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NUCLEAR REGULATORY COMMISSION  
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MEMORANDUM TO: Angela Buford, Branch Chief  
Materials Branch 1  
Division of Engineering  
Office of Nuclear Reactor Regulation

FROM: On Yee, Senior Materials Engineer **/RA/**  
Materials Branch 1  
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Office of Nuclear Reactor Regulation

SUBJECT: DIABLO CANYON POWER PLANT, UNIT 1 – STAFF ASSESSMENT  
OF REACTOR VESSEL MATERIAL SURVEILLANCE CAPSULE  
REPORT (CAPSULE B)

By letter dated June 29, 2026, (Agencywide Documents Access and Management System Package Accession No. ML26180A296), Pacific Gas and Electric Company (PG&E) (the licensee) submitted to the U.S. Nuclear Regulatory Commission (NRC) a reactor vessel surveillance capsule report for Diablo Canyon Power Plant Unit 1 (DCPP, Unit 1) in accordance with the Title 10, Code of Federal Regulations (CFR), Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements."

The NRC staff reviewed the report for surveillance capsule B and finds that the report satisfies the requirements of 10 CFR Part 50, Appendix H. The NRC staff's assessment is enclosed.

Docket No. 50-275

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Enclosure:  
Staff Assessment of Reactor Vessel  
Material Surveillance Capsule Report

Distribution:  
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STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
REACTOR VESSEL MATERIAL SURVEILLANCE REPORT  
DIABLO CANYON POWER PLANT UNIT 1  
PACIFIC GAS AND ELECTRIC COMPANY  
DOCKET NO. 50-275

1.0 Introduction

By letter dated June 29, 2026, (Agencywide Documents Access and Management System Package Accession No. ML26180A296), Pacific Gas and Electric Company (PG&E) (the licensee) submitted to the U.S. Nuclear Regulatory Commission (NRC) a reactor vessel surveillance capsule report for Diablo Canyon Power Plant Unit 1 (DCPP, Unit 1) in accordance with the Title 10, Code of Federal Regulations (CFR), Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements."

2.0 Regulatory Evaluation

10 CFR Part 50, Appendix H, requires licensees to implement a material surveillance program to monitor changes in the fracture toughness properties of ferritic materials in the reactor vessel beltline region of light water nuclear power reactors which result from exposure of these materials to neutron irradiation and the thermal environment. Under the program, fracture toughness test data are obtained from material specimens exposed in surveillance capsules, which are withdrawn periodically from the reactor vessel.

10 CFR 50, Appendix H requires the use of ASTM E 185-73, "Standard Recommended Practice for Surveillance Tests for Nuclear Reactor Vessels"; ASTM E 185-79, "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels"; and ASTM E 185-82, "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels."

10 CFR Part 50, Appendix H, requires the licensee to submit a summary report of each capsule withdrawal and the test results within 18 months of the date of capsule withdrawal, unless an extension is granted by the Director, Office of Nuclear Reactor Regulation. The surveillance capsule report must include the data required by ASTM E 185-82, to the extent practicable for the configuration of the specimens in the capsule, and the results of all fracture toughness tests conducted on the beltline materials in the irradiated and unirradiated conditions.

10 CFR Part 50, Appendix H also requires that if a change in the Technical Specifications is required, either in the pressure-temperature limits or in the operating procedures required to meet the limits, the expected date for submittal of the revised Technical Specifications must be provided with the report.

3.0 NRC Staff Assessment

3.1 Unit 1 Surveillance Capsule B report

3.1.1 Surveillance Capsule Program

The initial surveillance program for the Diablo Canyon Unit 1 reactor pressure vessel materials is described in WCAP-8465, "Pacific Gas and Electric Co. Diablo Canyon Unit No.1 Reactor Vessel Radiation Surveillance Program," (ML12242A013) and was developed in accordance

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with ASTM E185-70. This program was enhanced by PG&E when it implemented a supplemental surveillance program at the beginning of Cycle 6, which was approved by the NRC staff in letter dated September 4, 1992 (ML16341G687).

### 3.1.2 Neutron Fluence Evaluation

The radiation analysis and neutron dosimetry calculations described in Section 6 and Appendix A of WCAP-19173-NP were based on nuclear cross-section data derived from an Evaluated Nuclear Data File (ENDF) database (specifically, ENDF/B-VI). Furthermore, the methods used to develop the calculated reactor pressure vessel fluence are consistent with the NRC-approved methodology described in WCAP-18124-NP-A, "Fluence Determination with RAPTOR-M3G and FERRET," and WCAP-18124-NP-A, Supplement 1-NP-A, "Fluence Determination with RAPTOR-M3G and FERRET – Supplement for Extended Beltline Materials."

The staff noted that these two methods are consistent with those analytical methods in the licensee's current licensing basis and are permitted in Technical Specification Section 5.6.6. The licensee reported that Capsule B received a cumulative fast neutron fluence ( $E > 1.0$  MeV) of  $3.62 \times 10^{19}$  n/cm<sup>2</sup> after irradiation for 34.87 EFPY.

The staff noted that Sections 5 and 6 of WCAP-19173-NP document the information for temperature and neutron radiation environment measurements required by Section 11.4.5 of ATSM E 185-82.

### 3.1.3 Material Test Results

The staff noted that the licensee performed mechanical tests of the Charpy V-notch and tensile specimens in Capsule B to meet the requirements of ASTM Specification E185-82, which is in accordance with 10 CFR Part 50, Appendix H.

#### Transition Temperature Shift

Based on the test results, the staff noted the following in relation to transition temperature shift:

- Irradiation of the reactor vessel Lower Shell Plate B4107-1 Charpy specimens resulted in an irradiated 30 ft-lb transition temperature of 155.2°F. This corresponds to a 30 ft-lb transition temperature increase of 136.9°F for the transversely oriented specimens.
- Irradiation of the surrogate weld (Heat # 27204) Charpy specimens resulted in an irradiated 30 ft-lb transition temperature of 201.5°F. This corresponds to a 30 ft-lb transition temperature increase of 242.6°F for the surrogate weld specimens.
- Irradiation of the surveillance weld (Heat # 27204) Charpy specimens resulted in an irradiated 30 ft-lb transition temperature of 243.7°F. This corresponds to a 30 ft-lb transition temperature increase of 308.7°F for the surveillance program weld specimens.

The staff noted that Section 5.2, including Appendix C, of WCAP-19173-NP documents the information for Charpy tests required by Section 11.4.2 of ATSM E 185-82.

The licensee indicated following regarding the test results associated with transition temperature shift from Capsule B:

- The measured Lower Shell Plate B4107-1 shift is higher than the Regulatory Guide 1.99, Revision 2, Position 1.1 predictions, but is within 2-sigma, ( $2\sigma$ , 34°F).
- The measured surveillance weld (Heat # 27204) shift is higher than the Regulatory Guide 1.99, Revision 2, Position 1.1 predictions, but is within 1-sigma, ( $1\sigma$ , 28°F).
- The measured surrogate weld (Heat # 27204) shift is less than the Regulatory Guide 1.99, Revision 2, Position 1.1 predictions, but is not within 2-sigma, ( $2\sigma$ , 34°F).

The staff noted that the insights from the tests results associated with transition temperature shift from any single surveillance capsule may be limited, and that it is necessary to assess the collection of data obtained from the testing of all relevant surveillance capsules. This is consistent with guidance in Regulatory Guide 1.99, Revision 2 for use of Position 2.1 and the evaluation to determine the credibility of the surveillance data (referred to herein as credibility evaluation). The staff's assessment of the licensee's credibility evaluation, which is provided in Appendix D of WCAP-19173-NP, is documented below.

### Upper Shelf Energy

Based on the test results, the staff noted the following in relation to upper-shelf energy:

- The upper-shelf energy of Lower Shell Plate B4107-1 Charpy specimens resulted in an average energy decrease of 14.6 ft-lb after irradiation.
- The upper-shelf energy of the surrogate weld (Heat # 27204) Charpy specimens resulted in an average energy decrease of 45.7 ft-lb after irradiation.
- The upper-shelf energy of the surveillance weld (Heat # 27204) Charpy specimens resulted in an average energy decrease of 37.6 ft-lb after irradiation.

The staff noted that the predicted upper shelf energy decrease when using Position 1.2 of Regulatory Guide 1.99, Revision 2, is greater than the measured percentage (%) decrease in upper shelf energy from the testing of specimens in Capsule B. Additionally, the staff noted that this observation is consistent with the previous test results from the testing of specimens in Capsules S, Y and V from DCP, Unit 1.

Thus, the staff noted that the test results from Capsule B demonstrate that the method in Position 1.2 of Regulatory Guide 1.99, Revision 2, is conservative in predicting the decrease in upper-shelf energy of the reactor vessel material for DCP, Unit 1. As such, given the material property values (i.e., initial USE, %Cu) in the current licensing basis, the staff noted that the projected USE values approved in the staff's evaluation (ML25153A508) of the DCP's license renewal application continue to remain applicable when considering the surveillance data from Capsule B.

### Credibility Evaluation

The staff noted that the surveillance data for Lower Shell Plate B4107-1 is only available from Capsule B; thus, it is not included in the licensee's credibility evaluation of its surveillance data because Regulatory Guide 1.99, Revision 2 specifies two or more credible surveillance data sets to be available when using Position 2.1.

Appendix D of WCAP-19173-NP documents the licensee's credibility evaluation for weld Heat # 27204 performed in accordance with Regulatory Guide 1.99, Revision 2. The licensee determined that the DCP Unit 1 surveillance data for weld Heat # 27204 are deemed credible.

The staff reviewed the licensee's evaluation for weld Heat # 27204 in Appendix D and made the following observations:

- Surveillance data from a sister-plant (i.e., material with a heat-to-heat match) is available and was considered consistent with the requirements in 10 CFR 50.61(c)(2).
- The licensee assessed operating temperature and chemical composition of the sister-plant data for weld Heat # 27204 consistent with the approach approved in the staff's evaluation (ML25153A508) of the DCP's license renewal application.
- Greater than 68% of the surveillance data points (i.e.,  $\pm 1\sigma$  of available data) fall within the  $\pm 1\sigma$  of the 28°F scatter band for surveillance welds.

Based on its review and observations, the staff noted that the available surveillance data for the surveillance weld Heat # 27204 is credible in accordance with Regulatory Guide 1.99, Revision 2. Additionally, the staff noted the chemistry factor when considering the surveillance data from Capsule B is bounded by the value approved in the staff's evaluation (ML25153A508) of the DCP's license renewal application.

As such, given the material property values (i.e., initial  $RT_{NDT}$ , %Cu and %Ni) in the current licensing basis, the staff noted that (1) the pressurized thermal shock reference temperature approved in the staff's evaluation (ML25153A508) of the DCP's license renewal application and (2) the adjusted reference temperature values used in the current DCP Pressure and Temperature Limits Report (ML25210A382) continue to remain applicable when considering the surveillance data from Capsule B. Thus, the staff also noted that a revision to the current DCP Pressure and Temperature Limits Report (ML25210A382) based on the test results from Capsule B is not warranted.

#### 4.0 Conclusion

The NRC staff finds that the licensee's report for Capsule B from DCP Unit 1 satisfies the requirements of Appendix H to 10 CFR Part 50 and the licensee's assessment of the test results were appropriate and based on Regulatory Guide 1.99, Revision 2. The staff further finds that a revision to the licensee's current Pressure and Temperature Limits Report (i.e., Revision 17) is not warranted.