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PG&E Letter DCL-99-132

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

Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
Proposed Changes to Final Safety Analysis Report Sections 9.2.2 and 9.2.7

Dear Commissioners and Staff:

In PG&E Letter DCL-99-127, "Additional Information Regarding August/September 1997 Design Inspection," dated September 29, 1999, PG&E submitted information discussed during a June 10, 1999, conference call with the NRC staff regarding the August/September 1997 design inspection at the Diablo Canyon Power Plant. That submittal included proposed changes to Final Safety Analysis Report (FSAR) Sections 9.2.2, "Component Cooling Water System," and 9.2.7, "Auxiliary Saltwater System." In response to additional discussions with the NRC staff, PG&E has further revised those sections to reflect long term postaccident component cooling water system and auxiliary saltwater system operation. Proposed FSAR pages are attached.

If there are any questions regarding this information, please contact Patrick Nugent at (805) 545-4872.

Sincerely,

Lawrence F. Womack

cc: Edgar Bailey, DHS
Steven D. Bloom
Ellis W. Merschoff
David L. Proulx
Diablo Distribution

A053

Enclosure

PROPOSED FINAL SAFETY ANALYSIS REPORT CHANGES

(Pages 9.2-7, 9.2-25, 9.2-26 and 9.2-29)

Predicted CCW temperatures during both normal and accident conditions are within the limits of the CCW system temperature qualification.

INSERT A

~~The CCWS may be realigned in accordance with EOP E-1.4 based on plant conditions for long-term postaccident recirculation by manually realigning the vital headers into two redundant trains.~~ This long-term postaccident alignment provides further assurance of the capability to withstand a passive failure.

Cooling water for the CCW heat exchangers is supplied from the ASWS which also functions as an engineered safety system, thereby ensuring a continuous source of cooling. The CCWS, therefore, serves as an intermediate system between the RCS and ASWS, ensuring that any leakage of radioactive fluid from the components being cooled is contained within the plant.

Design data for some major CCWS equipment are listed in Table 9.2-3. The CCWS consists of the following major pieces of equipment.

9.2.2.2.1 Component Cooling Water Pumps

The three component cooling water pumps that circulate component cooling water through the CCWS are horizontal, double suction, centrifugal units. The pumps operate on electric power from the vital 4.16 kV buses that can be supplied from either normal or emergency sources.

9.2.2.2.2 Component Cooling Water Heat Exchangers

The two component cooling water heat exchangers are shell and tube type. Seawater circulates through the tube side. The shell is carbon steel, and the tubes are 90-10 Cu-Ni.

9.2.2.2.3 Component Cooling Water Surge Tank

The CCW surge tank, which is connected by two surge lines to the vital headers near the pump suction, is constructed of carbon steel. The tank is internally divided into two compartments by a partial height partition to hold two separate volumes of water. This arrangement provides redundancy to accommodate a passive failure when the CCWS is manually realigned into two trains.

The surge tank accommodates thermal expansion and contraction, and in- or out-leakage of water from the system. The tank is normally pressurized with nitrogen to provide sufficient static head to prevent the CCW in the CFCUs from boiling during a postulated large break LOCA coincident with a loss of offsite power. The primary source of nitrogen is the Class II nitrogen system.

In the event of loss of the design Class II nitrogen supply, Design Class I nitrogen is supplied from dedicated bottles, or the plant instrument air system will be available to provide the required pressurization of the tank. In order to prevent the pressure in the surge tank from

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Due to its vulnerability to a loss of inventory, the CCW system should be split into separate trains as soon as possible after aligning for long-term post LOCA recirculation if plant conditions are acceptable. The decision to split CCW trains will be made by the Technical Support Center based on the physical integrity of the trains, the availability of active components, and the reliability of power systems.

temperature limits for normal and post-accident conditions. The ASW and CCW systems operate together to remove heat from containment and vital equipment heat loads following design basis accidents with a postulated single active or passive failure. The ASW/CCW system must be able to remove the minimum required heat in order to ensure that the containment design pressure and temperature is not exceeded. Additionally, the ASW system must be able to remove sufficient heat from the CCW system so as to not exceed the CCWS design basis temperature limits when the containment heat removal equipment is operating at maximum predicted heat removal rates. The adequacy of the heat sink provided by the ASW/CCW systems has been evaluated to ensure that the minimum heat removal function is satisfied following a LOCA or MSLB (References 5 and 6). The ability of the ASW/CCW system to support the maximum containment heat removal without exceeding the CCW system design basis temperature limits following LOCA or MSLB has also been demonstrated (Reference 3).

The ASW system capability to perform its design basis function assumes the ASW pumps are capable of providing the minimum required flow under conditions of low tide, high CCW heat exchanger tube side differential pressure and supply temperatures up to 64°F. As discussed in Section 9.2.5, the Technical Specifications require a second CCW heat exchanger be placed in service when UHS temperature exceeds 64°F. The ASW flow rate and minimum acceptable flow are a function of the number of ASW pumps and CCW heat exchangers in service based on operating conditions and assumed single failure.

INSERT B

~~The ASW and CCW systems are designed so that they may be aligned into two separate vital loops during post-LOCA recirculation by manual manipulation of various system valves. This provides totally redundant and separate trains, which ensures that a passive failure during the recirculation phase will not cause a total loss of ASW or CCW. However, during post-LOCA split train operation, operator action is required to recover from specific active failure scenarios, which could otherwise lead to a loss of all vital equipment cooling.~~

9.2.7.2 System Description

There is a separate ASW system for Unit 1 and Unit 2. Each unit is provided with two ASW trains with crosstie capability. Each train consists of a full capacity electric motor-driven pump, the tubeside of the CCW heat exchanger and associated supply and discharge piping for the CCW heat exchanger. Upstream of the pumps, there is a unit ASW traveling water screen and a suction bay gate for each pump. There is a vacuum relief system on each ASW supply header piping to prevent water hammer. In addition, the Unit 1 and Unit 2 ASW piping system is arranged with interunit crosstie capability.

Each train is designed with the capability of providing adequate cooling to the CCW system during normal operation, plant safe shutdowns following normal operation, and refueling modes. Equipment design margins and system redundancy allow either an active or a passive failure of any component without degrading the system's cooling function under all modes of operation, including a design basis accident.

INSERT B:

During post-LOCA long term recirculation, the ASW system should remain cross-tied to assure that any active failure in the ASW or CCW system would not result in the loss of CCW system cooling. While vulnerable to a passive failure in this configuration, the ASW system capacity is such that the ASW system function would not be affected. A decision to split the ASW system into separate trains to mitigate a passive failure would be made by the Technical Support Center if it became required.

All system equipment is located within the turbine building and the intake structure and connected via buried plastic-lined carbon steel pipes between these two structures. These locations provide access for inspection and maintenance during either normal or postaccident operation.

During normal operation, both auxiliary saltwater pumps and one supply header are aligned with the operating CCW heat exchanger. Only one pump is required to run; the second pump, being on standby, provides backup against an active failure. By means of unit and redundant supply header crosstie motor-operated valves, the standby pump for one plant unit may act as a second standby for the other unit.

During the cooldown phase of a routine plant shutdown, both ASW pumps and CCW heat exchangers are in operation. If one pump or supply header is inoperative during cooldown, cooling would be accomplished safely, but the cooldown time would be extended.

During the safety injection phase or upon loss of the offsite power supply, both auxiliary saltwater pumps receive a start signal. On a bus transfer with no SI signal or loss of the offsite power supply, the previously operating ASW pump will immediately be restarted and the standby pump will receive a start signal. This design ensures both pumps in operation following the event of accident or upset condition, excluding the condition of a vital F or G bus failure.

In the injection and post-LOCA recirculation phases of the accident no operator action is required for operation or reconfiguration of the ASW system and its components. ~~During the post-accident recirculation phase of the accident, the ASW system may be realigned after evaluation by the Technical Support Center based on conditions in containment and heat loads on the CCW system. In the long term post-accident recirculation, the ASWS may be aligned into two separate redundant trains, each consisting of a pump, supply header and a CCW heat exchanger. This configuration provides full protection against a passive failure and provides the minimum required long term cooling requirements. Refer to Section 9.2.7.2.7 for heat removal capability in this configuration.~~ A decision to split the ASW system into separate trains to mitigate a passive failure would be made by the Technical Support Center if it become required.

9.2.7.2.1 Auxiliary Saltwater Pumps

The ASW pumps are powered from separate vital 4.16 kV buses, which can be energized by either the normal source or the emergency diesel generators. All loop components satisfy Design Class I criteria. The pumps are single stage, vertical, wet pit type driven by 4 kV motors. The design data for the ASW pumps are tabulated in Table 9.2-1. The piping and other essential lines (power, sensing, and control) that pass from the pumps to the main portion of the plant are shown in Figure 9.2-3.

structure is divided into two chambers (one for each unit) that are open to the ocean under all conditions. The two ASW return lines for each unit discharge into the chamber of that unit. The base slab of the discharge structure is keyed into and poured on sound rock. Where possible, the walls were formed directly against sound rock.

9.2.7.2.6 Heat Exchangers

The design details of the component cooling water heat exchangers are given in Table 9.2-3. Performance of the CCW heat exchanger is based on performance curves provided by the manufacturer. Design fouling is considered in accident analyses. Fouling is a combination of tube microfouling and tube flow blockage resulting from marine life. Mechanical tube plugging is limited to two percent of the tubes before the performance of the heat exchanger, as defined by the curves, is impacted. As noted in Section 9.2.7.2.3, provisions exist to control marine fouling on the tube side (ASW) of the CCW heat exchanger. Cathodic protection is provided on the tube side of the heat exchanger in the waterboxes.

9.2.7.2.7 Heat Rejection Capability

The capacity of the ASWS is based on post-design basis accident heat rejection requirements. The ASW and CCW systems operate together to remove heat from containment and safety-related loads following a design basis accident. Together the ASW and CCW systems must be able to remove the minimum required heat loads to ensure that the containment design pressure and temperature limits are not exceeded. Additionally, in accordance with GDC 44, the ASWS is designed to provide sufficient heat removal to maintain the CCWS within its design basis temperature limits for normal and post-accident CCWS conditions.

The ASWS and CCWS are essentially considered a single heat removal system for the purpose of assessing the ability to sustain either a single active or passive failure and still perform design basis heat removal. The heat removal capability of the ASW/CCW system has been evaluated to ensure that the minimum containment heat removal function is satisfied following a LOCA or MSLB (References 5 and 6). A single train of ASW (one ASW pump and one CCW heat exchanger) provides sufficient heat removal from containment to mitigate an MSLB or LOCA. The ability of the ASW and CCW systems to support the maximum containment heat removal without exceeding the CCW maximum supply temperature design basis limit following a LOCA or MSLB has also been demonstrated (Reference 3). The mechanistic analyses credited one or two ASW pumps, depending on the assumed single failure. A single CCW heat exchanger was assumed to be in service throughout the transient (except when the UHS temperature exceeds 64°F, two CCW heat exchangers are assumed in service). No credit was taken for operator action to align the second CCW heat exchanger or an ASW pump from the opposite unit. ~~In the split train configuration during post-accident operation, each separate train of ASW is capable of supplying the minimum heat removal capacity required and sustain a postulated passive failure. However, in this split train configuration, operator action may be required to realign the ASW and CCW systems to prevent loss of all cooling to containment and safety-related equipment following specific active failure scenarios.~~