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PG&E Letter DCL-11-035

10 CFR 50.54(f)

U.S. Nuclear Regulatory Commission
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Docket No. 50-323, OL-DPR-82
Diablo Canyon Unit 2
Supplement to 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-08-090, "Nine-Month Response to NRC Generic Letter 2008-01, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems,'" dated October 14, 2008
3. PG&E Letter DCL-10-014, "Supplement to Nine Month Response to NRC Generic Letter 2008-01, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems,'" dated February 9, 2010

The U. S. Nuclear Regulatory Commission (NRC) issued NRC Generic Letter (GL) 2008-01 (Reference 1) to request that each licensee evaluate its emergency core cooling system, residual heat removal (RHR) 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.

In Reference 2, Pacific Gas and Electric Company (PG&E) committed to perform a confirmatory walkdown to verify as-built piping configuration for a section of the RHR discharge piping during Unit 2 Refueling Outage Fifteen (2R15), and provide a supplement to PG&E's NRC GL 2008-01 response.

In Reference 3, PG&E provided the results of the walkdown, which identified a high point on the RHR line and made the following regulatory commitment:

> PG&E will install a vent at this high point on the RHR line during Unit 2 Refueling Outage Sixteen (2R16).

PG&E intends to optimize refueling outages by performing a primary system drain during the defuel window every third refueling outage, consistent with the schedule for steam generator tube inspection. Installation of this vent requires the RHR system to be drained. The next planned window to install this vent is 2R18, currently scheduled for September 2014.

PG&E is revising the regulatory commitment to:

> PG&E will install a vent at this high point on the RHR line during Unit 2 Refueling Outage Eighteen (2R18).

PG&E is adding the following regulatory commitment:

> PG&E will perform an ultrasonic test (UT) inspection at this local high point to inspect for gas accumulation following the dynamic venting of the RHR heat exchangers coming out of Unit 2 Refueling Outage Sixteen (2R16) and Unit 2 Refueling Outage Seventeen (2R17).

A discussion of potential gas intrusion mechanisms and other relevant information is provided in the Enclosure.

This response is submitted in accordance with 10 CFR 50.4.

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

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

Executed on March 17, 2011.

Sincerely,

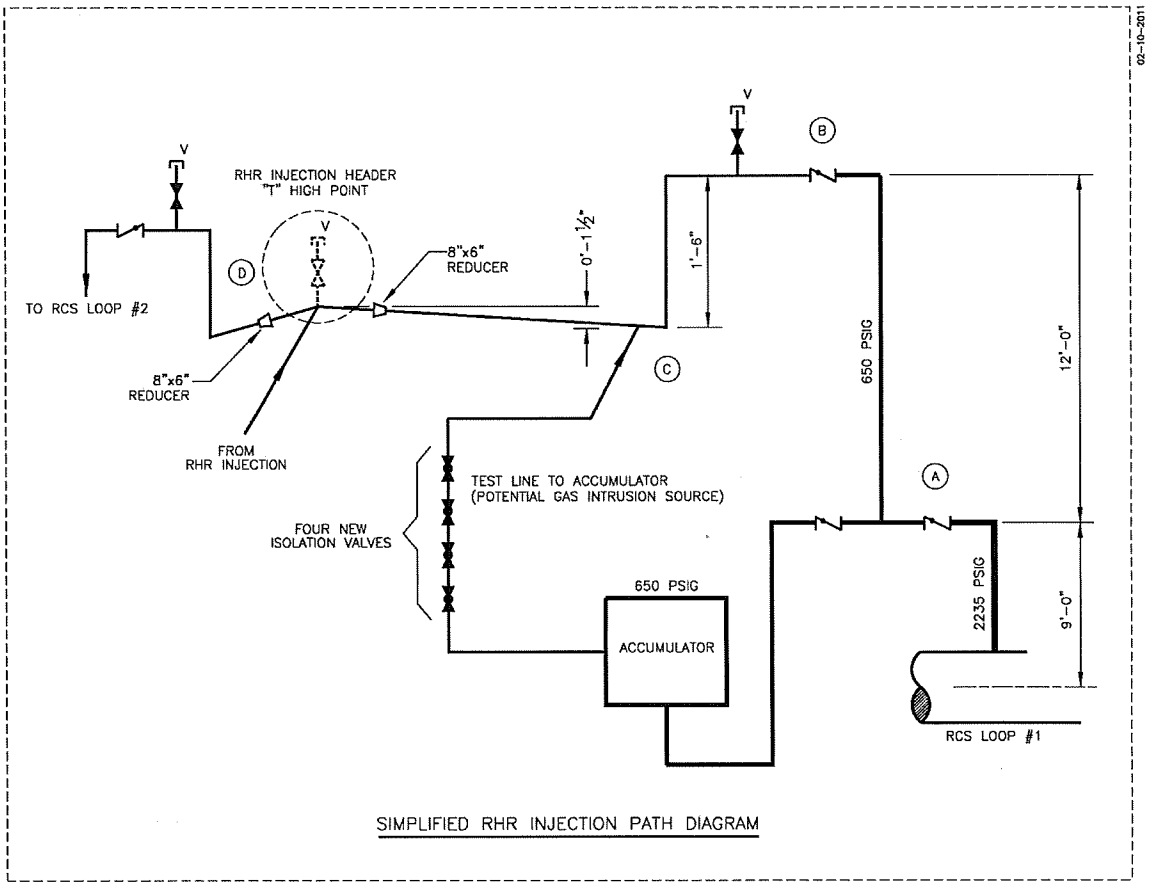
James R. Becker
Site Vice President

mjrm/4557/50037662
Enclosure
cc: Diablo Distribution
Gary W. Butner, California Department of Public Health
Elmo E. Collins, NRC Region IV
Michael S. Peck, NRC, Senior Resident Inspector
cc/enc: James Polickoski, Project Manager, Office of Nuclear Reactor Regulation
Alan B. Wang, Project Manager, Office of Nuclear Reactor Regulation

Revision to Commitment

Background

During the Generic Letter (GL) 2008-01 evaluation, Pacific Gas and Electric Company (PG&E) identified a potential gas accumulation local high point in a residual heat removal (RHR) injection header. The branch line off this RHR injection header leads to an inverted "U" configuration to form a branch line high point that can be vented through a vent valve (see Simplified RHR Injection Path Diagram). This RHR branch line connects to the accumulator (potential gas intrusion source) via the safety injection (SI) test line. PG&E committed to perform an emergency core cooling system (ECCS) piping walkdown inside containment to measure the as-built piping configuration of this section of piping during the Diablo Canyon Power Plant (DCPP) Unit 2 Refueling Outage Fifteen (2R15). The 2R15 ECCS piping walkdown data shows that this long horizontal RHR branch line is sloped away from the inverted "U" branch line high point, toward the RHR injection header, resulting in a potential void collection local high point at this RHR injection header "T" (point D in the attached diagram).



SIMPLIFIED RHR INJECTION PATH DIAGRAM

This local high point is higher in elevation than the bottom of the RHR branch line's ascending elbow which leads to the inverted "U" branch line high point (point C in the attached diagram) by 1.5 inches. Thus, leakage from the accumulator through the SI test line could result in gas accumulation in the identified local high point (point D in the attached diagram) at the RHR injection header "T", instead of migrating to the existing high point vent. As a result, PG&E committed to install a vent at this local high point "T".

Evaluation

The gas intrusion mechanisms that could result in gas accumulation at this RHR injection header "T" local high point are:

1. Leakage from the Accumulator through a series of test line isolation valves

2. Gas transport after reactor coolant system (RCS) vacuum refill mid-loop operation when coming out of an outage.

3. RCS leakage through a series of check and isolation valves

PG&E has made the following plant modifications and procedural enhancements to minimize the gas intrusion mechanisms above:

1. PG&E installed a vent at each branch line high point (Point B in the attached diagram) during Unit 2 refueling outage eleven (2003) to provide venting capability.

2. PG&E installed at least four manual isolation valves in series in the test line between the accumulator and this RHR injection header "T" local high point during 2R15. Leakage through this path can only occur if all the new isolation valves leak; any leak tight manual isolation valve isolates the leakage path.

3. PG&E performs dynamic venting of the RHR heat exchangers to flush out any potential gas introduced after the RCS vacuum refill midloop operation coming out of a refueling outage. In 2R15, an ultrasonic test (UT) at this RHR injection header "T" local high point following the dynamic venting did not identify any gas accumulation.

If precursors (i.e. plant conditions) are identified that are indicative of gas accumulation at this local high point, the DCPP Gas Intrusion Program requires that these precursors are entered into the corrective action program for further investigation and evaluation. This is to evaluate the potential for and impact of gas accumulation. The investigation could include the performance of an UT at this local high point.

RCS cold leg backleakage through the check valves is not a credible source for gas accumulation at this RHR injection header "T" local high point. If the first and second check valves were to leak and result in degassing, gas would accumulate upstream of the second check valve (point B in the above diagram), which is the branch line high point. Since the branch line high point is at a higher elevation than the RHR injection header "T", offgassing would occur at the branch line high point, not at the RHR injection header "T".

Another potential leakage path (not shown on Simplified RHR Injection Path Diagram) is from the RCS hot leg through the safety injection test line interface prior to the RHR injection header "T" local high point. RCS leakage would need to pass through a minimum of four valves (two check valves and two isolation valves or one check valve and four isolation valves) in order for gas to accumulate at the RHR injection header "T" local high point. Leakage through this path can only occur if all the valves in series leak; any leak tight manual isolation or check valve isolates the leakage path.

Accumulator backleakage through the second check valve is a gas accumulation mechanism; however, in this case, it cannot result in gas accumulation at the RHR injection header "T" local high point. The piping upstream of the second check valve (point B in the above diagram) is pressurized to refueling water storage tank (RWST) static pressure. If any leakage occurs across the second check valve, the leakage would primarily contain the dissolved nitrogen water from the accumulator, which would result in nitrogen accumulation in the inverted "U" branch line high point. From this RHR branch line high point location, the accumulated gas is not capable of transporting to the RHR injection header "T" unless the entire section of the RHR branch line between point B and point C is voided. If an accumulator water level change is identified, then UT can be performed at the RHR branch line existing high point vent (Point B), that is located upstream of the second check valve, and UT at the RHR injection header "T" (Point D).

Outgassing of a dissolved gas from the RCS in the RHR injection line upstream of the first check valve is not a gas accumulation mechanism for this location because the accumulator pressure is much higher than the volume control tank pressure where the hydrogen is dissolved into the RCS coolant.

Degassing of the RWST water at the RHR injection header "T" is not credible because the location is subject to the static pressure head of the RWST (at a higher elevation than the RHR piping).

An UT inspection could be performed at the RHR injection header "T" local high point if precursors to gas accumulation are identified. In 2R15, PG&E performed an UT inspection at this point following the dynamic venting of the RHR heat exchangers that did not identify any gas accumulation. PG&E is making the following new regulatory commitment:

> PG&E will perform an ultrasonic test (UT) inspection at this local high point to inspect for gas accumulation following the dynamic venting of the RHR heat exchangers coming out of Unit 2 Refueling Outage Sixteen and Unit 2 Refueling Outage Seventeen.

Based on the above, postponing installation of this RHR injection header high point vent until 2R18 will not adversely impact ECCS performance.