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PG&E Letter DCL-12-129

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

10 CFR 50.55a

Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
Request for Approval of an Alternative to the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI Pressure Test Requirements for Class 1 Reactor Vessel Flange Leakoff Lines

Dear Commissioners and Staff:

In accordance with the provisions of 10 CFR 50.55a(a)(3)(ii), Pacific Gas and Electric Company (PG&E) requests Nuclear Regulatory Commission (NRC) approval to use an alternative to the ASME Section XI Code pressure test requirements for inservice inspection (ISI) of Class 1 reactor vessel flange leakoff lines (Category B-P, Item B15.10) for Diablo Canyon Power Plant (DCPP) Units 1 and 2. The proposed alternative, "10 CFR 50.55a Request Number RVFLNG-INT3 – U1 & U2," is necessary because compliance with the ASME Code requirement is impractical in accordance with 10 CFR 50.55a(a)(3)(ii).

The proposed alternative examination for Class 1 reactor vessel flange leakoff lines pressure test at DCPP Units 1 and 2 is based on ASME Code Case N-805 which has not yet been approved by the NRC. The NRC staff has previously found similar requests from Millstone Power Station Unit 3 and North Anna Unit 1 to be acceptable.

PG&E requests NRC approval to use the alternative pressure test proposal for the reactor vessel flange leakoff lines during the third ten-year ISI interval for DCPP Units 1 and 2. The third inspection interval began January 1, 2006, for Unit 1 and July 1, 2006, for Unit 2. PG&E makes no regulatory commitments (as defined by NEI 99-04) in this letter.

If you have any questions regarding the information enclosed, or other ISI program activities, please contact Mr. Tom Baldwin at (805) 545-4720.

Sincerely,

Barry S. Allen
Site Vice President

rntt/4231/SAPN 50524575
Enclosure
cc: Diablo Distribution
cc/encl: Elmo E. Collins, NRC Region IV
Thomas R. Hipschman, NRC Senior Resident Inspector
Joseph M. Sebrosky, NRR Project Manager
State of California, Pressure Vessel Unit

Diablo Canyon Power Plant, Units 1 and 2

Inservice Inspection Program

Third 10-Year Inspection Interval

Revision 1

10 CFR 50.55a Request Number RVFLNG-INT3 – U1 & U2

Proposed Alternative
In Accordance with 10 CFR 50.55a(a)(3)(ii)

Pacific Gas and Electric Company
Diablo Canyon Power Plant, Units 1 and 2
10 CFR 50.55a Request Number RVFLNG-INT3 – U1 & U2

Proposed Alternative
In Accordance with 10 CFR 50.55a(a)(3)(ii)

1. American Society of Mechanical Engineers (ASME) Code Component Affected:

ASME Code Class:	Class 1
References:	ASME Section XI, Table IWB-2500-1 and Paragraph IWB-5222
Examination Category:	B-P (All Pressure Retaining Components)
Item Number:	B15.10
Description:	Alternative pressure testing requirements for the Reactor Pressure Vessel (RPV) Flange Seal Leak-Off Piping
Component:	Nominal pipe size (NPS) ¾ inch RPV Flange Seal Leakoff Piping
Plant Drawings:	102007, 102028, 500177, 500181, 108007, 104628, 234-165 (W)

2. Applicable Code Edition and Addenda:

ASME Boiler and Pressure Vessel Code, Section XI, 2001 Edition through 2003 Addenda

3. Applicable Code Requirements:

Table IWB-2500-1, Category B-P, Item B15.10 requires that all Class 1 pressure retaining components be subject to a system leakage test with a Visual VT-2 examination every refueling outage. Paragraph IWB-5222 specifies that the system leakage test is performed at pressure corresponding to 100 percent rated reactor power. The pressure retaining boundary shall correspond to the reactor coolant boundary, with all valves in the position required for normal reactor operation startup. For the system leakage test performed at or near the end of each inspection interval, the pressure retaining boundary shall extend to all Class 1 pressure retaining components within the system boundary.

4. Reason for Request: Impracticality of Compliance (10 CFR 50.55a(a)(3)(ii))

The RPV Flange Seal Leakoff Piping consists of two NPS 3/4 inch stainless steel pipelines extending from connections at the reactor vessel flange to appropriate isolation valves on the outside of the missile shield wall. The first line connects at the RPV flange outboard of and separated from normal operating reactor coolant pressure by the inner vessel O-ring seal which is itself compressed

between the vessel and head flanges forming a leak-tight seal under normal system conditions. An outer O-ring seal is located outside of the tap in the vessel flange for this first line. Failure of the inner O-ring seal is the only condition under which this first line is pressurized. Therefore, this first line is not expected to be pressurized during the system pressure test following a refueling outage.

The second line connects at the RPV flange outboard of the outer O-ring seal. Failure of both O-ring seals is the only condition under which this second line is pressurized. Therefore this second line is also not expected to be pressurized during the system pressure test following a refueling outage.

Impracticality of Compliance while the RPV head is removed

(Refer to sketch in Attachment 1) The inlet to these lines at the RPV flange is in each case a straight-bored hole 3/16 inch diameter through the flange cladding, normal to the plane of the flange, and extending through into a 0.742 inch internal diameter chamber welded under the cladding. The straight bore configuration of this opening to the piping precludes system pressure testing while the RPV head is removed because there is no provision to plug the orifice for testing using a pressure source on the pipe side, nor to install a pressure source connection to test from the flange side. Plugging or installing a connection would require machining threads in each flange opening with attendant concern over chips that may become a foreign material threat for fuel integrity or in the lines themselves. Additionally, machining would require extensive time in the estimated 20-40 millirem (mRem)/minute (min) field at the vessel flange, an as low as is reasonably achievable (ALARA) concern. After machining, installing and removing the plugs or pressure connections would require time for installation personnel in the estimated 20-40 mRem/min field, an additional ALARA concern. The 3/16 inch plug or pressure connection itself would also introduce a foreign material exclusion issue at the edge of the open reactor vessel.

Impracticality of Compliance while the RPV head is installed

(Refer to sketch in Attachment 1) The configuration also precludes system pressure testing by pressurizing the lines externally with the RPV head installed. The top head of the vessel contains two grooves that hold the O-rings. The O-rings are held in place by a series of retainer clips that are housed in recessed cavities in the flange face. If a pressure test of the first (inner) line were to be performed with the head on, the inner O-ring would be pressurized in the opposite direction than its design function. The test pressure would result in an inward force on the inner O-ring that would tend to push it into the recessed cavity that houses the retainer clips. Therefore, based on engineering judgment, PG&E concluded that the thin O-ring material would likely be damaged by the inward force.

The second (outer) line cannot be pressurized because there is no O-ring seal outboard of the second line opening in the RPV flange, thus there is no means to retain pressure.

5. Burden Caused by Compliance:

Machining the influent holes to accept plugs or pressure connections risks damage to the system and would subject personnel to significant radiation exposure.

Purposely failing or not installing the inner O-ring in order to perform a pressure test of the outer O-ring would require an additional top head removal cycle to install a new functional O-ring set. The time associated with removing and reinstalling the RPV head to replace the O-rings would subject personnel to significant radiation exposure. Therefore, based on engineering judgment, PG&E concluded that compliance with the IWB-5222 system pressure test requirement results in an unnecessary hardship without a compensating increase in the level of quality and safety.

6. Proposed Alternative and Basis for Use:

In lieu of the requirements of IWB-5222, a VT-2 visual examination of the accessible areas (i.e., the portion of the O-ring seal leak-off lines between the reactor shield wall penetration and the isolation valves on the outside of the missile shield wall) will be performed each refueling outage while the refueling cavity is filled, imposing static head of approximately 12 pounds per square inch, gage on the piping during the examination.

The portions of the lines between the reactor vessel flange and the reactor shield wall penetration are inaccessible when the reactor cavity is flooded. The inaccessible portions between the vessel insulation and the shield wall penetration become accessible for direct examination when the cavity is drained and the excore manways are removed, as typically done to provide access for examination of the reactor nozzle-to-pipe welds. This portion of the lines will be VT-2 examined each outage in conjunction with the reactor nozzle-to-pipe welds examination or during excore instrument maintenance although the lines will not be pressurized at that time because the refueling cavity is drained.

The short portion of the lines penetrating the insulation and RPV flange are not directly accessible. However surrounding areas and areas to which leakage would be channeled will be VT-2 examined each outage in conjunction with the above-mentioned examination of the portions between the insulation and shield wall that are accessible when the excore manways are removed. Again, the lines are not pressurized at this time because the refueling cavity is drained.

If any through-wall leakage did occur in the RPV Flange seal leakoff piping, either during cavity flooding or pressurization following O-ring failure, it would result in an accumulation of boric acid that would be detected during the VT-2 visual examinations proposed in this request.

The flange seal leakoff piping is essentially a leakage detection/collection system and the inner line would only function as a Class 1 pressure boundary if the inner O-ring fails, or for the outer line if both inner and outer O-rings fail, thereby pressurizing the piping. If the inner O-ring should leak during the operating cycle it will be identified by an increase in temperature of the leak-off line above ambient temperature. This high temperature (greater than 120°F) would actuate an alarm in the Control Room, which would be closely monitored by procedurally controlled operator actions allowing identification of any further compensatory actions required. The leakage would be directed to and collected in the reactor coolant drain tank.

Additionally, a 3/8 inch diameter opening can be compensated by the normal make-up capability of the system. The 3/16 inch diameter size of the inlet to each of the leakoff lines is smaller than the system makeup capacity, thus this piping could be excluded from the reactor coolant pressure boundary on that basis. The small size of the inlet openings to the lines provides additional assurance that orderly shutdown and cooldown of the reactor coolant system would be achieved even in the event a through-wall flaw was to occur in the leakoff piping.

The proposed alternative examination is based on ASME Code Case N-805 which has not yet been approved by the Nuclear Regulatory Commission (NRC).

7. Duration of Proposed Alternative:

The alternative is requested for the current third inservice inspection interval, which began January 1, 2006, and is nominally scheduled to end May 6, 2015, for Unit 1, and which began July 1, 2006, and is nominally scheduled to end March 12, 2016, for Unit 2.

8. Precedents:

(1) Millstone Power Station Unit 3 Relief Request IR-3-11, "Alternative Pressure Testing Requirements for the RPV Flange Leak-Off Piping", approved by the NRC Letter dated April 29, 2010 (ADAMS Accession Number ML101040042)

(2) North Anna Unit 1 Relief Request SPT-013, Examination Category B-P Pressure Retaining Components in the Reactor Coolant System" approved by NRC letter dated February 9, 2006 (ADAMS Accession Number ML060450517)

9. Reference:

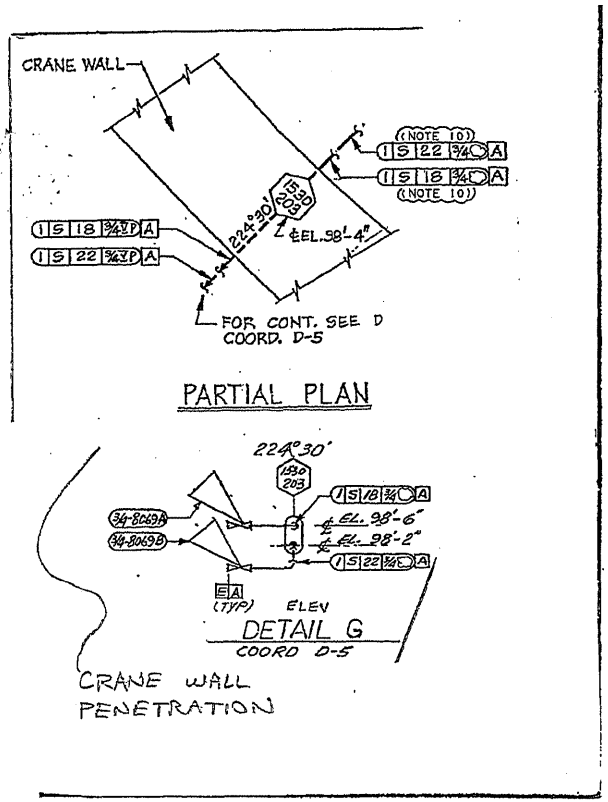
   ASME Code Case N-805, "Alternative to Class 1 Extended Boundary End of Interval or Class 2 System Leakage Testing of Reactor Vessel Flange O-ring Leak Detection System" was issued to the 2010 Edition of ASME Code Section XI and is listed in ASME Code Case Supplement 6.

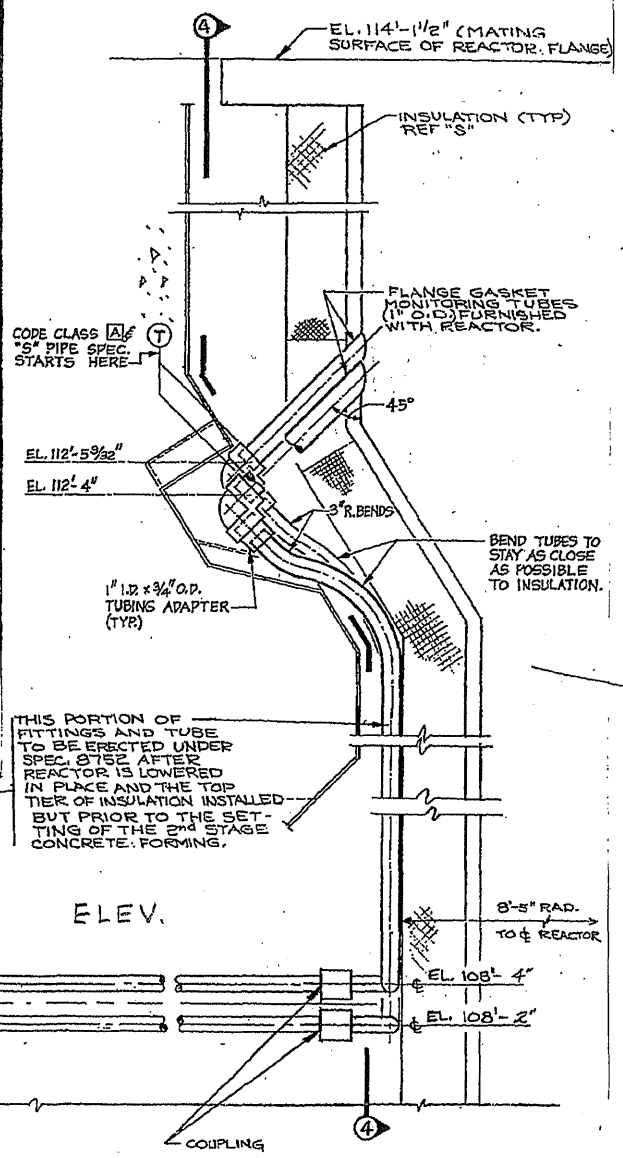
10. Attachment 1

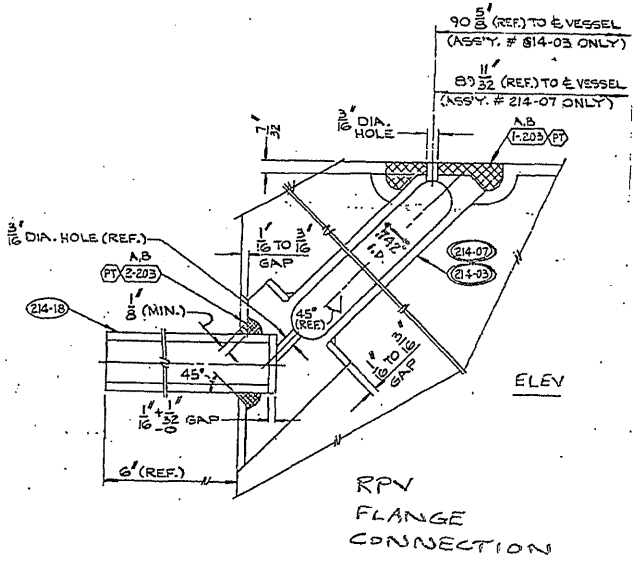
    RPV Flange Seal Leak-off Piping Configuration Sketch

Attachment 1

Reactor Pressure Vessel Flange Seal Leak-off Piping Configuration Sketch







LEAKOFF LINE ROUTING FROM RPV INSULATION TO SHIELD WALL PENETRATION

RPV LEAKOFF LINE CONFIGURATION SKETCH

RVFLNG-INT3-U1&2