UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO REQUEST FOR RELIEF FROM STOP VALVE CONTROL AND INTERLOCK

REQUIREMENTS OF SECTION III, ARTICLE 9, OF THE 1968 EDITION

OF THE ASME BOILER AND PRESSURE VESSEL CODE

PACIFIC GAS AND ELECTRIC COMPANY

DIABLO CANYON POWER PLANT, UNITS 1 AND 2

DOCKET NOS. 50-275 AND 50-323

1.0 INTRODUCTION

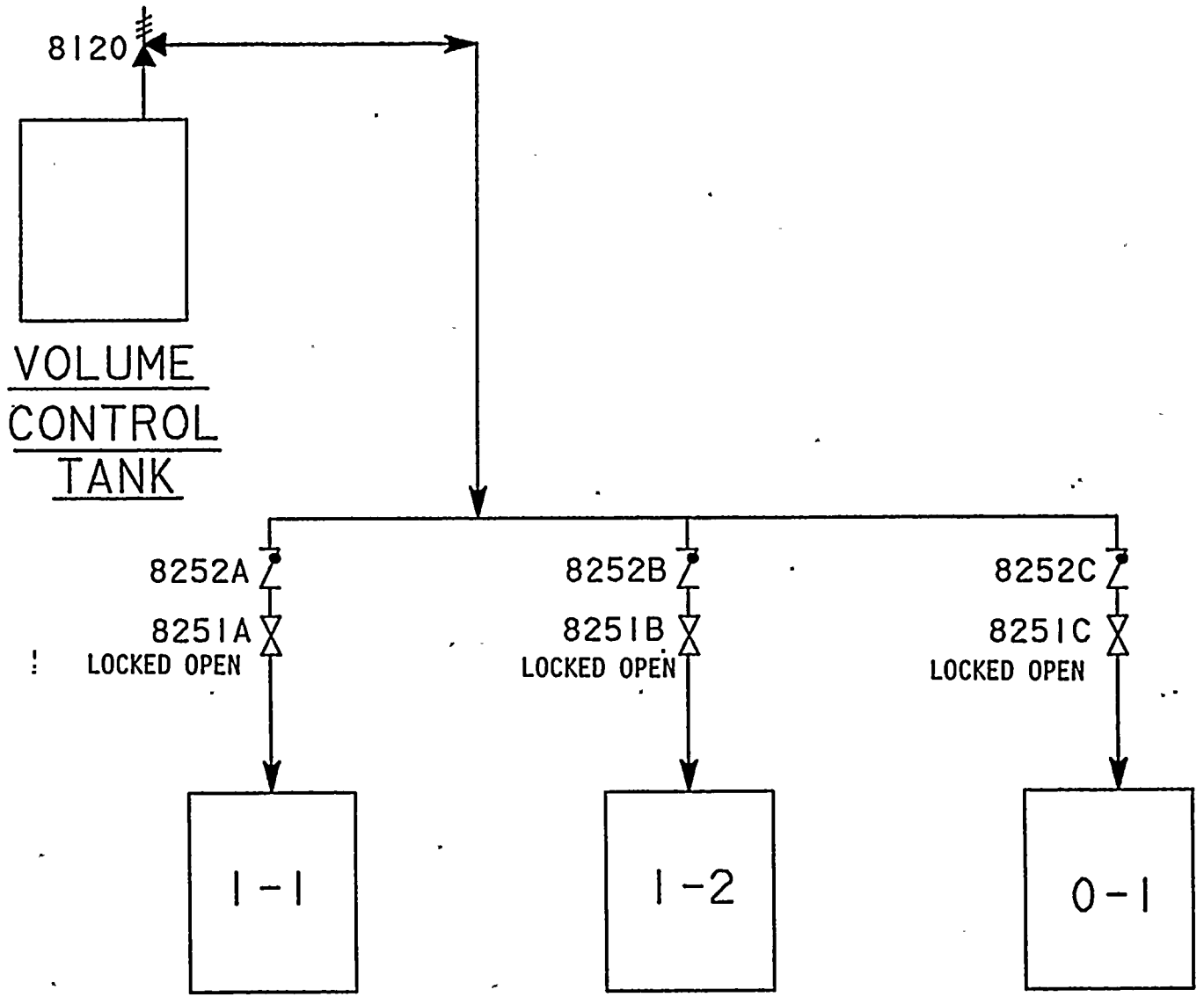
In a January 25, 1994, letter, Pacific Gas and Electric Company (the licensee) requested permanent relief from Article 9 of Section III of the 1968 Edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (the ASME Code). The relief would allow the licensee to use specific administrative controls on the block valves in the volume control tank (VCT) and the regenerative heat exchanger (RHE) relief valve discharge lines at Diablo Canyon Units 1 and 2. Specifically, the licensee requested relief for the following chemical and volume control system (CVCS) manual block valves:

	Unit 1	Unit 2
VCT line	CVCS-1-8251A, B, and C	CVCS-2-8251A, B, and C
RHE line	CVCS-1-8482	CVCS-2-8482

Descriptions of these valve installations follow.

Volume Control Tank Relief Valve Line

Figure 1 shows a schematic of the VCT block valve/relief valve configuration, which is typical for both units. The block valves are locked open in the relief valve CVCS-1-RV-8120 and CVCS-2-RV-8120 discharge paths. Each relief valve provides overpressure protection for VCT 1-1 and VCT 2-1. The relief valves discharge to one of three available liquid holdup tanks (LHUTs) that contain the radioactive gas or liquid released. The purpose of the block valves is to (1) isolate individual LHUTs for personnel safety during maintenance, (2) allow processing of individual LHUT contents without uncontrolled discharges into an LHUT, and (3) allow individual LHUT testing without incapacitating the entire system or VCT overpressure protection.



LIQUID HOLD-UP TANKS

FIGURE 1

Regenerative Heat Exchanger Relief Valve Line

Figure 2 shows a RHE block valve/relief valve configuration schematic that is typical for both units. The block valves are in the discharge path of spring U-loaded thermal relief check valves CVCS-1-8483 and CVCS-2-8483. Each relief valve provides overpressure protection for RHE 1-1 and RHE 2-1 if the CVCS malfunctions. Each relief valve discharges to the reactor coolant system (RCS). The purpose of the block valves is to facilitate RHE maintenance.

The 1968 Edition of the ASME Code, Section III, Article 9, paragraph N-910.8 specifies in part:

> Any stop valve or similar device on the inlet or discharge side of a protective device...shall be so constructed, positively controlled and interlocked...under all conditions of operation of the system.

The ASME issued Code Interpretation No. III-1-80-67R in March 1989 to clarify what it meant by controls and interlocks. The interpretation specified that controls and interlocks were pressure-sensing devices that would activate the stop valve to provide fluid access to the relief valve. The interpretation also made it clear that administrative control of block valve positions was not acceptable. The ASME incorporated these provisions into the 1989 Code Edition.

2.0 EVALUATION

Pursuant to 10 CFR 50.55a(a)(2), reactor systems and components must meet the the ASME Code requirements specified in 10 CFR 55.55a(b) through (g). Section 10 CFR 50.55a gives the NRC two methods for granting relief from ASME Code requirements. The NRC may authorize alternatives to the requirements of the Code pursuant to 10 CFR 50.55a(a)(3)(i) or 10 CFR 50.55a(a)(3)(ii). Paragraph 10 CFR 50.55a(a)(3)(i) requires the licensee to demonstrate that its proposed Code alternative would provide an acceptable level of quality and safety. Paragraph 10 CFR 50.55a(a)(3)(ii) requires the licensee to demonstrate that complying with Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The licensee requested relief on the basis that complying with Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The licensee stated that the block valve and relief valve configurations were part of the vendor's original standard design. The licensee also stated that having to comply with Code requirements would require backfit design modifications to install controls and interlocks for the subject block valves. Instead, the licensee proposed maintaining the following block valve administrative controls:

(1) Volume Control Tank Relief Valve Line

Block valves CVCS-1-8251A, B, C and CVCS-2-8251A, B, and C are locked open. Operating Procedure (OP) B-1B:II, "Boron Recycle

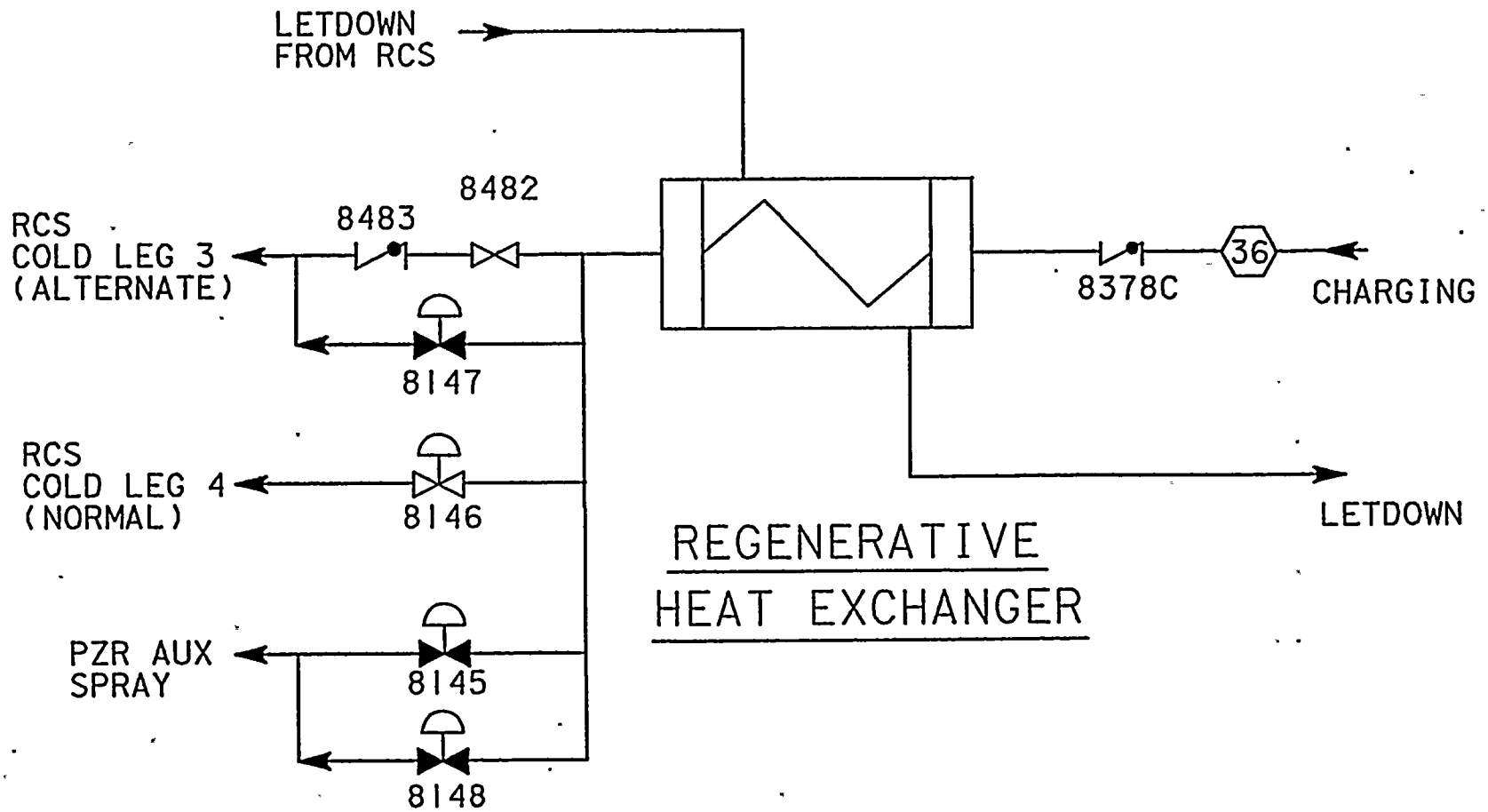

LETDOWN
FROM RCS
8482
8483
RCS
COLD LEG 3
(ALTERNATE)
8147
RCS
COLD LEG 4
(NORMAL)
8146
PZR AUX
SPRAY
8145
8148
8378C
36
CHARGING
LETDOWN
REGENERATIVE
HEAT EXCHANGER

FIGURE 2

System - Liquid Hold-Up Tank Alignment for Plant Heat-Up," indicates that these valves are locked open.

OP B-1A:IX, "CVCS - Alignment Verification for Plant Startup," requires that at least one block valve in each unit be locked open when the VCT is aligned for service. This assures that the VCT flowpath to the LHUT is maintained.

(2) Regenerative Heat Exchanger Relief Valve Line

Block valves CVCS-1-8482, and CVCS-2-8482 are located in a locked vault inside the containment biological shield. This area is highly controlled and is not accessible during power operation.

The licensee stated the current configuration provides an acceptable level of quality and safety. It concludes that mispositioning these block valves, although not desirable, would not impair plant shutdown capability or emergency core cooling system (ECCS) operation. The licensee addressed the consequences of losing VCT and RHE relief valve line overpressure protection as shown below.

Volume Control Tank Relief Valve Line

The VCT provides surge capacity to accommodate programmed pressurizer level changes. The VCT functions are not safety related. Relief valve CVCS-8120 discharges to one of three LHUTs to preserve VCT integrity if the CVCS malfunctions. Block valves CVCS-8251A, B, and C are installed between the relief valve and the three parallel discharge lines to the LHUTs. The relief valve does not have an active safety function and is not required to actively operate during or following an accident to perform a nuclear safety function.

The possibility of concurrent inadvertent closure of block valves 8251A, B, and C during power operation is extremely low, due to the licensee's previously described administrative controls. Nonetheless, if all three block valves are inadvertently closed at the same time during power operation, the pressure relief function of relief valve CVCS-8120 would be defeated. Without adequate relief capability, overpressurizing the VCT could potentially result in failure and release of RCS primary system liquid and gases to the auxiliary building.

Chapter 15 of the updated final safety analysis report (UFSAR) analyzes VCT passive failure (rupture) consequences. This analysis demonstrates that a complete VCT failure will not result in unacceptable radiological consequences. The FSAR Chapter 15 VCT rupture analysis bounds potential consequences of VCT rupture due to inadvertent VCT block valve closure.

Regenerative Heat Exchanger Relief Valve Line

The RHE is designed to recover CVCS letdown flow heat by reheating the charging flow. This reduces thermal effects on the RCS piping. The letdown stream flows through the RHE shell, and the charging stream flows through the tubes. The RHE functions are not safety related. Reactor coolant on the

charging side of the heat exchanger can be relieved to the RCS through thermal relief (spring-loaded) check valve CVCS-8483. This preserves RHE integrity if the system malfunctions. Block valve CVCS-8482 is installed upstream of relief valve CVCS-8483. The relief valve does not have an active safety function and is not required to actively operate during or following an accident to perform a nuclear safety function.

The possibility of inadvertently closing block valve CVCS-8482 during power operation is extremely low, due to the administrative controls earlier described. Nonetheless, the pressure relief function of spring-loaded check valve CVCS-8483 would be defeated if block valve CVCS-8482 is inadvertently closed during power operation. Without adequate relief capability, overpressurizing the RHE could potentially result in failure and a release of RCS primary system liquid and gases to the containment.

Chapter 15 of the UFSAR evaluates small-break loss-of-coolant accidents (LOCAs). The limiting case is a 4-inch-diameter pipe break in the cold leg. A postulated RHE rupture would result in less RCS fluid loss to the containment since the charging and letdown lines to and from the RHE are 3 inches in diameter and operators can isolate the RHE from the RCS. Therefore, small-break LOCA analysis described in Chapter 15 of the UFSAR envelopes this scenario.

We have determined that the licensee's locking open block valves, together with operating procedures, makes overpressurizing parts of the CVCS unlikely. We also found the plant configuration still does not meet all of the ASME Code requirements. However, the licensee has shown that compliance with the ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety of the plant. In order to meet the Code, the licensee would have to modify the design of the subject block valves to install controls and interlocks. The proposed alternative is sufficient for safe operation. The licensee has shown that the consequences of losing CVCS thermal pressure relief capability and the resulting CVCS loss are acceptable and do not result in the licensee's inability to safely shut down the plant.

3.0 CONCLUSION

We have determined that the previously identified CVCS manual block valve installed configurations do not meet all of the 1968 Edition of Section III of the ASME Code, Article 9 requirements. This Code edition is the applicable ASME construction code for Diablo Canyon, Units 1 and 2. However, the licensee has demonstrated that compliance with the ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety of the plant. We also find that mispositioning the manual block valves and subsequent overpressurizing and CVCS loss would not impair the licensee's ability to safely shut down the plant. Therefore, pursuant with 10 CFR 50.55a(a)(3)(ii), we find that it is acceptable to grant the licensee's request for relief from the ASME

requirements regarding control and interlock requirements for relief valve discharge line stop valves as required by 10 CFR 50.55a(a)(2)

Principal Contributors: L. Padovan
S. Peterson

Date: October 5, 1994