January 27, 2000

Mr. Gregory M. Rueger
Senior Vice President and General Manager
Pacific Gas and Electric Company
Diablo Canyon Nuclear Power Plant
P. O. Box 3
Avila Beach, CA 94177

SUBJECT: REVISION TO REQUIREMENTS FOR CONTINUOUS FIRE WATCHES FOR INOPERABLE FIRE BARRIERS - DIABLO CANYON NUCLEAR POWER PLANT, UNIT NO. 1 (TAC NO. MA4180) AND UNIT NO. 2 (TAC NO. MA4181)

Dear Mr. Rueger:

By letter dated October 21, 1998, as supplemented by letter dated October 29, 1999, Pacific Gas and Electric Company submitted for review and approval a revision to its fire protection program which is subject to license condition 2.C.(5) of Facility Operating Licenses Nos. DPR-80 and DPR-82. The revision would allow the use of 15-minute roving fire watches as continuous fire watches as specified in Revision 3 to Equipment Control Guideline (ECG) 18.7, "Fire Barrier Penetrations." The enclosed safety evaluation concludes that the change to ECG 18.7 is a change to the approved fire protection program that would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire and does not result in an unreviewed safety question (USQ). Therefore, prior approval by the Commission under paragraph 2.C.(5) of Facility Operating Licenses Nos. DPR-80 and DPR-82 is not required.

Sincerely,

/RA/

Steven D. Bloom, Project Manager, Section 2
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-275
and 50-323

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE REQUEST FOR NRC APPROVAL OF

A REVISION TO THE LICENSEE'S REQUIREMENTS FOR

CERTAIN CONTINUOUS FIRE WATCHES

PACIFIC GAS AND ELECTRIC COMPANY

DIABLO CANYON NUCLEAR POWER PLANT, UNITS 1 AND 2

DOCKET NOS. 50-275 AND 50-323

1.0 INTRODUCTION

License Amendments 74 (Unit 2) and 75 (Unit 1), dated January 13, 1993, relocated the Diablo Canyon Power Nuclear Plant (DCNPP) fire protection technical specifications (TSs) to plant procedures in accordance with Generic Letter (GL) 86-10, "Implementation of Fire Protection Requirements," dated April 24, 1986, and GL 88-12, "Removal of Fire Protection Requirements From Technical Specifications," dated August 2, 1988. These amendments also incorporated the standard fire protection license condition specified in GL 86-10. The DCNPP license condition (paragraph 2.C.(5) of Facility Operating Licenses Nos. DPR-80 and DPR-82) specifies that Pacific Gas and Electric Company (PG&E), the licensee for DCNPP, may make changes to the NRC-approved fire protection program without prior Commission approval if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire. GL 86-10 also stated that the provisions of Section 50.59, "Changes, tests and experiments," of Title 10 of the *Code of Federal Regulations* (10 CFR 50.59) apply to fire protection program changes. Whether or not the change results in an unreviewed safety question (USQ) is made on the basis of the "accident... previously evaluated" being the postulated fire for the fire area affected by the change. Therefore, changes to the DCNPP fire protection program are controlled by the fire protection license condition and 10 CFR 50.59.

As part of the TS relocation, the licensee relocated TS 3/4.7.10, "Fire Barrier Penetrations," to Equipment Control Guideline (ECG) 18.7, Revision 0, "Fire Barrier Penetrations," including the requirement to establish fire watches for nonfunctional fire barrier penetration seals. In January 1995, the licensee issued Revision 1 to ECG 18.7. This revision specified that certain 15-minute roving fire watches could be considered continuous fire watches. Later, in Revision 3 to ECG 18.7, the licensee added the specific areas (by fire detector zone) that can be assigned a 15-minute roving fire watch and specified how the fire watch is to be conducted.

By letter dated October 21, 1998, as supplemented by letter dated October 29, 1999, the licensee requested that the U.S. Nuclear Regulatory Commission (NRC) approve the use of 15-minute roving fire watches as continuous fire watches as specified in Revision 3 to ECG 18.7. For the reasons previously discussed, this change to the DCNPP fire protection

program requires NRC approval if it would adversely affect the ability to achieve and maintain safe shutdown in the event of a fire or if it results in a USQ.

2.0 DISCUSSION

2.1 Applicable Regulatory Requirements and Guidance

In 1976, the NRC adopted the "defense-in-depth" concept for reactor fire protection and began requiring licensees to compensate for fire protection deficiencies (inoperable, degraded, or nonconforming conditions) by implementing interim remedial measures until final corrective actions are taken. The NRC accomplished this step by requiring the licensees to adopt TSs for plant fire protection features, which included appropriate compensatory measures. Subsequently, most plants, including DCNPP, have relocated the fire protection requirements from the plant TSs to the plant procedures in accordance with GLs 86-10 and 88-12.

The fire protection regulation (10 CFR 50.48, "Fire protection") does not require, nor does it address, the use of compensatory measures for inoperable, degraded, or nonconforming fire protection conditions. Moreover, current staff review guidance (e.g., the Standard Review Plan) does not address such measures.

GL 91-18, Revision 1, "Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions," dated October 8, 1997, addresses licensee activities associated with resolving degraded and nonconforming conditions. Attachment 1 to GL 91-18, Revision 1, Inspection Manual, Part 9900 Technical Guidance, "Resolution of Degraded and Nonconforming Conditions," includes fire protection systems, structures, and components (SSCs) within the scope of the guidance for reviewing licensee actions involving degraded and nonconforming conditions. Section 4.6 of Attachment 1 to GL 91-18, Revision 1, identifies compensatory measures as an item to be considered in licensee assessments of reasonable assurance of safety for SSCs that are not expressly subject to TSs, and Section 4.7 of Attachment 1 to GL 91-18, Revision 1, provides guidance for evaluating compensatory measures as an interim step until final corrective actions are completed. However, Revision 1 to GL 86-10 does not provide detailed guidance on fire protection compensatory measures.

Absent express regulatory requirements and guidance, the following discussion details the technical bases for using fire watches as compensatory measures for inoperable, degraded, or nonconforming fire protection conditions and the general principles and industry practices associated with the use of fire watches.

2.2 Bases for Using Fire Watches as Compensatory Measures

Defense-in-depth combines multiple fire safety measures to achieve a balance among three echelons of fire protection: fire prevention, fire detection and suppression, and separation of redundant safe-shutdown functions. Defense-in-depth holds that weaknesses in one of the echelons can be offset by enhancing the other echelons. Fire watches are the most common type of compensatory measure used by the licensees. Although the term "fire watch" implies that fire watches look for fires, their primary responsibility is actually to help prevent fires. They accomplish this task by looking for uncontrolled ignition sources, fire hazards, and combustible

materials, and by providing prompt notification of such fire hazards. Therefore, fire watches strengthen the fire prevention echelon of defense in depth. In addition, because a fire watch either surveys an area regularly (e.g., every hour) or is continuously present within an area, he or she may also discover a fire. In this case, the fire watch would call out the fire brigade, give to the fire brigade exact information about the nature and location of the fire, and may initiate fire suppression activities if trained to do so. Therefore, fire watches can also strengthen the fire detection and suppression echelon of defense-in-depth[1].

2.3 Types of Fire Watches

In general, there are two types of fire watches that are used as interim remedial measures until a fire protection deficiency is corrected. They are the roving hourly fire watch patrol and the continuous fire watch. Fire watches are typically established on a fire area basis[2]. The type of fire watch needed (hourly or continuous) is usually determined by the level of automatic fire detection installed in the fire area that has an inoperable, degraded, or nonconforming condition. When an operable fire detection system is installed in the area, an hourly fire watch patrol is normally used. In some cases, an hourly fire watch can patrol multiple fire areas within the 1-hour period available to complete a fire watch tour. (Whether or not a single individual can cover multiple fire areas depends on whether the size, complexity, and accessibility of the areas allow all parts of the areas to be surveyed within the time allowed.) Conversely, when an automatic fire detection system is either not installed in the fire area or the installed system is inoperable, a continuous fire watch is typically used. Unlike the roving hourly fire watch patrol, which can patrol multiple areas, a continuous fire watch is an uninterrupted fire watch posted within a single fire area.

The following example illustrates the application of these general principles. If a licensee finds an inoperable fire barrier penetration seal, it would establish a fire watch to compensate for the inoperable seal until it can be repaired. If the area in which the seal is installed has an automatic fire detection system, the licensee would establish a roving hourly fire watch patrol. Under the general principles, this fire watch could leave the fire area and patrol other fire areas provided he or she surveys the area with the inoperable penetration seal at least once each hour. If the fire detection system later becomes inoperable (e.g., for functional testing or because of a malfunction) while the penetration seal is inoperable, the licensee would replace the roving hourly fire watch patrol with a continuous fire watch. The continuous fire watch would remain stationed within the fire area with the inoperable penetration seal and fire detection system.

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[1] In contrast to fire watches that are used as interim remedial measures until fire protection deficiencies are corrected, the primary responsibility of fire watches that are posted during hot work (e.g., cutting and welding operations) is to look for and extinguish fires that may occur as a result of the hot work. This type of fire watch is not the subject of this safety evaluation.

[2] By definition, a “fire area” is a plant area that is sufficiently bounded to contain a fire that starts within the area and to prevent a fire that starts outside the area from spreading into the area.

2.4 PG&E Request

Overall, DCNPP adheres to the general principles for fire watches previously discussed. However, as noted by the licensee in its submittal of October 21, 1998, many of the DCNPP fire detector systems cover multiple fire areas. Therefore, if the general principles are applied, when a single detection system is inoperable while another fire protection feature is impaired, multiple continuous fire watches would be required to cover multiple fire areas, even when the fire areas are within close proximity to one another. To reduce the fire watch burden under these circumstances, the licensee reviewed the fire detector zones that cover multiple rooms or fire areas against the following criteria:

1. each detector zone contains two or more rooms or fire areas,

2. the rooms or fire areas are on the same elevation,

3. the rooms or fire areas can be accessed without having to pass through security doors or radiological control barriers, and

4. a complete tour of each detection zone can be easily completed in about 5 minutes.

As a result of this review, the licensee identified 11 fire detector zones that could be surveyed by a 15-minute roving fire watch in lieu of a continuous fire watch without adversely affecting plant safety. Revision 3 to ECG 18.7 allows 15-minute roving fire watches to be considered continuous fire watches for the 11 fire detector zones even though they are not posted within a single fire area. It also specifies that the personnel assigned to a 15-minute roving fire watch must stay within the assigned fire detector zone. The fire watch must move between each room and fire area within the detector zone, spending about the same amount of time in each room and fire area (i.e., the fire watch will not stay in any single room or fire area for a prolonged period of time), with each room and fire area within the assigned detector zone being surveyed every 15-minutes or less. The licensee stated that fire watch personnel are formally trained using lessons guides and receive on-the-job training. In addition, the licensee maintains daily fire watch status logs which are reviewed by the fire watch supervisor.

The licensee stated that it uses 15-minute roving fire watches to optimize the number of personnel assigned as fire watches, which results in a cost benefit in situations in which it can be shown that the use of a 15-minute roving fire watch in lieu of a continuous fire watch would not adversely affect plant safety. The licensee also stated that it had evaluated Revision 3 to ECG 18.7 in accordance with 10 CFR 50.59 and determined that the revision did not result in a USQ.

3.0 EVALUATION

The licensee for DCNPP has relocated the fire protection TSs to plant procedures and has adopted the standard fire protection license condition. Therefore, changes to ECG 18.7 are controlled by the fire protection license condition and 10 CFR 50.59. NRC approval of the change to ECG 18.7 is required if the change would adversely affect the ability to achieve and maintain safe shutdown in the event of a fire or if it results in a USQ.

As part of its evaluation, the staff researched precedents and found that it has reviewed and approved a number of deviations from the general principles discussed in Section 2 of this safety evaluation. The precedent most closely related to PG&E's request involved D.C. Cook Nuclear Power Plant, Units 1 and 2 (D.C. Cook). In a letter of May 22, 1986, Indiana and Michigan Electric Company (IMEC), the licensee for D.C. Cook, requested that the staff approve the definition of a continuous fire watch that it proposed to include in the bases of the D.C. Cook TSs. The definition stated that a "continuous fire watch requires that a trained individual be in the specified [fire] area at all times and that each fire zone within the specified [fire] area is patrolled at least once every fifteen minutes with a margin of five minutes." In a letter to the licensee dated July 15, 1986, the staff approved the definition proposed by IMEC. In its letter, the staff noted that a continuous fire watch would be assigned to a number of fire zones within an area and that the fire zones are readily accessible and easily viewed by a single fire watch on a frequency of about every 15-minutes. The staff also noted that this method of applying fire watches would reduce the number of persons within the areas at a given time.

The staff compared the approach that it had approved for D.C. Cook against that used at DCNPP under Revision 3 to ECG 18.7. A continuous fire watch at D.C. Cook is restricted to a single fire area. However, the individual is permitted to rove the entire fire area without regard to the number of fire zones or rooms that must be checked within the area, provided that he or she surveys each part of the fire area every 15-minutes (with a 5-minute margin). This precedent established that the fire watch need not have a continuous line of sight throughout the fire area for which he or she is responsible to maintain an adequate level of fire safety. In contrast to the approach that the staff approved for D.C. Cook, under Revision 3 to ECG 18.7, certain fire watches at DCNPP are considered to be continuous even though they cross fire area boundaries. Like the approach used at D.C. Cook, the subject fire watches at DCNPP must also complete their roving tours within about 15 minutes and, thereby, survey each plant area at least once every 15 minutes. On the basis of its comparison of these two approaches, the staff concluded that, in effect, the "continuous" 15 minute roving fire watches used for certain fire detector zones at DCNPP are functionally equivalent to the continuous fire watches used at D.C. Cook. The staff also noted that the restrictions and performance criteria specified in Revision 3 to ECG 18.7 (e.g., the areas to be toured must be on the same elevation and must be accessible without having to pass through security doors or radiological control barriers; and the fire watch must move between each room, spend about the same amount of time in each room, and must not remain in any single room for a prolonged period of time) provide reasonable assurance that fire watch surveys will be effective and timely.

The staff also evaluated the use at DCNPP of 15-minute roving fire watches as continuous fire watches (as specified in Revision 3 to ECG 18.7) against the general guidance provided in GL 91-18, Revision 1. On the basis of its evaluation, the staff did not find any conflicts between GL 91-18, Revision 1, and the use at DCNPP of 15-minute roving fire watches as continuous fire watches for the fire detector zones specified in Revision 3 to ECG 18.7.

Overall, on the basis of its consideration of the general principles and purposes of fire watches, the specifics of DCNPP's proposal, the precedent at D.C. Cook, and the general guidance provided in GL 91-18, Revision 1, the staff found that the use at DCNPP of 15-minute roving fire watches as continuous fire watches for the fire detector zones specified in Revision 3 to ECG 18.7 provides reasonable assurance that the fire watch tours will be effective and timely and that fire hazards will be found in a timely manner. Therefore, there is reasonable assurance that the post-fire safe-shutdown capability will not be challenged by a fire. The staff also found that the licensee's proposal will reduce unnecessary regulatory burden. Finally, it is the staff's view that the use of a continuous uninterrupted fire watch in each fire area in lieu of a 15-minute roving fire watch for the specific fire zones specified in Revision 3 to ECG 18.7 would not result in a significant increase in the level of fire safety.

4.0 CONCLUSION

On the basis of its evaluation, as documented herein, the staff concludes that the licensee's change to ECG 18.7, as reflected in Revision 3 to ECG 18.7, is a change to the approved fire protection program that does not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire and does not result in a USQ. Therefore, the change does not require prior approval by the Commission under paragraph 2.C.(5) of Facility Operating Licenses Nos. DPR-80 and DPR-82.

Principal Contributor: S. West

Date: January 27, 2000