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PG&E Letter DCL-11-121

U.S. Nuclear Regulatory Commission
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10 CFR 50.90

Diablo Canyon Units 1 and 2
Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Response to NRC Request for Additional Information Regarding License
Amendment Request 09-07, "Delayed Access Offsite Power Circuit Conformance
with 1971 GDC-17"

- Reference:
1. PG&E Letter DCL-09-093, "License Amendment Request 09-07, Delayed Access Offsite Power Circuit Conformance with 1971 GDC-17," dated December 29, 2009
 2. "Diablo Canyon Power Plant - NRC Integrated Inspection Report 05000275/2009003 AND 05000323/2009003"
 3. "Diablo Canyon Power Plant, Units 1 and 2 - Request for Additional Information Email, License Amendment Request to Revise Licensing Basis to Discuss Conformance of Delayed Access Offsite Power Circuit to GDC 17 (TAC Nos. ME3018 and ME3019)"

In Reference 1, Pacific Gas and Electric Company (PG&E) submitted License Amendment Request 09-07 to revise the licensing basis as described in the Final Safety Analysis Report Update (FSARU) regarding the conformance of the delayed access offsite power circuit (the 500 kilovolt delayed access circuit) to 1971 General Design Criterion 17. The proposed change is being made in response to the enforcement action discussed in Section 40A5 of Reference 2.

On October 5, 2011, the NRC Staff provided a request for additional information (RAI) via e-mail (Reference 3). The Enclosure to this letter provides PG&E's response to the NRC RAI questions. The Attachment to the enclosure provides a copy of the original request.

PG&E makes no regulatory commitments (as defined by NEI 99-04) in this letter.



If you have any questions or require additional information, please contact Mr. Tom Baldwin at (805) 545-4720.

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

Executed on November 22, 2011.

James R. Becker
Site Vice President

rnrt/50244176

Enclosure

cc: Diablo Distribution

cc/enc: Elmo E. Collins, Regional Administrator, NRC Region IV
Michael S. Peck, NRC Senior Resident Inspector
Alan B. Wang, NRR Project Manager

PG&E Letter DCL-11-121
Enclosure

PG&E Response to NRC Request for Additional Information Regarding License
Amendment Request 09-07

PG&E Response to NRC Request for Additional Information Regarding License
Amendment Request 09-07

NRC Question 1:

Provide the technical and regulatory bases for the proposed time delay of approximately 54 minutes for the second offsite source.

PG&E Response:

The Pacific Gas and Electric Company (PG&E) RETRAN analysis submitted in license amendment request (LAR) 09-07 establishes that for anticipated operational occurrences, the specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded for a period of time in excess of 54 minutes. The analysis presumes a loss of the Startup offsite power circuit and a loss of the onsite alternating current (ac) power sources (i.e., diesel generators (DG)). Therefore, LAR 09-07 establishes an analytical value of 54 minutes for ensuring that the 1971 General Design Criteria (GDC) 17 acceptance criteria continue to be met. PG&E has further demonstrated that plant operators can complete the electrical backfeed of the delayed access 500 kV offsite power circuit within about 30 minutes, and perform the additional required actions to isolate reactor coolant pump (RCP) seal cooling, and restore reactor coolant system (RCS) makeup flow within the analytical value of 54 minutes. The proposed 54-minute time limit establishes significant analysis margin to bound the measured plant operator action times and complies with the 10 CFR 50, Appendix A, 1971 GDC-17 requirement:

"Each of these circuits shall be designed to be available in sufficient time following a loss of all onsite alternating current power supplies and the other offsite electric power circuit, to assure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded."

A. PG&E Technical Basis:

1. The Enclosure to PG&E Letter DCL-09-093 provides the RETRAN results that show the pressurizer narrow range level remains on scale for almost 54 minutes and the RCS subcooling ($T_{hot} - T_{sat}$) remains more than adequate such that the total time to establish the 500 kV backfeed and perform associated actions to stabilize the plant could take up to one hour without any adverse consequences.
2. As discussed in the PG&E LAR 09-07, the 54-minute analytical value bounds the time to access the second offsite power circuit (within approximately 30 minutes), and also includes the additional time required to isolate RCP seal cooling and to restore RCS makeup flow to control RCS inventory. PG&E has demonstrated, via analysis, that 54 minutes is sufficient time to ensure acceptable fuel design limits and design

conditions of the RCS pressure boundary are not exceeded, for the 1971 GDC-17 postulated conditions. LAR 09-07 is asking for NRC approval of the analysis.

3. The RETRAN analysis conservatively does not model or credit any specific operator actions in the thermal hydraulic sequence of events. However, the major operator actions required to stabilize the plant have not changed and consist of the following activities:
 - Unit trip / Loss of ac power (Initiating event)
 - Automatic Reactor Trip
 - Isolate flow to reactor coolant pump seals
 - Throttle turbine driven auxiliary feedwater pump
 - Isolate safeguards with interlocks
 - Open main generator motor operated disconnect
 - Close a 500 kV Main Generator output breaker (backfeed available)
 - Restore power to 4 kV Bus F and Bus G
 - Start Auxiliary Salt Water Pump 1-1
 - Start Component Cooling Water Pump 1-1
 - Start Centrifugal Charging Pump 1-2
 - Restore reactor coolant system makeup.
4. Once the 500 kV backfeed is completed and RCS makeup is restored, the RCP seal leakage remains within the makeup capability of a single charging pump such that no emergency core cooling system flow is required. There is adequate RCS inventory control, RCS natural recirculation flow, and secondary heat removal capability such that the operators can perform a controlled RCS cooldown to cold shutdown conditions as required by the applicable emergency operating procedures. This ensures the RCP seal integrity is maintained and the RCP seal leakage can be restored to normal operational limits per Westinghouse Technical Bulletin TB-04-22, Revision 1.

B. PG&E Regulatory Basis:

The current Diablo Canyon Power Plant (DCPP) licensing basis requirements for the offsite power system applicable to the proposed time delay are:

- (1) IEEE Std 308-1971, IEEE Standard Criteria for Class 1E Electric Systems for Nuclear Power Generating Stations, Sections 5.2.3(1) and 5.2.3(4).
- (2) Appendix A to 10 CFR Part 50, 1971 GDC-17, "Electric Power Systems"
- (3) Safety Guide (SG) 32, Use of IEEE Std 308-1971, "Criteria for Class 1E Electric Systems for Nuclear Power Generating Stations," August 11, 1972.

IEEE Std 308-1971 is endorsed by SG 32, Use of IEEE Std 308-1971, "Criteria for Class 1E Electric Systems for Nuclear Power Generating Stations," August 11, 1972. The requirements in IEEE Std 308-1971, Sections 5.2.3(1) and 5.2.3(4) would allow only one circuit for the preferred power supply, provided a provision exists for alternate access to the transmission network within eight hours of post-accident unit shutdown. These are bounded by the more restrictive requirements of 1971 GDC-17, which requires two physically independent circuits. SG 32 identifies conflicts between IEEE Std 308-1971 and 1971 GDC-17, and describes acceptable resolutions including: "An acceptable design would substitute a delayed access circuit for one of the immediate access circuits provided that the availability of the delayed access circuit conforms to 1971 Criterion 17."

The requested change in the allowed time delay of the second offsite power circuit does not alter the PG&E commitment to these requirements.

The basis for meeting the 1971 GDC-17 requirements for a delayed offsite power source was to restore the 500 kV backfeed within 30 minutes. The 54-minute proposed time encompasses additional actions to mitigate the loss of RCP seal cooling and to ensure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded for anticipated operational occurrences, as required by 1971 GDC-17. The 1971 GDC-17 acceptance criterion of not exceeding any RCS pressure boundary design limit is met by demonstrating that the RCS pressure never exceeds 110 percent of the RCS ASME design value. The fuel design limit is met by demonstrating that there is adequate RCS subcooling margin to ensure the fuel cladding never approaches a departure from nucleate boiling (DNB) condition.

Appendix A to 10 CFR Part 50, 1971 GDC-17 requires two offsite circuits, with one immediately available circuit. The 230 kV is an immediate access offsite power source, whereas 500 kV is a delayed access offsite power source.

NRC Question 2:

Explain how this proposed time delay is acceptable for the delayed offsite circuit (500 kV source) to provide adequate capacity and capability to assure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences.

PG&E Response:

The proposed change in the allowable time delay has no impact on the capacity or capability of the 500 kV backfeed auxiliary offsite power circuit. (See the response to Question 1 regarding the time delay.)

A. PG&E Technical Basis:

- (1) The requested change does not affect the capacity of the 500 kV offsite power circuit. Existing calculations demonstrate the capacity of the 500 kV offsite power circuit for anticipated operational occurrences and postulated post accident conditions. The change is not being requested due to any changes in DCPD electrical loading. Additionally, the Transmission Service Provider has not identified any transmission network changes necessitating a DCPD change.
- (2) The requested change does not affect the capacity required from the 500 kV transmission network.
- (3) The DCPD Offsite Power System is designed to supply offsite electrical power by two physically independent circuits. In addition to the 500 kV auxiliary offsite power circuit, the 230 kV Startup offsite power circuit also provides startup and standby power, and is immediately available following anticipated operational occurrences. The requested change does not affect how the 230 kV offsite power circuit complies with the license basis.

B. PG&E Regulatory Basis:

- (1) Appendix A to 10 CFR Part 50, 1971 GDC-17 requires each offsite power circuit to be designed with sufficient capacity and capability to assure that specified acceptable fuel design limits and design conditions of the RCS pressure boundary are not exceeded as a result of anticipated operational occurrences.
- (2) IEEE Std 308-1971, Section 5.2.3(3), requires the preferred power to be capable of starting and operating all required loads.

Existing PG&E calculations demonstrate that the 500 kV delayed offsite power circuit has sufficient capacity and capability to start and operate the loads required by 1971 GDC-17 and IEEE Std 308-1971.

NRC Question 3:

Explain how this proposed time delay is acceptable for the delayed offsite circuit (500 kV source) to provide adequate capacity and capability to assure that the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.

PG&E Response:

The 500 kV auxiliary offsite power circuit was not designed to be available in time to mitigate an accident. The 500 kV auxiliary offsite power circuit is a delayed offsite circuit. It is designed to be available to assure that specified acceptable fuel design

limits and design conditions of the reactor coolant pressure boundary are not exceeded, during anticipated operational occurrences. PG&E has not committed to immediate accident mitigation capability via manual restoration of the 500 kV auxiliary offsite power circuit.

The 230 kV Startup offsite power circuit is the immediately available offsite power source. It satisfies 1971 GDC-17 requirement that one of the offsite electric power circuits shall be designed to be available within a few seconds following a loss-of-coolant accident (LOCA) to assure that core cooling, containment integrity, and other vital safety functions are maintained.

A. PG&E Technical Basis:

The capacity and capability of the 500 kV offsite power circuit regarding post accident loading is not impacted by the requested change. Existing PG&E calculations demonstrate that the 500 kV delayed access offsite power circuit has sufficient capacity and capability to start and operate the required loads.

B. PG&E Regulatory Basis:

Mitigating a design basis accident using exclusively the delayed offsite power source is not a DCPD design or licensing basis requirement. The 500 kV source remains capable of being made available by opening the motor operated disconnect (MOD) under manual control from the control room, as documented in the 1973 FSAR submittal. LAR 09-07 provides the analytical basis for the maximum time to complete the necessary actions associated with establishing the 500 kV back feed, implementing the RCP seal coping strategy, and restoring RCS makeup flow during nonaccident conditions. As discussed in response to NRC questions 1 and 2, these actions assure that 1971 GDC-17 requirements are met.

NRC Question 4:

If the delayed offsite power source cannot meet the above requirement, explain how you plan to meet the above requirement.

PG&E Response:

As stated in the response to Question 2, the 500 kV offsite power source is a delayed source that is designed to provide adequate capacity and capability to assure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded. As stated in the response to Question 3, the 500 kV offsite power source is a delayed source that is not required by design or license to be available within a few seconds following a LOCA. Mitigating a design basis accident using exclusively the delayed offsite power source is not a DCPD design or licensing basis requirement. Accordingly, PG&E has no commitment to convert the

500 kV auxiliary offsite power circuit from a delayed access source to an immediately available source.

Additional Discussion

The NRC Request for Additional Information (RAI) included references to three documents that need clarification.

1. Regulatory Guide (RG) 1.93
2. NRC Standard Review Plan (SRP) Section 8.2
3. NRC Safety Evaluation Report

Each of these documents is further discussed below.

1. RG 1.93

The NRC RAI referenced RG 1.93, "Availability of Electric Power Sources." The DCPD licensing basis for the 500 kV backfeed circuit does not include a commitment to meet RG 1.93, December 1974. RG 1.93, Section A, Introduction, states: "Nuclear power plants wherein only one of the two required offsite circuits can be made available within a few seconds following a LOCA are outside the scope of this guide." DCPD is not committed to RG 1.93 for the 500 kV backfeed circuit.

2. NRC SRP, Section 8.2

The NRC RAI also referenced the NRC SRP, Section 8.2, Sub Section III (1)(e). DCPD is not a SRP committed plant, and therefore, the SRP is not applicable to DCPD.

3. NRC Safety Evaluation Report

The NRC RAI included the following statement: "The NRC staff notes that the original licensing basis for the second offsite source (delayed) 500 kV power source for DCPD is approximately 30 seconds, as described in NRC Safety Evaluation Report, 'Safety Evaluation By The Directorate of Licensing U.S. Atomic Energy Commission In The Matter of Pacific Gas And Electric Company Diablo Canyon Nuclear Power Station, Units 1 And 2, San Luis Obispo County, California Docket Nos. 50-275 And 50-323.'"

PG&E has reviewed the original licensing documents (Original 1973 FSAR). The following statement is included in the 1973 FSAR, page 8.2.1:

"When the main generator is out of service, the 230 kV offsite power source is backed up by a second external source consisting of auxiliary power from the 500 kV system through the main transformer to the unit auxiliary transformers. A motor-operated disconnecting link in the generator's main leads is opened to use this source. This link is a telescoping type which is an integral part of the generator isolated phase bus. This link is operated under manual control from the control room and is interlocked to prevent opening under load. In the event of loss of main generator output, this backup source of auxiliary power could be placed in service in approximately 30 seconds."

The following statement is included in the 1973 FSAR, page 8.2.3 and 8.2.4:

"In addition to the 230 kV offsite power source, the 500 kV transmission system can be used as an alternate source. As described earlier in this section, the main generator can be disconnected from the main and auxiliary transformers in approximately 30 seconds from the time of initiation of turbine-generator shutdown. The main and auxiliary transformers can then be restored to service as a source to the engineered safety feature loads. The time of power interruption from this source is of the same order as that allowable for the engineered safety features and; therefore, the 500 kV system serves as a backup for the 230 kV system."

The 1973 FSAR statements were based on license commitments to 1967 GDC-39 and to IEEE Std 308-1971. The design basis at that time did not include 1971 GDC-17 or SG 32. The 500 kV offsite power circuit design has always required manual operator actions to realign the backfeed since the original design was first submitted in the 1973 FSAR. Section 5.2.3(4) of IEEE Std 308-1971 required a minimum of one circuit from the transmission network normally to be available during operation. If only one circuit from the transmission network is normally available (i.e., the Startup offsite power circuit), the design shall include a provision for alternate access to the transmission network within eight hours of post unit shutdown. The 1973 FSAR statements met this requirement.

The 500 kV offsite power circuit design has always required manual operator actions since the original design was first submitted in the 1973 FSAR. That design concept has not been changed. The NRC has recognized that the timing of these manual actions cannot be credited for immediate accident mitigation response. In the NRC reviews associated with issuance of the original license, and in subsequent reviews of offsite power, the NRC has repeatedly recognized 500 kV as a delayed source in the context of 1971 GDC-17.

In addition, the following regulatory documents recognize that the 500 kV offsite power source is a delayed source:

The Unit 1 Facility Operating License (No. DPR-76) was issued by the NRC on September 22, 1981, to operate at five percent power. The following statement is included in TS 3.8.1.1, Limiting Condition of Operation:

"3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

- a. Two independent circuits (one with delayed access) between the offsite transmission network and the onsite Class 1E distribution system"

NRC Request for Additional Information

From: Wang, Alan
Sent: Wednesday, October 05, 2011 3:54 PM
To: Baldwin, Thomas (DCPP); Soenen, Philippe R
Cc: Polickoski, James; Lent, Susan; Burkhardt, Janet
Subject: Diablo Canyon Power Plant License Amendment Request Regarding GDC-17 (ME3018 And ME3019)

Philippe and Tom,

By application dated December 29, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML100040087), Pacific Gas and Electric company (PG&E, the licensee), requested an amendment to Facility Operating Licenses (Docket Nos. 50-275, and 50-323) for the Diablo Canyon Power Plant, Units 1 and 2 (DCPP). The proposed amendments would revise the DCPD licensing bases that discusses the conformance of the plant's delayed access source to 10 CFR Part 50, General Design Criteria 17. The NRC staff has determined that the following additional information is needed for the NRC staff to complete our review of the license amendment request (LAR). This request was discussed with Mr. Philippe Soenen of your staff on October 5, 2011, and it was agreed that a response would be provided by November 11, 2011. If circumstances result in the need to revise the requested response date, please contact James Polickoski at (301) 415-5430 or via e-mail at James.Polickoski@nrc.gov.

In Section 2.0 of the LAR, the licensee states that the proposed change would revise Final Safety Analysis Report Update (FSARU) Section 8.2.1.2, "500-kV System," to add the following: "Plant procedures contain actions for operators to complete the 500-kV backfeed, isolation of RCP seal cooling, and restoration of RCS makeup flow within approximately 54 minutes upon loss of 230-kV and all onsite ac power.

Appendix A to 10 CFR 50, General Design Criterion 17, "Electric power systems," states, in part, "An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be to 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. -----. Electric power from the transmission network to the onsite electric distribution system shall be supplied by two physically independent circuits.....Each of these circuits shall be designed to be available in sufficient time following a loss of all onsite alternating current power supplies and the other offsite electric power circuit, to assure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded. One of these circuits shall be designed to be available within a few seconds following a loss-of-coolant accident to assure that core cooling, containment integrity, and other vital safety functions are maintained.

Regulatory Guide 1.93, "Availability of Electric Power Sources," states, in part, in Section A that the Limiting Condition of Operation with respect to available electric power sources is an electric power system that satisfies GDC 17 consists of the following electric power sources: (1) two physically independent circuits from the offsite transmission network, each of which is either continuously available or can be made available within a few seconds following a loss-of-coolant

accident (LOCA), (2) redundant onsite a.c. power supplies, and (3) redundant onsite d.c. power supplies.

NRC Standard Review Plan Section 8.2, Sub Section III, (e) states "Each of the circuits from the offsite system to the onsite distribution buses should have the capacity and capability to supply the loads assigned to the bus or buses it is connected to during normal or abnormal operating conditions, accident conditions, or plant shutdown conditions. Therefore, the loads to be supplied during these conditions should be determined from information obtained in coordination with other branches. The capacity and electrical characteristics of transformers, breakers, buses, transmission lines, and the preferred power source for each path should be evaluated to assure that there is adequate capability to supply the maximum connected load during all plant conditions. The design should also be examined to assure that during transfer from one power source to another the design limits of equipment are not exceeded."

The NRC staff notes that the original licensing basis for the second offsite source (delayed) 500 kV power source for DCCP is approximately 30 seconds, as described in NRC Safety Evaluation Report, "Safety Evaluation By The Directorate of Licensing U.S. Atomic Energy Commission In The Matter of Pacific Gas And Electric Company Diablo Canyon Nuclear Power Station, Units 1 And 2 San Luis Obispo County, California Docket Nos. 50-275 And 50-323."

Provide the technical and regulatory bases for the proposed time delay of approximately 54 minutes for the second offsite source. Explain how this proposed time delay is an acceptable for the delayed offsite circuit (500 kV source) to provide adequate 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. If the delayed offsite power source cannot meet the above requirement, explain how you plan to meet the above requirement.

Alan Wang

Project Manager (DCPP)

Nuclear Regulatory Commission

Division of Operating Reactor Licensing