an assessment for training needs is required in accordance with the procedure for Review/Approval Process for Orders, Procedures and Instructions (Reference 24). The determination is typically a function of the nature of the change and the perceived impact on the organization. For procedure changes initiated by Generic Letter 2008-01, a reading assignment was generated to all Operators on 12/9/2008 (Reference 25).

SCE is an active participant in the NEI Gas Accumulation Team, which is currently coordinating with the Institute of Nuclear Power Operations (INPO) in the development of generic training modules for gas accumulation and management. These training modules target the Engineering, Operations, and Maintenance disciplines. When these training modules are completed and become available to the industry, SCE will evaluate them for applicability to SONGS and may implement a version tailored to meet station needs.

NRC Item 6

Describe the method used to ensure that the gas was successfully vented and not transported to another high point; for both the monthly inspections and other fill and vent operations. Justify how sequential venting starting at the source and working toward system loads is able to prevent the transportation of voids to another high point.

SCE Response

The Safety Injection System Removal / Return to Service Operation Procedure (Reference 14) specifies that the Emergency Core Cooling System (ECCS) pump suction piping be initially vented in a high-to-low elevation sequence [source-to-load]. Following the initial venting, the Low Pressure Safety Injection (LPSI), High Pressure Safety Injection (HPSI), and Containment Spray (CS) pumps are re-vented between the pump and an intermediate common-piping location in a low-to-high elevation sequence [load-to-source]. Each pump is then run on mini-flow; and the piping is re-vented in select locations. As an added assurance that venting was effective, prior to running each pump on mini-flow, the suction pressure is verified (References 14, 15, and 16).

Return to service of the discharge piping is governed by the Work Clearance Application / Work Clearance Document / Work Authorization Record Procedure

(Reference 31). Filling and venting is performed on piping that was drained in order to carry out a specific scope of work, in accordance with guidelines provided in the procedure.

Monthly venting is performed statically on the suction and discharge piping, in accordance with the Safety Injection Monthly Tests procedure (Reference 27), at system and local high point vents. With the exception of the high-pressure interface at the safety injection check valves (discussed below), only small quantities of gas have been removed during the monthly surveillance. During the monthly venting process, as the gas quantities are very low compared to the piping volume, there will be no appreciable movement of liquid in the piping, and therefore no transport of gas from one high point to another. Therefore, the venting sequence is not prescribed.

Historically, gas has accumulated at the ECCS discharge piping high-point headers, with the source being identified as depressurization of nitrogen-saturated water leaking back through the safety injection check valves. As the gas accumulates at an intermediate inverted "U" system high point, the gas will be effectively vented from the high point vents, and not transported to lower elevations. See Item 2 above, for details on quantification of the gas, venting frequency adjustments, and schedule for check valve replacement.

NRC Item 7

Provide a justification that a water level of 3 inches above the bottom of the down-turned RWST suction elbow is enough to prevent gas ingestion due to vortexing during accident conditions. Since flow rates under realistic accident conditions (non-degraded pumps, two trains running) may significantly exceed the design basis accident flow rates, clarify whether the water level is applicable to actual expected accident conditions and for all modes of operation.

SCE Response

In the response that follows, the development of the 3-inch water depth at which vortexing is precluded is described, followed by a synopsis of the analyses showing that air entrained at water levels below 3 inches will not be transported to the safety injection and containment spray pumps. In these analyses, pump run-out flow rates were utilized in order to bound the expected accident conditions and operational modes.

To place the RWST air ingestion calculation (Reference 11) in context, an explanation of the RWST down-turned suction elbow configuration and piping configuration between the RWST and the Containment Emergency Sump (CES) tie-in to the Engineered Safety Features (ESF) pumps is needed. Figure 1 describes schematically the configuration of the RWST suction elbow and the screen box attached to it. The end of the RWST suction elbow pipe extends to the bottom of what is noted as the top screen. The top screen consists of a 10x10 screen mesh, sandwiched between pieces of grating (Reference 12). The side screens consist of 10x10 screen mesh supported by grating on one side of the screen. The bottom of the screen box is a solid plate. The piping configuration for the RWST piping and the CES suction piping originating at the 14'-6" EL is shown in Figure 2. The RWST and the CES piping connect at the (-)3'-6" EL and continue to the ESF pump suction. Check valves are located in both the RWST and CES lines, denoted as S3-1204-MU-004 and S3-1204-MU-002. (Unit 3 Train B is the bounding piping configuration and is used in the evaluation.)

At the time the RWST level drops to 3 inches above the end of the RWST suction elbow, the Recirculation Actuation Signal (RAS) has already initiated (RAS occurs at a tank level above the horizontal section of the RWST suction elbow), the CES valves are fully open, and the Low Pressure Safety Injection (LPSI) pumps have been secured. Each train of the High Pressure Safety Injection (HPSI) and Containment Spray (CS) pumps takes suction from one of the two RWSTs. To conservatively estimate the flow from the RWST, both the HPSI and CS pumps are assumed to be operating at runout conditions with flows of 1000 gpm and 2500 gpm, respectively. It is also conservatively assumed that the containment is at atmospheric pressure. If higher containment pressures are assumed, the check valve in the RWST piping (MU002) will close on RAS, preventing lowering of the RWST to the levels described above.

As noted in the Nine-Month GL Response (Reference 5), the 3-inch submergence for air ingestion into the RWST suction elbow is determined from a Creare Inc. calculation (Reference 11). The 3-inch submergence is based on the depression of the fluid surface that would occur due to conversion of the static pressure at the fluid surface to velocity head at the RWST suction elbow entrance. The total flow through the pipe is 3500 gpm, as noted above. The RWST suction elbow is a 24-inch pipe with an inner diameter of 23.5 inches, leading to a flow velocity of 2.6 feet per second. Converting the velocity to a velocity head ($v^2/2g_c$), a value of 1.3 inches water column (wc) is obtained. Including the pipe entrance loss coefficient of 0.8, the head loss increases to 2.3 inches wc ((1.3" wc) x (1.0 + 0.8)). The 10x10 screen mesh surrounding the pipe entrance corresponds to an area of approximately 9.6 square feet. The 10x10 mesh is constructed of 0.025 inch wire, which yields a 50% clear area. As such, the flow velocity through the mesh for a 3600 gpm flow through a 4.8 square foot clear area is 1.6 feet per second, which results in a velocity head of 0.4 inches wc. This mesh head loss is added to the preceding head loss at the pipe entrance to obtain a total head loss of 2.7 inches wc. This value is then conservatively rounded up to 3 inches wc. Therefore, it is expected that the depression of the fluid adjacent the RWST suction elbow, as show in Figure 3, will reach the pipe entrance when the fluid level is 3 inches above the suction elbow pipe end. It should be noted that this evaluation conservatively does not consider the ability of the inverted pipe entrance of the RWST suction elbow, nor the mesh and grating that surrounds the RWST suction elbow, to suppress any swirling flow that could result in an air core vortex.

It is expected that the majority of the air bubbles ingested in the fluid entering the RWST suction elbow would vertically separate from the fluid as the fluid passes through the horizontal piping run downstream of the RWST suction elbow. The length of this horizontal pipe run, as shown in Figure 2, is approximately 30 feet. After the horizontal run, the piping turns downward for a distance of approximately 21 feet. This piping isometric was chosen since it describes the shortest horizontal run of the RWST discharges at SONGS. The Froude Number associated with the flow of 2.6 feet per second through the 23.5 inch RWST piping results in a value of 0.33. Per the NRC Staff Criteria for Gas Movement (Reference 4), the bubble formed is not expected to transport down the piping downstream of the horizontal pipe section, since the Froude Number of 0.33 is less than the value specified in the document for no gas transport of 0.4.

Notwithstanding the above evaluation relative to the Froude number required for gas transport, SCE performed a calculation (Reference 13) to determine the anticipated distance the air-ingested water column could advance in the piping, assuming air is ingested from the point at which the RWST level is 3 inches above the end of the RWST suction elbow, to the point at which the RWST level drops below the end of the RWST suction elbow, and suction is broken. The air-ingested water column would advance through the piping until the end of the air-ingested water column reached the elevation of the containment pool, plus overshoot to account for the momentum of the water column. Based on these evaluations, it was determined that the front of the air-ingested water column would not reach the RWST check valve (MU002) nor the tie-in to the CES piping. Therefore, even if the air were to transport, the air-ingested water column would not enter the pump suctions.

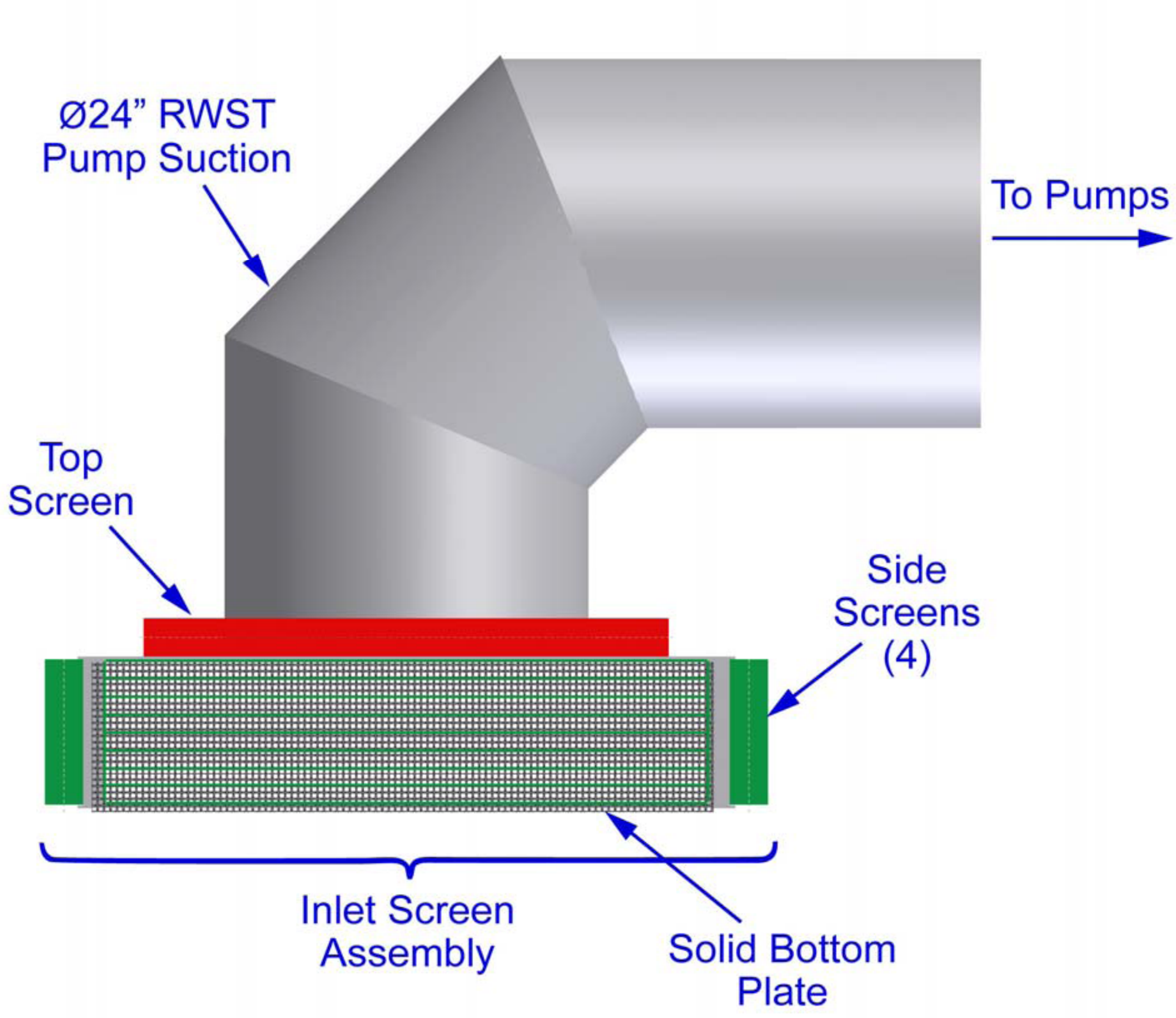

Figure 1; RWST Pump Inlet Screen, Elevation View

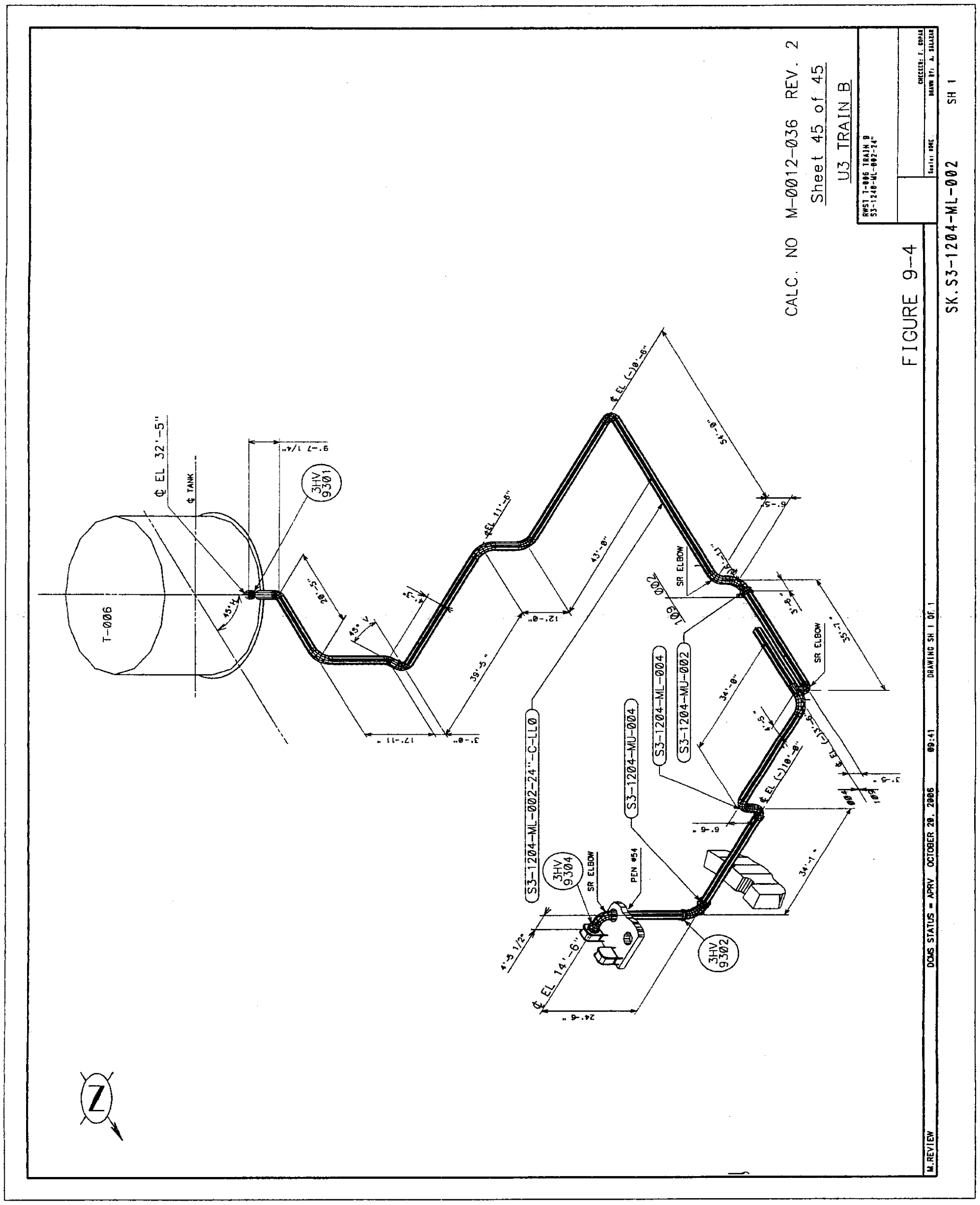

Figure 2; Unit 3 Train “B” Suction Piping

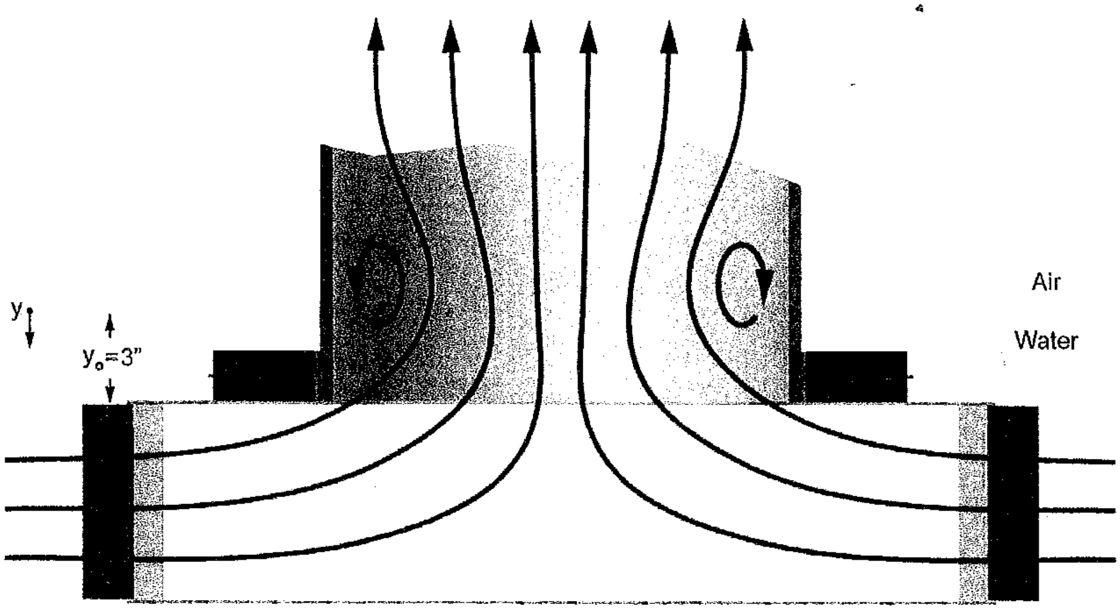

Figure 3; Flow Pattern Around the RWST Intake Just Prior to the Onset of Air Entrainment

NRC Item 8

In Reference 5, SCE assumed "that the potential voids … would pass through the pumps in the critical 20 second transient timeframe." This is not consistent with the NRC staff's acceptance criteria in Reference 4. Provide an analysis that meets the criteria (particularly the use of 0.5 second intervals), or provide additional justification that the current analysis bounds the behavior of the system.

SCE Response

SCE has actively participated in the NEI Gas Accumulation Team and PWROG Owners' Group activities focused on developing suitable guidance for licensees in the evaluation of gas voids in piping systems. These groups have engaged recognized industry experts and Nuclear Steam Supply System vendors to determine the most appropriate guidance. SCE will continue to participate in the development of guidance relative to the transport of gas voids in suction piping to the ECCS pumps, and will re-perform the analysis, once the guidance is finalized. SCE will provide a supplemental response with the results of the re-analysis. See Enclosure 2, new Corrective Action 9.

In the interim, SCE has reviewed the analysis cited in the Nine-Month GL Response (Reference 5), relative to criteria presented by Fauske & Associates at the July 9, 2009 NEI / NRC meeting (Reference 32). While the criteria are deemed preliminary at this point in time, each of the SONGS' postulated gas void volumes was compared with the largest down-comer volume between the potential gas void location and the pump suction (Reference 33). In all cases, the down-comer volume is greater than four times the postulated gas void volume; therefore, in accordance with the criteria, the volume of the down-comer will be sufficient to induce a kinematic shock region in the down-comer, thereby precluding "slug" flow. With respect to the pump gas ingestion fraction in the absence of slug flow, the SCE analysis is very similar to the "simplified equation" approach currently in development as a part of the ongoing industry group activities.

REFERENCES

Correspondence References
References 1 through 8 are from the NRC e-mail request (Reference 9)

1. Ruland, William H., “Preliminary Assessment of Responses to Generic Letter 2008-01, ‘Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems,’ and Future NRC Staff Review Plans,” NRC letter to James H. Riley, Nuclear Energy Institute, ML091390637, May 28, 2009.
2. Riley, James H., “Generic Letter (GL) 2008-01, ‘Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Contain Spray Systems’ Evaluation and 3 Month Response Template,” Letter to Administrative Points of Contact from Director, Engineering, Nuclear Generation Division, Nuclear Energy Institute, Enclosure 2, “Generic Letter 2008-01 Response Guidance,” March 20, 2008.
3. Case, Michael J., “NRC Generic Letter 2008-01: Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems,” Letter from Director, Division of Policy and Rulemaking, Office of Nuclear Regulation, NRC, ML072910759, January 11, 2008.
4. Warren C. Lyon, U.S. Nuclear Regulatory Commission, “Revision 2 to NRC Staff Criteria for Gas Movement in Suction Lines and Pump Response to Gas,” ML090900136, March 26, 2009.
5. Short, Michael P., “Nine-Month Response to NRC Generic Letter 2008-01, ‘Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems,’ San Onofre Nuclear Generating Station, Units 2 and 3.” Letter to Document Control Desk, NRC, from Vice President, Southern California Edison, ML0829504680, October 14, 2008.
6. Short, Michael P., “Nine-Month Supplemental (Post-Outage) Response to NRC Generic Letter 2008-01, ‘Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems,’ San Onofre Nuclear Generating Station, Unit 3.” Letter to Document Control Desk, NRC, from Vice President, Southern California Edison, ML090440570, February 12, 2009.
7. Short, Michael P., “Nine-Month Supplemental (Post-Outage) Response to NRC Generic Letter 2008-01, ‘Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems,’ San Onofre Nuclear Generating Station, Unit 2.” Letter to Document Control Desk, NRC, from Vice President, Southern California Edison, ML091690343, June 17, 2009.

8. Short, Michael P., "Revision to Commitment Completion Date and additional information associated with NRC Generic Letter 2008-01, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems,' San Onofre Nuclear Generating Station, Unit 2." Letter to Document Control Desk, NRC, from Vice President, Southern California Edison, ML091070587, April 17, 2009.

9. Hall, Randy; NRC Request for Additional Information – SONGS 2 and 3: GL 2008-01"; NRC e-mail to Linda Conklin, Southern California Edison; ML092960572, ML092960585, October 23, 2009.

10. not used

Technical References

11. SONGS Air Management from RWST and CES Report; Creare Inc.; TM-2791A / SO23-205-7-C139, Rev. 0

12. Refueling Water Storage Tank Safety Injection Suction Screen Drawing; Southern California Edison; SO23-407-13-105, Rev. 2

13. Postulated Transient Recirculation Flow from Refueling Water Storage Tank Calculation; Southern California Edison; M-0012-036, Rev. 2, and CCN D0003427

14. Safety Injection System Removal/Return To Service Operation Procedure; Southern California Edison; SO23-3-2.7.2, Rev. 19

15. Safety Injection System Operation Procedure; Southern California Edison; SO23-3-2.7, Rev. 23

16. Containment Spray System Operation Procedure; Southern California Edison; SO23-3-2.9, Rev. 25

17. Routine Equipment Operations Procedure; Southern California Edison; SO123-0-A6, Rev. 8

18. Shutdown Cooling System Operation Procedure; Southern California Edison; SO23-3-2.6, Rev. 26

19. Draining the Reactor Coolant System to a Reduced Inventory Condition Procedure; Southern California Edison; SO23-3-1.8, Rev. 27

20. Once A Shift Surveillance (Modes 1 - 4) Procedure; Southern California Edison; SO23-3-3.25, Rev. 30

21. Safety Injection Tanks (SITs) Technical Specification; Southern California Edison; 3.5.1

22. Emergency Core Cooling System (ECCS) Piping Gas Void Calculation Procedure; Southern California Edison; SO23-V-16, Rev. 0

23. LPSI/HPSI Nitrogen Pocket Transient Analysis Calculation; Southern California Edison; M-DSC-370, Rev. 0, CCN-D0005616

24. Review/Approval Process for Orders, Procedures and Instructions Procedure; Southern California Edison; SO123-VI-1, Rev. 26

25. Priority 2 Reading Assignment; Southern California Edison; Routing Number 2-08-103, Item 9

26. Systems Engineering Handbook; Southern California Edison; SY-SO23-G-2, Rev. 2

27. Safety Injection Monthly Tests Procedure; Southern California Edison; SO23-3-3.8, Rev. 23

28. Nuclear Notification regarding Safety Injection Tank 8 level decreases associated with check valve leakage; Southern California Edison; NN 200239017

29. Nuclear Notification regarding Safety Injection Tank 9 level decreases associated with check valve leakage; Southern California Edison; NN 200357717

30. ECCS - Operating Technical Specification; Southern California Edison; 3.5.2

31. Work Clearance Application / Work Clearance Document / Work Authorization Record (WCA/WCD/WAR) Procedure; Southern California Edison; SO123-XX-5, Rev. 27

32. Technical Basis for Gas Transport to the Pump Suction; Fauske & Associates; presented at the July 9, 2009 NEI / NRC meeting at Purdue University; transmitted by the PWROG on July 14, 2009 via letter OG-09-271

33. Nuclear Notification comparing gas void volumes with down-comer volumes; Southern California Edison; NN 200004023, Task 38

SUMMARY OF CORRECTIVE ACTIONS AND SCHEDULE
(Reference 5, Attachment 2, Section B)

All identified corrective actions will be tracked per the Corrective Action Program (CAP). The due dates are commensurate with plant need and safety significance of resolution.

Item	Corrective Action	Due Date
1.	Technical Specification Bases for SR 3.5.2.4 will be revised to read "Maintaining the piping from the RWST to the RCS full of water…"	90 days after completion of the Unit 3 Cycle 15 Refueling outage (scheduled for October 2008) **Complete**
2.	Procedure SO23-3-2.7.2, "Safety Injection System Removal/Return to Service Operation," (Reference 15) will be revised to include sweeping of the inverted "U" sections in the HPSI Train "A" discharge piping during plant restart until new vents are installed.	Prior to restart of the unit for the Unit 3 Cycle 15 Refueling outage (scheduled for October 2008) **Complete**
3.	Procedure SO23-3-3.8, "Safety Injection Monthly Tests" (Reference 17) specifies that one of the objectives is to vent accessible valves on the discharge side. The procedure vents valves on both the suction and discharge sides and vents valves deemed necessary to ensure that the system is sufficiently full without limitations imposed by accessibility. The procedure objective will be revised for clarification only.	Prior to restart of the unit for the Unit 3 Cycle 15 Refueling outage (scheduled for October 2008) **Complete**
4.	A vent valve will be added to the Train "A" discharge piping of the high pressure safety injection pumps in each unit.	U2C16 and U3C16 outages scheduled for the fall of 2009 and 2010, respectively **In Progress**
5.	An Engineering procedure will be developed to formalize SIT monitoring to provide a formal process of quantifying leakage into the low pressure side of the Safety Injection system.	90 days after completion of the Unit 3 Cycle 15 Refueling outage (scheduled for October 2008) **Complete**

Continues on next page

Item	Corrective Action	Due Date
6.	SCE 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. Following NRC approval of this TSTF, SCE will evaluate adopting the TSTF to either supplement or replace current TS and LCS requirements and submit the license amendment, if appropriate.	1 year after NRC approval of TSTF
7.	SCE will conduct confirmatory walkdowns as identified in Item 6 of the Design Evaluation for Unit 2 accessible and inaccessible piping and submit a Nine-Month supplemental response with the results of these walkdowns and any resulting corrective actions.	120 days after completion of the Unit 2 outage (scheduled for January 2009) (Revised by Reference 8) **Complete**
8.	SCE will conduct confirmatory walkdowns as identified in Item 6 of the Design Evaluation for Unit 3 accessible and inaccessible piping and submit a Nine-Month supplemental response with the results of these walkdowns and any resulting corrective actions.	60 days after completion of the Unit 3 Cycle 15 Refueling outage (scheduled for October 2008) **Complete**
9.	SCE will continue to participate in the development of guidance relative to the transport of gas voids in suction piping to the ECCS pumps and will re-perform the analysis, once the guidance is finalized. SCE will provide a supplemental response with the results of the re-analysis.	6 months after guidance is finalized