PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102-3298

May 9, 2025 SA2025-1308

Jarrod Meier, Director
Electric Regulatory Compliance
Pacific Gas & Electric Company (PG&E)
300 Lakeside Dr., Oakland, CA 94612

SUBJECT: Electric Substation Audit of PG&E San Carlos Headquarters

Mr. Meier:

On behalf of the Electric Safety and Reliability Branch (ESRB) of the California Public Utilities Commission (CPUC), Tom Roberts, Nora Nguyen, and Rafael Herranz of ESRB staff conducted an electric substation audit of PG&E's San Carlos Headquarters from February 24-28, 2025. During the audit, ESRB staff conducted field inspections 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 9, 2025, by 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.

Please note that ESRB will be posting the audit report and your response to our audit on the CPUC website. If there is any information in your response that you would like us to consider as confidential, we request that in addition to your confidential response, you provide us with a public version (a redacted version of your confidential response) to be posted on our website.

If you have any questions concerning this audit, please contact Tom Roberts at tom.roberts@cpuc.ca.gov or (415) 971-3907.

Sincerely,

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

Enclosure: CPUC Electric Substation Audit Report for PG&E San Carlos Headquarters

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CPUC SUBSTATION AUDIT FINDINGS
PG&E SAN CARLOS HEADQUARTERS
FEBRUARY 24-28, 2025

I. Records Review

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

- List of all assigned PG&E substations,
- Map showing all assigned PG&E substations in the San Carlos HQ,
- PG&E Substation Equipment Maintenance Requirements, Utility Standard: TD-3322S, Revision 10, with attachments 1 through 12,
- PG&E Substation Maintenance and Construction (SM&C) Manual, Utility Standard: TD-3322M, Revision 11, with attachments 3 through 12, and forms 1, 2, 5, 6, 7,
- PG&E Utility Standard: TD-3328P attachments 2 through 4, Revisions 0 and 1,
- PG&E Mobile Inspection Form, Utility Standard: TD-3468-01-F01, Revision 2 and F02, Revision 1,
- PG&E Substation Equipment Maintenance Requirements, Utility Standard: TD-3322S, Revision 10, with attachments 1 through 13,
- PG&E Substation Supplemental Inspection Program, Utility Standard: TD-3328S, Revision 3, with attachments 1 through 5,
- PG&E Substation Asset Performance Management (APM) Process, Utility Procedure: TD-3320P-36, Revision 1,
- PG&E Substation SAP Work Management System (WMS) Process, Utility Procedure: TD-3320P-12, Revision 7, with attachments 2, 4, 5, 6, 12, and 14,
- PG&E Substation Supplemental Inspection Program, Utility Standard: TD-3328S, Revision 3, with attachments 1 through 5,
- PG&E Mobile Substation Equipment – Maintenance and Operating Procedures, Utility Standard: TD-3468P-01, Revision 3, with attachments 1 through 3,
- Explanation of PG&E inspector training policies,
- List of all substation inspections conducted in the last five years,
- List of all open/pending, completed, cancelled, and late work orders and maintenance items in the previous five years,
- Equipment lists for all substations,
- Single-line diagrams of all substations,
- Last two visual inspection checklists for all substations,
- List of transformer banks that operated beyond nameplate capacity for the last five years for all substations,
- Infrared Testing records for all substations in the last two years,
- Most recent oil sample test results for all substations,
- Most recent electric test results for all substations,
- Training records for all substation and maintenance personnel in the past five years,
- Other relevant substation inspections for the past five years for all substations,
- Internal audit findings for San Carlos HQ for the past five years.

II. Records Violations

ESRB observed the following violations during the records review portion of the audit:

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

> *"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."*

a. PG&E Substation Equipment Maintenance Requirements, Utility Standard: TD-3322S[1], establishes PG&E's required end dates and out-of-compliance dates for corrective work as follows:

Table 1. Line Corrective (LC) Due Dates Per Priority Code

Priority Code	Required End Date	Out-of-Compliance Date
A	Within 30 days	Close notifications (after removing the hazard [make safe]) with either permanent or temporary repairs within 30 days. Create a new lower priority notification immediately for any remaining work that will exceed 30 days. Reference the Priority A notification number to ensure a record of temporary repairs is linked to the new notification.
B	Within 90 days	The out-of-compliance date is the 1st day of the 2nd month following the month in which the required end date occurs.
E	Within 365 days	The out-of-compliance date is the 1st day of the year following the year in which the required end date occurs.
F	Greater than 365 days	There is no out-of-compliance date. This work will be completed when it is operationally efficient to perform the work.

Based on Table 1 above, ESRB found 120 notifications that were closed after their past due dates.[2] Therefore, PG&E did not perform maintenance in accordance with accepted good practices described in Utility Standard TD-3322S. See Table 2 below for the Line Corrective (LC) notifications which were closed late.[3]

[1] PG&E Utility Standard TD-3322S, June 6, 2024, Revision 10, Section 1.3.3.
[2] This is based on an Out-of-Compliance Date calculated by ESRB using the criteria per Table 1 above and the Priority, Notification Date, and Completion Date provided in PG&E's January 29, 2025 response to Pre-Audit Data Request question 13. If the Out-of-Compliance Date provided by PG&E is used, 103 closed notifications were completed late. A spreadsheet with ESRB's calculations, which were added to PG&E file *DRU14880_Q13_Atch01_San Carlos_EC Notification Data.xls*, can be provided upon request.
[3] Table 2 does not include LC notifications that were still open at the time data was provided to ESRB on January 29, 2025. If on January 29, 2025 is used in lieu of a completion date, an additional 45 priority E notifications were open beyond the Out-of-Compliance Date (ESRB calculated the same Out-of-Compliance Date as PG&E for each of these notifications.) A spreadsheet with ESRB's calculations can be provided upon request.

Table 2. Overdue Line Corrective (LC) Notifications

Notification Number	Priority	Notification Date	Completion Date	Out-of-Compliance Date	Days Late
124234556	B	7/14/2022	12/15/2023	12/1/2022	379
124233243	B	7/20/2022	12/15/2023	12/1/2022	379
124233758	B	7/20/2022	11/28/2023	12/1/2022	362
124233485	B	7/20/2022	8/26/2023	12/1/2022	268
118752543	B	3/27/2020	4/7/2021	8/1/2020	249
120453822	B	1/21/2020	1/21/2021	6/1/2020	234
119131021	B	6/8/2020	6/4/2021	11/1/2020	215
119142171	B	6/8/2020	6/4/2021	11/1/2020	215
119751020	B	9/10/2020	6/18/2021	2/1/2021	137
119130338	B	6/8/2020	3/2/2021	11/1/2020	121
119142822	B	6/8/2020	1/20/2021	11/1/2020	80
119817335	B	7/31/2020	1/20/2021	12/1/2020	50
129109650	B	6/20/2024	11/23/2024	11/1/2024	22
119142172	B	6/8/2020	11/16/2020	11/1/2020	15
120736731	E	4/1/2021	9/30/2024	1/1/2023	638
122406040	E	11/22/2021	6/18/2024	1/1/2023	534
122379926	E	11/15/2021	6/16/2024	1/1/2023	532
122380120	E	11/15/2021	6/16/2024	1/1/2023	532
120737532	E	4/1/2021	4/29/2024	1/1/2023	484
122551282	E	12/31/2021	3/2/2024	1/1/2023	426
122545731	E	12/31/2021	1/19/2024	1/1/2023	383
122360431	E	11/9/2021	1/4/2024	1/1/2023	368
122545504	E	12/31/2021	11/18/2023	1/1/2023	321
124490136	E	9/12/2022	11/12/2024	1/1/2024	316
122545502	E	12/31/2021	10/20/2023	1/1/2023	292
124677258	E	10/10/2022	10/18/2024	1/1/2024	291
122551829	E	12/31/2021	10/18/2023	1/1/2023	290
122551868	E	12/31/2021	10/18/2023	1/1/2023	290
122545882	E	12/31/2021	10/16/2023	1/1/2023	288
122545507	E	12/31/2021	10/14/2023	1/1/2023	286
122548529	E	12/31/2021	10/13/2023	1/1/2023	285
122551208	E	12/31/2021	10/13/2023	1/1/2023	285
124677037	E	10/10/2022	9/30/2024	1/1/2024	273
124677252	E	10/10/2022	9/28/2024	1/1/2024	271
124676180	E	10/10/2022	9/21/2024	1/1/2024	264

Notification Number	Priority	Notification Date	Completion Date	Out-of-Compliance Date	Days Late
122442681	E	12/3/2021	9/19/2023	1/1/2023	261
124490102	E	9/12/2022	9/16/2024	1/1/2024	259
122430785	E	12/1/2021	9/16/2023	1/1/2023	258
122430953	E	12/1/2021	9/16/2023	1/1/2023	258
122548582	E	12/31/2021	9/15/2023	1/1/2023	257
122547413	E	1/3/2021	9/15/2023	1/1/2023	257
121358854	E	5/13/2021	9/14/2023	1/1/2023	256
122525779	E	12/28/2021	9/14/2023	1/1/2023	256
122545880	E	12/31/2021	9/9/2023	1/1/2023	251
122548159	E	12/31/2021	9/9/2023	1/1/2023	251
122611745	E	1/10/2022	8/16/2024	1/1/2024	228
122611822	E	1/10/2022	8/16/2024	1/1/2024	228
122613703	E	1/10/2022	8/16/2024	1/1/2024	228
122613750	E	1/10/2022	8/16/2024	1/1/2024	228
122611826	E	1/10/2022	8/13/2024	1/1/2024	225
122358790	E	11/9/2021	8/9/2023	1/1/2023	220
122385961	E	11/16/2021	8/9/2023	1/1/2023	220
122602649	E	1/3/2022	8/6/2024	1/1/2024	218
122603013	E	1/3/2022	8/6/2024	1/1/2024	218
122613665	E	1/10/2022	7/23/2024	1/1/2024	204
124677624	E	10/10/2022	7/23/2024	1/1/2024	204
123431352	E	4/18/2022	7/22/2024	1/1/2024	203
124490139	E	9/12/2022	7/22/2024	1/1/2024	203
124583785	E	9/27/2022	7/22/2024	1/1/2024	203
124677031	E	10/10/2022	7/22/2024	1/1/2024	203
124689506	E	10/11/2022	7/22/2024	1/1/2024	203
123047156	E	12/31/2021	7/21/2023	1/1/2023	201
122613330	E	1/10/2022	7/12/2024	1/1/2024	193
122431049	E	12/1/2021	7/7/2023	1/1/2023	187
122544152	E	12/31/2021	7/7/2023	1/1/2023	187
122544876	E	12/31/2021	7/7/2023	1/1/2023	187
122430956	E	12/1/2021	7/6/2023	1/1/2023	186
122431043	E	12/1/2021	7/6/2023	1/1/2023	186
122408541	E	11/22/2021	7/5/2023	1/1/2023	185
122408546	E	11/22/2021	7/5/2023	1/1/2023	185
122408812	E	11/22/2021	7/5/2023	1/1/2023	185
124680840	E	10/10/2022	6/28/2024	1/1/2024	179
118397895	E	12/30/2019	6/18/2021	1/1/2021	168
124677254	E	10/10/2022	6/1/2024	1/1/2024	152

Notification Number	Priority	Notification Date	Completion Date	Out-of-Compliance Date	Days Late
124991160	E	12/8/2022	6/1/2024	1/1/2024	152
122413125	E	11/23/2021	5/25/2023	1/1/2023	144
122436580	E	12/1/2021	5/25/2023	1/1/2023	144
122436759	E	12/1/2021	5/25/2023	1/1/2023	144
122525156	E	12/28/2021	5/25/2023	1/1/2023	144
122548585	E	12/31/2021	5/25/2023	1/1/2023	144
122548714	E	12/31/2021	5/25/2023	1/1/2023	144
122551201	E	12/31/2021	5/25/2023	1/1/2023	144
122551639	E	12/31/2021	5/25/2023	1/1/2023	144
122408893	E	11/22/2021	5/24/2023	1/1/2023	143
122387284	E	11/16/2021	5/22/2023	1/1/2023	141
122387362	E	11/16/2021	5/22/2023	1/1/2023	141
122410119	E	11/23/2021	5/20/2023	1/1/2023	139
122410248	E	11/23/2021	5/20/2023	1/1/2023	139
124689507	E	10/11/2022	5/17/2024	1/1/2024	137
122602818	E	1/3/2022	5/11/2024	1/1/2024	131
124243988	E	8/8/2022	5/11/2024	1/1/2024	131
122551283	E	12/31/2021	5/10/2023	1/1/2023	129
122525694	E	12/28/2021	5/9/2023	1/1/2023	128
122525348	E	12/28/2021	5/8/2023	1/1/2023	127
122525421	E	12/28/2021	5/8/2023	1/1/2023	127
122525428	E	12/28/2021	5/8/2023	1/1/2023	127
124677034	E	10/10/2022	5/4/2024	1/1/2024	124
122380321	E	11/15/2021	5/2/2023	1/1/2023	121
124677257	E	10/10/2022	4/27/2024	1/1/2024	117
124013962	E	7/7/2022	4/13/2024	1/1/2024	103
123795942	E	6/9/2022	4/12/2024	1/1/2024	102
124677250	E	10/10/2022	4/6/2024	1/1/2024	96
120138796	E	12/7/2020	4/4/2022	1/1/2022	93
124641757	E	10/5/2022	3/20/2024	1/1/2024	79
124641931	E	10/5/2022	3/20/2024	1/1/2024	79
122545508	E	12/31/2021	3/13/2023	1/1/2023	71
124681395	E	10/10/2022	2/29/2024	1/1/2024	59
124855223	E	11/9/2022	2/29/2024	1/1/2024	59
124642601	E	10/7/2022	2/23/2024	1/1/2024	53
124642605	E	10/7/2022	2/23/2024	1/1/2024	53
124823801	E	10/7/2022	2/23/2024	1/1/2024	53
124488290	E	9/12/2022	2/11/2024	1/1/2024	41
124528515	E	9/19/2022	2/3/2024	1/1/2024	33

Notification Number	Priority	Notification Date	Completion Date	Out-of-Compliance Date	Days Late
118196903	E	11/22/2019	1/27/2021	1/1/2021	26
122613335	E	1/10/2022	1/27/2024	1/1/2024	26
124490130	E	9/12/2022	1/10/2024	1/1/2024	9
124677000	E	10/10/2022	1/10/2024	1/1/2024	9
124677008	E	10/10/2022	1/10/2024	1/1/2024	9
124689624	E	10/11/2022	1/10/2024	1/1/2024	9
124866978	E	11/10/2022	1/4/2024	1/1/2024	3

b. PG&E Substation Equipment Maintenance Requirements, Utility Standard: TD-3322S, also refers to "SO Notifications:"

Table 2. Corrective Maintenance Tasks – Types LC and SO Notifications.[4]

During the audit, PG&E personnel indicated that SO type notifications are no longer used. Table 2 in the subject document should be updated to correctly define the descriptions and timing of corrective maintenance tasks.

c. PG&E Substation Equipment Maintenance Requirements, Utility Standard: TD-3322S[5], also establishes PG&E's required out-of-compliance dates for preventative work (PM) as follows:

1.3 Compliance
1. For preventive work, determine the out-of-compliance date using the notification required end date in the maintenance plan and the maintenance plan cycle.

- *IF the cycle is 1 year or more, THEN the out-of-compliance date is the 1st day of the year following the year in which the required end date occurs.*
- *IF the cycle is less than 1 year, THEN the out-of-compliance date is the 1st day of the month following the month in which the required end date occurs.*

Based on this excerpt from PG&E's procedure, and out-of-compliance dates provided by PG&E, ESRB noted eight PM notifications that were closed after their past due date. Therefore, PG&E did not perform maintenance in accordance with the accepted good

[4] PG&E Utility Standard TD-3322S, Attachment 5, Revision 7, Station and Headquarters Maintenance Template, May 28, 2021, Table 1, pages 12-14. See Table 2 rows with Standard Text Key ETS06, ETS18, ETS29, ETS46, ETS58, and ETS58. The term "SO" is not defined in this document.
[5] PG&E Utility Standard TD-3322S, June 6, 2024, Revision 10, Section 1.3.1.

practices described in Utility Standard TD-3322S. See Table 3 below for the PM notifications which were closed late.[6]

Table 3. Overdue Preventative Maintenance (PM) Notifications

Notification Number	Priority	Completion Date	Out-of-Compliance Date	Days Late
115609258	E	7/23/2021	1/1/2020	569
121067691	E	11/30/2022	1/1/2022	333
118392930	E	11/30/2021	1/1/2021	333
120676172	E	11/27/2023	1/1/2023	330
120676172	E	11/27/2023	1/1/2023	330
117602546	E	11/23/2021	1/1/2021	326
118134262	E	11/23/2021	1/1/2021	326
122624056	E	11/9/2023	1/1/2023	312
122624056	E	11/9/2023	1/1/2023	312
124445612	E	10/29/2024	1/1/2024	302
124916814	E	10/23/2024	1/1/2024	296
114390092	E	9/29/2020	1/1/2020	272
125730149	E	9/16/2024	1/1/2024	259
125612376	E	8/6/2024	1/1/2024	218
118392938	E	7/26/2021	1/1/2021	206
118392938	E	7/26/2021	1/1/2021	206
119059866	E	7/26/2021	1/1/2021	206
114994713	E	7/21/2021	1/1/2021	201
124960345	E	7/1/2024	1/1/2024	182
123169862	E	5/2/2023	1/1/2023	121
119798634	E	3/10/2022	1/1/2022	68
119798634	E	3/10/2022	1/1/2022	68
123977443	E	2/14/2024	1/1/2024	44
123977443	E	2/14/2024	1/1/2024	44
123977510	E	2/14/2024	1/1/2024	44
122403236	E	2/13/2023	1/1/2023	43
123977511	E	2/13/2024	1/1/2024	43
123977512	E	2/13/2024	1/1/2024	43
123977526	E	2/13/2024	1/1/2024	43
121417899	E	1/31/2022	1/1/2022	30
127507001	E	3/11/2024	3/1/2024	10
124988079	E	3/6/2023	3/1/2023	5

[6] Table 3 does not include PM notifications that were still open at the time data was provided to ESRB on January 29, 2025. If 1/29/25 is used in lieu of a completion date, an additional seven priority E notifications were open beyond the Out-of-Compliance Date. A spreadsheet with ESRB's calculations can be provided upon request.

124988090	E	3/6/2023	3/1/2023	5
124988091	E	3/6/2023	3/1/2023	5
120919500	E	7/2/2021	7/1/2021	1

2. **GO 174, Rule 31.1, Inspection Program Frequency** states:

"Substations shall be inspected as frequently as necessary.

- *Time intervals or other bases shall be specified in the Inspection Program."*

PG&E Substation Equipment Maintenance Requirements, Utility Standard: TD-3322S, establishes the frequency of PG&E's substation inspection program as follows:

"Substation inspection type - PG&E developed substation inspection types to determine the frequency of inspection. Initially, the categorization of a substation type is based on a PG&E-developed model that considers the risk each substation may have for public and employee safety, system criticality, security, and environmental risk. Then, field conditions or current activities (e.g., specific equipment or public issues) not represented in the model are considered, and the final substation type categorization is then made. Type 1 substations are inspected monthly and Type 2 substations are inspected on an every-other-month cycle."[7]

"Substation inspections – PG&E Substation Inspection Program is based on a time-based trigger. Substation Inspections are scheduled to be performed monthly for high criticality substations, and every other month for low criticality substations."[8]

"The criticality of the substation is based on numerous factors including, but not limited to, voltage class, capacity, NERC CIP jurisdiction, system operation criticality, as well as proximity to waterways, to population, or to environmentally sensitive areas. The methodology, contained in a spreadsheet, is then used to evaluate individual substations and assign a classification (frequency)."[9]

PG&E's January 14, 2025 response to Pre-Audit Data Request question 1 shows that substation inspections are performed on a monthly, or every other month cycle, consistent with TD-3322S.[10] However, the excerpts above fail to provide a clear basis for

[7] PG&E Utility Standard TD-3322S, – Attachment 11, Revision 3, PG&E Substation Inspection Program Summary, April 7, 2022, Section 2.
[8] PG&E Utility Standard TD-3322S, – Attachment 11, Revision 3, PG&E Substation Inspection Program Summary, April 7, 2022, Section 3.a.
[9] PG&E Utility Standard TD-3322S, – Attachment 5, Revision 7, Station and Headquarters Maintenance Template, May 28, 2021, note following Table 3.
[10] ESRB issued its Pre-Audit Data Request (PADR) on December 27, 2024. PG&E responded to this request in three batches, consistent with ESRB's request. Subsequently, ESRB issued follow up question about the PADR responses which PG&E referred to as PADR #2 through PADR #5. To avoid confusion, this report uses the date of PG&E's responses rather than the PADR numbers.

determining the inspection cycle for two reasons: 1) the determination is based on two different terms, the station type and station criticality; and 2) the specific criteria for categorizing a given station as Type 1 or Type 2, or as high criticality or low criticality are not provided.[11] Additional information provided by PG&E to ESRB through data requests and in-person meetings indicated that the station "type" and "criticality" have been replaced with a more holistic approach as part of the Substation Asset Management Planning process to establish and update the inspection cycle for each station.[12]

ESRB found that the documents defining the inspection cycles for PG&E substations are out of date and do not accurately reflect PG&E's current processes. PG&E must update its procedures to make them consistent with PG&E's current processes. In addition, if PG&E uses universally applied criteria to determine the cycle for a given substation, e.g. stations subject to CAISO control must be inspected monthly, these criteria should be included in PG&E documentation. Alternatively, if PG&E does not standardize the inspection frequency, i.e. the determination includes applying subject matter expertise on a station-by-station basis, this should be explicitly stated in the PG&E standards and procedures documents referenced herein.

3. **GO 174, Rule 33.1, Inspection Program Frequency** states:

> *"Electronic or hard copy records of completed Inspections shall include, at a minimum:.*
> - *Inspector name or identification*
> - *Inspection date*
> - *Brief description of identified discrepancies*
> - *Condition rating (where applicable)*
> - *Scheduled date of corrective action (where applicable)"*

PG&E Substation Equipment Maintenance Requirements establish the frequency of PG&E's substation infrared inspection program as follows:

> *"Yearly: Conduct infrared surveys on electric substation equipment to detect heat-producing connections and contacts and other thermal patterns that may indicate abnormal conditions or equipment failure"*[13]

This standard refers to "TD-3322M, SM&C Manual, Infrared Inspections" and "Form:

[11] ESRB requested the "PG&E-developed model that considers the risk each substation" referenced in TD-3322S-Attachment 11 in Post-Audit Data Request #3 questions 1 and 2 for the PG&E Bakersfield HQ Audit in 2024, but PG&E's March 13, 2024 response indicated that supporting documents could not be provided (DRU13143).
[12] PG&E's March 13, 2024 response to Post-Audit Data Request #3 question 1a for the PG&E Bakersfield HQ Audit in 2024 (DRU13143) referenced the following documents: TD-8103 "Substation Asset Management Plan" and TD-7025P-01 "Identifying Critical Electric Equipment."

[13] PG&E Utility Standard TD-3322S, – Attachment 5, Revision 7, Station and Headquarters Maintenance Template, May 28, 2021, Table 1, page 5.

Substation Infrared Inspection F80" in Table 1. The referenced manual addresses the use of an infrared (IR) camera and recordkeeping requirements:[14]

> *"A. General, 1. Purpose, Monitoring the thermal profile of equipment and its components helps determine if the equipment is operating properly or if it needs corrective work. An IR inspection with an IR camera provides a thermal image and the interpretive spot temperature of the target."*
>
> *"H. Recordkeeping: 1. Substation Infrared Inspection Form; a. When thermal anomalies are identified through an IR inspection, document this information in the APM remote software. During tech down procedures, use Form TD-3322M-F80, "Substation Infrared Inspection." Submit the form with attached images to the substation maintenance supervisor, who schedules the necessary follow-up inspections and repairs."*

As stated in the SM&C Manual, an IR camera is the primary tool used in these inspections, and images from the camera are only retained if an image documents a thermal anomaly. Also, PG&E's February 5, 2025 response to ESRB Pre-Audit Data Request question 18[15] states that PG&E transitioned to using APM for IR data collection and retention in 2023, except when APM is not accessible during an inspection.[16]

ESRB's review of the IR records provided in response to PG&E's response to ESRB Pre-Audit Data Request question 18 indicates that PG&E is in violation of Rule 33.1 because the inspection date is not clearly provided. While the APM records, as provided in an excel spreadsheet, appear to provide the information required by Rule 33.1,[17] a critical element of the inspection are the IR images of thermal anomalies, which are referenced in the APM data and were provided to ESRB as separate PDF files. These PDF files provided inconsistent date information, including no dates, dates added to cover pages, and dates embedded within IR images. This inconsistency not only prevents confirmation of the initial inspection date entered into APM, but it also prevents PG&E management and ESRB from verifying that re-inspection and any needed repairs were performed such that the thermal anomalies were mitigated. PG&E should update its

[14] PG&E Utility Manual TD-3322M, – Attachment 9, Revision 11, Infrared Inspections, June 6, 2023, pages 1 and 16.

[15] ESRB issued its Pre-Audit Data Request (PADR) on December 27, 2024. PG&E responded to this request in three batches, consistent with ESRB's request. Subsequently, ESRB issued follow up question about the PADR responses which PG&E referred to as PADR #2 through PADR #5. To avoid confusion, this report uses the date of PG&E's responses rather than the PADR numbers.

[16] "In 2023, PG&E has moved to routinely using our digital platform, AssetWise Performance Management (APM), for all data collection and has retired the use of hard copy collection, except for in needed circumstances. The APM output for infrared tests can be found in the excel file with each substation on a separate tab. The pdf files will include the photographs from the 2023-2025 inspections."

[17] PG&E file *TCR, DRU14880_Q18_Atch25_SAN CARLOS HQ_ETS.16_IR CHECKSHEETS FINAL_CONF.xlsx*. This assumes that the "Date and Time Collected" field in the APM data provides information for when the inspector entered data during the actual inspection, rather a later date, such as when a clerk entered inspection data in an office.

Utility Manual TD-3322M, – Attachment 9, to require inspectors to activate the IR camera feature to automatically superimpose a date and time stamp on the image.[18]

PG&E should also consider standardizing the IR reports, as were provided to ESRB as PDF files, to ensure they provide a clear and accurate record of all related inspections.[19] This should include providing the following: title page that indicates the station name and report contents, page numbers, dated images, equipment identification, description of anomalies, and a conclusion indicating how the original anomaly was mitigated. Standardized reports could help prevent some of the following records issues:

- **Bair** – the July 31, 2024 inspection found an anomaly on 1200/3 ABC Air switch and indicated that a 90-day re-inspect should be performed. There is no record of a re-inspection, or a PDF file with associated IR imagery.
- **Hillsdale** - the April 23, 2024 inspection found an anomaly on BK ABC X1 Air switch and indicated that a 90-day re-inspect should be performed. Re-inspect was performed on July 11, 2024,which indicated that repair was needed within 90 days. No other test records are included from APM. The PDF with images includes one with a date of July 11, 2024, but otherwise the report lacks dates and findings, which make it impossible to interpret what the anomalies were and any mitigations.
- **Ravenswood** – The PDF file doesn't include the station name, and there does not appear to be any images from the March 30, 2023 inspection, even though a thermal anomaly was noted.[20] The April 15, 2024 inspection found thermal anomalies on REG 175/Bypass, 283, and 253 air switches, and each triggered a 90 day re-inspect. The re-inspect on July 11, 2024 noted that no further action was needed on 253 and 283, but that repair was needed on REG 175/Bypass within 90 days. Images of Reg 175 Bypass A, 253A, 253 B, 283 A, and 283 B are dated July 10, 2024 rather than the APM date of July 11, 2024. The are no records of re-inspection after repairs on Reg 175 Bypass A. A second set of images does not have dates or notes of anomalies.
- Similar issues were encountered during the review of records for the San Carlos, San Mateo, and Watershed stations.

[18] PG&E's IR Report for the Bay Meadows station provides an example. See *DRU14880_Q18_Atch01_BAY MEADOWS_ETS.16.12067_IR.pdf*, Page 7 of 19.
[19] This includes the initial inspection and re-inspections, including re-inspections following any needed repairs.
[20] ESRB understood from conversations with PG&E during the audit that an image of the substation sign on the entry gate was taken for each IR inspection to document that the inspection was performed at the correct location.

III. Field Inspection

During the field inspection, ESRB inspected the following 18 substations:

Substation	City
San Carlos	San Carlos
Belmont	Belmont
Bay Meadows	San Mateo
Carolands	Hillsborough
Burlingame	Burlingame
San Mateo	San Mateo
Hillsdale	San Mateo
Hillsdale Switching Station	San Mateo
Half Moon Bay	Half Moon Bay
Ralston	Belmont
Watershed	Redwood City
Ravenswood	Menlo Park
Las Pulgas	Redwood City
Woodside	Woodside
Menlo	Menlo Park
SRI	Menlo Park
Bair	Redwood City
Redwood City	Redwood City

IV. Field Inspection – Violations List

ESRB observed the following violations of GO 174, Rule 12 during the field inspection:

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."

1. San Carlos Substation

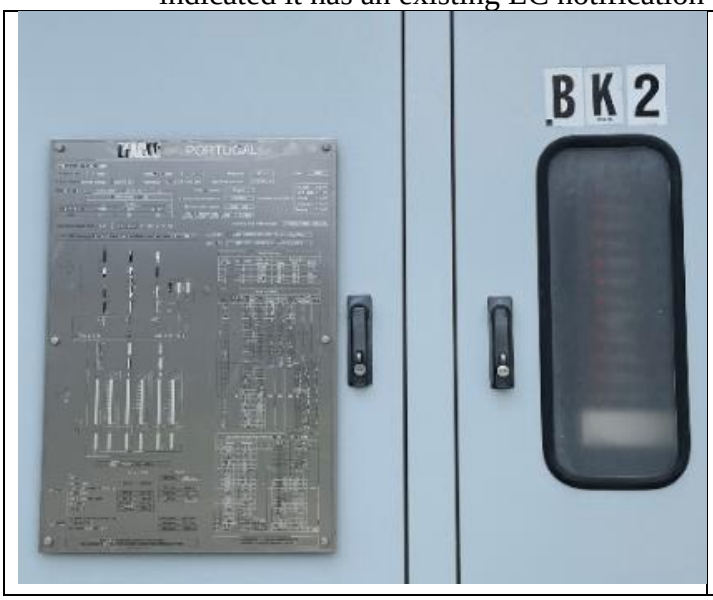
1.1. The circuit breaker for Feeder 405 has a faded counter.

1.2. The structure for Feeder 405 circuit breaker is missing bolts.

1.3. Transformer Bank 1, B phase, has low nitrogen and negative tank pressures. PG&E indicated it has an existing LC notification for this issue, #130711535.

2. Belmont Substation

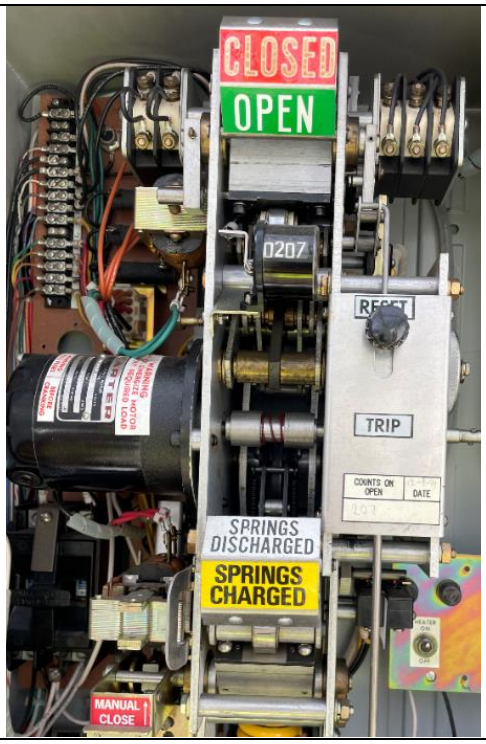
2.1. The counter for transformer bank 2 Load Tap Changer (LTC) is not legible. PG&E indicated it has an existing LC notification for this issue, #130713827.



2.2. An animal guard on the station service transformer is open. PG&E indicated it has an existing LC notification for this issue, #130712209.

2.3. Vegetation outside of station is growing over the perimeter fence.

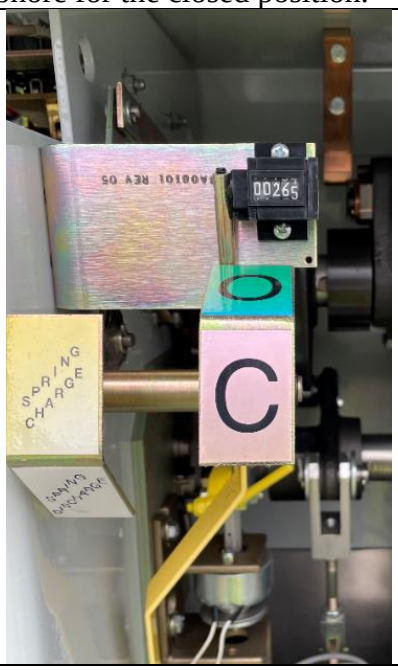
2.4. The plastic window over the semaphore on all four 4kV circuit breakers (401, 402, 403, and 406) is clouded; the color is still visible, but the letters are not. Images below of CB 401 show the issue applicable to all four 4 kV breakers.



Bay Meadows Substation

2.5. Circuit breaker 162 has a faded semaphore for the closed position.

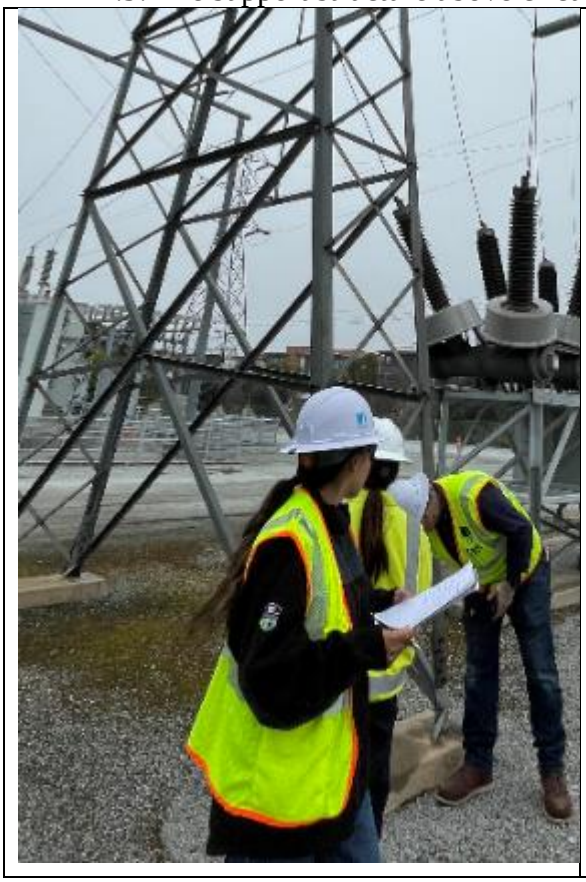
2.6. Circuit breaker 152 has a faded semaphore for the closed position.



2.7. The LTC for transformer bank 1 has an illegible counter. PG&E indicated it has an existing LC notification for this issue, #130515366.

2.8. The barbed wire perimeter fence is damaged. PG&E indicated it has an existing LC notification for this issue, #130532421.

2.9. The support structure above circuit breaker 132 is bent.



3. Carolands Substation

3.1. Expired eye wash. PG&E indicated it has an existing LC notification for this issue, #130883001.

3.2. Damaged perimeter fence. PG&E indicated it has an existing LC notification for this issue, #129861515.

3.3. The semaphore for the closed position on circuit switcher 66 is faded.

4. **Burlingame Substation**

4.1. Neither the red nor green position indicator lamp for circuit switcher 182 is lit.

5. **San Mateo Substation**

5.1. Transformer Bank 6 has an oil pan that is full. PG&E indicated it has an existing LC notification for this issue, #130780047.

5.2. Circuit 409 regulator counter is blank. PG&E indicated it has an existing LC notification for this issue, #129924412.

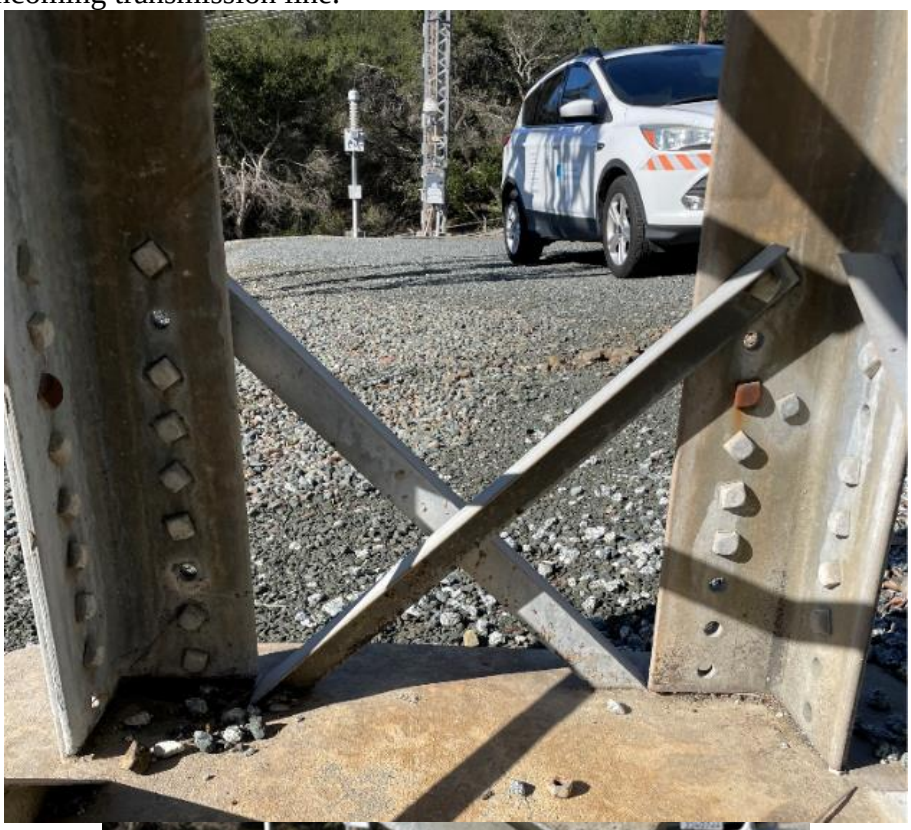
5.3. Transformer Bank 9 LTC counter is damaged and illegible.

6. Hillsdale Substation

6.1. Mounting bolt not installed for Feeder 402A regulator.

6.2. Vegetation is growing over the perimeter fence.

6.3. The structure is missing bolts at the base of the lattice tower supporting dead-end of incoming transmission line.



7. Hillsdale Junction Switching Station

7.1. Excessive ground vegetation and weeds are growing throughout the station inside the fence. PG&E indicated it has an existing LC notification for this issue, #129887824.

7.2. The perimeter fence is failing. PG&E indicated it has an existing LC notification for this issue, #130532898.

8. Half Moon Bay Substation

8.1. Switch 43 has an indicator on the shaft to show open or closed position, but this is illegible. PG&E indicated it has an existing LC notification for this issue, #130733676.

8.2. The label for switch 66 is faded and barely legible. PG&E indicated it has an existing LC notification for this issue, #129895451.

8.3. Faded LTC counter on transformer bank 2. PG&E indicated it has an existing LC notification for this issue, #130855626.

8.4. Transformer bank 2 LTC has a leak and is being filled from a 55 gallon drum. PG&E indicated it has two existing LC notifications for this issue, #130733638 for cleanup and #130733639 for repair.

8.5. Vegetation is growing on the perimeter fence. PG&E indicated it has an existing LC notification for this issue, #130743673.

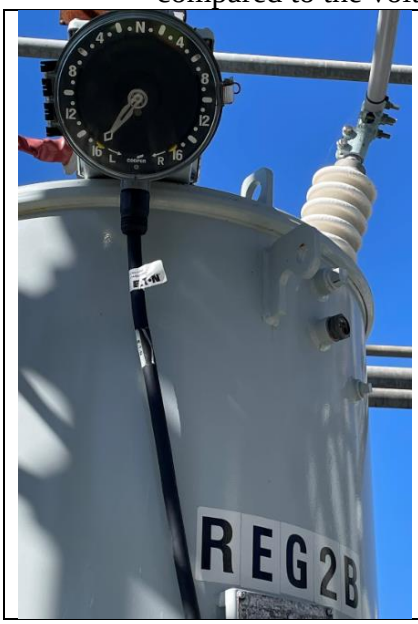
9. Ralston Substation

9.1. Switch 45 has a faded semaphore for the closed position.

9.2. Switch 35 has a faded semaphore for the open position.

9.3. Multiple bird nests in the cooling fins of transformer bank 2. B and C phase cleared by PG&E during the audit, but not A phase.

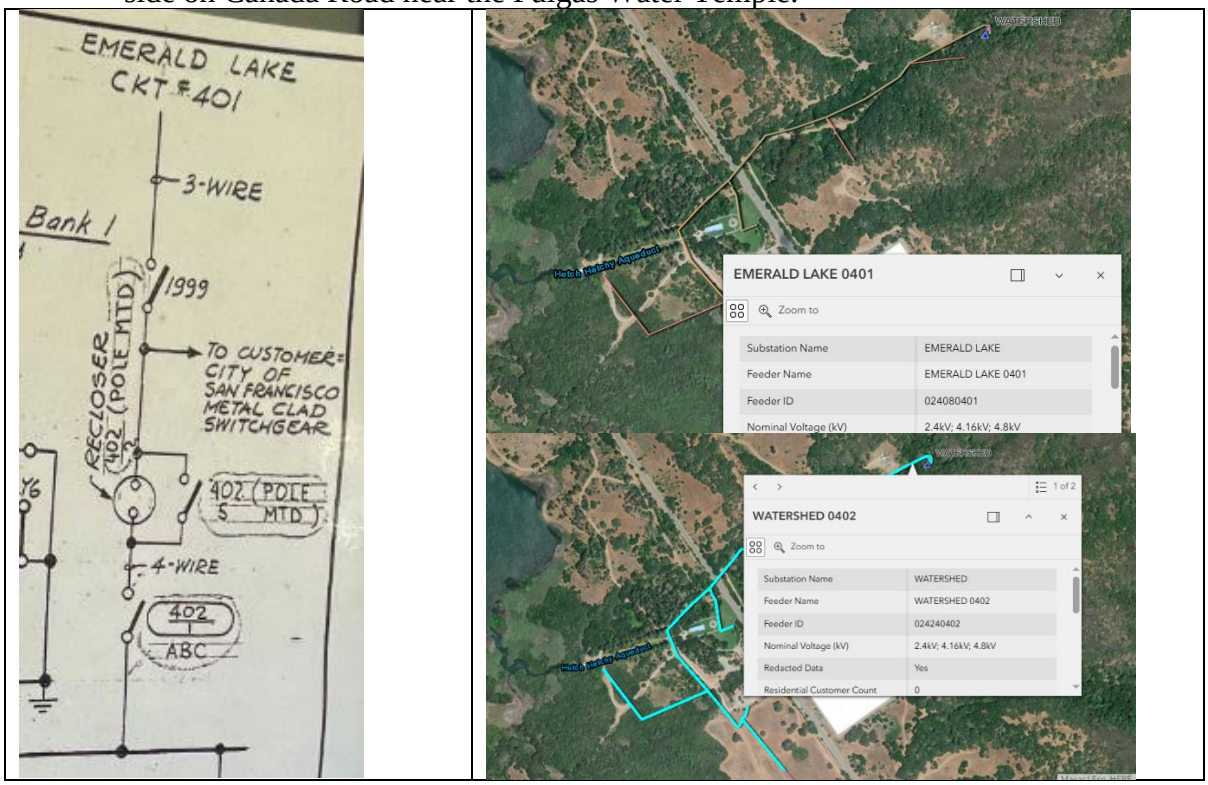
9.4. Regulator 2B position display appears to be broken based on a reading of 16 low compared to the voltage displayed on the regulator control panel.



9.5. Regulator 2C has red "Diagnostic Error" light illuminated. PG&E indicated it has an existing LC notification for this issue, #128203318.

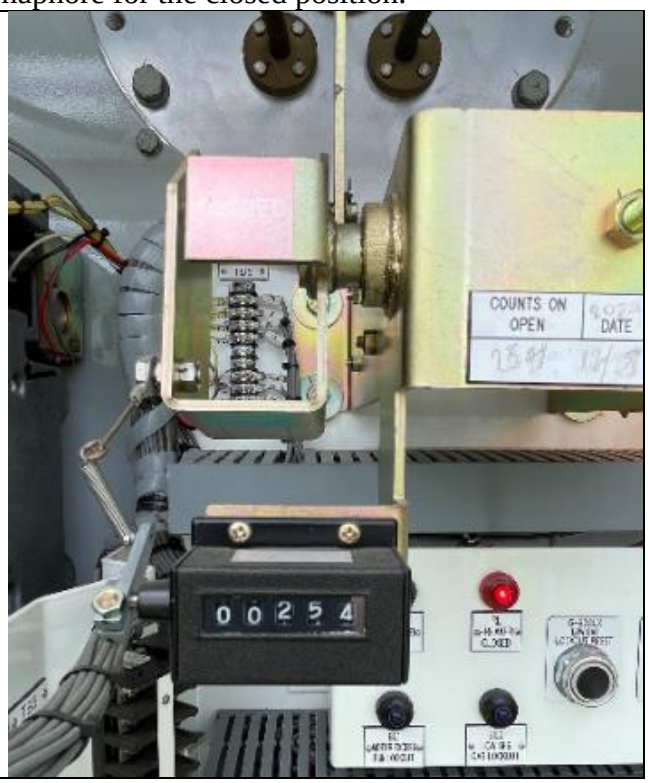
10. Watershed Substation

10.1. The station SLD does not agree with ICA map. The former shows feeder 402 connected to CCSF Metal Clad Switch gear, SW1999, and a tie to Emerald Lake 401 as part of the substation, but per the ICA map all of these are on the opposite side on Canada Road near the Pulgas Water Temple.



11. Ravenswood Substation

11.1. Circuit Breaker 112 has a faded semaphore for the closed position.



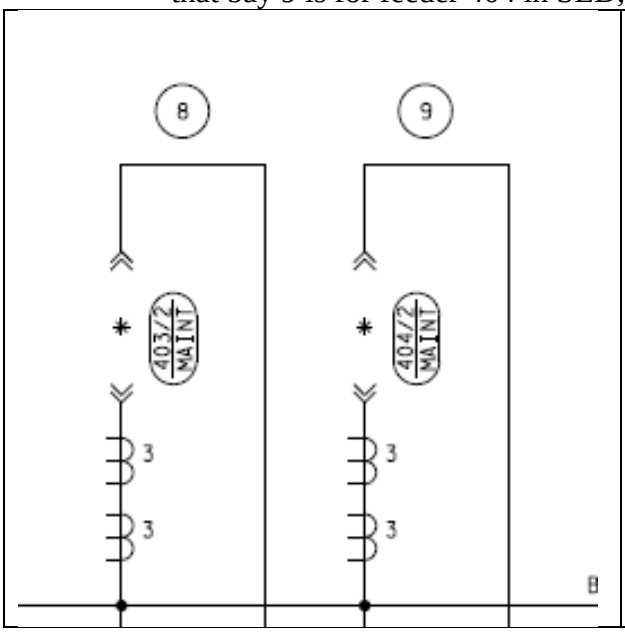
11.2. Circuit Breaker 122 has a faded semaphore for the closed position.

11.3. The counter for Circuit Breaker 182 has a misaligned last digit which prevents an accurate reading.

11.4. Bank 2 LTC doesn't have a temperature gauge. During the audit, PG&E checked with the assigned electrician who said the reading is taken with an IR gun. However, the surface temperature measured with an IR gun does not provide the internal oil or winding temperature as provided by an internal sensor and display gauge. This is an issue to be mitigated through a notification, unless PG&E can adequately explain how it converts the surface temperature into the internal temperature data that is recorded on PG&E's inspection data sheet.

12. Las Pulgas Substation

12.1. Revision 5 of the Single Line Drawing (SLD) for the station does not accurately reflect the equipment in each bay of the 4 kV metal clad switch gear. Images show that bay 9 is for feeder 404 in SLD, but it is actually for 403.



13. Woodside Substation

13.1. Circuit Breaker 1101 and 1102 have debris on the bushings.

13.2. Circuit Breaker 1101 has a faded semaphore for the closed position and misaligned counter that prevents accurate readings.

14.3 Switch 17 has a damaged/misaligned counter

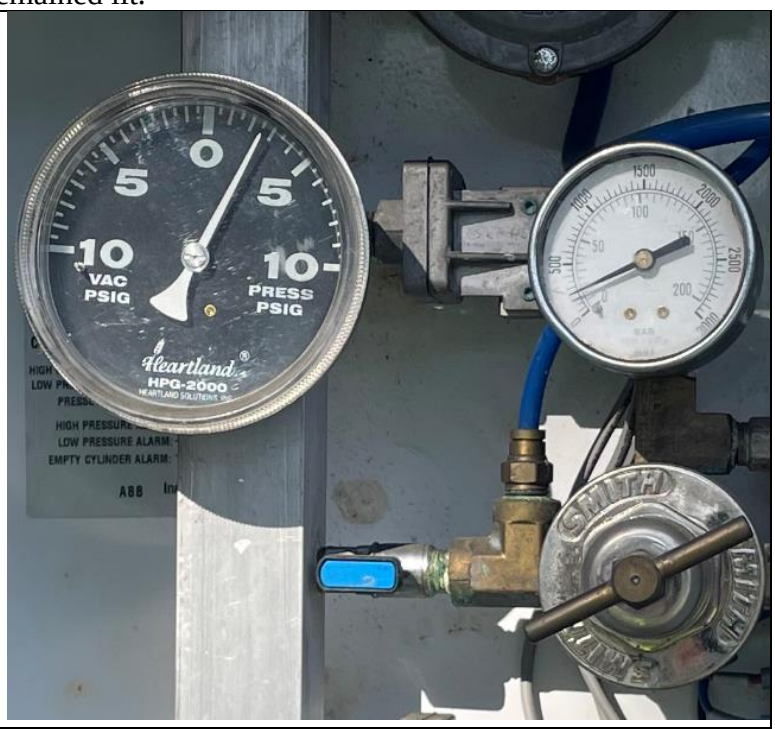
14. Menlo Substation

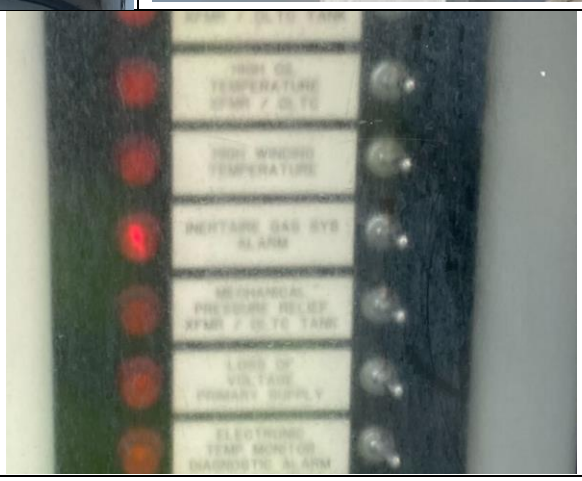
14.1. There are bird nests in transformer bank 2 radiators.

14.2. Transformer bank 3 has a damaged LTC counter: the first digit is illegible. PG&E indicated it has an existing LC notification for this issue, #130733121.

15. SRI Substation

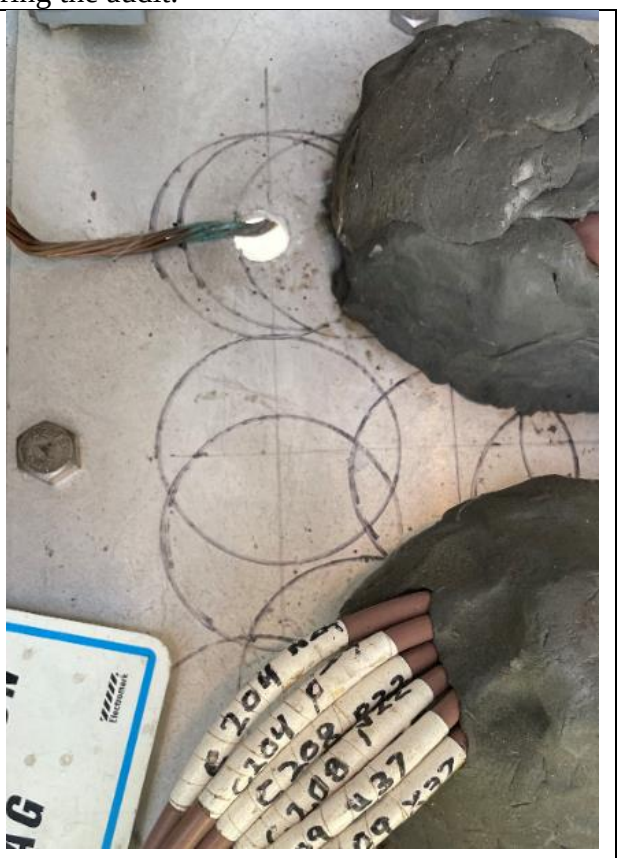
15.1. The red indicator light for low Bank 1 “inert N2 gas” was lit even though the gauge for bank 1 pressure shows significant positive pressure of 2.5 psi, and the regulated nitrogen pressure is approximately 200 psi. PG&E attempted to reset the indicator during the audit, but it remained lit.





16. Bair Substation

16.1. A hole for the ground wire in the bottom of the circuit breaker 152 cabinet was open, but it was sealed by PG&E during the audit.



16.2. A hole in the bottom of the circuit breaker 172 cabinet was open, but it was sealed by PG&E during the audit.

16.3. Circuit breaker 182 has a damaged counter. PG&E indicated it has an existing LC notification for this issue, #130876429.

16.4. There is extensive erosion of station ground fill which undercuts concrete pads. PG&E indicated it has an existing LC notification for this issue, # 130704185.

16.5. Transformer bank 1C has an oil leak, damaged gauges, and missing fan covers. PG&E indicated it has existing LC notifications for these issues: # 130894851 for gauges; #130827416 for the leak: and #130822348 to replace fans.

16.6. Transformer bank 1B has missing fan covers. PG&E indicated it has an existing LC notification for this issue, # 130822347.

16.7. Transformer bank 1A has an oil leak. PG&E indicated it has two existing LC notifications for this issue: # 130703905 for clean up and #126368093 for repair.

16.8. Transformer bank 1C has an oil leak.

16.9.Circuit breaker 72 has a chipped bushing on the transformer side of phase C.

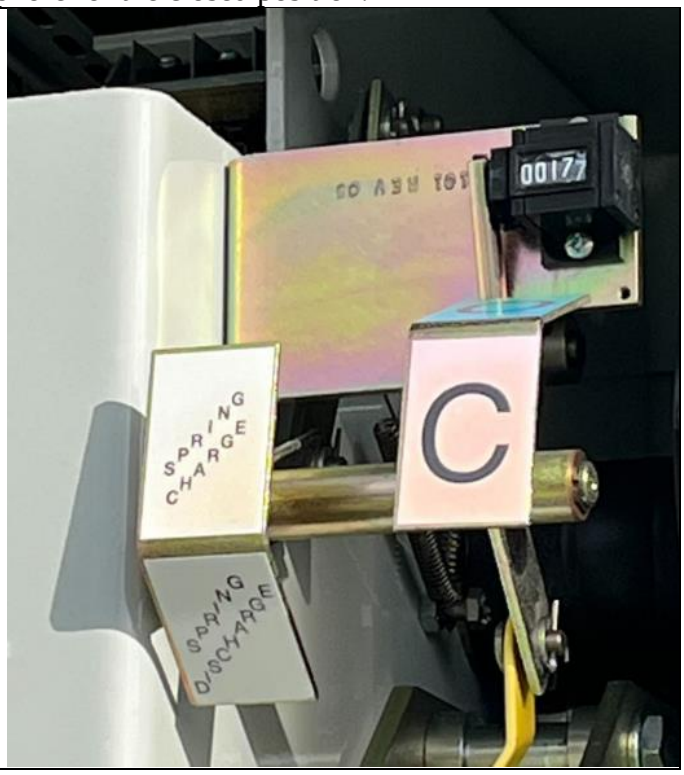
16.10. Circuit breaker 22 has an illegible counter. PG&E indicated it has an existing LC notification to replace counter, but it is legible: # 130881900.

16.11. Circuit Breaker 42 has a damaged counter. PG&E indicated it has an existing LC notification for this issue: # 130881869.

16.12. Circuit Breaker 1101 has a damaged counter. PG&E indicated it has an existing LC notification for this issue: # 130116524.

16.13. Circuit Breaker 1104 has a damaged counter: the first two digits are blacked out.

17.14 Circuit breaker 162 has a faded semaphore for the closed position.



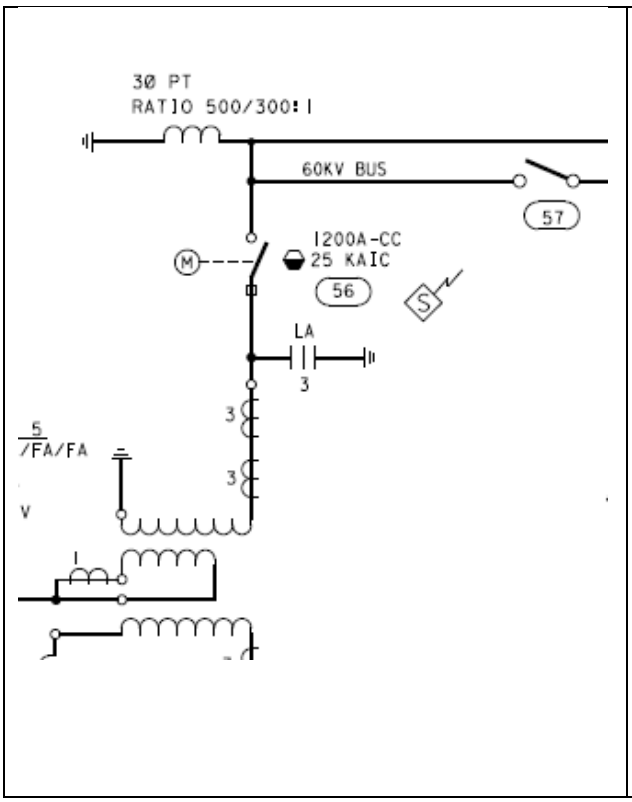
17. Redwood City Substation

17.1. Circuit breaker 14 has a faded semaphore for the closed position and a damaged semaphore for the open position.[21]

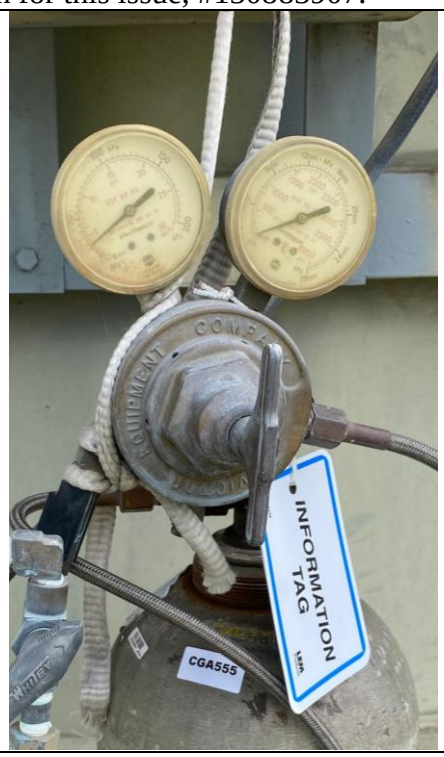
17.2. Air switch 57 is physically here and on the SLD, but not the equipment list provided in PG&E's February 5, 2025 response to Pre-audit data request question 14.[22]

[21] Refer to image of CB 24 for an example of a repaired semaphore that may have had the same issue before.

[22] ESRB issued its Pre-Audit Data Request (PADR) on December 27, 2024. PG&E responded to this request in three batches, consistent with ESRB's request. Subsequently, ESRB issued follow up question about the PADR responses with PG&E referred to as PADR #2 through PADR #5. To avoid confusion, this report uses the date of PG&E's responses rather than the PADR numbers.



17.3.The bottle pressure gauge for nitrogen on transformer bank 4 C phase is damaged. PG&E indicated it has an existing LC notification for this issue, #130883907.



17.4. The spare transformer for transformer bank 4, labeled “Spare Bank#1,” has a winding temperature gauge that isn’t working and has loose wires coming out of it, as well as an electrical box that is missing a cover and exposing wires. PG&E indicated it has an existing LC notification for this issue, #130805230.

17.5. The spare transformer for transformer bank 4, labeled “Spare Bank#1,” vented oil onto the pad during the audit. Clean up was in process during the audit.

17.6.Circuit breaker 1300 has the last digit missing from the counter. PG&E indicated it has an existing LC notification for this issue:129973699.