



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

December 14, 2009

Mr. John T. Conway
Senior Vice President – Energy Supply
and Chief Nuclear Officer
Pacific Gas and Electric Company
Diablo Canyon Power Plant
77 Beale Street, B32
San Francisco, CA 94105

SUBJECT: DIABLO CANYON POWER PLANT, UNIT NOS. 1 AND 2 - REQUEST FOR
TECHNICAL SPECIFICATION INTERPRETATION OF 230 KILOVOLT SYSTEM
OPERABILITY (TAC NOS. ME0711 AND ME0712)

Dear Mr. Conway:

By letter dated February 23, 2009, and supplemented by letter dated September 14, 2009, Pacific Gas and Electric Company (PG&E, the licensee) in accordance with U.S. Nuclear Regulatory Commission (NRC) Inspection Manual, Part 9900: Technical Guidance, Chapter STSINTR, "Licensee Technical Specification Interpretations," requested NRC concurrence with its position regarding the capacity and capability of the Diablo Canyon Power Plant, Unit Nos. 1 and 2 (DCPP), 230 kiloVolt (kV) offsite power system to meet Technical Specification (TS) 3.8.1, "AC [Alternating Current] Sources - Operating," and TS 3.8.2, "AC Sources – Shutdown."

The NRC staff has completed its review and concluded, as described in the enclosed safety evaluation, that the DCPP TS Limiting Condition for Operation (LCO) 3.8.1.a and TS LCO 3.8.2.a do not include the operability requirement that the 230 kV electrical transmission system load flow and dynamic loading analyses demonstrating that the 230 kV system has sufficient capacity and capability to operate the engineered safety features (ESFs) for a design-basis accident (or unit trip) on one unit, and those systems required for an orderly shutdown of the second unit. While the capacity and capability of the 230 kV transmission system are important electrical system parameters and may affect TS operability, they are not specifically identified as TS LCO 3.8.1.a or TS LCO 3.8.2.a operability requirements and, therefore, should not be used to determine compliance with DCPP TS LCO 3.8.1 or TS LCO 3.8.2.

The NRC staff did not agree that TS LCOs 3.8.1.a and 3.8.2.a operability is based on the ability to transfer to the 230 kV offsite power system without loading the emergency diesel generators, and provide adequate voltage to safety-related loads.

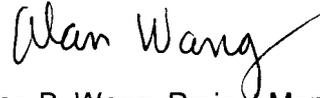
Therefore, the NRC staff concluded that the DCPP design and licensing basis requires that the 230 kV system offsite power source must have sufficient capacity and capability to (1) operate the ESFs for a design-basis accident on one unit and concurrent safe shutdown on the remaining unit and (2) operate the ESFs for dual unit trips as a result of a seismic event or abnormal operational occurrences.

J. Conway

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If you have any questions regarding the enclosed safety evaluation, please contact me at (301) 415-1445.

Sincerely,

A handwritten signature in black ink that reads "Alan Wang". The signature is written in a cursive style with a long, sweeping underline.

Alan B. Wang, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-275 and 50-323

Enclosure:
Safety Evaluation

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EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REGARDING 230 KILOVOLT SYSTEM

PACIFIC GAS AND ELECTRIC COMPANY

DIABLO CANYON POWER PLANT, UNIT NOS. 1 AND 2

DOCKET NOS. 50-275 AND 50-323

1.0 INTRODUCTION

By letter dated February 23, 2009, and supplemented by letter dated September 14, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML090650592 and ML092650289, respectively), Pacific Gas and Electric Company (PG&E, the licensee) requested that the U.S. Nuclear Regulatory Commission (NRC) review and concur with its interpretation of Technical Specification (TS) 3.8.1, "AC [Alternating Current] Sources - Operating," and TS 3.8.2, "AC Sources – Shutdown." PG&E stated that it concluded that AC source operability was not contingent on the 230 kiloVolt (kV) offsite power system capacity and capability at Diablo Canyon Power Plant, Unit Nos. 1 and 2 (DCPP) to provide vital electrical loads for a concurrent shutdown on both units. The NRC staff reviewed the interpretation in accordance with NRC Inspection Manual, Part 9900: Technical Guidance, Chapter STSINTR, "Licensee Technical Specification Interpretations." The NRC staff concluded that the DCPP TS interpretation was inconsistent with the DCPP licensing basis and TS operability requirements.

2.0 REGULATORY EVALUATION

The following NRC requirements and guidance documents were applicable to the NRC staff's review of the licensee's TS interpretation request:

- The regulations in paragraph (c)(2)(ii) of Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.36, "Technical specifications," require that "[a] technical specification limiting condition for operation [LCO] of a nuclear reactor must be established for each item meeting one or more of the [criteria set forth in 10 CFR 50.36(c)(2)(ii)(A)-(D)]."
- General Design Criterion (GDC) 5, "Sharing of structures, systems, and components," of Appendix A to 10 CFR Part 50 established the requirement that "structures, systems, and components important to safety shall not be shared among nuclear power units unless it can be shown that such sharing will not significantly impair their ability to perform their safety functions"

Enclosure

- GDC 17, "Electric power systems," of Appendix A to 10 CFR Part 50 requires, in part, that nuclear power plants have onsite and offsite electric power systems to "permit the functioning of structures, systems, and components that are important to safety." The onsite system is required to have "sufficient independence, redundancy, and testability" to perform its safety function, assuming a single failure. The offsite power system is required to be supplied by "two physically independent circuits ... designed and located so as to minimize to the extent practical the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions." In addition, this criterion requires provisions to "minimize the probability of losing electric power from any of the remaining [electric power] supplies as a result of ... the loss of power from the unit, the loss of power from the offsite transmission network, or the loss of power from the onsite electric power supplies. "
- NRC Regulatory Guide (RG) 1.32, Revision 0, "Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants," describes a method acceptable to the NRC staff of complying with GDC 17 and GDC 18, "Inspection and testing of electric power systems," with respect to the design, operation, and testing of safety-related electric power systems in all types of nuclear power plants.

The TSs for operating nuclear power plants include the operational restrictions resulting from the loss of power sources. In general, plant TSs require the operability of the offsite power system as a part of the LCO and specify actions to be taken when the offsite power system is inoperable. DCP's TS LCOs for TS 3.8.1 and TS 3.8.2 are consistent with NUREG-1431, "Technical Specifications - Westinghouse Plants," (STS) and state the following:

3.8.1 AC Sources – Operating

LCO 3.8.1 The following AC electrical sources shall be OPERABLE:

- a. Two qualified circuits between the offsite transmission network and the onsite Class IE AC Electrical Power Distribution System; and
- b. Three diesel generators (DGs) capable of supplying the onsite Class 1E power distribution subsystem(s); and
- c. Two supply trains of the diesel fuel oil (DFO) transfer system.

3.8.2 AC Sources – Shutdown

LCO 3.8.2 The following AC electrical power sources shall be OPERABLE:

- a. One qualified circuit between the offsite transmission network and the onsite Class 1E AC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems-Shutdown";
- b. One diesel generator (DG) capable of supplying the onsite Class 1E AC electrical power distribution subsystem(s) required by LCO 3.8.10; and
- c. One supply train of the diesel fuel oil (DFO) transfer system.

The TS Bases for DCPD TS 3.8.1 are consistent with STS Bases and state, in part, the following:

The Unit 1 Offsite Circuit #1 consists of [230 kV/12 kV] Startup Transformer 1-1 supplied from the immediate access 230 kV Switchyard power source, which feeds [12 kV/4 kV] Startup Transformer 1-2 through series supply breakers 52VU12 and 52VU14. Startup Transformer 1-2 then supplies power through breaker 52HG15 to each vital bus feeder breaker (Bus F - 52HF14, Bus G - 52HG14, Bus H - 52HH14).

The Unit 2 Offsite Circuit #1 consists of [230 kV/12 kV] Startup Transformer 2-1 supplied from the immediate access 230 kV Switchyard power source, which feeds [12 kV/4 kV] Startup Transformer 2-2 through series supply breakers 52VU23 and 52VU24. Startup Transformer 2-2 then supplies power through breaker 52HG15 to each vital bus feeder breaker (Bus F - 52HF14, Bus G - 52HG14, Bus H - 52HH14).

3.0 TECHNICAL EVALUATION

The licensee requested NRC concurrence with its position regarding the capability of the DCPD 230 kV offsite power system to meet the LCOs for TS 3.8.1 and TS 3.8.2.

In its February 23, 2009, submittal, the licensee stated its position as follows:

The 230 kV offsite power system is considered operable for normal and off-normal configurations when load flow and dynamic loading analyses demonstrate that the 230 kV system has sufficient capacity and capability to operate the engineered safety features for a design basis accident (or unit trip) on one unit, and those systems required for an orderly shutdown of the second unit. A concurrent trip of the second unit need not be assumed. Operability is based on the ability to transfer to the 230 kV offsite power system without loading the

emergency diesel generators, and provide adequate voltage to safety-related loads.

The NRC staff disagrees with the licensee's position regarding DCPD TS LCO 3.8.1 and TS LCO 3.8.2. Specifically, TS LCO 3.8.1 and TS LCO 3.8.2 operability does not include the 230 kV electrical transmission system load flow and dynamic loading analyses demonstrating that the 230 kV system has sufficient capacity and capability to operate the ESFs for a design-basis accident (or unit trip) on one unit, and those systems required for an orderly shutdown of the second unit. The NRC staff also disagrees with the licensee that operability of TS LCO 3.8.1 and TS LCO 3.8.2 is based upon the ability to transfer to the 230 kV offsite power system without loading the emergency diesel generators, and provide adequate voltage to safety-related loads.

3.1 TSs 3.8.1 and 3.8.2 Operability

The DCPD TS requirement for two qualified offsite power sources (or circuits) refers to the circuits from the transmission network via the 230 kV/12 kV and 500 kV/25 kV transformers to the Class 1E ESF buses for each unit. Specifically, one TS "offsite circuit" is the 230 kV power supply which includes the first inter-tie breaker(s) at the 230 kV switchyard, the 230 kV/12 kV transformers, and all of the equipment downstream such as breakers, transformers, switches, interrupting devices, cabling, and controls up to the Class 1E buses. Similarly, the other TS "offsite circuit" is supplied from the 500 kV switchyard to the onsite Class 1E ESF buses.

Compliance with DCPD TS LCO 3.8.1.a requires that each unit must have offsite power supplied to the unit specific Class 1E buses from the 230 kV and 500 kV systems. The equipment associated with 230 kV "offsite circuit #1," for DCPD Unit 1, and "offsite circuit #2," for DCPD Unit 2, is described in the DCPD TS Bases and Chapter 8 of the Final Safety Analysis Report. The DCPD TS 3.8.1 and 3.8.2 Bases description of the offsite circuit is consistent with STS 3.8.1 and 3.8.2 Bases which state, in part, that "[a]n offsite circuit consists of all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network to the onsite Class 1E ESF bus(es)".

Similarly, compliance with DCPD TS LCO 3.8.2.a requires that each unit must have at least one offsite power supply to the unit-specific Class 1E buses (from either the 230 kV or the 500 kV system).

Compliance with DCPD TS LCO 3.8.1 also requires the offsite power sources meet GDC 17. This GDC requires the offsite power system "provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents." Also, GDC 5 requires that licensees shall not share structures, systems, and components important to safety among nuclear power units "unless it can be shown that such sharing will not significantly impair their ability to perform their safety functions..." The licensee must ensure that a spurious ESF actuation on the non-accident unit would not result in the loss of the preferred power supply.

If the offsite power system is not capable of providing the requisite power, then the licensee should declare the system inoperable and apply the pertinent plant TS provisions. For example, if the DCPD analyses of the 230 kV system, such as load flow and dynamic loading analyses, indicate that the 230 kV system has insufficient capacity and capability to operate the ESF for a limiting design-basis event, then DCPD must enter the applicable action statements of DCPD TS 3.8.1.a or TS LCO 3.8.2.a. Additionally, if the licensee is notified that the transmission system cannot supply the facility with the minimum required voltage or frequency, based on transmission system operator analysis of the transmission system (i.e., the system contingency analysis), the licensee should evaluate compliance with LCO 3.8.1.a or LCO 3.8.2.a to determine operability of the affected offsite system(s) and verify continued operation of the facility to be within the current licensing and design basis requirements.

3.2 Dual Unit Trips

In its TS interpretation request, the licensee referenced previous License Amendment Nos. 130 and 132, approved for DCPD Units 1 and 2, respectively, in the NRC's safety evaluation (SE) dated April 29, 1999 (ADAMS Accession No. ML022390464). In the licensee's submittal, it stated that the DCPD offsite power system licensing basis required the offsite power system to have sufficient capacity and capability to operate the ESFs for a design-basis accident (or unit trip) on one unit, and those systems required for an orderly shutdown of the second unit. The licensee also clarified that a trip of the second unit 30 seconds following a design-basis accident was neither a licensing or design basis requirement.

As part of the requested TS interpretation, NRC staff reviewed the referenced license amendment request (LAR) 98-01 dated January 14, 1998, and supplemental letters dated May 19, 1998, and February 5, 1999 (ADAMS Legacy Library Accession Nos. 9801220198, 9805280285, and 9902160209, respectively); the NRC's SE dated April 29, 1999; and DCPD licensee event report (LER) 95-007, "230 kV System May Not Be Able to Meet Its Design Requirements for All Conditions Due to Personnel Error," dated August 6, 1996 (ADAMS Legacy Library Accession No. 9608140037). In the LER, the licensee stated that the 230 kV system may not have been able to meet its operability requirements for some system loading conditions. On January 14, 1998, the licensee submitted LAR 98-01 to install load tap change transformers and capacitor banks to address the non-compliance of the 230 kV system.

During its review, the NRC staff identified that the licensee made changes to the DCPD licensing basis without following the regulatory requirements at 10 CFR 50.59, "Changes, tests and experiments." Within 15 months of revising the language of the design-basis coping response for the dual unit DCPD site, the licensee submitted the same changes to the NRC staff for review as LAR 98-01. Specifically, the licensing basis changed from "...safe shutdown of the second unit" to "...orderly shutdown of the second unit." Using the revised language during a design-basis accident would allow the electric generator of the second (non-accident) unit to remain synchronized with the offsite transmission system and thereby continue to receive 500 kV offsite power until the unit generator output was eventually reduced to the point of separating from the 500 kV offsite system. This change would reduce the analyzed maximum loading on the 230 kV offsite electrical system by eliminating the post-trip electrical loading to the second unit which, if tripped, would also require station service power from the 230 kV system for up to 30 minutes after initiation of the event. The 30-minute time interval is based on

the time assumed for performing the realignment to the 500 kV offsite electrical system. Thus, this change eliminated the need to consider the 30-minute post-trip loading of the 230 kV system for the second unit because an "orderly shutdown" of the unit is expected to take greater than 30 minutes to complete. The inappropriate unilateral change subsequently caused the licensee to submit inaccurate information to the NRC staff related to the 230 kV system licensing basis in LAR 98-01 and in the subject TS interpretation.

Operability of DCP's preferred power system is dependent on the capability of the system to meet its safety function established by the plant licensing basis. The DCP licensing basis requires that the 230 kV system has the capability to provide AC power to operate the ESF for a design-basis accident on one unit and concurrent safe shutdown on the remaining unit as described in Section 8, "Multi-Unit Station Considerations," of Institute of Electrical and Electronics Engineers (IEEE) Standard 308-1971, "Class 1E Electrical Systems." IEEE Standard 308-1971 required that the licensee maintain 230 kV system capability for the type of accident, type of shutdown, and the unit assumed to have the accident resulting in the largest total preferred capability requirements. This IEEE Standard is endorsed by the NRC in RG 1.32, Revision 0, "Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants." DCP is committed to both IEEE Standard 308-1971 and RG 1.32, Revision 0. Additionally, the DCP 230 kV system capability must be sufficient to operate the ESF for dual unit trips as a result of a seismic event as prescribed by Item 22, "Seismic Trip," of TS Table 3.3.1-1, "Reactor Trip System Instrumentation." In addition, offsite power operability is dependent on the availability of system voltages above the degraded voltage setpoints, as described in TS 3.3.5, "Loss of Power Diesel Generator Start Instrumentation." Meeting these minimum voltage requirements ensures that preferred offsite power sources are available to support safe shutdown of DCP under postulated conditions.

In addition, the NRC staff review of DCP's operating experience showed that dual unit trips occurred on several instances due to grid disturbances or ocean debris on condenser (cooling water) traveling screens (e.g., LER 94-020-00 dated December 14, 1994, LER 96-012-01 dated August 10, 1996, and LER 99-009-00 dated October 28, 1999 (ADAMS Legacy Library Accession Nos. 9501190176 and 9704230234, and ADAMS Accession No. ML993410074, respectively)).

Based on the above, the DCP 230 kV offsite power system must be able to withstand dual unit trips as a result of these anticipated operational occurrences as required by GDC 17.

4.0 CONCLUSION

Based on the above, the NRC staff position regarding the licensee's TSs 3.8.1 and 3.8.2 operability statement is that the staff disagrees with the licensee's interpretation of the DCP TS Sections 3.8.1 and 3.8.2 regarding AC electrical power source operability. DCP TS LCO 3.8.1.a and TS LCO 3.8.2.a do not include the operability requirement that the 230 kV electrical transmission system load flow and dynamic loading analyses demonstrating that the 230 kV system has sufficient capacity and capability to operate the ESFs for a design-basis accident (or unit trip) on one unit, and those systems required for an orderly shutdown of the second unit. While the capacity and capability of the 230 kV transmission system are important electrical system parameters and may affect TS operability, they are not specifically identified as TS LCO

3.8.1.a or TS LCO 3.8.2.a operability requirements and, therefore, should not be used to determine compliance with DCPD TS LCO 3.8.1 or TS LCO 3.8.2.

The NRC staff also disagrees that TS 3.8.1.a and 3.8.2.a operability is based on the ability to transfer to the 230 kV offsite power system without loading the emergency diesel generators, and provide adequate voltage to safety-related loads.

Therefore, NRC staff does not agree with PG&E's interpretation and concludes that the DCPD design and licensing basis requires that the 230 kV system offsite power source must have sufficient capacity and capability to (1) operate the ESFs for a design-basis accident on one unit and concurrent safe shutdown on the remaining unit and (2) operate the ESFs for dual unit trips as a result of a seismic event or abnormal operational occurrences.

Principal Contributors: G. Waig
R. Mathew

Date: December 14, 2009

J. Conway

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If you have any questions regarding the enclosed safety evaluation, please contact me at (301) 415-1445.

Sincerely,

/RA/

Alan B. Wang, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-275 and 50-323

Enclosure:
Safety Evaluation

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