UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 19, 2025

Ms. Paula Gerfen
Senior Vice President, Generation
and Chief Nuclear Officer
Pacific Gas and Electric Company
Diablo Canyon Power Plant
P.O. Box 56
Avila Beach, CA 93424

SUBJECT: DIABLO CANYON NUCLEAR POWER PLANT, UNITS 1 AND 2 - REGULATORY AUDIT SUMMARY IN SUPPORT OF REVIEW OF LICENSE AMENDMENT REQUEST REGARDING REVISION TO TECHNICAL SPECIFICATION 1.1 AND ADDITION OF TECHNICAL SPECIFICATION 5.5.21 TO USE ONLINE MONITORING METHODOLOGY (EPID L-2024-LLA-0179)

Dear Ms. Gerfen:

By application dated December 31, 2024 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML24366A169), Pacific Gas and Electric Company (PG&E, the licensee) requested changes to the Technical Specifications (TSs) for the Diablo Canyon Nuclear Power Plant, Units 1 and 2 (Diablo Canyon). The proposed amendments would revise TS 1.1, “Definitions,” and add TS 5.5.21, “Online Monitoring Program,” to use the online monitoring methodology, which provides controls to determine the need for calibration of transmitters using condition monitoring.

The NRC staff conducted a virtual regulatory audit between March 10 and August 13, 2025, to examine the licensee’s non-docketed information on the proposed Diablo Canyon online monitoring methodology. This audit was conducted in accordance with the audit plan dated February 25, 2025 (ML25051A270).

The purpose of this audit was to gain understanding, to verify information, or to identify information that will require docketing to support the basis of the licensing or regulatory decision. The audit summary is enclosed.

Sincerely,

/RA/

Samson S. Lee, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-275 and 50-323

Enclosure:
Audit Summary

cc: Listserv

REGULATORY AUDIT SUMMARY

IN SUPPORT OF REVIEW OF LICENSE AMENDMENT REQUEST REGARDING

REVISION TO TECHNICAL SPECIFICATION 1.1 AND ADDITION OF

TECHNICAL SPECIFICATION 5.5.21 TO USE ONLINE MONITORING METHODOLOGY

PACIFIC GAS AND ELECTRIC COMPANY

DIABLO CANYON NUCLEAR POWER PLANT, UNITS 1 AND 2

DOCKET NOS. 50-275 AND 50-323

1.0 BACKGROUND

By letter dated December 31, 2024 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML24366A169), Pacific Gas and Electric Company (PG&E, the licensee) submitted a license amendment request (LAR) for Diablo Canyon Nuclear Power Plant, Units 1 and 2 (Diablo Canyon). The proposed amendments would revise the Diablo Canyon Technical Specification (TS) 1.1, “Definitions,” and add TS 5.5.21, “Online Monitoring Program,” to use the online monitoring (OLM) methodology.

The licensee proposes to use the OLM methodology as the technical basis to switch from a time-based surveillance frequency for channel calibrations to a condition-based calibration frequency based on OLM results. The proposed amendments are based on the U.S. Nuclear Regulatory Commission (NRC)-approved Analysis and Measurement Services Corporation (AMS) topical report (TR) AMS-TR-0720R2-A, “Online Monitoring Technology to Extend Calibration Intervals of Nuclear Plant Pressure Transmitters,” August 2021 (ML21235A493).

The NRC staff from the Office of Nuclear Reactor Regulation (NRR) has initiated its review of the LAR in accordance with NRR Office Instruction LIC-101, “License Amendment Review Procedures,” Revision 6, dated July 31, 2020 (ML19248C539).

2.0 AUDIT DATES AND LOCATION

The regulatory audit was conducted remotely from March 10, 2025, to August 13, 2025.

3.0 REGULATORY AUDIT BASIS

A regulatory audit is a planned license or regulation related activity that includes the examination and evaluation of primarily non-docketed information associated with the LAR. The purpose of this audit was to gain understanding, to verify information, or to identify information that will require docketing to support the basis of the licensing or regulatory decision. This audit was conducted in accordance with NRR Office Instruction LIC-111, “Regulatory Audits,” Revision 2, dated December 30, 2024 (ML24309A281), with exceptions noted within the audit plan dated February 25, 2025 (ML25051A270).

The NRC staff performed this audit to support its evaluation of whether the PG&E LAR can be approved per Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.90, “Application

for amendment of license, construction permit, or early site permit." The NRC staff's review will be informed by NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light Water Reactor] Edition," Branch Technical Position (BTP) 7-12, "Guidance on Establishing and Maintaining Instrument Setpoints," Revision 6, August 2016 (ML16019A200). The results of this audit are being used to enhance the NRC staff's understanding of the licensee's proposed OLM LAR.

4.0 AUDIT PARTICPANTS

NRC Participants from NRR

- Gilberto Blas Rodriguez, Division of Engineering and External Hazards (DEX)/Instrumentation and Controls Branch (EICB),
- David Rahn, DEX/Long Term Operations and Modernization Branch
- Norbert Carte, DEX/EICB,
- Tarico Sweat, Division of Safety Systems/Technical Specification Branch

5.0 AUDIT SCOPE

This audit focused on reviewing the OLM procedures and Diablo Canyon specific OLM reports to confirm that the proposed Diablo Canyon OLM program would be implemented in a manner that is consistent with the NRC-approved AMS OLM topical report. A secondary purpose of this audit was to enable the NRC staff to develop a better understanding of the information being used to support the implementation of the Diablo Canyon OLM program.

The licensee and AMS supported the audit by providing remote access to requested reports and by making appropriate staff with detailed knowledge of AMS-TR-0720R1 available for discussions with the NRC staff.

6.0 REGULATORY AUDIT ACTIVITIES

Audit Call, March 10, 2025

During the entrance call, the licensee provided an overview presentation. This outlined the LAR, OLM, and some of the contents outlined in the referenced documentation, emphasizing the selection of amenable transmitters and justification for the program. The licensee also provided an overview of the outline, structure and organization of the reports that were generated as part of the proposed OLM program implementation for Diablo Canyon.

Audit Call, May 20, 2025

The NRC staff requested the licensee to address the following audit questions:

1. The proposed method of monitoring instrument channel drift performance requires the use of a chain of equipment that is external to the instrument channel being monitored. This external equipment chain (Plant Process Computer, Data Historian, and Data Acquisition Equipment) is used to flag instrument channels for calibration that have drifted beyond the weighted average of the group of similar function instrument channels. The amount of drift that is to be detected is only fractions of a percentage of calibrated span

of the instrument channel. However, each piece of external monitoring equipment in the chain of monitoring equipment between the monitored instrument channel and the final string of data that is analyzed to detect excessive drift in the instrument channel has its own uncertainties. It is not clear from the license amendment whether the sum of the uncertainties in the chain of monitoring equipment may actually be capable of measuring with a high enough precision to be able to detect such small drift values or whether this chain of equipment may in fact be masking the fractions of a percent of calibrated span worth of drift that is intended to be detected. Please provide a calculation of the uncertainty that is propagated in the chain of monitoring equipment (i.e., Plant Process Computer, Data Historian, and Data Acquisition Equipment) that includes all the uncertainties that are included within the chain, such as analog to digital (A/D) quantization conversions, anti-aliasing and sampling effects, numerical analysis effects due to rounding and truncating, algorithm-specific uncertainty, data communication error effects, and other effects that are typically associated with the use of digital equipment for processing live data. Please show a comparison of the resulting uncertainty of the monitoring equipment measurement uncertainty against the magnitude of drift error, in percent of calibrated instrument channel span such that it can be determined that the magnitude of drift to be detected is not being masked by the uncertainty in use of this monitoring equipment.

2. For the provided uncertainty terms found in the Analysis and Measurement Services Corporation (AMS) Report DBC2411R0, “OLM [Online Monitoring] Analysis Methods and Limits Report for Diablo Canyon,” for each of the included uncertainty terms (for example, Computer Published Accuracy (CPA) and Computer Input Accuracy (CIA), these differ between some and are the same for other transmitter groups) how were each of these determined? What components went into this determination if they contain multiple uncertainty terms for that loop portion? If there are any assumptions being made, please delineate these and justify why these assumptions are deemed reasonable.

3. Is the plant data historian uncertainty and OLM data acquisition equipment uncertainty being captured as part of the safety related loop uncertainty determination for the OLM calculation? If so, since none of this equipment is part of the instrument loop being monitored, why isn’t the uncertainty of this OLM monitoring equipment not added algebraically to the total loop uncertainty calculation rather than represented within the square-root-of-the-squares calculation for the safety-related instrument channel? Provide a justification as to why the uncertainty of the plant process computer should be considered as part of the loop uncertainty calculation. Since the output of the plant process computer is not part of the safety related instrument channel being monitored, then why is the uncertainty of the process computer not added algebraically to the uncertainty of the channel being monitored?

Licensee Responses:

1. The licensee elaborated on where they obtained the associated uncertainties used for generating terms that are used in its OLM limits established equations. The licensee also

provided information related to the equipment resolution of the associated equipment that is being proposed for the OLM program. The licensee also explained where the measurement is being done in relation to the drift that is being measured, as it relates to the analog to digital converters and associated bit resolution. Finally, the licensee emphasized the measurement precision in comparison to the established OLM limit regarding a potential drift error being masked.

2. The licensee expanded on the provided numbers found in AMS Report DBC2411R0, "OLM Analysis Methods and Limits Report for Diablo Canyon," related to computer input accuracy and published accuracy uncertainties. The licensee also explained that no assumptions were made in the numbers used, also detailing each of the different configurations that will be used for the transmitter groups to be included in the OLM program for Diablo Canyon.

3. The licensee reiterated the contents of the AMS Topical Report chapter 7 explanation of the calculation of the OLM limit that was used in response to this question.

Audit Call, July 30, 2025

The NRC staff requested the licensee to address the following audit question:

> Pacific Gas and Electric Company (PG&E, the licensee) proposes to use Measurement and Test Equipment (M&TE), which includes the plant computer, to collect data and check if a transmitter needs calibration. The licensee plans to measure how much each transmitter's readings change over time, or drift, and compare these to a set Online Monitoring (OLM) limit. For certain cases, the drift being measured is very small. However, the documents referenced in the LAR indicate that the uncertainties associated with the proposed M&TE to measure these changes can be large.
>
> Please explain how PG&E has determined that the M&TE being proposed, which includes the plant process computer, is capable of reliably measuring the instrument channel drift with an accuracy that will not mask the drift being measured given the associated uncertainty in these configurations. For example, describe how the proposed M&TE, inclusive of digital signal conversion and algebraic presentation, is sufficiently accurate to reliably measure the drift in the transmitters included in the OLM program to support the decision making (for example, see Annex H of Recommended Practice 67.04.02,"Methodologies for the Determination of Setpoints for Nuclear Safety-Related Instrumentation," approved December 10, 2010, International Society of Automation (ISA)).

Licensee Response:

The licensee demonstrated using the methodology identified in the ISA Recommended Practice RP 67.04.02 Annex H, and the uncertainty terms described therein being accounted for, that the uncertainty associated with the plant process computer, and other devices needed to measure the drift of the instrument channels in the OLM program as part of the proposed M&TE, is actually much smaller than that which was initially provided in the audit documents. The licensee explained that the originally-provided estimates were overly conservative, which they discovered upon performing an estimate of the device uncertainties when applying the recommended practice analysis. The licensee explained that the plant process computer and

other devices which encompass the proposed M&TE to be used to measure the drift in the instrument channel are quite accurate, with an uncertainty much smaller than the allowance value used to account for the measurement accuracy.

On the basis of this licensee response, the NRC staff noted that the licensee demonstrated that the magnitude of the uncertainty estimates for the plant process computer and other M&TE used to monitor for drift of the instrument channels in the OLM program appeared to be low enough to enable reliable measurement of the drift of these channels as they approach the OLM limits.

Audit Call, August 13, 2025

The NRC staff requested the licensee to respond to the following audit question:

> The licensee proposed to revise the TS 1.1 Definition, CHANNEL CALIBRATION, to add "excluding transmitters in the TS 5.5.21 Online Monitoring Program." Please provide justification for excluding transmitters from the CHANNEL CALIBRATION definition.

Licensee Response:

The licensee described how the transmitters will continue to be calibrated at a frequency determined by the Online Monitoring Program in accordance with AMS-TR-0720R2-A. The proposed wording was needed to take full advantage of the frequency allowances provided by the Online Monitoring Program. The current TS Definition wording would limit the use of the program. Also, the TS Bases provides additional information related to the transmitter surveillance frequency based on the Online Monitoring Program.

7.0 DOCUMENTS AVAILABLE ON LICENSEE WEB-BASED PORTAL

The licensee supported the audit by making appropriate licensee staff available for discussions who have detailed knowledge of AMS-TR-0720 R1, and the principles and bases for the OLM processes discussed in the TR.

The following documents were made available for the NRC staff to view on a web-based portal throughout the duration of the audit period. The NRC staff examined and evaluated the documents and verified that key elements including calculations of OLM limits, amenable transmitters to be included in the OLM program, backstop calculations, maximum sampling rate calculations, OLM coverage of transmitter setpoints and range, plant procedures for data retrieval, analysis and capture, of the OLM program would be implemented as described in AMS-TR-0720R2-A.

1. Analysis and Measurement Services Corporation (AMS) Report DBC2410R0, "OLM Amenable Transmitters Report for Diablo Canyon"

2. AMS Report DBC2411R0, "OLM Analysis Methods and Limits Report for Diablo Canyon"

3. AMS Report DBC2412R0, "OLM Drift Monitoring Program Report for Diablo Canyon"

4. AMS Procedure OLM2201, "Procedure for Online Monitoring Data Retrieval," December 2022

5. AMS Procedure OLM2202, “Procedure for Performing Online Monitoring Data Qualification and Analysis,” August 2024

6. AMS Report DBC2413R0, “OLM Noise Analysis Program Report for Diablo Canyon”

7. AMS Procedure NPS1501, “Procedure for Noise Data Collection from Plant Sensors,” March 2015

8. AMS Procedure NAR2201, “Procedure for Performing Dynamic Failure Mode Assessment Using Noise Analysis,” August 2024

Review notes for each of the AMS reports audited are provided below.

DBC2410R0, “OLM Amenable Transmitters Report for Diablo Canyon”

This report addresses steps 1 through 6 of section 11.1.1 of the TR for the transmitters in Diablo Canyon that are included in the OLM program. It identifies groups of pressure, level and flow transmitters for each unit that qualify to be entered into the Diablo Canyon OLM program.

DBC2411R0, “OLM Analysis Methods and Limits Report for Diablo Canyon”

This report addresses steps 7 through 8 of section 11.1.1 of the TR AMS-TR-0720R2-A for the transmitters in Diablo Canyon that are included in the OLM program. The NRC staff observed greater values for uncertainties associated to the M&TE in certain configurations and transmitter groups. This led to the conversation related to the recommended practice in relation to uncertainty associated with the plant process computer that is included as part of the proposed M&TE, to account for uncertainties associated with digital system accuracy term.

DBC2412R0, “OLM Drift Monitoring Program Report for Diablo Canyon”

This document provides the steps to be followed to implement OLM for transmitter drift monitoring in accordance with TR AMS-TR-0720R2-A for Diablo Canyon. The steps described in the document are intended to be repeated at each operating cycle to identify the transmitters that should be scheduled for a calibration check. Following the steps in this document will ensure that OLM data is properly acquired, qualified, analyzed, interpreted, reported, and documented.

OLM2201, “Procedure for Online Monitoring Data Retrieval,” December 2022

This is a test procedure for retrieving OLM data from the plant historian using the AMS Bridge software. It provides general steps that are followed when retrieving OLM data, not specific to Diablo Canyon.

OLM2202, “Procedure for Performing Online Monitoring Data Qualification and Analysis,” August 2024

This is a procedure outlining the general steps that are followed when performing OLM data analysis of the data being retrieved. It provides general steps that are followed when analyzing OLM data, not specific to Diablo Canyon.

DBC2413R0, “OLM Noise Analysis Program Report for Diablo Canyon”

This document provides the steps that must be followed to implement noise analysis for assessment of transmitter dynamic failure modes. The steps described are to be repeated at each operating cycle at Diablo Canyon for a minimum of one transmitter on a staggered basis in each redundant group which has a response time requirement as outlined to identify its dynamic failure modes. The steps outlined in this document ensure that proper noise analysis equipment is used, and data is properly acquired, qualified, analyzed, interpreted, reported, and documented.

NPS1501, “Procedure for Noise Data Collection from Plant Sensors,” March 2015

This procedure provides guidelines for the collection of noise data to determine the dynamic performance characteristics of sensors and systems in nuclear power plants and other processes. This procedure is used for on-line data acquisition from a wide variety of sensors and systems while the plant is operating at any mode that provides adequate signal amplitudes for analysis.

NAR2201, “Procedure for Performing Dynamic Failure Mode Assessment Using Noise Analysis,” August 2024

This procedure provides general guidelines for performing dynamic failure mode assessment using the noise analysis method. This document is not specific to Diablo Canyon.

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