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PG&E Letter DCL-14-098

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

Diablo Canyon Units 1 and 2
Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82

Ninety-Day Response to NRC Request for Additional Information – National Fire Protection Association Standard 805

References:

(1) PG&E Letter DCL-13-065, "License Amendment Request 13-03, License Amendment Request to Adopt NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants (2001 Edition)," dated June 26, 2013
(2) NRC Letter, "Diablo Canyon Power Plant, Units 1 and 2 – Request for Additional Information Re: License Amendment Request to Adopt National Fire Protection Association Standard 805 (TAC Nos. MF2333 and MF2334)," dated July 31, 2014
(3) PG&E Letter DCL-14-093, "Revision to Response Date for NRC Request for Additional Information – Fire Modeling 3 – National Fire Protection Association Standard 805," dated October 27, 2014

Dear Commissioners and Staff:

In Reference 1, Pacific Gas and Electric Company (PG&E) submitted a license amendment request to adopt National Fire Protection Association Standard 805.

In Reference 2, the NRC provided a request for additional information (RAI) regarding Reference 1. The RAI questions were discussed in draft form in a teleconference on July 8, 2014, and during an audit performed at Diablo Canyon Power Plant during the week of July 14-18, 2014. Enclosed are PG&E's 90-day responses to the RAI questions.

As discussed with the NRC on October 16, 2014, and submitted in Reference 3, Fire Modeling RAI 3 will be submitted during the 120-day RAI response.

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

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 October 29, 2014.

Sincerely,

Barry S. Allen
Site Vice President

mjrm/4557/50037411-11
Enclosure
cc: Diablo Distribution
cc/enc: Marc L. Dapas, NRC Region IV Administrator
Thomas R. Hipschman, NRC Senior Resident Inspector
Eric R. Oesterle, NRC Senior Project Manager
Gonzalo L. Perez, California Department of Public Health

Ninety-day Response to NRC Request for Additional Information – National Fire Protection Association Standard 805

References:

1. PG&E Letter DCL-13-065, "License Amendment Request 13-03, License Amendment Request to Adopt NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants (2001 Edition)," dated June 26, 2013

2. NRC Letter, "Diablo Canyon Power Plant, Units 1 and 2 – Request for Additional Information Re: License Amendment Request to Adopt National Fire Protection Association Standard 805 (TAC Nos. MF2333 and MF2334)," dated July 31, 2014

Attachment 1 of this enclosure includes a list of acronyms used in this response for convenience.

On July 31, 2014, the NRC provided a RAI (Reference 2) regarding LAR 13-03 (Reference 1), herein referred to as "LAR" or "the LAR." PG&E's 90-day responses to the NRC questions are provided below.

NRC SSA RAI 6:

In LAR Attachment G, there are numerous recovery actions to provide portable fans for temporary cooling of the vital 480 V switchgear rooms, the battery rooms, and the inverter/battery charger rooms for fire areas 34 (U2), 3-BB, 3-CC, 5-A-1, 5-A-3, 5-A-4, 5-B-1, 5-B-3, 5-B-4, 6-B-5, and TB-7. The NRC staff noted that portable generators are used to provide electrical power for these recovery actions. Please provide the following additional information:

a) Describe the location(s) of the portable generators when in use for these recovery actions and the location of NSCA structures, systems, and components (SSCs), if any, in the vicinity of these location(s). Describe the installation of temporary power cables, the connections to distribution panels during the recovery actions, and any disruptions to fire area boundaries. Provide justification for the configuration of the equipment manipulated by these recovery actions.

b) Describe the type of fuel and quantity associated with the generator and the availability and the location(s) of sufficient fuel sources to support maintaining safe and stable conditions for the time period required.

c) Provide justification that refueling the generators does not present a fire exposure hazard to NSCA SSCs.

d) LAR Attachment B, Table B-2, Element 3.1.2.6.3 states in the Alignment Basis that heating, ventilation, and air conditioning (HVAC) is required for the ASW pump rooms, the 4 kiloVolt (kV) switchgear rooms, and the direct current (DC) and 480 Volt (V) switchgear rooms. The staff noted that portable ventilation is also utilized in the event of fire-induced failure of the required systems. LAR Attachment G does not include recovery actions for portable ventilation in the ASW pump rooms and 4kV switchgear rooms. Clarify this discrepancy.

e) In the current Appendix R licensing basis, there are recovery actions for temporary restoration of Main Control Room (MCR) ventilation following a loss of MCR ventilation; however, in the NFPA 805 LAR, there are no recovery actions for temporary restoration of MCR ventilation. Provide a justification for the lack of these recovery actions.

PG&E Response:

a) Per PG&E procedure, the portable generator(s) would be located in the Machine Shop (Fire Area TB-7, Fire Zone 16) when in use for the recovery actions in question. The Machine Shop is a large room, approximately 55 feet wide by 120 feet deep. Approximately 75 percent of the room has a 55 foot ceiling; the remainder is open to the turbine deck. The Machine Shop is accessible directly from outdoors via a large roll-up door, which can be left open to enhance ventilation.

There are cables associated with NSCA SSCs located in the Machine Shop. Specifically, cables associated with Unit 2 AFW Pump 2-2, Unit 2 4 kV Busses D & E (non-vital busses), and startup power to all Unit 2 4 kV busses are located in the Machine Shop.

The installation of temporary power cables, the connections to distribution panels during the recovery actions, and disruptions to fire area boundaries are described below for the Unit 1 & 2 480 V switchgear rooms, battery rooms, and the inverter/battery charger rooms. Adequate equipment is available to provide temporary ventilation to all of these areas (for one unit) simultaneously. This equipment is pre-staged and periodically inventoried, by PG&E procedure, to ensure availability when needed. Disruptions to fire area boundaries are due to doors opened to allow airflow and/or temporary power cables (240 VAC or less) through. This configuration is only permissible per procedure in cases where required cooling is lost or for post-fire smoke removal. Additionally, plant procedures that require appropriate compensatory measures to be implemented for fire area boundary impairments will still apply. For these reasons, the temporary impairment of fire area boundaries for temporary ventilation will not adversely impact the plant's ability to achieve and maintain the fuel in a safe and stable condition.

Unit 1 480 V Switchgear Rooms:

Per PG&E procedure, air to the temporary ventilation fans would be supplied from outside (Fire Area 34) into stairwell No. 5 (Fire Area AB-2) via stairwell No. 2 (Fire Area AB-1) at the 140 foot elevation, down stairwell No. 5 and into the Unit 1 non-vital and vital 480 V switchgear rooms (Fire Areas 5-A-4, 5-A-3, 5-A-2, and 5-A-1) at 100 foot elevation. Exhaust air would flow through stairwell No. 1 (Fire Area AB-3) via the Unit 2 non-vital 480 V switchgear room (Fire Area 5-B-4), up stairwell No.1 and to the outside (Fire Area 34) at 164 foot elevation. Fire doors between each of these fire areas would be opened to allow for temporary air flow.

If 120 VAC power is not available at the local receptacles to run the temporary ventilation fans, a temporary power cable would be run from the portable generator located in the Machine Shop (Fire Zone 16, Fire Area TB-7), up stairwell No.1 (Fire Area AB-3), and through the Unit 2 non-vital 480 V switchgear room (Fire Area 5-B-4) to a distribution panel located on the 100 foot elevation near door 223 in Fire Area 5-A-4. Fire doors between each of these fire areas would be opened to allow for power cables to be run.

Unit 1 Inverter/Battery Charger and Battery Rooms:

Per PG&E procedure, air to the temporary ventilation fans would be supplied from outside (Fire Area 34) into stairwell No. 5 (Fire Area AB-2) via stairwell No. 2 (Fire Area AB-1) at 140 foot elevation, down stairwell No. 5 and into the Unit 1 reactor trip switchgear room and the three Unit 1 inverter/battery charger rooms (Fire Areas 6-A-4, 6-A-3, 6-A-2, and 6-A-1) at 115 foot elevation. Exhaust air would flow through stairwell No. 1 (Fire Area AB-3) via the Unit 1 and Unit 2 Electrical Areas (Fire Areas 6-A-4 and 6-B-4), up stairwell No. 1 and to the outside (Fire Area 34) at 164 foot elevation. Fire doors between each of these fire areas would be opened to allow for temporary air flow.

If 120 VAC power is not available at the local receptacles to run the temporary ventilation fans, a temporary power cable would be run from the portable generator located in the Machine Shop (Fire Zone 16, Fire Area TB-7), up stairwell No. 1 (Fire Area AB-3), and through the Unit 2 and Unit 1 Electrical Areas (Fire Areas 6-B-5 and 6-A-5) to a distribution panel located on the 115 foot elevation near door 325 in Fire Area 6-A-5. Fire doors between each of these fire areas would be opened to allow for power cables to be run.

The installation of portable fans in the 480 V switchgear rooms and the inverter/battery charger rooms was analyzed and found to be sufficient to lower the temperature profile of the boundary conditions for applicable heat slabs (walls) in the battery rooms. Therefore, no doors into the battery rooms would need to be opened.

Unit 2 480 V Switchgear Rooms:

Per PG&E procedure, air to the temporary ventilation fans would be supplied from outside (Fire Area 34) into stairwell No. 5 (Fire Area AB-2) via stairwell No. 2 (Fire Area AB-1) at the 140 foot elevation, down stairwell No. 5 and into the Unit 1 and Unit 2 non-vital 480 V switchgear rooms and the Unit 2 vital 480 V switchgear rooms (Fire Areas 5-A-4, 5-B-4, 5-B-3, 5-B-2, and 5-B-1) at 100 foot elevation. Exhaust air would flow through stairwell No. 1 (Fire Area AB-3) via the Unit 2 non-vital 480 V switchgear room (Fire Area 5-B-4), up stairwell No. 1 and to the outside (Fire Area 34) at 164 foot elevation. Fire doors between each of these fire areas would be opened to allow for temporary air flow.

If 120 VAC power is not available at the local receptacles to run the temporary ventilation fans, a temporary power cable would be run from the portable generator located in the Machine Shop (Fire Zone 16, Fire Area TB-7), up stairwell No. 1 (Fire Area AB-3), and through the Unit 2 non-vital 480 V switchgear room (Fire Area 5-B-4) to a distribution panel located on the 100 foot elevation near door 223 in Fire Area 5-A-4. Fire doors between each of these fire areas would be opened to allow for power cables to be run.

Unit 2 Inverter/Battery Charger Rooms:

Per PG&E procedure, air to the temporary ventilation fans would be supplied from outside (Fire Area 34) into stairwell No. 5 (Fire Area AB-2) via stairwell No. 2 (Fire Area AB-1) at the 140 foot elevation, down stairwell No. 5 and into the Unit 1 and Unit 2 reactor trip switchgear rooms and the three Unit 2 inverter/battery charger rooms (Fire Areas 6-A-4, 6-B-4, 6-B-3, 6-B-2, and 6-B-1) at 115 foot elevation. Exhaust air would flow through stairwell No. 1 (Fire Area AB-3) via the Unit 2 Electrical Area (Fire Area 6-B-4), up stairwell No. 1 and to the outside (Fire Area 34) at 164 foot elevation. Fire doors between each of these fire areas would be opened to allow for temporary air flow.

If 120 VAC power is not available at the local receptacles to run the temporary ventilation fans, a temporary power cable would be run from the portable generator located in the Machine Shop (Fire Zone 16, Fire Area TB-7), up stairwell No. 1 (Fire Area AB-3), and through the Unit 2 Electrical Area (Fire Area 6-B-5) to a distribution panel located on the 115 foot elevation near door 330 in Fire Area 6-B-5. Fire doors between each of these fire areas would be opened to allow for power cables to be run.

The installation of portable fans in the 480 V switchgear rooms and the inverter/battery charger rooms was analyzed and found to be sufficient to lower the temperature profile of the boundary conditions for applicable heat slabs (walls) in the battery rooms. Therefore, no doors into the battery rooms would need to be opened.

b) The portable generators use diesel fuel. Per PG&E procedure, a portable generator will operate for approximately 16 hours on a full tank of fuel (16 gallon tank). Portable generator fuel tanks are maintained full. Two 34-gallon fuel buggies for refilling the portable generators are located in the LTCW pump rooms, located in the Unit 1 and Unit 2 polisher buttress area.

c) As discussed in SSA RAI-06.a, the portable generator(s) would be located in the Machine Shop (Fire Area TB-7, Fire Zone 16) when in use for the recovery actions in question. The Machine Shop is equipped with an automatic fire suppression system in the areas with a ceiling, and with manual fire suppression equipment in the fire zone, including a fire hose and multiple fire extinguishers. Fire hoses and extinguishers are also available in adjacent fire zones.

As noted in SSA RAI-06.a, cables associated with Unit 2 AFW Pump 2-2, Unit 2 4 kV Busses D & E (non-vital busses), and startup power to all Unit 2 4 kV busses are located in the Machine Shop. EDGs are available for fires in all Fire Areas that credit recovery actions that install temporary ventilation. Therefore, fire-induced damage to these cables would not adversely affect the plant's ability to achieve and maintain a safe and stable condition, even if the fire spread from Fire Zone 16 to other Fire Zones within Fire Area TB-7.

NSCA SSCs are also located in adjacent Fire Zones 14-A, 14-E, 19-A and 19-E, which are all also located in Fire Area TB-7. Adjacent Fire Zones 14-A, 14-E, 19-A, and 19-E are all protected by automatic fire suppression and feature manual suppression equipment including fire hoses and fire extinguishers either in the fire zone or adjacent fire zones. Additionally, Fire Zones 14-E and 19-E are equipped with automatic fire detection. These features would reduce the likelihood that a fire in Fire Zone 16 would spread to an adjacent zone, and provide assurance that a fire that did spread would be detected and suppressed quickly.

Per PG&E procedure, portable ventilation is used in cases where required cooling is lost or for post-fire smoke removal. Therefore, the portable generator is expected to be used in post-fire scenarios, when operators and fire brigade personnel are alerted and prepared to respond to emerging situations. As a result, in the case of a fire in the portable generator area, trained and equipped personnel will be in a position to respond immediately to extinguish the fire.

Refueling is accomplished with 34-gallon fuel buggies described in SSA RAI-06.b. Hoses can be run directly from the buggy to the portable generator fuel tank, and a hand pump used to transfer fuel. This process minimizes the possibility of spillage. Additionally, the portable generators use diesel fuel, which has a high flash point that will further reduce the potential that any fuel that does spill could present an ignition hazard.

Due to the configuration of the Machine Shop, the fire protection features therein and in adjacent fire zones, and the availability of alerted and equipped personnel in the aftermath of a fire, the positioning of the portable generator in the Machine Shop does not present a fire exposure hazard to NSCA SSCs and will not adversely impact the plant's ability to achieve and maintain the fuel in a safe and stable condition.

d) The NSCA requires HVAC systems for the Battery, Inverter and DC Switchgear and 480 V Vital Switchgear Rooms (Fire Areas 6-A-1, 6-A-2, 6-A-3, 6-B-1, 6-B-2, 6-B-3, 5-A-1, 5-A-2, 5-A-3, 5-B-1, 5-B-2, and 5-B-3) and the ASW pump vaults (Fire Areas 30-A-1, 30-A-2, 30-A-3, and 30-A-4).

Each ASW pump vault is equipped with dedicated HVAC capability that is independent of HVAC capability for the redundant ASW pump vaults. There is no fire area for which the credited ASW pump loses HVAC capability. Consequently, no VFDRs or recovery actions are required to provide portable ventilation to the ASW pump vaults.

The NSCA does not require HVAC for the 4 kV switchgear rooms, as a PG&E calculation indicates that the design temperature rise with no manual action for the 4 kV switchgear rooms will not affect equipment operation. Consequently, no VFDRs or recovery actions are required to provide portable ventilation in the 4 kV switchgear rooms.

To clarify, LAR Attachment B, Table B-2, Element 3.1.2.6.3 Alignment Basis, paragraph 3 is revised to read:

"HVAC systems are required for the ~~following plant areas:~~ Battery, Inverter and DC Switchgear and 480V Vital Switchgear Rooms (Fire Areas 6-A-1, 6-A-2, 6-A-3, 6-B-1, 6-B-2, 6-B-3, 5-A-1, 5-A-2, 5-A-3, 5-B-1, 5-B-2, and 5-B-3) and the Auxiliary Saltwater (ASW) pump vaults (Fire Areas 30-A-1, 30-A-2, 30-A-3, and 30-A-4).

- ~~ASW Pump Rooms~~
- ~~4kV Switchgear Rooms~~
- ~~DC and 480V Switchgear Rooms~~"

e) Subsequent to LAR submittal, an analysis has been performed to assess the potential for a loss of CRVS in the event of a fire. This analysis revealed that a fire in Fire Areas 7-A, 7-B, AB-1, or CR-1 could result in a loss of both trains of CRVS.

MCR ventilation is provided by the CRVS. The CRVS consists of two independent, redundant trains; each train consists of the equipment necessary to provide cooling to ensure that MCR ambient temperature is acceptable for equipment and personnel.

Fire Areas 7-A, 7-B, and CR-1

The post-fire compliance strategies for a fire in Fire Areas 7-A, 7-B, or CR-1 credit evacuating the MCR and establishing control at the HSDP. Therefore, the loss of CRVS due to a fire in Fire Areas 7-A, 7-B, or CR-1 does not require a recovery action.

Fire Area AB-1

A fire in Fire Area AB-1 could cause a loss of both trains of CRVS. This results in a VFDR in this fire area for each unit. Risk assessments and a revision to the Fire Risk Evaluations will be completed for this Fire Area for each unit. The risk, change in risk, impact on DID, and impact on safety margin resulting from this VFDR and any associated recovery actions will be evaluated, and the results reported as part of the response to PRA RAI 03. This response will include discussion of SSA RAIs 06.a through 06.c. Feasibility of recovery actions, if required, will be confirmed in the RAFA per Implementation Items S-3.16 and S-3.17.

NRC SSA RAI 7:

LAR Attachment C describes the fire suppression effects on NSPC on a fire area basis as required by NFPA 805, Section 2.4.2.4. Please provide the following additional information:

a) The "Fire Suppression Effects on Nuclear Safety Performance Criteria," section of the fire area states one of the following statements for several fire areas (Examples include: 3-Q-1, 3-T-1, 4-A-1, 4-A-2, 4-A (U1), 4-B-1, 4-B-2, 4-B (U1/U2) and 6-A-4) (Also include any other fire areas that did not provide sufficient information for the NRC staff to complete its review in addition to the examples cited):

> There is no suppression effect concern for this Fire Area because there is no NSCA credited electrical equipment in this Fire Area.

or,

> There is no suppression effect concern for this Fire Area because there are no fire suppression systems or NSCA credited equipment in the Fire Area.

The NRC staff notes that the fire areas are performance-based areas that contain VFDRs and have been assessed for risk. Explain the conclusion that there is no NSCA equipment in the fire area. In addition, explain why manual suppression effects are not addressed in these fire areas.

b) Similar to a) above, several deterministic-based areas also contain the same statements (Examples include: 3-P-1, 3-P-5, 4-A (U2), 7-C, 11-D, etc.) (Also include any other fire areas that did not provide sufficient information for the NRC staff to complete its review in addition to the examples cited): Confirm that these deterministic areas do not contain NSCA-credited equipment.

c) For certain fire areas, the LAR states "no fire suppression systems in the fire area," but the defense-in-depth (DID) section states under Echelon 2 that the area is provided with an automatic suppression system (e.g., 3-B-1, 3-B-2, 3-D-1, and 3-D-2). (Also include any other fire areas that did not provide sufficient information for the staff to complete its review in addition to the examples cited): Clarify the discrepancies.

d) Fire areas AB-2 and TB-13 state there are "no fire suppression systems in the fire areas," but the required systems table for the fire areas indicates a wet pipe fire suppression system is required. Clarify this discrepancy.

e) The NRC staff notes that fire area 4-A (U2) is a deterministic fire area and that the LAR states, "There is no suppression effect concern for this fire area because there is no NSCA credited equipment in this fire area." Fire area 4-A (U2) is associated with licensing action No. 2 in LAR Attachment K, that is being transitioned and is associated with a VFDR from 10 CFR 50, Appendix R, Section III.G.2(c). Explain the conclusion that no NSCA credited equipment is in this fire area in light of the need to transition the subject licensing action.

PG&E Response:

a) The "Fire Suppression Effects on Nuclear Safety Performance Criteria" section of each fire area in PG&E NFPA 805 LAR, Enclosure 1, Attachment C is based on an analysis of fire suppression effects performed to evaluate the ability of NSCA equipment to function when exposed to fire suppression agents that could discharge from DCPP's fire suppression systems, consistent with sections 2.4.2.4 and 4.2.1 of NFPA 805.

In accordance with this guidance and applicable industry operating experience, the fire suppression effects analysis only considers NSCA credited equipment that is susceptible to damage resulting from fire suppression activities. That equipment includes pump motors, distribution panels, control cabinets, motor operated valves, control stations, motor control centers, switchgear, transmitters, and similar equipment. Equipment such as closed mechanical systems (e.g., piping and tanks) and electrical cables that do not terminate in the fire area (i.e., cables that enter the area, transit some portion of the area, and exit the area without terminating in the area) were not considered to be susceptible to damage resulting from fire suppression effects, per industry guidance. These

considerations apply to fire suppression effects resulting from both manual action and automatic suppression systems. In other words, neither manual nor automatic suppression will adversely affect the ability to achieve the NSPC in those fire areas that do not contain NSCA credited equipment that is susceptible to damage resulting from fire suppression activities. Therefore, those areas comply with NFPA 805, 2001 edition, sections 2.4.2.4 and 4.2.1.

The following performance-based fire areas are identified in LAR Attachment C as not containing NSCA credited equipment:

3-Q-1, 3-T-1, 4-A-1, 4-A-2, 4-A (U1), 4-B-1, 4-B-2, 4-B (U1), 4-B (U2), 6-A-4, 6-A-5, 6-B-4, 6-B-5, 8-G, 8-H, 24-D

Fire Area 3-Q-1

LAR Attachment C states, "there is no NSCA credited electrical equipment in this Fire Area" for fire area 3-Q-1, which has one associated VFDR.

VFDR 1-3Q1-001 identifies the presence of manual valve FCV-437, which is required to be opened prior to depletion of the CST to ensure adequate long-term AFW supply. No other NSCA credited components are located in this area. No electrical equipment located in Fire Area 3-Q-1 is required to achieve and maintain the fuel in a safe and stable condition in the event of a fire in Fire Area 3-Q-1. Since the only component in the area that is required to achieve and maintain the fuel in a safe and stable condition in the event of a fire in Fire Area 3-Q-1 is a mechanical valve not impacted by water spray, no fire suppression effects concerns (manual or automatic) exist in Fire Area 3-Q-1.

Fire Area 3-T-1

LAR Attachment C states, "there is no NSCA credited electrical equipment in this Fire Area" for Fire Area 3-T-1, which has three associated VFDRs.

VFDR 2-3T1-001 identifies the loss of CST level indication from the MCR due to fire-induced cable damage (i.e., LT-40 is not located in the area). VFDR 2-3T1-002 identifies the loss of RWST level indication from the MCR due to fire-induced cable damage (i.e., LT-920, LT-921, and LT-922 are not located in the area). VFDR 2-3T1-003 identifies the presence of manual valve FCV-437, which is required to be opened prior to depletion of the CST to ensure adequate long-term AFW supply. No other NSCA credited components are located in this area. No electrical equipment located in Fire Area 3-T-1 is required to achieve and maintain the fuel in a safe and stable condition in the event of a fire in Fire Area 3-T-1. Since the only component in the area that is required to achieve and maintain the fuel in a safe and stable condition in the event of a fire in Fire Area 3-T-1 is a mechanical valve not impacted by water spray, no fire suppression effects concerns (manual or automatic) exist in Fire Area 3-T-1.

Fire Areas 4-A-1, 4-A-2, 4-A (U1), 4-B-1, 4-B-2, 4-B (U1), 4-B (U2), 6-A-4, 6-A-5, 6-B-4, 6-B-5, 8-G, 8-H, and 24-D

LAR Attachment C states "there are no...NSCA credited equipment in the Fire Area" for fire areas 4-A-1, 4-A-2, 4-A (U1), 4-B-1, 4-B-2, 4-B (U1), 4-B (U2), 6-A-4, 6-A-5, 6-B-4, 6-B-5, 8-G, 8-H, and 24-D, all of which have associated VFDRs.

The VFDRs associated for these fire areas are identified to exist due to fire-induced cable damage (i.e., the credited NSCA equipment are not located in the area, but supporting cables are routed through the area). For each of these fire areas, no electrical equipment located in the area are required to achieve and maintain the fuel in a safe and stable condition. The cables associated with the VFDRs are routed through, and do not have terminations in the listed fire areas. Since the only components in the area that are required to achieve and maintain the fuel in a safe and stable condition are cables that are not susceptible to fire suppression effects, no fire suppression effects concerns (manual or automatic) exist in Fire Areas 4-A-1, 4-A-2, 4-A (U1), 4-B-1, 4-B-2, 4-B (U1), 4-B (U2), 6-A-4, 6-A-5, 6-B-4, 6-B-5, 8-G, 8-H, or 24-D.

For clarity, the applicable suppression effects statements cited above are revised to replace "NSCA credited electrical equipment" or "NSCA credited equipment" with "equipment that is required to achieve and maintain the fuel in a safe and stable condition and susceptible to damage resulting from fire suppression activities."

b) The following deterministic-based fire areas are identified in LAR Attachment C as not containing NSCA credited equipment:

> 2, 3-P-1, 3-P-5, 3-P-12, 3-V-1, 3-V-5, 3-V-12, 4-A (U2), 7-C, 7-D, 11-D, 13-E, 13-F, 14-B, 15, 17, 18, 22-C, 26, 27-A, 27-B, 27-C, 33, AB-2, AB-3, IS-1 (Fire Zone 30-B only), TB-13, TB-14, TB-15, TB-16, V-1, V-2, and V-4.

These fire areas may contain cables that support NSCA credited equipment, but do not contain equipment credited in the NSCA. Electrical cables that do not terminate in the fire area (i.e., cables that enter the area, transit some portion of the area, and exit the area without terminating in an electrical box, panel, or cabinet) are not considered to be susceptible to damage resulting from fire suppression effects, per industry guidance. These areas do not contain equipment that is required to achieve and maintain the fuel in a safe and stable condition, and do not contain cable terminations.

c) The following fire areas are identified in LAR Attachment C with the statement, "no fire suppression systems in the fire area," and states (under Echelon 2 of DID) that the area is provided with an automatic suppression system:

3-B-1, 3-B-2, 3-D-1, and 3-D-2.

As stated in PG&E NFPA 805 LAR Attachment C, in the case of each of these fire areas, water spray in an adjacent fire area protects a door between the areas. Specifically, for Fire Area 3-B-1, water spray in Fire Area 3-B-3 protects door B18 between Fire Areas 3-B-1 and 3-B-3. For Fire Area 3-B-2, water spray in Fire Area 3-B-3 protects door B17 between Fire Areas 3-B-2 and 3-B-3. For Fire Area 3-D-1, water spray in Fire Area 3-D-3 protects door B43-2 between Fire Areas 3-D-1 and 3-D-3. Finally, for Fire Area 3-D-2, water spray in Fire Area 3-D-3 protects door B42-2 between Fire Areas 3-D-2 and 3-D-3.

To clarify, the statements in LAR Attachment C for Echelon 2 of DID for fire areas 3-B-1, 3-B-2, 3-D-1, and 3-D-2 is revised to read as follows:

> "The Fire Area is provided with an automatic detection system ~~and an automatic suppression system~~. Automatic suppression systems located in an adjacent fire area ensure that the fire protection provided by a door between areas is adequate to the hazards associated with the areas in question. Manual suppression capabilities are provided in the area. Pre-fire plans document the location of manual suppression apparatus and critical fire response information."

d) For Fire Area AB-2, there are no fire suppression systems in the fire area. The "Required Fire Protection Systems and Features" table for the fire area incorrectly indicates that a wet pipe suppression system is required for Fire Zone S-5. This was previously identified and was entered into the DCPP corrective action program. The PG&E NFPA 805 LAR, Table 4-3, and Attachment C are revised to indicate that no automatic suppression is available in Fire Zone S-5.

   For Fire Area TB-13, there are automatic fire suppression systems in Fire Zones 24-E and 25. The fire suppression systems in Fire Zones 24-E and 25 are credited for Existing Engineering Equivalency Evaluations (also known as Fire Hazards / Appendix R Evaluations, FHAREs).

   For clarity, the PG&E NFPA 805 LAR, Attachment C, for Fire Area TB-13 "Fire Suppression Effects on Nuclear Safety Performance Criteria" is revised to read:

   > "There is no suppression effect concern for this Fire Area because ~~there are no fire suppression systems or NSCA credited equipment in the Fire Area~~ there is no NSCA credited equipment that is susceptible to damage resulting from fire suppression activities in this Fire Area."

e) Fire Area 4-A (Unit 2) represents the same physical volume as Fire Area 4-A (Unit 1), analyzed in the NSCA for impact on Unit 2 instead of Unit 1. The NSCA shows that for Unit 2, Fire Area 4-A complies with the deterministic requirements

of NFPA 805, 2001 edition, section 4.2.3, "Deterministic Approach," when the existing licensing action discussed in LAR Attachment K, Licensing Action No. 2 is applied. Application of the licensing action is necessary for Unit 2 to demonstrate deterministic compliance due to the presence of cables that support the redundant DFOTPs.

Specifically, Fire Area 4-A contains cables that support NSCA credited equipment for Unit 2. It does not contain any equipment that is credited in the NSCA for Unit 2. Electrical cables that do not terminate in the fire area (i.e., cables that enter the area, transit some portion of the area, and exit the area without terminating in an electrical box, panel, or cabinet) are not considered to be susceptible to damage resulting from fire suppression effects. Fire Area 4-A does not contain Unit 2 NSCA equipment, and does not contain Unit 2 cable terminations. Therefore, Fire Area 4-A (Unit 2) does not contain NSCA credited equipment for Unit 2.

NRC Fire Protection Engineering (FPE) RAI 1:

NFPA 805, Section 3.3.5.3, provides the requirement that electrical cable construction shall comply with a flame propagation test acceptable to the authority having jurisdiction (AHJ) (i.e., the NRC). NFPA 805, Section 3.3.5.3 includes an exception that is not endorsed by the NRC, as described in paragraph 50.48(c)(2)(v) of Title 10 of the *Code of Federal Regulations* (10 CFR). In the compliance basis statement in LAR Attachment A, for Element 3.3.5.3, the licensee states that, "Therefore, Category 4 cables are permitted to remain as is per the exception to this section." Please provide further justification for the acceptability of the Category 4 cable and wiring to meet the requirements of NFPA 805 Section 3.3.5.3 that does not rely on the exception.

PG&E Response:

Electrical cables installed at DCPP fall into one of five categories:

1. Cables tested to the flame test requirements of IEEE-383-1974. These cables meet the requirement without further clarification.

2. Cables tested to the flame test requirements in UL 1666 or UL 1581. The flame tests in these UL Standards meet or exceed the requirements of IEEE 383-1974 per the guidance of NEI 04-02, Revision 1, as supplemented by FAQ 06-0022, Revision 3.

3. Cables tested to the flame test requirements of UL 910. The flame tests in this UL Standard meet or exceed the requirements of IEEE 383-1974 as evaluated and documented in ABB Impell Corporation Document No. 0170-219-001, Revision 1, (PG&E Electrical Cable Acceptability Analysis). Specifically, the UL 910 standard represents a much more severe test condition than IEEE 383 and the acceptance criteria are more conservative.

4. Cables that were not originally intended to meet the flame tests of IEEE 383, since they are used in small quantities, and/or are generally routed in conduit or used inside panels and equipment, including: wire and cables supplied by the vendor as part of the equipment; specialty cables, such as video, communication, and data cables; wire or cable used only within panels or equipment; lighting and receptacle cables that are installed entirely within fully enclosed raceway (conduit, solid tray with solid covers).

5. Cables that have a flame-retardant coating or covering applied or an automatic fixed fire suppression system installed to provide an equivalent level of protection in lieu of meeting the flame propagation tests discussed above, as permitted by 10 CFR 50.48(c)(2)(v).

Subsequent to LAR submittal, it was noted that cables in two fire areas (nine cables in Fire Area 10 and three cables in Fire Area 20) have a flame-retardant coating applied because the cables themselves are not tested to the flame test requirements of IEEE-383-1974 or an equivalent test. Therefore, a fifth category is added to the LAR.

To clarify, the Compliance Statement for Element 3.3.5.3 is revised to "Complies with Clarification" and "Submit for NRC Approval." The Compliance Basis for this element is revised to read:

> "Plant requirements comply with the acceptable electrical cable construction tests acceptable to the AHJ (NRC) as documented in FAQ 06-0022 and as clarified below. Electrical cables at DCPP meet the intent of IEEE 383-1974 flame test requirements as stated in FAQ 06-0022 or ABB Impell Corporation Document No. 0170-219-001, Revision 1, (PG&E Electrical Cable Acceptability Analysis). Cables installed at DCPP fall into one of five ~~four~~ categories:
>
> (1) Cables tested to the flame test requirements of IEEE 383-1974. These cables meet the requirement without further clarification.
>
> (2) Cables tested to the flame test requirements in UL 1666 or UL 1581. The flame tests in these UL Standards meet or exceed the requirements of IEEE 383-1974 per the guidance of NEI 02-04, Revision 1, as supplemented by FAQ 06-0022, Revision 3.
>
> (3) Cables tested to the flame test requirements in UL 910. The flame tests in this UL Standards meet or exceed the requirements of IEEE 383-1974 as evaluated and documented in ABB Impell Corporation Document No. 0170-219-001, Revision 1, (PG&E Electrical Cable Acceptability Analysis). Specifically, the UL 910 standard represents a much more severe test condition than IEEE 383 and the acceptance criteria are more conservative.
>
> (4) Cables that were not originally required to meet the flame tests of IEEE 383

since they are used in small quantities, and/or are generally routed in conduit or used inside panels and equipment, including: Wire and cables supplied by the vendor as part of the equipment; Specialty cables, such as video, communications, and data ~~telephone, and instrumentation~~ cables; Wire or cable used only within panels or equipment; Lighting and receptacle cables that are installed entirely within fully enclosed raceway (conduit, solid tray with solid covers).

(5) Cables that have a flame-retardant coating applied or an automatic fixed fire suppression system installed to provide an equivalent level of protection in lieu of meeting the flame propagation tests discussed above, as permitted by 10 CFR 50.48(c)(2)(v).

Submit for NRC Approval: NRC approval is requested in Attachment L for the use of Category 4 cables that do not comply with a flame propagation test as acceptable to the AHJ. ~~Additionally, all cables installed at DCPP in analyzed fire areas subsequent to June 1, 1991, meet the requirements of IEEE 383 (Category 1), UL 1666 or 1581 (Category 2), or UL 910 (Category 3). Therefore, Category 4 cables are permitted to remain as is per the exception to this section.~~"

Section 4.1.2.3 of the LAR is revised to add the following bullet to the list of NFPA 805 Chapter 3 sections that are not specifically met: "Section 3.3.5.3 – NRC approval is requested for the existence of cables that do not comply with an acceptable flame propagation test."

The LAR, Table 5-3, entry for 10 CFR 50.48(c)(2)(v) is revised to:

"The use of performance-based methods is requested for some existing cables. See Attachment L, Approval Request 6. For the remainder of existing cables, electrical cable construction complies with a flame propagation test that was found acceptable to the NRC as documented in NEI 04-02, Revision 2, Table B-1."

The following Approval Request is added to Attachment L of the LAR:

"**Approval Request 6**

NFPA 805, Section 3.3.5.3

NFPA 805, Section 3.3.5.3 states:

> *"Electric cable construction shall comply with a flame propagation test as acceptable to the AHJ."*

Diablo Canyon Power Plant (DCPP) has cables that were not originally required to meet the flame tests of IEEE 383. PG&E requests NRC approval for cables

that do not meet the flame tests of IEEE 383 as an acceptable variance from the requirements of NFPA 805, Chapter 3 requirements.

A review of cables installed at DCPP reveals the existence of cables that do not meet the criteria of NFPA 805, Section 3.3.5.3. These cables are used in small quantities in most fire areas, and/or are generally routed in conduit or used inside panels and equipment. Specifically, subject cables can be characterized as being in one of the following categories:

- Wire or cable used only within panels or equipment.
- Lighting and receptacle cables that are installed entirely within fully enclosed raceway (i.e., conduit, solid tray with solid covers).
- Specialty cables, such as video, communication, and data cables.

Basis for Request:

The basis for the approval request of this deviation is:

- Cables that are internal to panels and equipment or installed entirely within fully enclosed raceway:
    - Do not contribute to the fire growth and spread in any fire area, as assessed in accordance with the methodologies of NUREG/CR-6850.
    - Do not present a credible risk of ignition, as assessed in accordance with the methodologies of NUREG/CR-6850.
- Specialty cables, such as video, communication, and data cables that are not installed entirely within fully enclosed raceway:
    - Are not associated with NSCA equipment. Therefore, damage to these cables would not result in inability to achieve and maintain the fuel in a safe and stable condition.
    - With the exception of the Unit 1 and Unit 2 Communications Rooms (Fire Areas 7-C and 7-D) and the Main Control Room (Fire Area CR-1), fire areas contain a quantity of these cables that does not contribute to fire growth and spread.
        - The Unit 1 and Unit 2 Communications Rooms (Fire Areas 7-C and 7-D) are protected by an automatic CO2 suppression system. Hose stations and portable fire extinguishers are also available in the vicinity. A fire in one

of these rooms would be readily detected and extinguished by the automatic actuation of the CO2 suppression system.

- The Main Control Room (Fire Area CR-1) is constantly manned, and is protected by automatic in-cabinet detection systems. Hose stations and portable fire extinguishers are available in the vicinity. A fire in the Main Control Room would be readily detected because it is constantly manned, and quickly extinguished.

- Video, communication, and data cables are fiber optic or low-voltage cables that are not generally susceptible to self-ignition and electrical shorts that could result in fire and potential damage to external targets.

Acceptance Criteria Evaluation:

Nuclear Safety and Radiological Release Performance Criteria:

The use of cables that are internal to panels and equipment or installed entirely within fully enclosed raceway does not contribute to fire growth and spread or ignition frequency in any fire area, since they are internal to panels and equipment or fully enclosed raceway. Therefore, their use does not result in a challenge to the plant's ability to achieve and maintain the fuel in a safe and stable condition. Therefore, there is no impact on the nuclear safety performance criteria.

The use of specialty cables, such as video, communication, and data cables that are not installed entirely within fully enclosed raceway does not contribute to fire growth and spread or ignition frequency in any fire area, since such cables are low voltage and therefore not generally susceptible to self-ignition. For those areas where the quantity of such cables is significant, adequate fire detection or automatic suppression, and manual fire suppression equipment are provided to ensure rapid detection and suppression in the event of a fire. Such cables are not associated with NSCA equipment, and their use does not result in a challenge to the plant's ability to achieve and maintain the fuel in a safe and stable condition. Therefore, there is no impact on the nuclear safety performance criteria.

The use of cables internal to panels and equipment or installed entirely within fully enclosed raceways and the use of specialty cables do not have any impact on the radiological release performance criteria. The radiological release review was performed based on the manual fire suppression activities in areas containing, or potentially containing, radioactive materials and is not depended on the types of cables. The cables do not change the radiological release evaluation performed that potentially contaminated water is contained and smoke monitored. The cables do not add additional radiological materials to the area or

challenge systems boundaries. Therefore, there is no impact on the radiological release performance criteria.

Safety Margin and Defense-in-Depth:

The use of cables that are internal to panels and equipment or installed entirely within fully enclosed raceway does not contribute to fire growth and spread or ignition frequency in any fire area, since they are internal to panels and equipment or fully enclosed raceway. Precautions and limitations on use ensure that these materials do not impact the analysis of the fire event. Therefore, the inherent safety margin and conservatisms in these analysis methods remain unchanged.

The use of specialty cables, such as video, communication, and data cables that are not installed entirely within fully enclosed raceway does not contribute to fire growth and spread or ignition frequency in any fire area, since such cables are low voltage and therefore not generally susceptible to self-ignition. For those areas where the quantity of such cables cannot be characterized as "insignificant", adequate fire detection, and automatic and/or manual fire suppression equipment are provided to ensure rapid detection and suppression in the event of a fire. Also, such cables are not associated with NSCA equipment. Precautions and limitations on use ensure that these materials do not impact the analysis of the fire event. Therefore, the inherent safety margin and conservatisms in these analysis methods remain unchanged.

The three echelons of DID are: (1) to prevent fires from starting (combustible/hot work controls); (2) rapidly detect, control and extinguish fires that do occur, thereby limiting damage (fire detection systems, automatic fire suppression, manual fire suppression, PFPs); and (3) provide adequate level of FP for systems and structures so that a fire will not prevent essential safety functions from being performed (fire barriers, fire-rated cable, success path remains free of fire damage, RAs). The use of cables that were not originally required to meet the flame tests of IEEE-383 does not affect echelons 1, 2, and 3, as discussed above. They do not directly result in compromising automatic or manual fire suppression functions, fire protection for systems and structures, or post-fire SSD capability.

Conclusion:

NRC approval is requested for the use of cables that do not meet the flame tests of IEEE-383 (or equivalent) in accordance with the requirements of NFPA 805, Section 3.3.5.3.

The performance-based approach satisfies the following criteria:

(A) Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release

(B) Maintains safety margins; and

(C) Maintains fire protection DID (fire prevention, fire detection, fire suppression, mitigation, and post-fire nuclear safety capability)"

NRC FPE RAI 2:

NFPA 805 Section 3.4.1(c) requires that the fire brigade leader and at least two brigade members have sufficient training and knowledge of nuclear safety systems to understand the effects of fire and fire suppressants on NSPC. The licensee stated it complies with this requirement with exception of a noted change to correct a procedure to properly reflect plant practice. The NRC staff noted that the fire brigade organization includes an operations responder assigned to the fire brigade to act as the knowledgeable individual on safe shutdown and also be the liaison with the control room (CR) during the event. Based on the NRC staff's review of the LAR, the LAR does not provide sufficient information for the staff to determine whether the operations responder or the brigade leader qualifications demonstrate the competence to assess the potential safety consequences of a fire and advise control room personnel. Please provide the following:

a) Clarification of compliance with NFPA 805, Section 3.4.1(c), or the exception to that section that allows sufficient training and knowledge to be provided by an operations advisor dedicated to the fire brigade.

b) If not relying on an operations advisor, describe how the fire brigade leader and members have sufficient training and knowledge of nuclear safety systems and understand the effects of fire and fire suppression on nuclear safety performance criteria.

c) Describe how the operations responder has sufficient training and knowledge of nuclear safety systems and understands the effects of fire and fire suppression on NSPC.

d) If the operations responder is considered an "operations advisor" per the exception to NFPA 805, Section 3.4.1(c), describe whether this position is dedicated to fire brigade support and if so; whether the position is responsible for other actions related to the event and what those other responsibilities entail.

e) Describe the interaction and means of communication between the brigade leader, operations responder, and CR. Describe whether the brigade leader and operations responder are in the fire location. Describe whether all responders wear turn-out gear. Describe how communication effected with regard to

suppression effects on nuclear safety between the brigade members directly applying suppression, the brigade leader, and the operations responder.

PG&E Response:

a) PG&E complies with the exception to NFPA 805 (2001 edition), 3.4.1(c), which states: "Sufficient training and knowledge shall be permitted to be provided by an operations advisor dedicated to industrial fire brigade support."

Per PG&E procedure, the operations advisor is called the OR. The responsibilities of the OR include:

- Coordination and communication between the IC, at the scene, and the Control Room or Technical Support Center,
- Assist the IC in regard to Safe Shutdown equipment considerations, and
- Assist the IC with requests for securing plant equipment, securing electrical sources and opening fire barriers (doors).

For clarity, PG&E NFPA 805 LAR Enclosure 1, Attachment A, Element 3.4.1(c) Compliance Basis is revised as follows:

"~~Complies with the exception of a statement in Casualty Procedure M-6, "Fire," Revision 33A, that allows the Incident Commander to be an operations responder. This is not actual plant practice. Therefore, Compliance Basis will be Complies one Implementation Item S-3.13 is completed.~~ Complies with the Exception. Casualty Procedure M-6, Section 2.1.1, specifies that "an operations responder will accompany the [Incident Commander] in all emergency responses inside the protected area." The operations responder as discussed above is equivalent to the operations advisor as permitted by the exception.

Casualty Procedure M-6 allows the Incident Commander to be an operations responder. This is not actual plant practice, and Implementation Item S-3.13 was established to revise the procedure. Therefore, the Compliance Basis will be 'Complies' once Implementation Item S-3.13 is completed."

b) As noted in the response to FPE RAI-02.a, PG&E complies with the exception to Section 3.4.1(c) of NFPA 805. PG&E relies on an operations advisor, who is referred to as the OR.

c) Per PG&E procedure, ORs are either Licensed Operators or are qualified level 8 Nuclear Operators. Level 8 Nuclear Operators are trained and qualified on plant systems, and have a minimum of two years of experience beyond initial training

and qualifications. Therefore, level 8 Nuclear Operators possess sufficient training and knowledge of both primary and secondary systems, as well as emergency and abnormal operating procedures.

In addition, all ORs receive initial and periodic refresher training on duties and responsibilities. Annual drill participation is also required in accordance with an approved Job Performance Measure. Therefore, ORs are trained in the effects of fire and fire suppression on NSPC.

d) As discussed in the response to FPE RAI-02.a, the OR is considered an operations advisor per the exception to NFPA 805 Section 3.4.1(c). The OR is dedicated to fire brigade support. Per PG&E procedure, the responsibilities of the OR are:

- Coordination and communication between the IC, at the scene, and the Control Room or Technical Support Center,
- Assist the IC in regard to Safe Shutdown equipment considerations, and
- Assist the IC with requests for securing plant equipment, securing electrical sources and opening fire barriers (doors).

The OR's other duties are suspended during an emergency to allow for response to the emergency with the fire brigade.

e) Describe the interaction and means of communication between the brigade leader, OR, and CR

Per PG&E procedure, upon notification of a fire emergency (e.g., via the plant fire alarm), the OR dials into the bridge line (a.k.a. "the Fire Phone"), along with the fire captain and control room personnel. This initial communication will inform the OR where the fire and the IC will be.

Subsequent to this communication, the OR obtains prescribed equipment (including a radio, pre-plans, the OR checklist, an AED, and the gurney), and responds to the scene to join up with the IC. If unable to find the IC, the OR uses the fire repeater channel on the radio to establish contact.

After responding to the scene, the OR then uses the radio or other available communications equipment such as plant telephones to establish communication with the CR. Communications from the OR to the CR include: description of the affected area, the time that firefighting commences, quantity and containment status of involved hazardous material, description and status of involved NSPC equipment, ventilation changes recommended by on scene personnel, the time that the fire is extinguished, and requests from the IC for outside assistance. The fire pre-plans are used as a communication tool to allow the OR to precisely

describe fire and suppression effect locations to CR personnel, who can then provide backup and required actions regarding NSPC equipment. This arrangement also allows the OR to communicate information regarding suppression effects on nuclear safety directly to the IC.

Describe whether the brigade leader and OR are in the fire location

Per PG&E procedure, the IC sets up an incident command post at a safe location near the scene. The OR responds to the incident command post.

Describe whether all responders wear turn-out gear

Per PG&E procedure, emergency responders respond in fire turnouts as appropriate; however, the OR does not have fire turnouts or a Self-Contained Breathing Apparatus (SCBA), and does not enter any area with hazardous atmospheric conditions.

Describe how communication effected with regard to suppression effects on nuclear safety between the brigade members directly applying suppression, the brigade leader, and the OR

Communication between the IC and OR are described above. Because the IC and OR respond to the scene or a nearby location per PG&E procedure, they are able to communicate directly with each other and with brigade members regarding suppression effects on nuclear safety.

NRC FPE RAI 3:

Numerous attributes in NFPA 805 Chapter 3 define the Power Block. LAR Attachment I provides a listing of power block structures and the associated fire areas, but does not specifically list a "Yard" fire area other than the transformer yard. Fire Areas 2, 26, and 27A-C are included in LAR Attachment C but not in LAR Attachment I. Risk values (Core Damage Frequency (CDF) and Large Early Release Frequency (LERF)) are provided for Fire Areas 2 and 26 in LAR Attachment W. LAR Attachment E includes evaluation of radioactive release from fire areas 2, 26, and 27A-C. Nuclear Energy Institute (NEI) 04-02, "Guidance for Implementing a Risk-Informed, Performance Based Fire Protection Program Under 10 CFR 50.48(c)," Revision 2 (ADAMS Accession No. ML081130188), Appendix K, Section K.2, includes structures for radioactive waste as being in the power block.

a) Please provide confirmation that fire areas 2, 26, 27A, B and C, are properly described along with an appropriate basis for the determination.

b) Confirm there are no other SSCs that would be considered in the yard area outside the primary structures listed in LAR Attachment I. Include a discussion of the Raw Water Storage Reservoir.

PG&E Response:

a) Fire Area 2 (Auxiliary Boiler)

This fire area is a compartment in the Unit 1 side of the FHB on the 85 foot elevation. The compartment contains the abandoned-in-place package boiler, and contains no NSPC equipment or cables, as described in the NSCA. Because this fire area is internal to the FHB, it is part of the power block as defined in NEI 04-02, Appendix K, Section K.2. It is currently appropriately described in Attachment C and Attachment E, and included in Attachment W, Table W-4 (DCPP Unit 1 and Common Fire Area Risk Summary). Fire Area 2 is in the power block definition in Attachment I, in the FHB, between Fire Areas V-4 and 3-P-1.

Fire Area 26 (Chemical and Gaseous Storage)

This fire area is a chemical and gaseous storage vault (also known as the yard vault) east of the fuel handling building at 115 foot elevation. The area contains no NSPC equipment or cables, as described in the NSCA. Because this fire area is part of the RCA, and can contain radiological material, it is part of the power block as defined in NEI 04-02, Appendix K, Section K.2. It is currently appropriately described in Attachment C and included in Attachment W, Table W-4 (DCPP Unit 1 and Common Fire Area Risk Summary). It is also appropriately described in Attachment E, although the description is replaced with "Chemical and Gaseous Storage" for consistency with Attachment C. Fire Area 26 is added to the power block definition in Attachment I.

Fire Area 27-A (Boxed Waste Zone)

This fire area is material storage inside a structure east of the FHB at 115 foot elevation. The area contains no NSPC equipment or cables, as described in the NSCA. Because this fire area is part of the RCA, and can contain radiological material, it is part of the power block as defined in NEI 04-02, Appendix K, Section K.2. It is currently appropriately described in Attachment C and Attachment E, and included in Attachment W, Table W-4 (DCPP Unit 1 and Common Fire Area Risk Summary). The risk contribution of Fire Area 27-A is included in Fire Area 26 CDF/LERF in Table W-4. Fire Area 27-A is added to the power block definition in Attachment I.

Fire Area 27-B (Drum Storage Zone)

This fire area is drum storage inside a structure east of the FHB at 115 foot elevation. The area contains no NSPC equipment or cables, as described in the NSCA. Because this fire area is part of the RCA, and can contain radiological material, it is part of the power block as defined in NEI 04-02, Appendix K,

Section K.2. It is appropriately described in Attachment C and Attachment E, and is included in Attachment W, Table W-4 (DCPP Unit 1 and Common Fire Area Risk Summary). The risk contribution of Fire Area 27-A is included in Fire Area 26 CDF/LERF in Table W-4. Fire Area 27-B is added to the power block definition in Attachment I.

Fire Area 27-C (Contaminated Oil Storage)

This fire area is for contaminated oil storage inside a structure east of the FHB at 115 foot elevation. The area contains no NSPC equipment or cables, as described in the NSCA. Because this fire area is part of the RCA, and can contain radiological material, it is part of the power block as defined in NEI 04-02, Appendix K, Section K.2. It is appropriately described in Attachment C and Attachment E, and is included in Attachment W, Table W-4 (DCPP Unit 1 and Common Fire Area Risk Summary). The risk contribution of Fire Area 27-A is included in Fire Area 26 CDF/LERF in Table W-4. Fire Area 27-C is added to the power block definition in Attachment I.

PG&E NFPA 805 LAR, Attachment I is revised as follows:

> A new row, "Radwaste Laundry Facility and Yard Vault" is added, containing the following Fire Areas: 26, 27-A, 27-B, and 27-C.

PG&E NFPA 805 LAR, Attachment E is revised to:

> "change the Fire Zone Description for Fire Area / Fire Zone 26 to "Chemical and Gaseous Storage ~~Building 117B Radwaste Laundry and Storage Facility~~" for consistency."

PG&E NFPA 805 LAR, Attachment W is revised to:

> "change the Fire Zone Description for Fire Area / Fire Zone 26 to "~~Unit 1 and 2~~ Chemical and Gaseous Storage" for consistency."

b) There is one case of cables associated with NSCA equipment in the yard area outside the primary structures/areas listed in PG&E NFPA 805 LAR Attachment I.

Specifically, cable runs from the turbine building to the intake structure include cables that are associated with NSCA equipment for both units. These cables are in conduit embedded in concrete, except when they pass through electrical pull boxes. Electrical pull boxes are normally closed with concrete covers of 6" or greater thickness. Procedures are in place that ensure when pull boxes are opened, redundant train pull boxes are not affected. Electrical pull boxes are equipped for drainage, contain no combustibles or ignition sources aside from the cables themselves, and are separated by vitality so that no cables of redundant trains are run through the same pull box. Finally, these cable runs do

not contribute to plant fire risk, as evaluated in the FPRA. On this basis, these cable runs are excluded from the power block.

The RWSR is at an elevation of 298.5 feet approximately 750 feet east of the power block. It contains one NSCA component, the RWSR (MU-0-RWST), a mechanical structure. There are no electrical cables associated with this component, and no electrical cables associated with any other NSCA equipment are in the vicinity. The area contains no radiological sources within the scope of the radiological release requirements of NFPA 805, it contains no water treatment facilities that are credited in the Fire PRA or the NSCA, and is not identified as a fire area or zone in the current licensing basis. Therefore, a fire in the vicinity of the RWSRs would have no adverse impact on the plant's ability to achieve and maintain the fuel in a safe and stable condition. On this basis, the RWSR is excluded from the power block, in accordance with the guidance of NEI 04-02, Appendix K, Section K.2.

In conclusion, no changes to the power block definition in LAR Attachment I are required due to equipment in the yard area outside the primary structures/areas listed in PG&E NFPA 805 LAR Attachment I.

NRC FPE RAI 5:

LAR Attachment L, Approval Request 3, contains the following statement regarding safety margin:

> *The use of these materials has been defined by the limitations of the analytical methods used in the development of the Fire Probabilistic Risk Assessment (FPRA). Therefore, the inherent safety margin and conservatisms in these methods remain unchanged.*

Please provide the following:

a) A description of how the use of these materials has been defined by the limitations of the analytical methods of the PRA.

b) A description of the meaning of "inherent safety margin and conservatisms in these methods."

PG&E Response:

a) & b) The use of the materials discussed in this Approval Request is subject to limitations and precautions that ensure that their use does not impact the results of analyses of fire events within the FPRA. For example, the fact that EMT (thin wall) conduit is only used for non-Class 1E cables (as discussed below) ensures that Class 1E cables are not subject to physical damage as a result of being installed in thin wall conduit. This and similar limitations

ensure that the assumptions in the FPRA remain valid, thereby ensuring that safety margin and conservatisms are unaffected.

The second sentence extends language found in NEI 04-02, Section 5.3.5.3 (Safety Margins), which refers to inherent safety margin present in the internal events PRA model, to FPRA methods. This extension is reasonable because NRC-accepted methods are used to perform the FPRA. Deviations are evaluated against the methods and criteria for the overall internal events PRA and FPRA model development for consistency, or confirmation of bounding treatment, to confirm that the safety margin inherent in the PRA model is preserved. If the deviation does not change the FPRA, the safety margin inherent in the FPRA is also unchanged.

Specifically:

- Embedded nonmetallic conduit is protected from physical damage and from damage resulting from either an exposure fire or from a fire within the conduit impacting other targets. The areas with plastic conduit have been analyzed in their current configuration. Precautions and limitations on use ensure that these materials do not impact the analysis of the fire event. Therefore, the inherent safety margin and conservatisms in these analysis methods remain unchanged.

- PVC-coated rigid iron conduit does not lend itself to credible fire propagation that would cause safe shutdown circuits or equipment to be affected. If a fire were to occur in a fire area containing these conduits, existing controls such as fire-rated barriers, electrical raceway fire barrier systems, spatial separation, etc. would ensure that redundant cabling and circuitry would not be affected by the fire. Additionally, because the conduit is rigid iron, it will provide equivalent physical and electrical protection to standard rigid iron conduit, and will therefore not result in additional risk of damage to circuits. Precautions and limitations on use ensure that these materials do not impact the analysis of the fire event. Therefore, the inherent safety margin and conservatisms in these analysis methods remain unchanged.

- Per PG&E design guidance, EMT (thin wall) conduit is not used for Class 1E applications installed after June 1, 1982, and the analysis of Class 1E circuits is not affected. The circuits enclosed in EMT conduit are not essential to achieve safe and stable plant conditions. Additionally, the circuits are fully enclosed by conduit and therefore are not susceptible to in-conduit self-ignition. Precautions and limitations on use ensure that these materials do not impact the analysis of the fire event. Therefore, the inherent safety margin and conservatisms in these analysis methods remain unchanged.

- Per PG&E design guidance, use of nonsheathed, metallic, flexible conduit is minimized and never used in place of Rigid Iron conduit; for example, it is used for fiber optic and low-voltage video, communication, and data cables. It is not used with power, control, or instrumentation circuits that are essential to achieve safe and stable plant conditions except in short lengths to connect components, as allowed by NFPA 805 section 3.3.5.2. Additionally, fiber optic and low-voltage cables are less susceptible to self-ignition and electrical shorts that could result in fire and potential damage to external conduits. Precautions and limitations on use ensure that these materials do not impact the analysis of the fire event. Therefore, the inherent safety margin and conservatisms in these analysis methods remain unchanged.

Based upon the above discussion, Approval Request 3 is revised as follows (note that the following also includes revisions from the response provided to FPE RAI-04):

"**Approval Request 3**

NFPA 805, Section 3.3.5.2

NFPA 805, Section 3.3.5.2 states:

> *"Only metal tray and metal conduits shall be used for electrical raceways. Thin wall metallic tubing shall not be used for power, instrumentation, or control cables. Flexible metallic conduits shall only be used in short lengths to connect components."*

PG&E requests NRC approval for the use of non-metallic conduit as an acceptable variance from the requirements of NFPA 805, Chapter 3. ~~requirements.~~

DCM T-22 requires that rigid Polyvinylchloride (PVC) conduit not be used in nonembedded applications without coordination with Fire Protection personnel:

- PG&E policy is to use PVC outdoors, either embedded or not embedded in concrete.

- PVC-coated ~~Rigid Iron~~ rigid iron conduit is used above ground in outdoor areas and indoor areas subject to wet or corrosive environments, such as the intake structure. Additionally, coated metal flexible conduit is used in short lengths to connect components.

DCM T-22 requires that Acrylonitrile-Butadiene-Styrene (ABS) conduit be embedded in concrete or in earth beneath a protective concrete slab in indoor and outdoor applications. DCM T-22 requires that Transite be only used when buried directly in the ground or encased in cement:

- Since Transite is an asbestos product, its manufacture has been discontinued. As a replacement for Transite Type II, PG&E Thermal Electric Design Standard (TEDS) 051879 allows the use of ABS, high density polyethylene (HDPE), or PVC for direct burial use, provided they meet the requirements of the "Western Underground Committee Model Specification No. 3-1."

DCM T-22 requires that Electrical Metallic Tubing (EMT) (thin wall) conduit may not be used for Class 1E circuits (as defined by IEEE 308-1971) installed after June 1, 1982.

As discussed above, nonmetallic conduit is used in embedded and underground applications throughout the plant and in the intake structure.

Also, as discussed above, EMT (thin wall) conduit is used for non-Class 1E circuits throughout the plant.

Finally, nonsheathed, metallic, flexible conduit is used throughout the plant for fiber optic and low-voltage video, communication, and data cabling.

Basis for Request:

The basis for the approval request of this deviation for embedded nonmetallic conduit is:

- Access points to embedded conduit are required by DCM T-22 to be rigid steel. The nonmetallic conduit in question is used in concrete embedded applications, thus providing physical protection and separation for the conduit.

- The plastic conduit embedded in concrete is not subject to flame/heat impingement from an external source which would result in structural failure, contribution to fire load, and/or damage to the circuits contained within, where the conduit is embedded in concrete.

- Failure of circuits within embedded conduits resulting in a fire would not result in damage to external targets. In other words,

other circuits would not be exposed to the effects of a circuit failure in the embedded conduit.

- NFPA 70 (National Electric Code (NEC)), Article 352, allows use of Rigid Nonmetallic Conduit for underground and embedded applications.

The basis for the approval request of this deviation for PVC-coated rigid iron conduit used above ground is as follows:

- PVC-coated rigid iron conduit provides equivalent physical and electrical protection to standard rigid iron conduit, because the characteristics of the metallic body of the conduit are not affected by the coating.

- The use of PVC-coated rigid iron conduit is limited to outdoor areas and indoor areas subject to wet or corrosive environments, such as the intake structure.

- NFPA 70 (NEC), Article 344, allows rigid metal conduit to be used in wet areas and areas subject to severe corrosive influences, provided that it is equipped with corrosion protection.

- Because the PVC coating is thin, it is not expected to sustain fire on the conduit exterior for any credible length of time. Specifically, the plastic coating is approximately 0.060" thick or less, and is not expected to provide any credible influence on fire propagation behavior.

- If a fire were to occur in a fire area containing these conduits, existing controls such as fire-rated barriers, electrical raceway fire barrier systems, spatial separation, etc. would ensure that redundant cabling and circuitry would not be affected by the fire.

The basis for the approval request of this deviation for coated flexible metallic conduit used in short lengths to connect components is as follows:

- Coated flexible metallic conduit provides equivalent physical and electrical protection to uncoated flexible metallic conduit, because the characteristics of the metallic body of the conduit are not affected by the coating.

- The use of such conduit complies with the requirements of NFPA 805, 2001 edition, with the exception that the metallic flexible conduit is coated with thermoplastic material.

- Because the thermoplastic coating is thin, it is not expected to sustain fire on the conduit exterior for any credible length of time. Specifically, the plastic coating is approximately 0.060" thick or less, and is not expected to provide any credible influence on fire propagation behavior.

- If a fire were to occur in a fire area containing these conduits, existing controls such as fire-rated barriers, electrical raceway fire barrier systems, spatial separation, etc. would ensure that redundant cabling and circuitry would not be affected by the fire.

The basis for the approval request of this deviation for EMT (thin wall) conduit is:

- EMT is used only for non-Class 1E applications. Accordingly, potentially affected equipment is only that which is not essential to achieve safe and stable plant conditions (DCM T-19).

- EMT is used extensively throughout the plant in non-Class 1E applications. Replacing all such conduit would be extremely burdensome and cost ineffective, with little additional enhancement of the fire protection program.

- The NEC states, in Article 358.10, that "the use of EMT shall be permitted for both exposed and concealed work." According to the NFPA Report on Proposals for Revision to NFPA 805-2001, Section 3.3.5.2 of NFPA 805, was revised for consistency with NFPA 70 to remove the sentence regarding thin-wall metallic tubing. The current edition, NFPA 805-2010, retains this change.

  The revised section (which is Section 5.3.7.2 in the 2010 edition) states:

  > "Only metal tray and metal conduits shall be used for exposed electrical raceways." The addition of the word "exposed" indicates that plastic conduits are permitted for electrical raceways that are not exposed (i.e., embedded or underground).

The basis for the approval request for this deviation for nonsheathed, metallic, flexible conduit for fiber optic and low-voltage video, communication, and data cables is:

- The video, communication, and data cables in question are not power, control, or instrumentation circuits and are not essential to achieve safe and stable plant conditions.

- Fiber optic and low-voltage cables are not generally susceptible to self-ignition and electrical shorts that could result in fire and potential damage to external targets.

Acceptance Criteria Evaluation:

Nuclear Safety and Radiological Release Performance Criteria:

The use of nonmetallic conduit for raceways embedded in concrete is allowed by NFPA 70, National Electric Code (NEC), and provides adequate physical and electrical protection for cables. The use of plastic conduit in embedded locations does not affect nuclear safety, as the material in which conduits are run within an embedded location are not subject to the failure mechanisms that could potentially result in circuit damage or resultant damage to external targets. Therefore, there is no impact on the nuclear safety performance criteria.

The use of PVC-coated rigid iron conduit is provided for in NFPA 70 (NEC) and provides equivalent physical and electrical protection for cables as uncoated rigid iron. The use of PVC-coated rigid iron conduit in areas subject to corrosive influences does not affect nuclear safety, as the characteristics of this PVC-coated conduit do not lend themselves to credible fire propagation that would cause safe shutdown circuits or equipment to be affected. If a fire were to occur in a fire area containing these conduits, existing controls such as fire-rated barriers, electrical raceway fire barrier systems, spatial separation, etc. would ensure that redundant cabling and circuitry would not be affected by the fire.

The use of coated metal flexible conduit is used in short lengths to connect components does not affect nuclear safety, as the conduit will provide equivalent protection to uncoated flexible metallic conduit, and the characteristics of this plastic-coated conduit do not lend themselves to credible fire propagation that would cause safe shutdown circuits or equipment to be affected. If a fire were to occur in a fire area containing these conduits, existing controls such as fire-rated barriers, electrical raceway fire barrier systems, spatial separation, etc. would ensure that redundant cabling and circuitry would not be affected by the fire.

The use of EMT does not affect shutdown-related circuits, as it is limited for use with non-Class 1E circuits. Therefore, there is no impact on the nuclear safety performance criteria.

The use of nonsheathed, metallic, flexible conduit for fiber optic and low-voltage video, communication, and data cables does not affect shutdown-related circuits, as it is limited for use with video, communication, and data circuits. Therefore, there is no impact on the nuclear safety performance criteria.

The use of nonmetallic conduit in embedded installations, the use of PVC-coated rigid iron conduit, the use of coated flexible metallic conduit in short lengths to connect components, the use of EMT with non-Class 1E circuits, and the use of nonsheathed, metallic, flexible conduit for fiber optic and low-voltage video, communication, and data cables do not have any impact on the radiological release performance criteria. The radiological release review was performed based on the manual fire suppression activities in areas containing, or potentially containing, radioactive materials and is not dependent on the type of conduit material. The conduit material does not change the radiological release evaluation ~~performed~~ conclusion that potentially contaminated water is contained and smoke is monitored. The conduits do not add additional radiological materials to the area or challenge systems boundaries that contain plastic conduits.

Safety Margin and Defense-in-Depth:

Embedded nonmetallic conduit is protected from mechanical damage and from damage resulting from either an exposure fire or from a fire within the conduit impacting other targets. The areas with plastic conduit have been analyzed in their current configuration. Precautions and limitations on use ensure that these materials do not impact the analysis of the fire event. Therefore, the inherent safety margin and conservatisms in these analysis methods remain unchanged.

PVC-coated rigid iron conduit does not lend itself to credible fire propagation that would cause safe shutdown circuits or equipment to be affected. If a fire were to occur in a fire area containing these conduits, existing controls such as fire-rated barriers, electrical raceway fire barrier systems, spatial separation, etc. would ensure that redundant cabling and circuitry would not be affected by the fire. Additionally, because the conduit is rigid iron, it will provide equivalent physical and electrical protection to standard rigid iron conduit, and will therefore not result in additional risk of damage to circuits. Precautions and limitations on use ensure that these materials do not impact the analysis of the fire event. Therefore, the inherent safety margin and conservatisms in these analysis methods remain unchanged.

Coated flexible metallic conduit in short lengths to connect components does not lend itself to credible fire propagation that would cause safe

shutdown circuits or equipment to be affected. If a fire were to occur in a fire area containing these conduits, existing controls such as fire-rated barriers, electrical raceway fire barrier systems, spatial separation, etc. would ensure that redundant cabling and circuitry would not be affected by the fire. Additionally, because the conduit is metallic, it will provide equivalent physical and electrical protection to standard flexible metallic conduit, and will therefore not result in additional risk of damage to circuits. Precautions and limitations on use ensure that these materials do not impact the analysis of the fire event. Therefore, the inherent safety margin and conservatisms in these analysis methods remain unchanged.

EMT (thin wall) conduit is not used for Class 1E applications after 6/1/82, and the analysis of Class 1E circuits is not affected. The circuits enclosed in EMT conduit are not essential to achieve safe and stable plant conditions. Additionally, the circuits are fully enclosed by conduit and therefore are not susceptible to in-conduit self-ignition. Precautions and limitations on use ensure that these materials do not impact the analysis of the fire event. Therefore, the inherent safety margin and conservatisms in these analysis methods remain unchanged.

Nonsheathed, metallic, flexible conduit is used only for fiber optic and low-voltage video, communication, and data cables. They are not power, control, or instrumentation circuits and are not essential to achieve safe and stable plant conditions. Additionally, fiber optic and low-voltage cables are not susceptible to self-ignition and electrical shorts that could result in fire and potential damage to external conduits. Precautions and limitations on use ensure that these materials do not impact the analysis of the fire event. Therefore, the inherent safety margin and conservatisms in these analysis methods remain unchanged.

~~Noncompliant conduit material is either embedded in a noncombustible configuration or is not used with Class 1E circuits. The use of these materials has been defined by the limitations of the analytical methods used in the development of the Fire Probabilistic Risk Assessment (FPRA). Therefore, the inherent safety margin and conservatisms in these methods remain unchanged.~~ The three echelons of DID are: (1) to prevent fires from starting (combustible/hot work controls); (2) rapidly detect, control and extinguish fires that do occur, thereby limiting damage (fire detection systems, automatic fire suppression, manual fire suppression, PFPs); and (3) provide adequate level of FP for systems and structures so that a fire will not prevent essential safety functions from being performed (fire barriers, fire-rated cable, success path remains free of fire damage, RAs). The use of embedded/underground plastic conduit, EMT, and nonsheathed, metallic, flexible conduit for

video, communication, and data cables does not affect echelons 1, 2, and 3. They do not directly result in compromising automatic or manual fire suppression functions, fire protection for systems and structures, or post-fire SSD capability.

Conclusion:

NRC approval is requested for the use of nonmetallic, PVC-coated rigid iron, coated flexible metallic conduit in short lengths to connect components, EMT, and flexible conduit at DCPP as described above.

The performance-based approach satisfies the following criteria:

(A) Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release

(B) Maintains safety margins; and

(C) Maintains fire protection DID (fire prevention, fire detection, fire suppression, mitigation, and post-fire nuclear safety capability)."

NRC FPE RAI 7:

LAR Attachment L, Approval Request 5, requests approval of a performance-based approach to compliance with NFPA 805 Section 3.3.8 regarding the installation of an automatic-closing, heat-actuated valve on the EDG day tank withdrawal connection as required by NFPA Standard 30 "Flammable and Combustible Liquids Code." Please address the following:

a) In the basis for request, the LAR describes a number of valves in the fill lines to the day tank and the fuel supply lines to the EDG and indicates manual actions can be taken by operators to close the valves and minimize fuel leakage. Describe the location and configuration of the valves in the lines to and from the EDG day tank, including the location of the valves relative to the EDG tank and the potential fire location. For example, state whether these valves would remain accessible during a fire in the EDG day tank area.

b) In the basis for request, the LAR states that credible fires of sufficient size and intensity to damage the EDG day tanks are not anticipated, in-part, because an EDG day tank spill will be directed from the EDG room by floor drains to the turbine building sump. Provide further explanation describing the potential, or lack thereof, for a fuel fire in the EDG room to propagate to the turbine building