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PG&E Letter DCL-15-061

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

10 CFR 50.90

Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
Second Radiation Release 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 - Radiation Release (Rad Release) Request for Additional Information Re: License Amendment Request (LAR) 13-03 to Adopt National Fire Protection Association Standard 805 (TAC Nos. MF2333 and MF2334)," dated September 23, 2014
- 3) PG&E Letter DCL-14-123, "Radiation Release Response to NRC Request for Additional Information – National Fire Protection Association Standard 805," dated December 31, 2014
- 4) NRC Email from S. Lingam, Project Manager, "Diablo Canyon, Units 1 and 2 – Radiation Release Requests for Additional Information (RAIs) for Fire Protection License Amendment Request (LAR) (TAC Nos. MF2333 and MF2334)," dated April 7, 2015

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 (NFPA 805).



In Reference 2, the NRC provided a request for additional information (RAI) regarding Reference 1. PG&E provided a response to Reference 2 in Reference 3.

In Reference 4, the NRC provided additional radiation release RAI questions. The RAI questions were discussed in draft form in a teleconference on April 7, 2015. Enclosed are PG&E's responses to these RAI questions.

PG&E makes no new 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. Philippe Soenen at 805-545-6984.

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

Executed on May 7, 2015.

Sincerely,

Barry S. Allen
Vice President, Nuclear Services

mjrm/4557/50631710

Enclosure

cc: Diablo Distribution
cc/enc: Marc L. Dapas, NRC Region IV
Thomas R. Hipschman, NRC Senior Resident Inspector
Siva P. Lingam, NRR Project Manager
Gonzalo L. Perez, Branch Chief, California Dept of Public Health

Second Radiation Release 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 - Radiation Release (Rad Release) Request for Additional Information Re: License Amendment Request (LAR) 13-03 to Adopt National Fire Protection Association Standard 805 (TAC Nos. MF2333 and MF2334)," dated September 23, 2014
- 3) PG&E Letter DCL-14-123, "Radiation Release Response to NRC Request for Additional Information – National Fire Protection Association Standard 805," dated December 31, 2014
- 4) NRC Email from S. Lingam, Project Manager, "Diablo Canyon, Units 1 and 2 – Radiation Release Requests for Additional Information (RAIs) for Fire Protection (NFPA-805) License Amendment Request (LAR) (TAC Nos. MF2333 and MF2334)," dated April 7, 2015

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

On April 7, 2015, the NRC provided additional RAI questions (Reference 4). Below are PG&E's responses to the NRC RAIs.

Radiation Release RAI 09:

Will each zone/area/building of interest have its own administrative activity limit, based on a zone specific calculation?

PG&E Response:

There will not be separate calculations to establish an administrative activity limit for each zone, area, or building.

The administrative activity limit established in "Radioactive Release From Dry Active Waste Fire Suppression Calculation," (Vendor Calculation 030007-CALC-01) will be applied to each radiologically contaminated fire fuel package or bundle, rather than

to a specific zone, area, or building. A fire fuel package or bundle is the material anticipated to be involved in a fire, either because the fire starts in the material or from the spread of a fire originating elsewhere. The administrative limit establishes the maximum storage value for material which can become involved in a single fire event.

Radiation Release RAI 10:

The response states that the Administrative Limit will ensure that "releases do not exceed 10 CFR Part 20 limits." Is this statement referring to the dose limit for a member of the public? If so, is the calculated dose to a real individual or a maximum exposed individual consistent with the Offsite Dose Calculation Manual? Is the Administrative Limit set bases on meeting the concentration limits in Appendix B to 10 CFR Part 20?

PG&E Response:

The limits referred to in PG&E's responses to RAIs 02, 03, 04, and 05 in Reference 3 refer to the dose limit for a member of the public. They are from 10 CFR 20.1301 (a) (1), "The total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem (1 millisievert) in a year..."

The calculated dose is to the critical receptor and is as defined in the DCPD ODCM.

The administrative limit is not based on meeting the concentration limits in Appendix B to 10 CFR Part 20, but rather the TEDE to the critical receptor, as defined in PG&E CAP A-8, "Offsite Dose Calculations."

Radiation Release RAI 11:

Describe the methodology used for each calculation to establish the maximum curie Administrative Limit, including all of the input assumptions and parameters used in these calculations.

PG&E Response:

Methodology

The calculations, "Radioactive Release From Dry Active Waste Fire Suppression Calculation" (Vendor Calculation 030007-CALC-01) and "Radioactive Release From Waste Oil Fire Suppression Calculation," (Vendor Calculation 030007-CALC-02) were intended to establish a bounding value for storage of radiologically contaminated material. Therefore, the liquid and airborne pathways were assessed

individually. Vendor Calculation 030007-CALC-02 addressed contaminated oil while Vendor Calculation 030007-CALC-01 addressed combustible material in general.

In both calculations, determination of the dose to specific organs as a result of a fire was based on the PG&E CAP A-8, Revision 36. This procedure is based on RG 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR 50, Appendix I," Revision 1, and NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants."

Based on the equations in PG&E CAP A-8, for an airborne release, all that is needed to determine an organ dose from a particular isotope is the dispersion or deposition factor, the dose commitment factor, and the activity released.

Similarly, for a liquid release, all that is needed to determine an organ dose from a particular isotope is the dose commitment factor, the isotopes concentration in the undiluted effluent, the duration of the release, and the near field dilution factor.

Most of the dose commitment factors for the isotopes under consideration were found in attachments to PG&E Procedure CAP A-8. For those isotopes whose dose commitment factor was not listed in the procedure, equations from NUREG-0133 were used in conjunction with dose conversion factors obtained from RG 1.109, NUREG-0172, or the LADTAP computer code written by the NRC Radiological Assessment Branch to calculate doses from several radionuclide release pathways.

The dispersion factor, quantity released, the duration of the liquid release and the near field dilution factor are addressed in the critical assumptions and input parameters.

Because the equations in PG&E CAP A-8 determine the Committed Dose Equivalent to individual organs, the CEDE and the TEDE were determined using the definitions found in 10 CFR 20.1003.

Once the TEDE from burning 1 microcurie (μCi) of material was determined, the administrative limit was determined by comparing this dose to the limit of 100 millirem TEDE.

Critical Assumptions Germane to both Calculations

1. For the airborne pathway:

- a. The fire brigade does not respond, and the fire burns for 60 minutes, consuming all the material.
 - b. The airborne particulates are treated as a ground release.
 - c. The degree of atmospheric dispersion at the critical receptor is per Attachment 2 of PG&E CAP A-8.
 - d. Three exposure pathways associated with an airborne release were assessed: inhalation, consumption of leafy vegetables, and exposure from a ground plane.
2. For the liquid pathway:
- a. The fire brigade arrives immediately and fights the fire for one hour.
 - b. Fire brigade uses one fire hose with a flow rate of 125 gallons per minute.
 - c. Other than the initial entrainment in the fire hose flow, no additional dilution takes place until the effluent mixes with the ocean.
 - d. Transportation of the liquid effluent from the location of entrainment to the ocean is assumed to be instantaneous. No credit is taken for absorption of the material into the ground prior to reaching the ocean.
 - e. The length of time the effluent flows into the ocean is one hour. This was set equal to the length of time the fire brigade fights the fire. Because it is assumed that all the entrained material reaches the ocean, this value has no impact on the calculations.
 - f. Only the salt water fish and salt water invertebrate consumption pathway was considered for the liquid release.

Critical Assumptions for the Combustible Material Calculation

1. The source material involved in the fire is assumed to be 1 μCi of DAW, with an isotopic composition based on a container of compacted DAW (Box 10-B-001).

This box was selected as it contained the highest gross quantity of radioactivity recorded at DCPD for the last several years.

2. A fire will consume the entire container of DAW within one hour at a uniform rate.
3. For the airborne pathway:

The airborne release fraction (ARF) is six percent. Values found in the literature for DAW-like material range from 0.05 percent to six percent. The value of six percent was chosen for conservatism. (Reference DOE-HDBK-3010-94, "Airborne Release Fractions/Rates and Respirable Fractions For Nonreactor Nuclear Facilities Volume I - Analysis of Experimental Data," dated December 1994)

4. For the liquid pathway:

Forty percent of the material becomes entrained in the water used to extinguish the fire. For Douglas fir, NUREG/CR-2658, "Characteristics of Combustion Products: A Review of the Literature," dated July 1983, states that up to 30 percent of the material will remain in the soot and ash. This material would be available to be washed away in the water used to extinguish the blaze. Since the NUREG value is based on Douglas fir and not typical DAW material, the percent available to become entrained in the water used to fight the fire was increased to 40 percent to add conservatism.

Critical Assumptions for the Oil Calculation

1. The source was assumed to be a container of oil containing one μCi of radioactive material. The isotopic mix of the contaminated oil is based on the concentration of nuclides in the reactor water. Noble gases and isotopes with half-lives less than eight days were excluded. The reactor water's isotopic composition was chosen because DCPD has not generated any contaminated oil since 2003.
2. When mixed with the oil, the percent by volume of the reactor water in the oil was assumed to be 0.04 percent. Concentrations greater than this would call into question the quality of the oil.

3. For the airborne pathway:

The ARF for a fire involving a single barrel of oil is assumed to be 10 percent. Per DOE-HDBK-3010-94, this value is the bounding value for both a superheated BLEVE and a vigorous fire involving organic combustible liquids burning to dryness.

4. For the liquid pathway:

All of the material becomes entrained in the water used to extinguish the fire.

Input Parameters

1. Dose commitment factors were either:

- a. From Attachments 1, 5-12 of PG&E CAP A-8, or
- b. Determined using NUREG-0133 methodology in conjunction with dose conversion factors obtained from RG 1.109, NUREG-0172, or LADTAP.

2. The dispersion and deposition factors for the critical receptor, X/Q, and D/Q, are from Attachment 2 of PG&E CAP A-8.

3. The bioaccumulation factors, which are needed to calculate the dose commitment factor for isotopes not listed in PG&E CAP A-8, were obtained from RG 1.109 or NUREG/CR-4013.

Radiation Release RAI 12:

What fraction of the contaminated oil stored in the Fire Zone is assumed to be consumed in the fire? If less than 1.0 provide basis for the assumption. What fraction of the activity in the contaminated oil is assumed to be released as an airborne effluent? - as a liquid effluent?

PG&E Response:

For Vendor Calculation 030007-CALC-02, "Radioactive Release From Waste Oil Fire Suppression Calculation," all of the oil is assumed to be consumed by the fire.

To be conservative, as discussed in the response to RAI 11, the airborne and liquid pathways were assessed individually.

When assessing the airborne route, 10 percent of the material was assumed to become airborne. Per DOE-HDBK-3010-94, this value is the bounding value for both a superheated BLEVE and a vigorous fire involving organic combustible liquids burning to dryness.

When assessing the liquid pathway, 100 percent of the radioactive material was assumed to be released and make its way to the ocean.

Radiation Release RAI 13:

Are operator actions credited in the calculations for reducing the amount of effluent released? If so, specify the operator actions and describe the assumed impact on the resulting dose.

PG&E Response:

In establishing the administrative limit for DCCP, no operator actions were credited in reducing the amount of effluent released.

Acronym List

ARF	Airborne Release Fraction
BLEVE	Boiling Liquid Expanding Vapor Explosion
CAP	Chemical Analysis Procedure
CEDE	Committed Effective Dose Equivalent
DAW	Dry Active Waste
DCPP	Diablo Canyon Power Plant
LADTAP	Liquid Annual Dose to All Persons (Computer Code)
LAR	License Amendment Request
NFPA	National Fire Protection Association
NRC	Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
PG&E	Pacific Gas and Electric Company
RAI	Request for Additional Information
RG	Regulatory Guide
TEDE	Total Effective Dose Equivalent