

## PUBLIC UTILITIES COMMISSION

505 VAN NESS AVENUE  
SAN FRANCISCO, CA 94102-3298



May 20, 2022

SA2022-1004

Lise Jordan, Sr. Director  
Regulatory Compliance and Quality Assurance  
Pacific Gas and Electric Company (PG&E)  
77 Beale Street  
San Francisco, CA 94105

**SUBJECT:** Electric Substation Audit of PG&E's Concord Headquarters

Dear Ms. Jordan:

On behalf of the Electric Safety and Reliability Branch (ESRB) of the California Public Utilities Commission (CPUC), Charles Mee, Ogeonye Enyinwa, and Chris Lee of ESRB staff conducted an electric substation audit of PG&E's Concord Headquarters from April 4, 2022 through April 8, 2022. During the audit, ESRB staff conducted field inspection of PG&E's substation facilities and equipment and reviewed pertinent documents and records.

As a result of the audit, ESRB staff identified violations of General Order 174. A copy of the audit findings itemizing the violations is enclosed. Please provide a response no later than June 17, 2022, via electronic copy of all corrective actions and preventive measures taken by PG&E to correct the identified violations and prevent the recurrence of such violations and observations. The response should indicate the date of each remedial action and preventive measure taken for the violations and observations. For any outstanding items not addressed, please provide the projected completion dates of PG&E's corrective actions.

If you have any questions concerning this audit, please contact Charles Mee at (415) 730-7012 or [charles.mee@cpuc.ca.gov](mailto:charles.mee@cpuc.ca.gov).

Sincerely,

A handwritten signature in blue ink, appearing to read "Banu Acimis".

Banu Acimis, P.E.  
Program and Project Supervisor  
Electric Safety and Reliability Branch  
Safety and Enforcement Division  
California Public Utilities Commission

Enclosure: CPUC Electric Substation Audit Findings

Cc: Lee Palmer, Director, Safety and Enforcement Division, CPUC  
Nika Kjensli, Program Manager, ESRB, SED, CPUC  
Nathan Sarina, Senior Utilities Engineer (Supervisor), ESRB, SED, CPUC

Rickey Tse, Senior Utilities Engineer (Supervisor), ESRB, SED, CPUC  
Charles Mee, Senior Utilities Engineer (Specialist), ESRB, SED, CPUC  
Ogeonye Enyinwa, Senior Utilities Engineer (Specialist), ESRB, SED, CPUC  
Chris Lee, Utilities Engineer, ESRB, SED, CPUC

**CPUC SUBSTATION AUDIT FINDINGS**  
**PG&E CONCORD HEADQUARTERS**  
**April 4 – 8, 2022**

**I. Records Review**

During the substation audit, Electric Safety and Reliability Branch (ESRB) reviewed the following standards, procedures, and records for PG&E's Concord Substation Headquarters:

- TD-3322M REV.10 Substation Inspection Manual, and its attachments
- TD-3322M Infrared Inspections
- TD-3322M Insulating Oil
- TD-3322M Substation Batteries
- TD-3322S Rev. 7 Substation Equipment Maintenance Requirements, and its attachments
- TD-3328S Rev.1 Substation Supplemental Inspection Program and its attachments
- TD-3320P-36 Rev.0 Substation Asset Performance Management
- TD-3320P-12 Accumulated Critical Current (ACC) Process
- TD-3320P-07 Fire Protection Systems and Equipment
- List of all the substations
- Maps of all the substations
- Single-line diagrams of the ESRB selected substations
- Equipment lists for the ESRB selected substations
- List of the previous five years inspections to all the substations
- List of the previous five years line correction notifications in the substations
- Oil Test samples for the ESRB selected substations
- Visual Detailed Inspections for the ESRB selected substations
- Substation Infrared Inspection samples for the ESRB selected substations
- Circuit Breaker Maintenance Form samples for the ESRB selected substations
- List of other periodic inspections
- Quality Verification Substation Concord HQ Findings
- Over loaded transformer banks in the past five years
- Explanation to PG&E's inspector training policy

## II. Field Inspection

During the field inspection, ESRB inspected substations listed Table 1:

**Table 1: List of PG&E's Substations**

Description	# of Transformer Banks	Voltage Class (kV)
BABEL SUB	1	21
CHRISTIE SUB	5	115
CLAYTON SUB	5	115
CONTRA COSTA SUB	15	230
CROCKETT COGEN SY*	0	230
FRANKLIN SUB	2	60
LAKEWOOD SUB	7	115
LONE TREE SUB	2	230
MARSH SUB	3	60
MORAGA SUB	7	230
PITTSBURG PP	2	230
PITTSBURG SUB	4	60
SARANAP SUB	1	21
SOBRANTE SUB	6	230
VALLEY VIEW SUB	2	115
WILLOW PASS SUB	5	115

\*Crockett Cogen Switch Yard does not have a transformer bank owned by PG&E

## III. Field Inspection – Violations List

ESRB observed the following violations during the field inspection:

1. **GO 174, Rule 12, General** states in part:

*“Substations shall be designed, constructed and maintained for their intended use, regard being given to the conditions under which they are to be operated, to promote the safety of workers and the public and enable adequacy of service.*

*Design, construction, and maintenance should be performed in accordance with accepted good practices for the given local conditions known at the time by those responsible.”*

ESRB’s findings are listed in the Table 2:

**Table 2: GO 174, Rule 12 Findings**

<b>Substations</b>	<b>Findings</b>	<b>Notes</b>
Christie01	A bird's nest at Switch 1215 for Christie-Sobrante line	PG&E Notification #: 123182915
Clayton01	Missing delineator	
Clayton02	Hanging light cover	
Clayton03	Damaged light pole foundation	
Clayton04	Abandoned cooling water hose at the transformer bank cooling fans	
ContraCosta02	Lean and damaged light pole	PG&E Notification #: 123201518
Franklin01	Broken light	PG&E Notification #: 122980381
Pittsburg01	Spare transformer paint peeling	PG&E Notification #: 123216486
Pittsburg02	Tripping hazard	After that audit, PG&E said it corrected this deficiency. PG&E needs to provide photos showing the correction.
PittsburgPP01	Foundation erosion	PG&E Notification #: 123175449
Sobrante02	Abandoned annunciator	
ValleyView01	Missing cover on light pole foundation	
ValleyView02	Leaning light pole	PG&E Notification #: 123206191
WillowPass01	At 21 kV yard - missing cover on light pole foundation	After the audit, PG&E said it corrected this deficiency. PG&E needs to provide photos showing the correction.
WillowPass02	Faded gauge labels at Bank 3	After that audit, PG&E said it corrected this deficiency. PG&E needs to provide photos showing the correction.
WillowPass04	The "High" is missing in the "High Voltage" sign	

Figures 1 through 4 demonstrate pictures corresponding to the findings in Table 2:

Figure 1: GO 174, Rule 12 Findings 1/4



Christie01: A bird's nest at Switch 1215



Clayton01: Missing delineator



Clayton02: Hanging light cove



Clayton03: Damaged light pole foundation

Figure 2: GO 174, Rule 12 Findings 2/4



Clayton04: Abandoned cooling water hose at the transformer bank cooling fans



ContraCosta02: Lean and damaged light pole



Franklin01: Broken light



Pittsburg01 Spare transformer paint peeling

Figure 3: GO 174, Rule 12 Findings 3/4



Pittsburg02: Tripping hazard



PittsburgPP01: Foundation erosion



Sobrante02: Abandoned annunciator



ValleyView01: Missing cover on light pole foundation

Figure 4: GO 174, Rule 12 Findings 4/4



ValleyView02: Leaning light pole



WillowPass01: At 21 kV yard - missing cover on light pole foundation



WillowPass02 Faded gauge labels at Bank 3



WillowPass04: The "High" is missing in the "High Voltage" sign

2. PG&E’s TD-3322M Substation Batteries Subsection II.D.1<sup>1</sup> states in part:

*“While performing battery maintenance, inspect all battery cell jars, terminal posts, and racks for corrosion, electrolyte leaks, damage, cracks, and bulging cases.”*

ESRB’s finding is listed in Table 3:

**Table 3: TD-3322M Subsection II.D.1 Finding**

<b>Substation</b>	<b>Finding</b>	<b>Notes</b>
ContraCosta01	Cracking cap at the battery terminals	PG&E Notification #: 120849300

Figure 5 demonstrates a picture of the finding listed in Table 3:

**Figure 5: TD-3322M Substation Batteries Subsection II.D.1 Finding**



ContraCosta01: Cracking cap at the battery terminals

<sup>1</sup> PG&E TD-3322M Substation Batteries, Revision 13, P.5

**3. PG&E’s TD-3322M Substation Inspection Manual, Subsection V.J.11<sup>2</sup> General Condition of the Mechanism** states in part:

*“a. Visually check the mechanism for the following defects when accessible:*

- Loose, missing, or damaged parts, bolts, screws, or keepers.*
- Corrosion or rust on electrical terminals or mechanical parts.*
- Pitting, burning, or abnormal wear on all exposed auxiliary contacts or relays.*
- Dry, gummy, hardened, solidified, or dirty lubrication.*
- Other abnormal conditions.”*

ESRB’s finding is listed in the Table 4:

**Table 4: TD-3322M, Subsection V.J.11 Finding**

<b>Substation</b>	<b>Finding</b>	<b>Notes</b>
Moraga01	Loose gasket on Circuit Breaker (CB) 372	After that audit, PG&E said it corrected this deficiency. PG&E needs to provide photos showing the correction.

Figure 6 demonstrates a picture of the finding listed in Table 4:

---

<sup>2</sup> PG&E TD-3322M REV.10 Substation Inspection Manual, P.58

**Figure 6: TD-3322M Substation Inspection Manual, Subsection V.J.11 Finding**



Moraga01: Loose gasket on Circuit Breaker (CB) 372

**4. PG&E’s TD-3322M Substation Inspection Manual, Subsection V.I.<sup>3</sup>, Regulators and LTCs** prescribed oil related requirements in the following items:

- 2. Oil Preservation Systems
- 9. Cabinets and Heaters
- 13. Tap-Changer Breather Devices
- 14. Online Oil-Filtration Systems
- 15. Oil-Level Gauges

ESRB’s finding is listed in the Table 5:

**Table 5: TD-3322M Subsection V.I. Finding**

<b>Substation</b>	<b>Finding</b>	<b>Notes</b>
WillowPass03	Leaking oil at LTC	PG&E Notification #: 121677014

Figure 7 demonstrates a picture of the finding listed in Table 5:

---

<sup>3</sup> PG&E TD-3322M REV.10 Substation Inspection Manual, P.48-53

**Figure 7: TD-3322M Substation Inspection Manual, Subsection V.I. Finding**



WillowPass03: Leaking oil at the LTC

**5. PG&E’s TD-3322M Substation Inspection Manual, Subsection V.A.6, Stored Equipment states in part:**

*“Ensure that stored equipment is grounded properly in accordance with the procedures in the Protective Grounding Manual.”*

ESRB’s finding is listed in the Table 6:

**Table 6: TD-3322M Subsection V.A.6 Finding**

<b>Substation</b>	<b>Finding</b>
ValleyView04	An underground cable that is not in use is not grounded

Figure 8 demonstrates a picture of the finding listed in Table 6:

**Figure 8: TD-3322M Subsection V.A.6 Finding**



ValleyView04: An underground cable that is not in use is not grounded

## IV. Observations

1. **PG&E’s TD-3322M REV.10 Substation Inspection Manual, Subsection II.E. Priority Codes for Abnormal Conditions** states:

*“Station inspectors should use the following priority codes to initially rank the urgency of the service work when abnormal conditions are identified. For complete information concerning priority codes, refer to Utility Standard TD-3322S. The priority code selected should be based on the probability and consequences of failure, and the impact to safety, security, and circuit protection:*

**Priority 1:** *Functional failure. Urgent service work is necessary.*

**Priority 2:** *High-impact work. Service work is necessary within 30 days.*

**Priority 3:** *Pending operation queue. Service work is necessary within 6 months.*

**Priority 4:** *Pending non-operation queue. Service work is necessary within 12 months.*

**Priority 5:** *Pending as schedules and budgets permit.”*

In PG&E’s response to ESRB’s Pre-Audit Date Request (DR)23, PG&E conducted Quality Verifications and identified 1,270 findings with different risk levels, which are summarized in Table 7:

**Table 7: Audit Findings by Risk / Finding Type**

<b>Finding Type</b>	<b>Low</b>	<b>Medium</b>	<b>High</b>
Field	291	497	9
Record	218	255	
<b>Grand Total</b>	<b>509</b>	<b>752</b>	<b>9</b>

However, PG&E did not explain how the risk levels as listed in the Table 2 match with the priority levels as described in PG&E’s TD-3322M REV.10 Substation Inspection Manual. PG&E needs to explain the risk levels corresponding to priority levels as described in PG&E’s TD-3322M REV.10 Substation Inspection Manual. PG&E also needs to provide PG&E’s corrective actions to the above findings along with completion dates. If there are findings pending corrective actions, please provide a list of each item with projected completion dates.

2. **The California Independent System Operator (CAISO) Large Generator Interconnection Agreement, Section 9.6.1. Power Factor Design Criteria<sup>4</sup>** states in part:

*“For all Generating Facilities other than Asynchronous Generating Facilities, the Interconnection Customer shall design the Large Generating Facility to maintain a composite power delivery at continuous rated power output at the terminals of the Electric Generating Unit at a power factor within the range of 0.95 leading to 0.90*

<sup>4</sup> CAISO Fifth Replacement Tariff, Appendix V Standard Large Generator Interconnection Agreement, at P. 30

*lagging, unless the CAISO has established different requirements that apply to all generators in the Balancing Authority Area on a comparable basis.”*

In the electric power industry, the good utility practice is to maintain the power factor for a substation in the range of 0.85 leading to 0.85 lagging (or -0.85----+0.85) to provide adequate services to interconnected customers. ESRB’s observations are listed in the Table 8:

**Table 8: Inadequate Power Factors**

<b>Substations</b>	<b>Power Factor</b>
ValleyView03	-0.533
WillowPass05	-0.742
LoneTree01	-0.792

Figure 9 demonstrates the findings listed in Table 8:

Figure 9: Inadequate Power Factors



ValleyView03: Power Factor = -0.533



WillowPass04: Power Factor = -0.792



LoneTree01: the Power Factor = -0.742