File No. 260035 **Committee Item No.** 2
Board Item No. _____

COMMITTEE/BOARD OF SUPERVISORS

AGENDA PACKET CONTENTS LIST

Committee: Public Safety and Ngbh Services **Date:** May 14, 2026
Board of Supervisors Meeting: **Date:** _____

Cmte	Board	
☐	☐	**Motion**
☐	☐	**Resolution**
☐	☐	**Ordinance**
☐	☐	**Legislative Digest**
☐	☐	**Budget and Legislative Analyst Report**
☐	☐	**Youth Commission Report**
☒	☐	**Introduction Form**
☐	☐	**Department/Agency Cover Letter and/or Report**
☐	☐	**MOU**
☐	☐	**Grant Information Form**
☐	☐	**Grant Budget**
☐	☐	**Subcontract Budget**
☐	☐	**Contract / DRAFT Mills Act Agreement**
☐	☐	**Form 126 – Ethics Commission**
☐	☐	**Award Letter**
☐	☐	**Application**
☒	☐	**Public Correspondence**

OTHER

☒	☐	FYI Referral 011326
☒	☐	Referral YC 020326
☒	☐	PG&E Presentation 021226
☒	☐	Merchants Presentation 021226
☒	☐	YC Response 021626
☐	☐	PG&E Evaluation 050826
☐	☐	
☐	☐	
☐	☐	

Prepared by: Monique Crayton **Date:** May 8, 2026
Prepared by: _____ **Date:** _____
Prepared by: _____ **Date:** _____

BOARD of SUPERVISORS

City Hall
1 Dr. Carlton B. Goodlett Place, Room 244
San Francisco 94102-4689
Tel. No. (415) 554-5184
Fax No. (415) 554-5163
TDD/TTY No. (415) 554-5227

M E M O R A N D U M

TO: Rosie Dilger, Pacific Gas & Electric Company
Sara Yoel, Pacific Gas & Electric Company
Julia Latimer, Pacific Gas & Electric Company

FROM: Monique Crayton, Assistant Clerk, Public Safety and Neighborhood Services Committee, Board of Supervisors

DATE: January 13, 2026

SUBJECT: LEGISLATION INTRODUCED

The Board of Supervisors' Public Safety and Neighborhood Services Committee has received the following hearing request, introduced by Supervisor Alan Wong on January 6, 2026:

File No. 260035

Hearing to discuss the cause(s), escalation, response, and impacts of the widespread power outages that began on December 20, 2025, and which have disproportionately affected residents and small businesses in the Richmond, Sunset, Presidio, Civic Center, South of Market (SOMA), and other San Francisco neighborhoods, to understand how a localized substation incident escalated to affect nearly one-third of the City; to assess communication failures and gaps in emergency response protocols; to evaluate economic impacts on small businesses and hardships faced by seniors, persons with disabilities, and other vulnerable residents; to discuss and understand the remedies, claims processes and support being provided to affected residents and businesses; and requesting the Pacific Gas and Electric Company (PG&E) to report.

If you have any comments or reports to be included with the file, please forward them to me at the Board of Supervisors, City Hall, Room 244, 1 Dr. Carlton B. Goodlett Place, San Francisco, CA 94102.

CC:
Office of Chair Dorsey
Office of Supervisor Wong

BOARD of SUPERVISORS

City Hall
1 Dr. Carlton B. Goodlett Place, Room 244
San Francisco 94102-4689
Tel. No. (415) 554-5184
Fax No. (415) 554-5163
TDD/TTY No. (415) 554-5227

M E M O R A N D U M

TO: Joy Zhan, Interim Director, Youth Commission

FROM: Monique Crayton, Assistant Clerk,
Public Safety and Neighborhood Services Committee

DATE: February 3, 2026

SUBJECT: LEGISLATIVE MATTER INTRODUCED

The Board of Supervisors' Public Safety and Neighborhood Services Committee has received the following hearing request, introduced by Supervisor Alan Wong on January 6, 2026. This item is being referred for comment and recommendation.

File No. 260035

Hearing to discuss the cause(s), escalation, response, and impacts of the widespread power outages that began on December 20, 2025, and which have disproportionately affected residents and small businesses in the Richmond, Sunset, Presidio, Civic Center, South of Market (SOMA), and other San Francisco neighborhoods, to understand how a localized substation incident escalated to affect nearly one-third of the City; to assess communication failures and gaps in emergency response protocols; to evaluate economic impacts on small businesses and hardships faced by seniors, persons with disabilities, and other vulnerable residents; to discuss and understand the remedies, claims processes and support being provided to affected residents and businesses; and requesting the Pacific Gas and Electric Company (PG&E) to report.

Please return this cover sheet with the Commission's response to Monique Crayton, Assistant Clerk, Public Safety and Neighborhood Services Committee.

****

RESPONSE FROM YOUTH COMMISSION Date: _____

____ No Comment
____ Recommendation Attached

_____
Chairperson, Youth Commission

C: Office of Chair Dorsey
Office of Supervisor Wong

BOARD of SUPERVISORS

City Hall
1 Dr. Carlton B. Goodlett Place, Room 244
San Francisco 94102-4689
Tel. No. (415) 554-5184
Fax No. (415) 554-5163
TDD/TTY No. (415) 554-5227

M E M O R A N D U M

TO: Joy Zhan, Interim Director, Youth Commission

FROM: Monique Crayton, Assistant Clerk,
Public Safety and Neighborhood Services Committee

DATE: February 3, 2026

SUBJECT: LEGISLATIVE MATTER INTRODUCED

The Board of Supervisors' Public Safety and Neighborhood Services Committee has received the following hearing request, introduced by Supervisor Alan Wong on January 6, 2026. This item is being referred for comment and recommendation.

File No. 260035

Hearing to discuss the cause(s), escalation, response, and impacts of the widespread power outages that began on December 20, 2025, and which have disproportionately affected residents and small businesses in the Richmond, Sunset, Presidio, Civic Center, South of Market (SOMA), and other San Francisco neighborhoods, to understand how a localized substation incident escalated to affect nearly one-third of the City; to assess communication failures and gaps in emergency response protocols; to evaluate economic impacts on small businesses and hardships faced by seniors, persons with disabilities, and other vulnerable residents; to discuss and understand the remedies, claims processes and support being provided to affected residents and businesses; and requesting the Pacific Gas and Electric Company (PG&E) to report.

Please return this cover sheet with the Commission's response to Monique Crayton, Assistant Clerk, Public Safety and Neighborhood Services Committee.

****

RESPONSE FROM YOUTH COMMISSION Date: 02/17/2026

___ No Comment
_✓_ Recommendation Attached

_____
Chairperson, Youth Commission

C: Office of Chair Dorsey
Office of Supervisor Wong

Youth Commission
City Hall ~ Room 345
1 Dr. Carlton B. Goodlett Place

(415) 554-6446
(415) 554-6140 FAX

YOUTH COMMISSION
MEMORANDUM

TO: Board of Supervisors - Public Safety and Neighborhood Services Committee

CC: Monique Crayton, Assistant Clerk
Angela Calvillo, Clerk of the Board
Alisa Somera, Legislative Deputy Director

FROM: 2025-2026 Youth Commission

DATE: Tuesday, February 16, 2026

RE: SUBJECT: YOUTH COMMISSION LEGISLATION REFERRED 02/03/26

At the Youth Commission's in-person meeting on Monday, February 2, 2026, the Commission discussed and took action on BOS File No. 260035:

1. The Youth Commission positively recommends this piece of legislation to the full Board of Supervisors and the Mayor's Office.
2. The Youth Commission also inquired about the following:
    - How will the City they hold PG&E accountable in the future?
    - Why were certain neighborhoods out of power, when others didn't?
    - Was this a power grid issue?
    - How did this power outage affected public transportation, those in homeless shelters, and other vulnerable populations?
    - How will this be prevented from happening in the future?
    - What PG&E is doing to help financially support those who were affected negatively by the power outage?

The Youth Commission recognizes that the hearing has been heard at the February 12th, 2026, PSNS Committee and has been continued to the call of the Chair.

Please do not hesitate to contact Youth Commissioners or Youth Commission staff at (415) 554-7112 with any questions. Thank you.

Mission Substation Update

February 12, 2026

Overview

For more than 120 years, we have had the privilege of proudly serving San Francisco families and businesses.

We are accountable to all those impacted by the outage last December, the frustration it caused, and our inadequate communication.

We are taking action to earn your trust

What Happened

- On Saturday, December 20, a circuit breaker failure led to a fire at the Mission Substation.
- For the safety of PG&E and SFFD crews, we turned off power in the substation.
- This resulted in an outage impacting **~130,000** customers.
- Within 3 hours of being able to safely access the site, we had restored power to ~97,000 customers, 75% of those impacted.

We want to thank the City and County of San Francisco, our local first responders, and everyone across our hometown who worked together to support those affected by this outage.

The information herein is preliminary. All figures are approximate and are based on our currently available data sources. These data sources are subject to refinement.

Event Timeline

Our unwavering focus was to:

- Ensure the safety of firefighters and emergency responders
- Restore power safely and as quickly as possible
- Provide impacted customers with support resources

Saturday, Dec. 20

- **1:04 PM** — Circuit breaker issue resulting in fire and outage
- **2:31 PM** — Substation de-energized for safety
- **6:38 PM** — SFFD declares substation safe, PG&E crews permitted access
- **9:30 PM** — **75% of customers restored (~97,000)**

Sunday, Dec. 21

- Third-party cause investigator engaged
- **4:00 PM** — Community Resource Center opened in the Richmond District
- **4:21 PM** — **90% of customers restored (~117,000)**

Monday, Dec. 22

- **7:00 AM** — Temporary generation turned on
- **7:00 AM** — **97% of customers restored (~126,000)**
- Automatic bill credits announced
- **6:00 PM** — Community Resource Center opened near Civic Center

Tuesday, Dec. 23

- **4:31 AM** — **100% of customers restored (~130,000)**

Saturday, Dec. 28

- **4:31 AM** — Temporary generation disconnected

The information herein is preliminary. All figures are approximate and are based on our currently available data sources. These data sources are subject to refinement.

Immediate and Ongoing Actions

We have undertaken a series of immediate actions to provide safe and reliable service and to support all our impacted customers in San Francisco.

Taking Immediate Action

Improving reliability for our customers

- Returned Mission Substation to normal configuration
- Engaged third-party expert cause evaluator
- Conducting accelerated system inspections
- Enhancing 24/7 system monitoring

Improving Restoration Time Estimates

Addressing inaccurate customer notifications

- Conducting third-party review of estimated time of restoration (ETOR) process
- Changing the usual automatic notification process when there are extenuating circumstances
- Updating notification language to provide more targeted, timely and accurate information

Partnering with the City of San Francisco

Working together on emergency preparedness and management

- Sharing third-party review results and action plans
- Strengthening communications with local officials and partnering with SF Department of Emergency Management
- Inviting the City to observe evidence examinations as part of the third-party review

The information herein is preliminary. All figures are approximate and are based on our currently available data sources. These data sources are subject to refinement.

Committed to Our Customers in San Francisco

We are working directly with customers and have support resources available. We are also working directly with San Francisco supervisors and City staff.

Engaging with Our Customers

1/9	Held a merchant walk in partnership with Supervisor Wong's office
1/9	Participated in Supervisor Chan's Office Hours to provide claims support
1/16	Held a Community Coffee Connect to provide claims support in the Richmond
1/19	Met with Chinatown Merchants United Association of San Francisco (CMUAS)
1/20	Met with People of Parkside Sunset (POPS)
1/27	Held a claims workshop in the Sunset
1/27	Met with 8 merchant groups
1/28	Held a claims workshop in Chinatown
1/30	Held a merchant walk in the Sunset
2/10	Hosted a small business workshop in Chinatown

- Chinatown Merchants United Association of San Francisco (CMUAS)
- People of Parkside Sunset (POPS)
- The Outer Sunset Merchant and Professional Association
- Sunset Chinese Cultural District
- Clement Street Merchants
- Balboa Village Merchants Association
- Geary Boulevard Merchants Association
- San Francisco Community Alliance for Unity, Safety & Education

Financial Compensation

Automatic Bill Credits: $200 bill credits for residential customers and $2,500 for non-residential customers

Outage Claims: Expedited resolution in multiple languages via our dedicated claims hotline. Claims are still open for the 12/20 event and subsequent outages. As of February 10:

- **$1.2+ million** in claims distributed
- **2,744** claims received
- **~89%** claims resolved
- **~15-day** average resolution

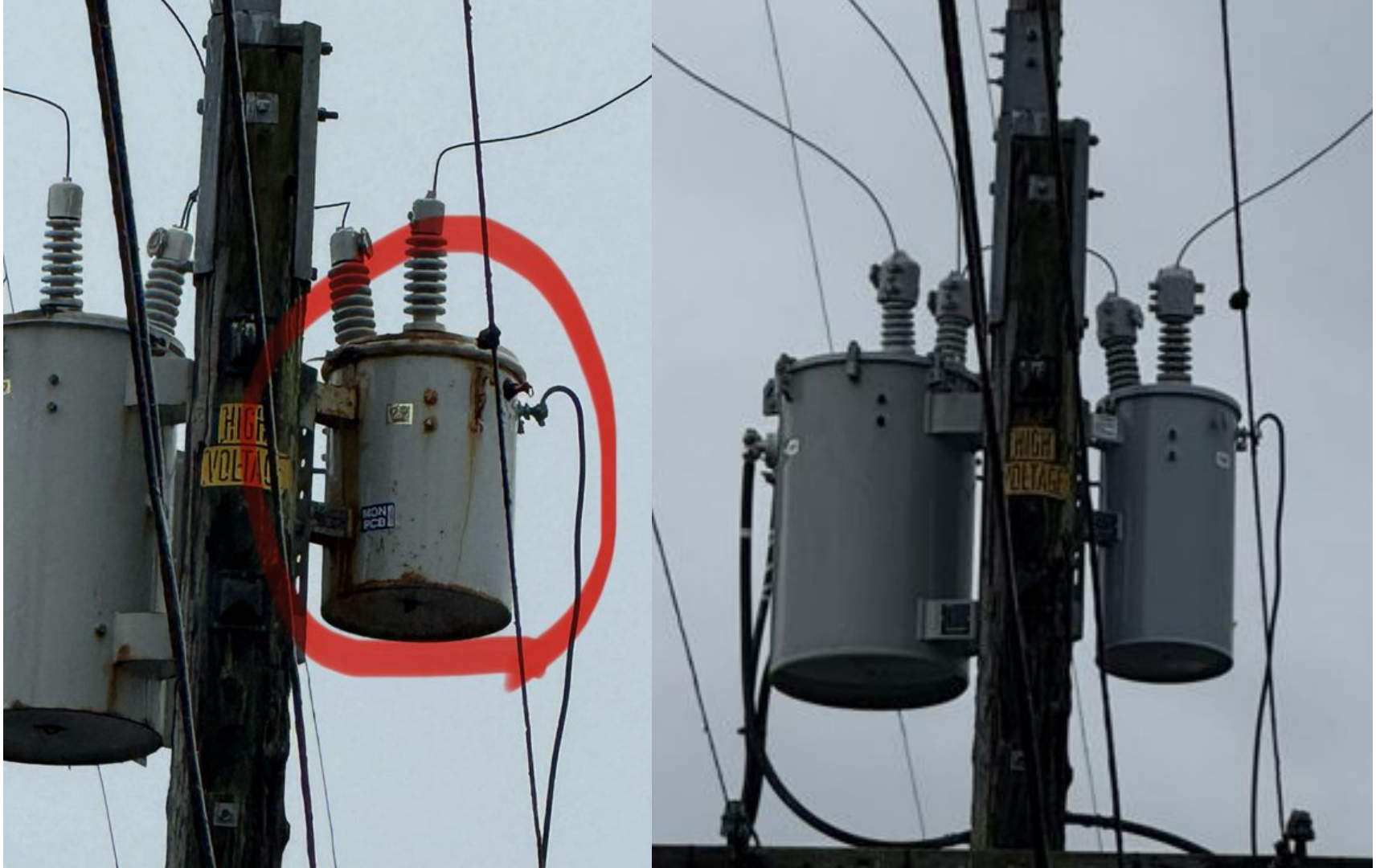
Data as of 2/10/26

Ongoing claims support:
M-F, 8 a.m. – 5 p.m. (415) 973-4548

We will continue to support and engage customers and community groups in the coming months

The information herein is preliminary. All figures are approximate and are based on our currently available data sources. These data sources are subject to refinement.


Rocky Road


NON PCB
HIGH VOLTAGE


PORK


HOT FOOD
135° F

Sales summary

Leave feedback

NEAR REAL-TIME

Custom
Dec 6, 2025 - Dec 6, 2025

Underdogs Tres
Underdogs Tres

Custom hours

Employees

Show percentages

Related reports

Cash drawer overview | Orders | Order details | Payments | Shifts | Cash activity audit

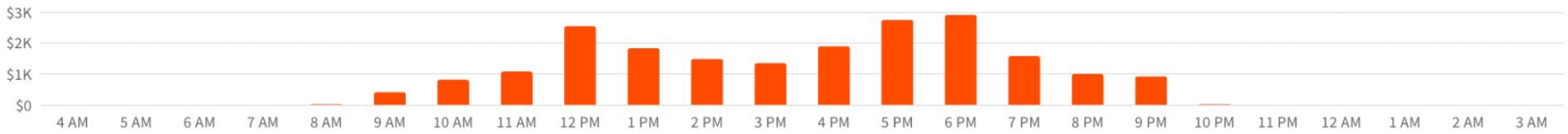
Normal vs. Outage Day

December 6, 2025 (Normal Operations)

- Net Sales: **$20,564.03**
- Total Sales: **$24,935.29**
- Tips: **$2,643.92**

Sales trends

Time of day (totals)



Benchmarking insight

Your overall order volume grew ▲ 4% vs ▲ 7% for your peers in the last 7 days

More →

Revenue Summary

Net sales	$20,564.03
Gratuity	$0.00
Tax amount	$1,727.34
Tips	$2,643.92
Deferred (other)	$0.00
Paid in total	$0.00
Total amount	**$24,935.29**

Cash Summary

Cash drawer history

Expected closeout cash	$255.18
Actual closeout cash	$254.00
Cash overage/shortage	-$1.18
Expected deposit	$254.00
Actual deposit	—
Deposit overage/shortage	—

Sales summary

Leave feedback

NEAR REAL-TIME

Custom
Dec 20, 2025 - Dec 20, 2025

Underdogs Tres
Underdogs Tres

Custom hours

Employees

Show percentages

Related reports

Cash drawer overview | Orders | Order details | Payments | Shifts | Cash activity audit

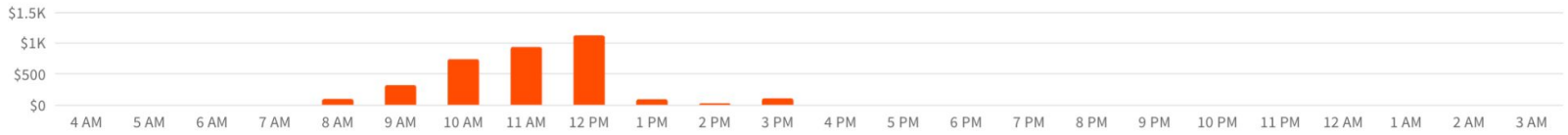
Normal vs. Outage Day

December 20, 2025 (Power Outage Day)

- Net Sales: **$3,426.81**
- Total Sales: **$4,287.15**
- Tips: **$359.86**

Sales trends

Time of day (totals)



Benchmarking insight

Your overall sales grew ▲ 2% vs ▲ 15% for your peers in the last 7 days

More →

Revenue Summary

Net sales	$3,426.81
Gratuity	$0.00
Tax amount	$288.45
Tips	$359.86
Deferred (gift cards)	$150.00
Paid in total	$62.03
Total amount	**$4,287.15**

Cash Summary

Cash drawer history

Expected closeout cash	$0.00
Actual closeout cash	$0.00
Cash overage/shortage	$0.00
Expected deposit	$0.00
Actual deposit	—
Deposit overage/shortage	—

From: Jasbir Dhuga
To: Board of Supervisors (BOS); MahmoodStaff
Subject: Subject Line: Public Question for Hearing File No. 251222 (Grid Resilience & AV Protocols)
Date: Friday, January 2, 2026 8:18:16 AM

Target: Department of Emergency Management (DEM) & SFMTA

> "Between 9:40 AM (when power was lost) and 1:09 PM (when the substation fire occurred), the city had nearly 3.5 hours where 7,000 traffic signals were dark. Why was no emergency order issued during this 3.5-hour window to clear autonomous vehicles from the roads *before* the fire department needed to respond to the second emergency?"

Target: PG&E Executives

> "PG&E has stated the substation fire occurred at 1:09 PM, yet outages began at 9:40 AM. Does PG&E acknowledge that the 3.5-hour delay in resolving the initial grid instability created the traffic conditions that subsequently delayed emergency vehicles from reaching the substation fire itself?"

Signed
J.S.Dhuga

From:	Carroll, John (BOS)
To:	M Eilo; Board of Supervisors (BOS)
Subject:	RE: Transportation needs PUBLIC POWER!
Date:	Monday, January 5, 2026 10:23:53 AM
Attachments:	image001.png

Thank you for your comment letter.

By copy of this message to the board.of.supervisors@sfgov.org email address, your comments will be forwarded to the full membership of the Board of Supervisors.

John Carroll
Assistant Clerk
Board of Supervisors
San Francisco City Hall, Room 244
San Francisco, CA 94102
(415)554-4445

 Click here to complete a Board of Supervisors Customer Service Satisfaction form.

The Legislative Research Center provides 24-hour access to Board of Supervisors legislation and archived matters since August 1998.

From: M Eilo <blinkpopshift@gmail.com>
Sent: Monday, December 22, 2025 8:30 AM
To: Carroll, John (BOS) <john.carroll@sfgov.org>
Subject: Transportation needs PUBLIC POWER!

This is the last straw. End PGE now. Multiple friends were stuck taking multiple busses for hours or paying for rides they can't afford just because we keep letting PGE exist.

In 1996 there was a very similar fire in that same substation that caused a blackout. Did they update infrastructure to prevent it happening again? No. Instead they hiked rates to pay their fucking CEO millions a year and their shareholders a huge return.

I want what Sac has: municipal power. Time to catch up with the times only 75 years late.

From: Kendrick Lewallen
To: Board of Supervisors (BOS)
Subject: PG&E power outage personal story
Date: Monday, January 5, 2026 9:41:45 PM

Dear supervisors, of San Francisco thank you for your time. I come to you as a constituent of district 6 and I would like to address the negligence of pg&e.

As a tenant living at 1190 Mission St. The entire building was impacted. I have lived in San Francisco for over 14 years as a resident in San Francisco. I've never experienced anything like the power outage that residents experienced across the city. Especially in my neighborhood SOMA even worse the Richmond' district. As you are aware our trinity building 1190 mission street, from December 20 to December 23rd without electricity! PG&E failed us as a community tremendously . The results are, spoiled food, I personally couldn't take care of tasks that needed to be taken care of due to the stress the anxiety that induced not to mention, I have PTSD I watched my mother pass in front of me earlier this year back in August. She also experienced the power outage. She was living off of a respirator, and she was grasping for air. Begging for help, I absolutely felt helpless in that moment near the end of her life..

Furthermore, I continuously called PG&E, vocalizing my frustration, and also bringing up the fact that the community, families and children were suffering immensely! Additionally I also looked around at other buildings surrounding us, seeing the fact my neighbors all had their electricity back, yet we didn't. This was very alarming. I found out after speaking with a security guard in my lobby that our building had a generator that was full,according to her, PG&E would not authorize our available fueled generator. I brought it up to PG&E. I couldn't ever get answers and then the only answer I did get was you can submit a request about the generator to our team that handles this and it will take two days for them to respond while we were in a power outage. This is absolutely a mockery of a company when they can't get back to you about your buildings generator that could have restored power to the entire building.

Why is it that it would take two days for the higher ups to address that issue this doesn't make any sense whatsoever and I believe that PG&E should not exist here in San Francisco because they have plaid guilty to murder. back in 2018 in fact, not that long ago as your are aware the campfire killed 84 people and that was due to PG&E's negligence! Fast forward to 2025, SOMA San Francisco on eighth street a substation caught on fire and could have exploded. Why did the substation catch on fire? No one really knows there are no answers yet and I believe that PG&E probably knows but isn't being transparent with the public about this issue. I'm deeply alarmed by their lack of compassion,their lack of care about the 4000 residence that remained without power for four days while other residents in the city of San Francisco were able to get their electricity back within 24 hours.

This also seems to be a reoccurring issue in the Richmond District. Apparently the Richmond District has been without power multiple times during the month of December 2025..

It’s a shame that I even have to write to you today about this particular issue, but it’s important that we all collectively speak out against PG&E’s lackluster practices. We should have an option to select a different energy provider, considering the negligence of PG&E has been absolutely ridiculous and irresponsible.

This truly mess with many people Christmas plans. Ultimately making many in our community upset. I have heard pg&e won’t properly compensate individuals for their losses.

Moreover, I had to get a hotel room to fill some kind of sanity to I can be productive, needed to charge my phone. I was told that my hotel room would be comped by PG&E. They’ve told me I should call 211 and that 211 should have some type of voucher for us to get a hotel room, however 211 said that they do not offer any type of voucher for hotel rooms to be covered. I also had to get take out multiple times. I spent over $400 because of this outage not to mention I probably have lost $450 worth of food in my refrigerator. I have yet to file a claim with PG&E because I have just been so busy after the power outage. The origin of my personal frustration with this issue is a simple fact I had so much going on at that time and had to get ready for a job that I took in another town temporarily, so it’s been very frustrating to say the least,

I’m sorry that this letter is coming to you so late, but I hope that you guys are able to see that these issues are very important and impact us as a community and we should really consider an alternative to PG&E and PG&E should be held accountable for financial losses of residence

Thanks again for taking the time to read my statement it’s important for everyone’s voice to be heard. Happy new year may this be a better year than last.

Kendrick Lewallen

From: Richard Rothman
To: Crayton, Monique (BOS); Yu, Angelina (BOS); Yan, Calvin (BOS)
Subject: Re: Hearing on PGE
Date: Monday, February 9, 2026 8:09:20 AM

With reference to the hearing file no. 260035 regarding the citywide blackout on December 20.
I live in the Outer Richmond district and had no electricity for 48 hours. Kept getting mixed messages from PGE when the power would be on. In reference to the $200 credit that PGE gave everyone in the black, I think the credit should be prorated. Some people whose power was out for only 5 hours got $200, the same amount as those whose power was out for 48 hours. If your electricity was out for longer than you should get a larger credit.

Thanks
Richard Rothman, District One resident.

On Fri, Feb 6, 2026 at 3:19 PM Crayton, Monique (BOS) <monique.crayton@sfgov.org> wrote:

> Here is a link to the meeting agenda.
>
> **Monique C. Crayton (she/her)**
>
> ***Assistant Clerk***
>
> Board of Supervisors - Clerk's Office
>
> 1 Dr. Carlton B. Goodlett Place, Room 244
>
> San Francisco, CA 94102
>
> (415) 554-7750 | Fax: (415) 554-5163
>
> monique.crayton@sfgov.org | www.sfbos.org
>
> **(VIRTUAL APPOINTMENTS)** To schedule a "virtual" meeting with me (on Microsoft Teams), please ask and I can answer your questions in real time.
>
> ---
>
> **From:** Crayton, Monique (BOS)
> **Sent:** Friday, February 6, 2026 10:21 AM

To: Richard Rothman <rrothman555@gmail.com>
Subject: RE: Hearing on PGE

Yes. I'll send you a link to the meeting agenda when it is posted.

Thank you!

Monique C. Crayton (she/her)

Assistant Clerk

Board of Supervisors - Clerk's Office

1 Dr. Carlton B. Goodlett Place, Room 244

San Francisco, CA 94102

(415) 554-7750 | Fax: (415) 554-5163

monique.crayton@sfgov.org | www.sfbos.org

(VIRTUAL APPOINTMENTS) To schedule a "virtual" meeting with me (on Microsoft Teams), please ask and I can answer your questions in real time.

From: Richard Rothman <rrothman555@gmail.com>
Sent: Friday, February 6, 2026 6:49 AM
To: Crayton, Monique (BOS) <monique.crayton@sfgov.org>
Subject: Re: Hearing on PGE

Hello,

Checking in to see if you have the schedule for next Thursday's meeting and whether PGE will be on the agenda.

Thanks

Richad

On Tue, Feb 3, 2026 at 12:01 PM Crayton, Monique (BOS) <monique.crayton@sfgov.org> wrote:

> Please check-in with me on Thursday, February 5th when the meeting agenda is finalized.
>
> Thank you!
>
> **Monique C. Crayton (she/her)**
>
> ***Assistant Clerk***
>
> Board of Supervisors - Clerk's Office
>
> 1 Dr. Carlton B. Goodlett Place, Room 244
>
> San Francisco, CA 94102
>
> (415) 554-7750 | Fax: (415) 554-5163
>
> monique.crayton@sfgov.org | www.sfbos.org
>
> **(VIRTUAL APPOINTMENTS)** To schedule a "virtual" meeting with me (on Microsoft Teams), please ask and I can answer your questions in real time.
>
> ---
>
> **From:** Richard Rothman <rrothman555@gmail.com>
> **Sent:** Tuesday, February 3, 2026 11:49 AM
> **To:** Crayton, Monique (BOS) <monique.crayton@sfgov.org>
> **Subject:** Hearing on PGE

Hello,

Will the hearing about PGE be at the Feb 12 meeting? When will the meeting agenda be available?

Thanks

Richard Rothman

415 350-7629

February 12, 2026

To the Honorable Members of the San Francisco Board of Supervisors Public Safety & Neighborhood Services Committee
City Hall, 1 Dr. Carlton B. Goodlett Place, Room 244
San Francisco, CA 94102

Subject: Ongoing Concerns Regarding Frequent PG&E Power Outages, Aging Infrastructure, and Failures to Provide Transparent Communications in Sherwood Forest

Honorable Supervisors and Representatives from PG&E:

I am writing to formally submit my continued frustration and concern regarding the **systemic unreliability of PG&E's electrical service** in the Sherwood Forest neighborhood. Our neighborhood experiences more outages than any other neighborhood in San Francisco.

For the past nearly six years, living on Casitas Ave, I have experienced more power outages than in all my previous homes combined. These are not brief blips; they are significant outages lasting for days at a time, which is both incomprehensible and unacceptable for a major urban area.

The impact is substantial, affecting our ability to work from home and creating safety risks for residents who depend on consistent power.

The core issues which need to be addressed are as follows:

1. Aging and Outdated Infrastructure:
While PG&E often cites weather-related causes, emergency crews on site have repeatedly informed me that our specific lines and equipment are **wholly outdated and in need of a serious upgrade**. PG&E's own communications have mentioned "replacing conductors, cross arms, and electric wires," confirming the equipment issue. An incident on December 14, 2024, involved a transformer sparking in a neighbor's backyard creating a fire risk.

2. Inadequate Vegetation Management:
In the summer of 2022, I specifically requested an inspection of a tree branch overhang. The inspector declined to trim it, stating it would take "pretty gusty winds" to cause a problem. Months later, that exact tree caused a 2-day outage, requiring emergency crews to hack away at it in the middle of the night. We continue to receive notifications about "tree safety work," indicating an ongoing problem.

3. Communication and Accountability Failures:
PG&E communication often falls short. There is no transparency. Nor is there confidence in the information if and when it is provided. Claims for food spoilage have

been denied, citing the same reasons each time. We have had to file multiple complaints with the CPUC (Complaint #670409 and #207436) to seek resolution.

A sampling of the outages we've experienced. This is not even close to an exhaustive list.

Date Range	Duration	Notes
Jan 4–Jan 6, 2023	2 days	Tree branch falling cited as cause
Feb 4–Feb 7, 2024	74 hours	Longest recent outage
Oct 2, 2024	Multiple	Two separate outages in one day
Feb 4, 2025	24 hours	
June 23–June 24, 2025	~12 hours	

Requested Actions:
I respectfully urge this committee to demand that PG&E commit to a concrete plan for **upgrading the infrastructure** in the Sherwood Forest area, specifically placing power lines underground as emergency crews have suggested is necessary due to the strong winds we experience on the tallest hill in San Francisco. We require accountability and a dedicated community liaison for transparent, real-time communication during future events.

Thank you for your attention to this critical matter of public safety.

Sincerely,
Patricia Martell
256 Casitas Ave
San Francisco, CA 94127
415.215.9222
patriciamartell@gmail.com

From:	Charleen Maghzi-Ader
To:	Crayton, Monique (BOS)
Subject:	February 12th Public Safety and Neighborhood Services Committee meeting at 10am Testimony
Date:	Monday, February 9, 2026 4:38:32 PM
Attachments:	PGE facts-2.pdf February 22, 2025 impact of outages on elderly.pdf

To: Representatives from PG&E, including the CEO, attending the February 12, Public Safety and Neighborhood Service Committee Hearing

As testified in my attached communication of February 11, 2025, and statement of impact on February 22, 2025, the frequent unplanned prolonged power outages over the previous five years has been unacceptable “service." Our home is alternatively occupied by family members and friends of all ages from infancy to seniors, with a wide range of needs for dependable electricity.

Because of this, that in addition to purchasing and operating a gas generator with extension cords running all over our home as well as a portably battery, we have made the decision to make a costly investment in a solar battery that is integrated into our solar panels. Installation is planned for as soon as the extra tedious San Francisco permitting process is completed.

All of this expense for dependable electrical power, plus the extra muss and fuss was not required during my 75 years as a SF resident. Because of this situation, I request reimbursement for my out of pocket expenses of $50,000 for my gas generator purchased in 2020, solar panels installed in 2021, solar battery being installed in 2026.

Sincerely,

Charleen Maghzi
266 Casitas Avenue
San Francisco, CA 94127

February 11, 2025

In an effort to understand the root cause(s) for the frequent prolonged power outages experienced particularly in the past 2 years, I received a partial 2/6/25 PGE response to my inquiry, providing only information about the past year.

The following inaccurate official response from PGE customer service demonstrates their lack of understanding the depth of the multiple incidents of prolonged power failure experienced by customers on this grid. I have added in the last column the actual minutes of outage experienced based on the texted times sent by PGE.

Date - Time	Basic Cause	Minutes Out	**Actual minutes affirmed by PGE texts**
12/14/2024 12:13:00 PM	Equipment Failure/Involved	307	**474**
10/1/2024 10:36:00 PM	Equipment Failure/Involved	20	**6200**
8/28/2024 4:44:00 PM	Equipment Failure/Involved	118	**291**
6/12/2024 10:38:00 PM	Equipment Failure/Involved	32	**24**
		477	**6989**

The latest outage 2/4, 2 PM – 2/5, 1:30 PM lasted for 1410 minutes. This adds up to **8399 minutes or 140 hours in the past year**!

We do not have the statistics from the previous year that seems to have had more frequent and longer outages. A prolonged 5-6 day outage in February 2024 required the use of a gas generator to keep my ill post operative craniotomy husband's hospital bed operating, our refrigerator running, with the need to purchase expensive prepared foods, and causing us to give away our aquarium and parakeets since these pets were unable to live in the cold household environment.

I would like to know what "equipment failure/involved" means and what is being done to improve the antiquated equipment? PGE crew members frequently state that the cause is falling branches/tree limbs. If this is the case, then why are the encroaching trees not being properly pruned or removed by the PGE crews to maintain their service lines?

Very tired and irritated,
Charleen Maghzi
Senior citizen living at 266 Casitas for nearly 50 years,
never having experienced such undependable service as in the past years.

February 22, 2025

Statement of impact of unreliable public utility on the delicate elderly population

We would like to inform PGE of the catastrophic impact of the prolonged power outage as it impacts the elderly, frail or medically compromised individuals by sharing our experience during the January outage, as well as the multiple outages in 2023 in Sherwood Forest.

My husband has been recovering from brain surgery and cancer treatments. In his frail condition, maintaining body heat is a high priority as well as warm nutritious food. In our home, power is required for our central heating, electric water heater for showering, electric blanket, electric operated hospital bed, kitchen appliances, and refrigerator.

Because of the frequency of blackouts, we have invested in a gas-powered generator of moderate capacity. Fortunately able bodied family members were available to replenish the gasoline required to supply minimum 24/7 power to keep the bed blanket and the hospital bed functioning, our refrigerator, as well as essential electronic communication devices such as our phone and computer. Extension cords had to be placed and secured throughout the home to power essential devices. Hot meals were ordered for delivery at an extra expense.

This is just one scenario that represents the condition of many of our elderly neighbors who may not be able to participate in this hearing.

I am a 3rd generation San Franciscan, and never before have I experienced such interruptive electrical “service.”

Questions:
What is the status of the equipment “serving" Sherwood Forest homes that have consistently been impacted?

- Has the equipment aged and is preventative replacement needed?
- What is the ongoing plan for preventative tree trimming around the power lines?
- What additional services are available to those with medical needs, some short and long term? How are they prioritized?

Charleen and Steve Maghzi-Ader

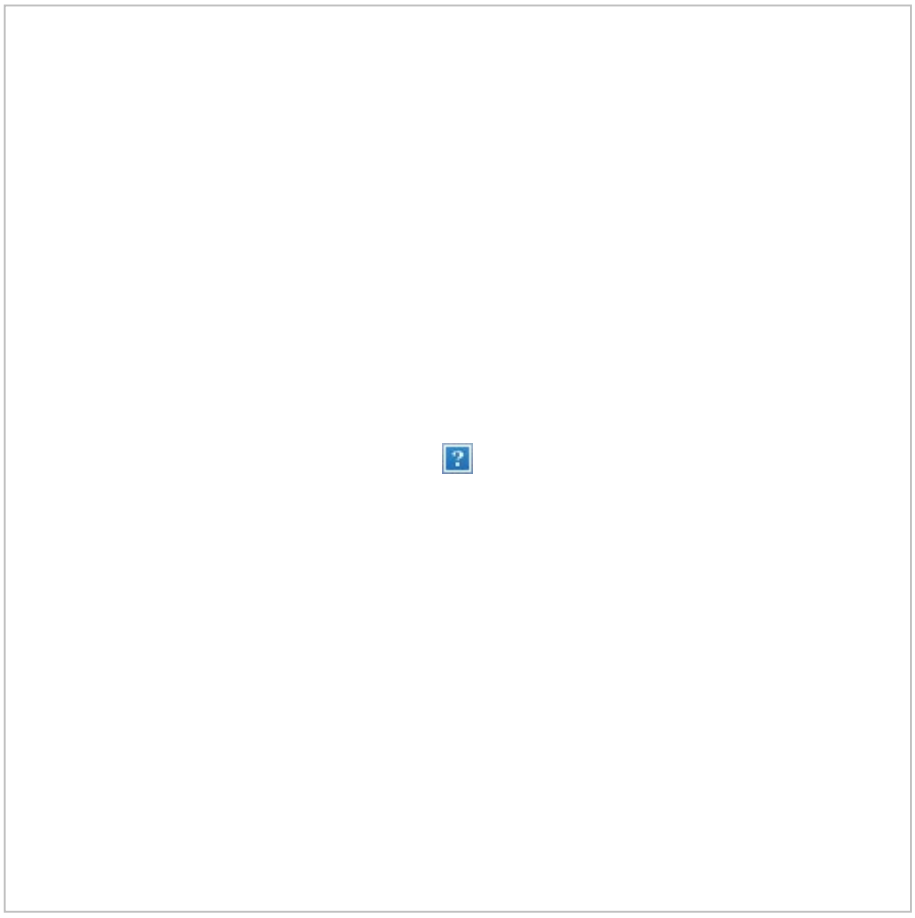
266 Casitas Avenue, SF CA 94127

From: Maria Breaux
To: Crayton, Monique (BOS)
Subject: Re: Share Your Feedback on San Francisco's Power Future
Date: Tuesday, February 10, 2026 11:11:48 AM

My public comment:

What's the holdup? The city's been working with PG&E for years to give public power back to the public. Give the people what they want.

On Tue, Feb 10, 2026 at 10:00 AM Our City. Our Power. <publicpower@sfwater.org> wrote:



Dear Public Power Supporters,

As you well know, a massive **PG&E power outage on December 20, 2025**, plunged nearly one-third of San Francisco into darkness. For many residents, service disruptions and uncertainty continued well into the new year.

In response, the San Francisco Board of Supervisors has called for a public hearing to examine the City's relationship with PG&E. The following items will be discussed at the Committee's upcoming meeting:

- **Hearing: Widespread Power Outages Affecting San Francisco**

Neighborhoods;
- **Re-Affirming City Support to Acquire PG&E Assets;**

The hearing will be hosted by the **Public Safety and Neighborhood Services Committee** on February 12 at 10:00 a.m. at City Hall – Legislative Chamber, Room 250. **View the meeting agenda here**.

We strongly encourage you to provide public comment online or in person in support of full public power in San Francisco Your voice helps demonstrate the growing demand for a more reliable, transparent, and community-focused energy system. To provide public comment online, please email Monique Crayton at **monique.crayton@sfgov.org**.

We look forward to engaging with you throughout this process and working together toward a responsible transition that puts our communities first. Visit ***Our City, Our Power*** to learn more about the City's campaign acquire PG&E and explore expanding Public Power in San Francisco.

Thank you for your continued support!

Public Comment Announcement
Members of the public attending meetings in person or remotely will have an opportunity to provide public comment on every action or discussion item. Persons unable to attend the meeting may submit to the City, by the time the proceedings begin. Written comments should be submitted to the Clerk of the Board or the Clerk of the Committee: 1 Dr. Carlton B. Goodlett Place, Room 244, San Francisco, CA 94102. Comments not received prior to the hearing may be delivered to the Clerk of the Board or the Clerk of the Committee and will be shared with the Members. All comments received will be made part of the official record.

From:	Cal Law
To:	Crayton, Monique (BOS)
Cc:	Yu, Angelina (BOS); Chan, Connie (BOS); SherrillStaff; SauterStaff; WongStaff (BOS); MahmoodStaff; DorseyStaff (BOS); MelgarStaff (BOS); MandelmanStaff (BOS); FielderStaff; Waltonstaff (BOS); ChenStaff
Subject:	Public Comment on Item 260035 and Item 260030
Date:	Wednesday, February 11, 2026 9:10:51 PM

Hi Monique,

I regret that I am unable to attend tomorrow's meeting due to work obligations, but I would like to submit this public comment for the record.

My power was out from Saturday, December 20th at 1:00 p.m. until Monday, December 22nd at 7:00 a.m. More recently, I experienced another outage lasting several hours, without warning. I have very limited ability to hold PG&E accountable for these outages or to seek meaningful recourse.

I appreciate the City's continued commitment to re-affirming support for acquiring PG&E's local assets. However, I strongly believe the Board of Supervisors should also send a clear and direct message to the California Public Utilities Commission urging it to complete the valuation process. Finalizing a fair market valuation is a critical step toward establishing a binding purchase price and getting public power to San Francisco.

The City should apply consistent pressure to ensure the CPUC completes this process so that we can determine a fair and enforceable path to acquiring PG&E's assets and improving reliability for residents.

Thank you for your time and consideration.

--
Cal Law (they/them)

CHINESE CHAMBER OF COMMERCE

730 Sacramento Street, San Francisco, CA 94108

(415) 982-3000 Fax: (415) 982-4720

February 12, 2026

San Francisco Board of Supervisors
Public Safety and Neighborhood Services Committee
1 Dr. Carlton B. Goodlett Place, Rm. 244, San Francisco, CA

Dear Members of the Public Safety & Neighborhood Services Committee,

On behalf of the Chinese Chamber of Commerce of San Francisco, we appreciate the opportunity to provide comments regarding Agenda Items 3, 4, and 5 concerning the December power outage and its impact on our communities.

The widespread outage in December had a significant effect on residents and small businesses throughout San Francisco, including many within our AAPI and Chinese business community. The timing—immediately preceding the Christmas holiday and Winter Solstice celebrations—compounded economic hardship and disrupted critical business operations during one of the busiest and most important retail periods of the year.

While we do not excuse the failures that led to this incident, we acknowledge and appreciate the concrete steps PG&E has taken to assist those most affected. PG&E representatives proactively engaged with merchants, explained the claims process, and provided assistance with filings. Importantly, bilingual support was made available to non-English-speaking business owners, helping to reduce barriers that often prevent small businesses from accessing relief. These actions demonstrate a commitment to making corrective improvements.

At the same time, our members have expressed ongoing concerns. Reliable utility service is especially critical as businesses prepare for the upcoming Lunar New Year, one of the most economically significant periods for Chinatown and many small merchants across the city. Business owners have emphasized the need for improved reliability measures to prevent future disruptions, as well as a claims process that is accessible, transparent, and efficient—particularly for monolingual owners who may require language assistance. Timely processing of outstanding claims remains a priority.

We respectfully urge continued dialogue, transparency, and expedited resolution of pending claims, alongside strengthened infrastructure and accountability measures to safeguard against similar events in the future. A sustained partnership among the City, PG&E, and the small business community is essential to protecting the vitality of Chinatown and ensuring the long-term economic health of San Francisco.

Thank you for your leadership and attention to this important matter.

Sincerely,

Donald Luu
President
SF Chinese Chamber of Commerce

From: Daniel Lovett
To: Crayton, Monique (BOS)
Subject: Public comment - PG&E outages - Public Safety & Neighborhood Services Committee
Date: Thursday, February 12, 2026 11:23:33 AM

I'm a small business owner in and resident of the Outer Richmond. The PG&E outages of December 20, 21, & 22 were devastating for my business. I've yet to hear an explanation or receive adequate compensation. We demand better, and PG&E will *never* provide this. It's time for them to go. No more shareholder run utilities in San Francisco, period.

Daniel Lovett

--
DANIEL LOVETT

3239 BALBOA ST
SAN FRANCISCO 94121
415•322•8646

Exponent®

SF X (Mission)
Substation Outage Event
December 20, 2025

Direct Cause Evaluation

SF X (Mission) Substation Outage Event
December 20, 2025

Direct Cause Evaluation

Prepared for:

Pacific Gas and Electric Company
300 Lakeside Drive
Oakland, California 94612

Prepared by:

Exponent Inc.
149 Commonwealth Drive
Menlo Park, California 94025

May 5, 2026

2513048.000 - 7785

Contents

List of Figures

Limitations

At the request of PG&E, Exponent is conducting a causal evaluation of the SF X (Mission) Substation outage event on December 20, 2025. The purpose of this evaluation is to determine the direct cause[1] of this event. The results and conclusions of this evaluation are based on information supplied by PG&E and public records, as well as inspection, investigation, and analysis by Exponent. The opinions and comments formulated during this assessment are based on observations and information available at the time of this assessment. Only facts and observations deemed relevant to the direct cause of the incident are included in this report. Exponent's investigation into the root cause(s)[2] of this incident is on-going and will be documented in a separate report.

We understand that our duty in performing this investigation is to assist PG&E, the city of San Francisco, the CPUC, and any other interested parties in determining the cause of the outage event at the SF X (Mission) Substation on December 20, 2025. We have complied with, and will continue to comply with, that duty as independent experts. In this regard, we note that the findings presented herein are made to a reasonable degree of engineering certainty, meaning the conclusions have been reached on a more-likely-than-not basis and can be logically supported by the available facts. If new data becomes available or there are perceived omissions or misstatements in this report regarding any aspect of those conditions, we ask that they be brought to our attention as soon as possible so that we have the opportunity to fully address them.

[1] For the purposes of this report, Exponent adopts PG&E's definition of a direct cause as being "an action, flaw or force that is the immediate cause of an event. Occurs immediately prior to the incident; directly results in its occurrence and, if eliminated or modified, would have prevented the undesired outcome." (See PGE GOV-6102P-13.)

[2] For the purposes of this report, Exponent adopts PG&E's definition of a root cause as being "the most basic reason(s), lowest actionable level of management control, for a problem whose removal prevents, or minimizes the probability of recurrence of the problem." (See PGE GOV-6102P-13.)

Executive Summary

On December 20, 2025, at approximately 1304 hours, an arc-flash event and subsequent fire occurred at the Mission Substation 12 kV switchgear cubicle 1112/12 ("Incident Cubicle"), located at 8th and Mission Street in the City of San Francisco. The event led to an unplanned, sustained outage affecting more than 120,000 customers at its peak. Approximately eighty percent of the total affected customers were restored within 13 hours, and the remainder were restored over the course of three days.[3] To determine the origin and cause of the arc-flash event and subsequent ignition, PG&E retained Exponent to lead an independent investigation into the direct cause of the incident.

Exponent applied the scientific method to systematically investigate the event and objectively evaluate the evidence to determine the most likely cause of the equipment failure and subsequent ignition. What follows is a background followed by our findings related to the direct cause. These findings are based on our review and examination of the documents and evidence, including inspection of the incident breaker ("Incident Breaker No. 52"), inspection of the Incident Cubicle and its associated components, analysis of digitally recorded data, review of examination reports and hardware for similar components in other cubicles, and our technical knowledge and expertise.

Background:

1- The arc-flash originated within the Incident Cubicle at Cell No. 5. The arc-flash incident was captured by security camera footage and digitally recorded by the protective relays.
2- Cell No. 5 contained Incident Breaker No. 52 in the top cubicle (the Incident Cubicle, also known as X-1112/12) and Circuit Breaker No. 94 in the bottom cubicle (X-1112/22). The Incident Cubicle consists of multiple components, including the cubicle's rear electrical-insulation system, Incident Breaker No. 52, and a barrier insulating board ("Incident Insulating Board").
3- The rear electrical-insulation system of the cubicle consists of several components, including the current transformers (CTs) and the CT insulating tubes, as well as the busbar penetration

[3] PG&E Integrated Logging and Information System (ILIS) report No. 25-0134456.

wall. Other equipment located at the rear of the cubicle includes the CT wiring and the bus-work connections.

4- Incident Breaker No. 52 consists of breaker arms that connect to the bus work at the rear of the cubicle, vacuum tubes that contain the breaker's internal contacts, a grounded housing that includes the front grounded plate, and electrical insulation materials that provide isolation between the energized parts and ground. Incident Breaker No. 52 was racked into the Incident Cubicle on November 16, 2025, and remained racked inside the cubicle at the time of the event. Incident Breaker No. 52 was in the open position when the arc-flash event occurred.

5- The Incident Insulating Board was positioned behind Incident Breaker No. 52 and in front of the metal shutter plates that would close when the breaker was racked out. When the breaker was racked in, Incident Breaker No. 52's arms extended through the Incident Insulating Board's through-holes to reach the bus work at the rear of the cubicle. In the Incident Cubicle, the upper three holes correspond to the bus-section side contacts, and the lower three correspond to the feeder-side contacts of the breaker. Throughout this report, the Incident Insulating Board is described as a separate component and not as part of the cubicle's rear insulation system.

Summary of the Finding:

1- The most likely direct cause of the arc-flash event within the Incident Cubicle is surface breakdown of the Incident Insulating Board. This is based on the following:
    a. Evidence of metal erosion is observed on the breaker arms of the circuit breaker (Circuit Breaker No. 56) that had been in service in the Incident Cubicle immediately prior to the installation of Incident Breaker No. 52 in November 2025. The location of this erosion at the ends of the breaker arms is consistent with contact between the arms and the edges of the Incident Insulating Board's through-holes while the breaker was racked in. Similar erosion patterns are observed on another circuit breaker that was removed from service in a different cell.

b. The Incident Insulating Board was mostly destroyed as a result of the arc-flash event and subsequent fire. However, damage patterns on different barrier insulating boards at similar locations, consistent with early stages of arcing, have been documented and reported from other cells within the substation. This further supports the presence of contact between the edge of the through-holes and the breaker arms at the Incident Insulating Board.

c. Digitally recorded data from the time of the arc-flash event show that a fault initiated between phase B and phase C on the feeder side approximately half a cycle before the involvement of phase A and ground. The feeder-side voltage also dropped simultaneously. A review of Incident Breaker No. 52 construction shows that any initial phase-to-phase failure at the breaker would have had to occur through the existing insulating materials and/or their surfaces, given the large separation distances between phases in open air.

d. Barrier insulating boards retrieved from other breaker cells at the 12 kV bus section D switchgear at the Mission Substation exhibited similar damage patterns, indicating contact between the edges of the through-holes and the breaker arms.

e. Damage observed on Circuit Breaker No. 56 arms, along with the corresponding damage pattern on the Incident Insulating Board photographed on or around November 2025 – prior to the racking of Incident Circuit Breaker 52 in the Incident Cubicle – shows evidence of contact between the breaker arms and the Incident Insulating Board. This further supports the likelihood that the Incident Insulating Board made contact with Incident Breaker No. 52's arms, leading to elevated electrical stress and ultimately insulation failure of the Incident Insulating Board.

f. Surface tracking, driven by contact of energized conductors with insulating surfaces in the presence of moisture and contamination, is a known cause of insulation failure, which can result in arc flashes within electrical equipment.[4]

[4] SANDIA Report, "High Energy Arcing Fault Fires in Switchgear Equipment, A Literature Review," SAND2008-4820, printed February 2009.

2- Based on the evidence, failure of Incident Breaker No. 52 or the cubicle's rear electrical insulation system[5] has been ruled out as the initiating cause of the arc-flash. This conclusion is based on the following:

   a. Destructive examination of the Incident Cubicle revealed no metal erosion at the busbar tabs entering the cubicle, which would have indicated electrical arcing. However, components and electrical insulation surfaces at the rear of the cubicle were thermally damaged. The lack of evidence of arcing indicates that the insulation damage resulted from the subsequent fire and post-failure events rather than being the initiating cause of the arc-fault failure.

   b. Significant metal erosion and melting were observed at all three phases of Incident Breaker No. 52's arms and at the outer ends of the vacuum bottles, while the grounded housing and front plate exhibited substantially less melting damage. The separation distances between breaker arms of different phases, combined with the nominal phase-to-phase voltage of a 12 kV switchgear, make a spontaneous phase-to-phase breakdown between breaker arms unlikely under normal operating conditions. Therefore, the observed melting and metal erosion between the breaker-arm phases most likely resulted from subsequent arcing events following the initial failure. The likely reason for the observed evidence of arcing between the largely separated breaker arms after the initial failure is described next.

   c. Computed Tomography Scanning ("CT Scan") of Incident Breaker No. 52 did not show metal erosion or melting at the breaker's open contacts inside the vacuum bottles, whereas the exterior surfaces of the bottles and the breaker arms exhibited significant melting and metal loss, despite large separation distances. This indicates that the large separation distances between phases were likely bridged by conductive particles and ionized material generated during earlier events, significantly reducing the insulating properties of the air between phases when the observed damages occurred. In contrast, the smaller separation distances between the breaker contacts inside the vacuum bottles retained their insulating integrity,

[5] For the purposes of this report, the Incident Insulating Board is not considered part of the Incident Cubicle's rear electrical-insulation system.

preventing arcing within the bottles, as evidenced by the absence of metal erosion at the contacts. This further supports the opinion that the majority of the damage observed outside the bottles and at the breaker arms occurred after the initial failure. Therefore, failure of Incident Breaker No. 52 could be ruled out as the initiating cause of the arc-flash within the Incident Cubicle.

d. Copper globules were discovered inside the Incident Cubicle, most likely associated with the CT wires. While CTs can develop high induced voltages if their secondary wiring is severed or left open, their ability to sustain an arc-flash rapidly diminishes as arc impedance increases when interacting with plastics and other insulating materials within the cubicle. Therefore, although the evidence at the CT wiring indicates localized electrical arcing, more likely than not, the arcing was a consequence of the initial event.

3- The most likely failure mechanism is degradation of surface insulation of the Incident Insulating Board, likely assisted by moisture and surface contamination, that resulted in the failure of the Incident Insulating Board. Bases for this opinion include:

a. It is likely that placement of the Incident Insulating Board within the Incident Cubicle could allow the sides of the through-holes to come into contact with the back end of the breaker arms when the breaker was fully racked in. This contact, combined with surface contamination and moisture, are competent drivers of degradation of the Incident Insulating Board. Degradation to insulation most likely resulted in failure of the Incident Insulating Board and the arc-flash event.

b. Incident Cubicle was equipped with a space heater to mitigate the relative humidity content within the cubicle; however, the heater was likely not energized at the time of the event. This is because the cubicle's heater was configured to be energized when both breakers in the cell were in the open position, while only one of the breakers in the cell (Incident Breaker No. 52) was in the open position at the time of the arc-flash event.[6]

[6] PG&E Drawing No. 4050371, Rev. 1, "12 kV Switchgear (Cells 1-14T), Bus Section 'D' – Auxiliary Equipment," issued per PG&E As-Built, 3/16/2011.

c. The substation building appeared to be prone to elevated humidity and moisture due to two factors around the time of the arc-flash event:

   i. The building is ventilated with unconditioned outside air, and the lack of heating, cooling, and humidity control for this ventilation air exposes the building interior to the variability of the outdoor climate, including high relative humidity and large/uncontrolled temperature swings. It is known that such conditions can also lead to condensation under certain weather conditions. Specifically, condensation can occur when there are sudden temperature changes during periods of high humidity, such as a long duration of cool weather that brings the equipment and surrounding structure to a low temperature, followed by a rapid warm front with rain or fog. In such a situation, higher dew point outdoor air may be introduced into the building before the structure and equipment can warm up sufficiently to prevent condensation. This is exactly the weather pattern that preceded the arc-flash event, with warmer temperatures and rain starting on December 17 after almost two weeks of consistently cooler weather. Moreover, since the heater in Cell No. 5, which serves to mitigate high relative humidity, was off at the time of the event, condensation on insulating surfaces within the Incident Cubicle would be more likely to form.

   ii. Open, unprotected ventilation shafts that extend from the roof to the basement, as well as the ventilation air intake pits, allow rainwater intrusion into the basement level of the building during rain events. Exponent observed ponding of water on the basement floor directly below these openings after a rain event - evaporation of this ponded water would increase any existing humidity levels in the basement area. Although it is not clear to what extent this increase in the existing humidity contributed to the event, the room with the Incident Cubicle does receive ventilation air via the air intake pit (which was observed to be holding water), and the basement level and any increase in humidity due to standing water in these areas would lead to a higher humidity and a higher probability of condensation in the switchgear room.

d. At the time of Exponent's site visit, the filters for the ventilation air[7] to the incident room had been compromised by water and were no longer providing filtration of the outside air. However, how long the filters were in this condition and the extent to which lack of air filtration for the ventilation air in the switchgear room contributed to the arc-flash event are unknown.

These conclusions have been reached to a level of at least more likely than not, and the findings can be explained in light of the facts and observations using logical reasoning. This summary does not contain all of Exponent's technical evaluations, analyses, conclusions, or recommendations. Hence, the main body of this report is at all times the controlling section. This report summarizes the findings of the direct cause evaluation of the incident. The root cause evaluation in this matter is ongoing.

[7] Ventilation air for the incident switchgear room is drawn into the building through a below-grade opening, passes through a filter bank to the supply fan, and is then routed upward through floor openings into the switchgear room. Exponent's investigation found that the four supply fans were non-operational and air was being drawn through them, presumably by the rooftop exhaust fans.

1 Purpose

The purpose of this report is to address the direct cause of the initial arc-flash event at the Mission Substation at 1304 hours on December 20, 2025. This report provides background on the event and status of the actions and assessments related to determining the cause of the arc-flash and subsequent fire event. Information related to the restoration events after the initial arc-flash was not part of the direct cause evaluation. However, information that is relevant to determining the cause of the initial arc-flash is included in this report.

Exponent continues to work with PG&E to investigate and evaluate the root causes of the incident. The findings will be provided at the conclusion of the root cause investigation.

2 Investigation Approach

Exponent's investigation into the direct cause[8] of the December 20, 2025 outage event in San Francisco, California, encompassed five major phases rooted in the scientific method of inquiry. Exponent's investigation process was not linear, and major investigation phases overlapped as hypotheses were developed, challenged, and refined.

2.1 Investigation Phases

Investigation Initiation

December 22, 2025 – January 20, 2026

This phase began when Exponent was notified of the event by PG&E and concluded once Exponent received a contractual agreement to perform the investigation.

Data Collection and Fact Gathering

December 22, 2025 – April 23, 2026

During this phase, Exponent investigators collaborated with PG&E personnel to gather the data and information needed **to** analyze the arc-flash event and determine the probable direct cause. This included site visits to the Mission Substation as well as identification and retention of electrical equipment and materials of interest. Additionally, this phase included retention of perishable data sources such as relay oscillography, security camera footage, and post incident monitoring of interior building temperature and relative humidity. Lastly, PG&E, the Incident Breaker No. 52 manufacturer (Eaton Corporation), and the switchgear manufacturer (Powercon Corporation) supported Exponent's requests for relevant design, maintenance, and communication records.

[8] Direct Cause Evaluation (DCE) uses the scientific method to systematically evaluate the evidence to determine the most likely action, flaw, force, or process that is the immediate cause of an event and, if eliminated or modified, would have prevented the undesired outcome.

Data Analysis and Evidence Examination

December 29, 2025 – April 24, 2026

During this phase, Exponent analyzed the data collected to develop and rule out potential failure mechanisms. This included an examination and evaluation of collected materials, an evaluation of the building's performance in managing moisture, and a review of the operational and maintenance history of Incident Breaker No. 52 and Incident Cubicle.

Determination of Probable Direct Cause

March 2, 2026 – April 24, 2026

During this phase, Exponent investigators evaluated and weighed the information collected to determine the most probable direct cause of the incident. These findings are subsequently reviewed internally as part of the Exponent's quality assurance process and subsequently validated by PG&E.

Documentation and Acceptance of Findings

March 3, 2026 – May 5, 2026

During this phase, Exponent documented the information and analyses performed to determine and support the most probable direct cause in a technical report. This final work product is provided to PG&E.

2.2 Investigation Timeline

- **December 20, 2025:** SF X (Mission) Outage Event
- **December 22, 2025:** PG&E – Exponent incident investigation kickoff; data collection activities initiated
- **December 23, 2025 – January 17, 2026:** Initial site inspections and evidence preservation
- **December 24, 2025:** System Protection/Relay data secured
- **December 29-30, 2025:** Substation swab and wipe sampling initiated; temporary building environmental condition monitoring sensors (temperature, humidity) installed. Cell No. 5 extracted from Bus Section D.

- **January 2, 2026:** Building envelope and ventilation system inspection during an active weather event.
- **January 9, 2026:** Reviewed PG&E Computerized Maintenance Management Systems (CMMS) (i.e., SAP and APM) for Incident Breaker No. 52
- **January 16, 2026:** First Non-Destructive Evidence Examination at PG&E's Applied Technology Services (ATS) facility in San Ramon, California; PG&E System Protection Analysis (Rev 1) published
- **January 23, 2026:** Reviewed PG&E's System Protection Event Analysis
- **January 27, 2026 – February 21, 2026:** Additional Non-destructive/Minimally Intrusive Multi-party Evidence Examinations (including Light Detection and Ranging (LiDAR) scanning, X-Ray, Computed Tomography (CT) scanning)
- **February 23, 2026:** Multi-party Destructive Evidence Examination at PG&E ATS
- **March 2, 2026:** Multi-party Non-Destructive Evidence Examination at PG&E ATS
- **April 15, 2026:** Non-destructive evidence examination (photograph) of other Bus Section D barrier insulation boards at PG&E ATS
- **April 23, 2026:** Multi-party Destructive Evidence Examination of select barrier insulation boards at Exponent Laboratory in Menlo Park, California
- **May 5, 2026:** Direct cause evaluation technical report issued

3 General Mission Substation Description

The San Francisco X (Mission) Substation is a key element in supplying power to the City of San Francisco. Mission is an indoor substation housed in a three-story enclosed structure located at 8th Street and Mission Street in San Francisco (Figure 1). The substation serves customers in downtown San Francisco, as well as the Sunset, Richmond, Western Addition, Chinatown, and North Beach neighborhoods. Mission Substation was built in the late 1940s with a small extension in 1956 and a seismic strengthening project in 2003. After substation fire events in 2003 and 2005, the building was renovated and the high-voltage electrical equipment was replaced and rebuilt over a period of time from 2008 to 2015.[9]

The Mission Substation is connected to the 115 kV system through the following sources:[10]

- X-Y #1, 115 kV cable (Mission to Larkin)
- P-X #1, 115 kV cable (Mission to Hunter's Point)
- P-X #2, 115 kV cable (Mission to Hunter's Point)
- A-X #1, 115 kV cable (Mission to Potrero)

There are five 115/12 kV transformers that feed the 12 kV switchgear (including Bus Section D by Transformer Banks 1 and 2; Bus Section E by Transformer Bank 4; and Bus Section F by Transformer Banks 5 and 6).[11,12] The 12 kV switchgear is shown in Figure 2. The 12 kV bus section provides service to distribution radial feeders, network feeders, and tie cables.

[9] Pacific Gas and Electric, Mission Substation Rebuild, February 23, 2015, filename: Mission Rebuild old 2015.ppt.

[10] PG&E Drawing No. 4050040 Rev 7, Single Line Diagram, San Francisco X (Mission) Substation, dated December 16, 2022.[11] Ibid.

[11] Ibid.

[12] There is no Transformer Bank 3 currently at Mission Substation.

Figure 1. Mission Substation.

Figure 2. 12 kV Switchgear at Mission Substation.

4 Background

4.1 Existing Electrical Conditions Prior to the Event

For the event that is the subject of this report, the key elements are Transformer Banks 1 and 2, Station Service Bank 2, and Bus Section D (where the event originated). The configuration of the station prior to the event is shown in Figure 3. This figure shows the 115 kV bus (top of Figure 3) and 12 kV bus section D (bottom of Figure 3). 12 kV bus sections E and F were minimally involved in the initiating event and are not shown here but can be found in the PG&E Single Line Diagram.[13] At this time prior to the event, the station status was:[14]

- All four 115 kV sources into Mission were energized.
- All five 115/12 kV transformers were energized.
- 12 kV Bus 1 Section D was energized by Transformer Bank 1 and had tie cables NX-1 through NX-4. The tie breaker (1150/12) between 12 kV Bus 1 Sections D and E was in the closed position.
- 12 kV Bus 2 Section D was energized by Transformer Bank 2 and had tie-cables KX-1 through KX-4, Network X3 (circuits X-1105, X-1106, X-1112, X-1114, X-1115, X-1121), Station Service Bank 2, and 12/4 kV Transformer Bank 9. The tie-breaker (1150/22) between 12 kV Bus 2 Sections D and E was open.
- 12 kV Bus 1 Section E was energized by Transformer Bank 1 through closed tie-breaker CB-1150/12. Bus 2 Section E was energized by Transformer Bank 4. Buses 1 and 2 in Section F were energized by Transformer Banks 5 and 6.

[13] PG&E Drawing No. 4050040 Rev 7, Single Line Diagram, San Francisco X (Mission) Substation, dated December 16, 2022.

[14] Mission Outage Protection Timeline 12-20-2025 REV2.pdf.

There were additional pre-existing conditions that existed at the time of the outage including:

- Incident Breaker No. 52, which was located in Cell No. 5, cubicle X-1112/12 at the time of the event, was placed into service on November 16, 2025, from the spare breaker inventory. Circuit Breaker No. 56, which had been in Cell No. 5, cubicle X-1112/12 previously, was removed from service on November 2, 2025. Suspected water damage was reported after removal from service.[15]
- Incident Breaker No. 52 was in the open position at the time of the arc-flash event and energized on both the 12 kV Bus 1 Section D and X-1112 feeder sides (the lower cubicle breaker in the same cell, Circuit Breaker No. 94, was in the closed position).[16]
- The four NX tie cables and the four KX tie cables are all located within the same bus section (Section D).[17]
- Heaters in Cell No. 5 cubicles were not configured to turn on at the time of the event (by design) due to the 1112/22 breaker being closed.[18,19]
- 115/12 kV Banks 1 and 2 were loaded within a typical range.[20]

[15] LC notification no. 132018244, Water Damage CB 1112/12, created November 14, 2025, completed November 16, 2025.

[16] Mission Outage Protection Timeline 12-20-2025 REV2.pdf.

[17] PG&E Drawing No. 4050040 Rev 7, Single Line Diagram, San Francisco X (Mission) Substation, dated December 16, 2022.

[18] PG&E Drawing No. 4050371, Rev. 1, "12 kV Switchgear (Cells 1-14T), Bus Section 'D' – Auxiliary Equipment."

[19] Interviews with PG&E personnel and review of the PG&E As-Built Drawing No. 4050371, Rev. 1

[20] EDPI, Bank 1 and 2 Average Amps on December 20, 2025, at 1304 hours, 1188A and 1137A at 12 kV, respectively.

Figure 3. Configuration Prior to Event.[21] (Note: “green” is an open breaker and “red” is a closed breaker.)

4.2 Event Description

At 1304 hours on Saturday, December 20, 2025, an arc-flash occurred at the Mission Substation in the 12 kV switchgear Cell No. 5 circuit breaker location X-1112/12 (top cubicle location in the cell). This circuit breaker, Circuit Breaker No. 52 (“Incident Breaker No. 52”), was in the open position but was energized from 12 kV Bus 1 Section D and from the feeder side that was energized by Bus 2 Section D. Also, the breaker in the lower cubicle at Cell No. 5 (Cubicle X-1112/22) was in the closed position at the time of the arc-flash event. Therefore, although Circuit Breaker No. 52 was in the open position, the feeder side of its contacts remained energized. A camera inside the substation captured the event, which shows a flash, the upper cubicle door opening first, and continued arcing or fire.[22] A photograph taken from the video is shown in Figure 4. The event resulted in a fire within the cell, which also burned and damaged

[21] Mission Outage Protection Timeline 12-20-2025 REV2.pdf.

[22] CB 52 Explosion.mp4.

control wiring above the cell. A photograph of the damaged Incident Breaker No. 52 is shown in Figure 5. The damaged Incident Breaker No. 52 was manufactured by Eaton Cutler Hammer (Model No. 150VCPW50C), and the switchgear was designed and built by PowerCon Corporation.

Figure 4. Ignition following arc-flash event in Cell No. 5 (red arrow).

Figure 5. Damaged Circuit Breaker from Cell No. 5 (Incident Breaker No. 52).[23]

[23] PG&E Post-Incident Site Inspection, December 21, 2025, filename: IMG_0307.JPG.

4.3 Protection Response

Prior to the event, CB X-1112/12 (Incident Breaker No. 52)[24] was open and energized from the 12 kV bus section D. The fault began as a phase B-C fault approximately half a cycle before the involvement of ground and one and a half cycles before the involvement of all three phases and ground. Overlapping zones of protection operating indicated that the fault was located at CB X-1112/12. The initial fault was cleared within 60 milliseconds as designed.[25]

After the initial fault and arc-flash occurred, the protection systems operated to isolate the fault on CB X-1112/12. The protection systems tripped seven circuit breakers:[26]

- CB X-1112/22[27]
- CB BK-1/12[28]
- CB 1150/12[29]
- CBs NX-1/12, NX-2/12, NX-3/12, and NX-4/12[30]

Figure 6 shows these protection actions in the "immediate protection actions."[31] These protection actions occurred as intended. This initial action resulted in the loss of 12 kV Bus 1 Section D and resulted in about 14,000 sustained customer outages and about 17,000 momentary outages (from opening of tie-breaker CB-1150/12 and closing of Bank 4 CB BK-4/12 to re-energize 12 kV Bus 1 Section E seven seconds later, as intended).[32] Captured data of the initial event by the system protection shows that the initial contact between phase B and phase C on the feeder side

[24] At the time of the incident, CB X-1112/12 contained Circuit Breaker No. 52 ("Incident Breaker No. 52").

[25] Mission Outage Protection Timeline 12-20-2025 REV2.pdf.

[26] Ibid.

[27] At the time of the incident, CB X-1112/22 contained Circuit Breaker No. 94, per the post-incident equipment audit performed by the PG&E Substation Operational Readiness Team on December 21, 2025.

[28] At the time of the incident, CB BK-1/12 contained Circuit Breaker No. 60, per the post-incident equipment audit performed by the PG&E Substation Operational Readiness Team on December 21, 2025.

[29] At the time of the incident, CB 1150/12 contained Circuit Breaker No. 90, per the post-incident equipment audit performed by the PG&E Substation Operational Readiness Team on December 21, 2025.

[30] At the time of the incident, CB NX-1/12 contained Circuit Breaker (CB) No. 54, NX-2/12 contained CB No. 58, NX-3/12 contained CB No. 64, and NX-4/12 contained CB No. 68, per the post-incident equipment audit performed by the PG&E Substation Operational Readiness Team on December 21, 2025.

[31] Mission Outage Protection Timeline 12-20-2025 REV2.pdf.

[32] Ibid.

occurred approximately half a cycle before the involvement of phase A and ground. The feeder-side voltage also dropped simultaneously. This information is displayed in Figure 7.

Subsequent events occurred after the initial arc-flash but were not related to the direct cause of the arc flash event.

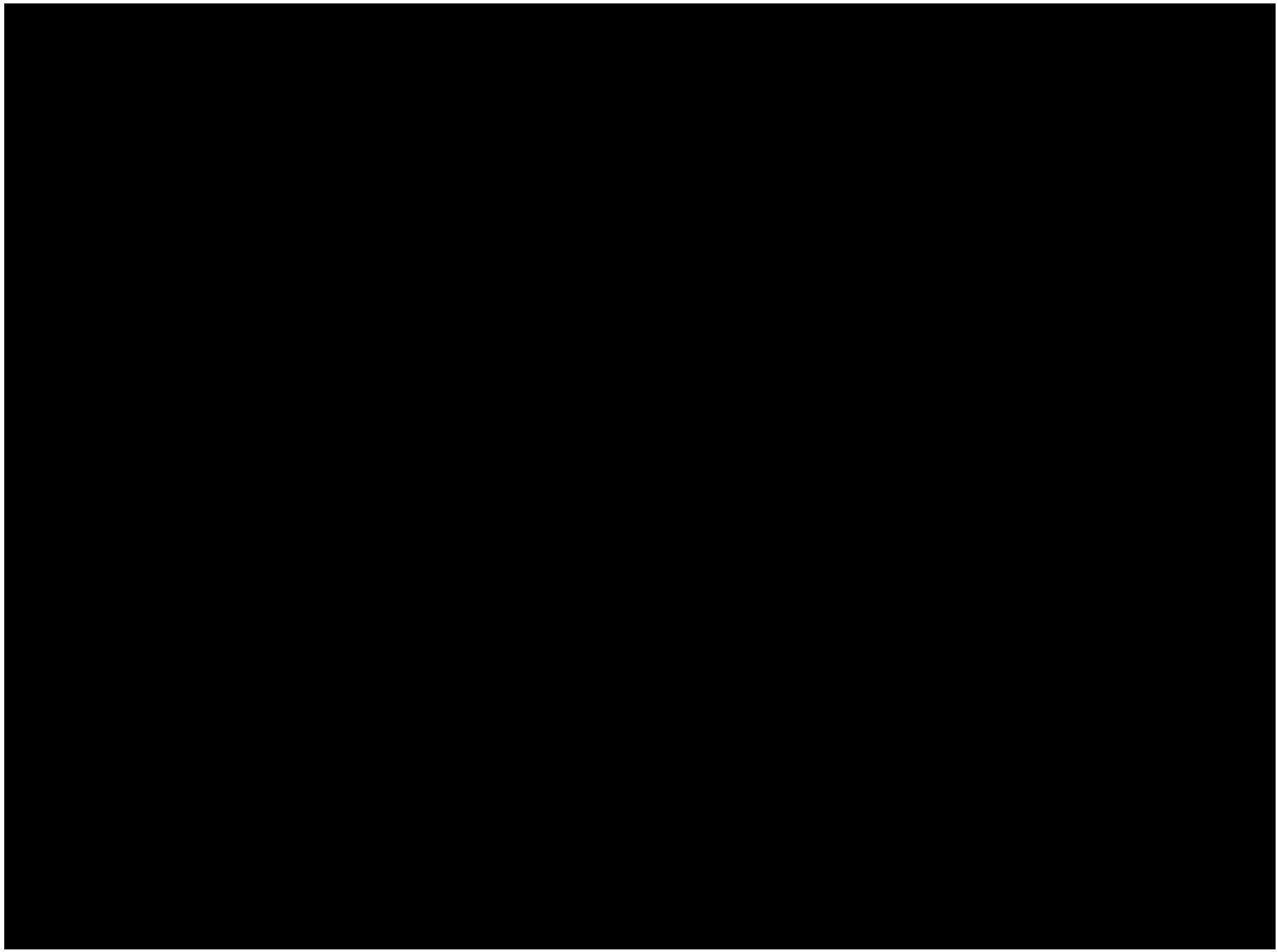


Figure 6. Initial Fault and Immediate Protection Response.

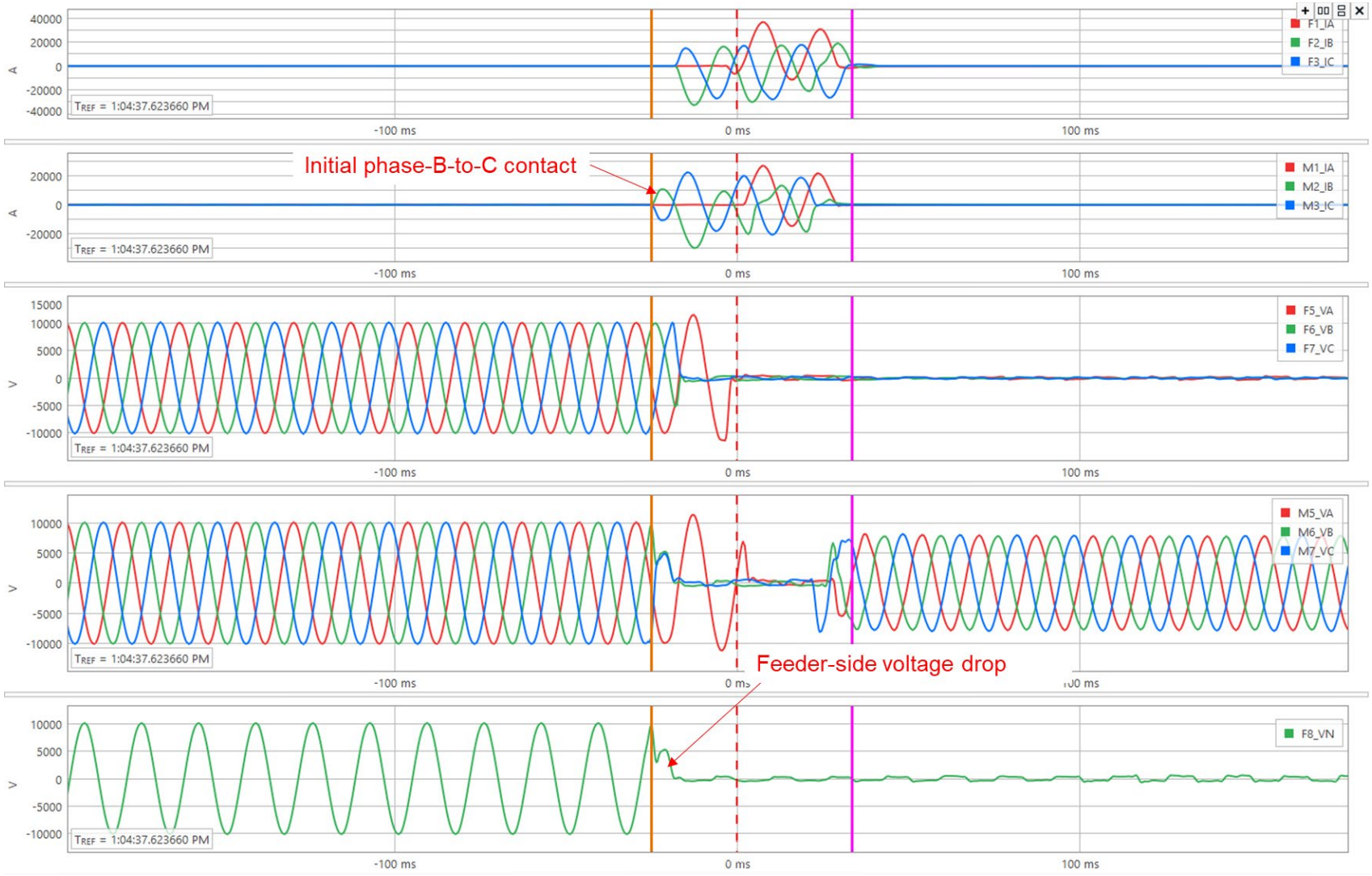


Figure 7. Captured protection data during the initial fault.

4.4 Building and Environmental Condition

Built in the late 1940s to house high-voltage electrical equipment, this three-story electrical substation is a cast-in-place reinforced concrete slab-and-beam structure with steel columns cast in concrete.[33] The building rises 61 feet above grade and includes a single subterranean level extending 13 to 16 feet below ground. A northwest corner addition was completed in 1958, and the building's exterior was redesigned in 2013.

The roof assembly consists of a built-up system with a gravel surface, contained by a three-foot-high parapet. The parapet is capped and waterproofed with a granulated sheet membrane, which is sealed along the top with mastic. The roof slopes toward a grid of interior drains aligned with the structural columns. Several prominent features are above and at the main roof plane: a stairway penthouse at the west end, a 32-by-20-foot elevator shaft enclosure to the north, and two large 8-by-30-foot air intake openings along the northeast and southeast elevations, which have associated ventilation shafts that extend vertically downward through the building all the way to the basement. These two ventilation shafts (topped by unprotected openings at the roof plane) and two additional air intake pits on the ground level of the northwest and southwest elevations allow precipitation to enter the building and collect in the basement during and after rain events, like the one that preceded the arc-flash event (see Figure 8). Based on the inspection of the building, there does not appear to be an interior drain system that would drain water out of these basement locations. Following the December 31 through January 6 rain event, Exponent observed ponded water for several days on the basement floor directly below each of the vertical ventilation shaft roof openings. Evaporation of this ponded water would serve to increase the existing relative humidity inside the basement even after the rain event has ended. Exponent did not observe any evidence of liquid water entering the first floor where the switchgear is located, although our inspection was limited due to access constraints, and it was not possible to observe the ceiling directly above the Incident Cubicle at that time.[34]

---

[33] Pacific Gas and Electric, Mission Substation Rebuild, February 23, 2015, filename: Mission Rebuild old 2015.ppt.

[34] During the time Exponent was documenting the existing conditions at Mission Substation, for safety reasons, Exponent was unable to thoroughly document the existing condition of the ceiling above the 12 kV bus section D, Cell No. 5.

Based on Exponent's site observations and review of mechanical drawings for the building, the building is intended to be mechanically ventilated with unconditioned outside air via a variety of supply fans located in the basement and exhaust fans located in a rooftop penthouse. The northwest side of the building (containing high-voltage switchgear) and the southeast side of the building (containing the transformers) have separate mechanical ventilation systems. Review of the ventilation diagram indicates that the design intent was for four supply fans in the basement to draw in ventilation air for the incident switchgear room through a below-grade opening (air intake pit) and a filter bank, then route it upward through floor openings into the switchgear room (see Figure 9). Exponent's investigation found that the four supply fans were non-operational and air was being drawn through them, presumably by the rooftop exhaust fans.

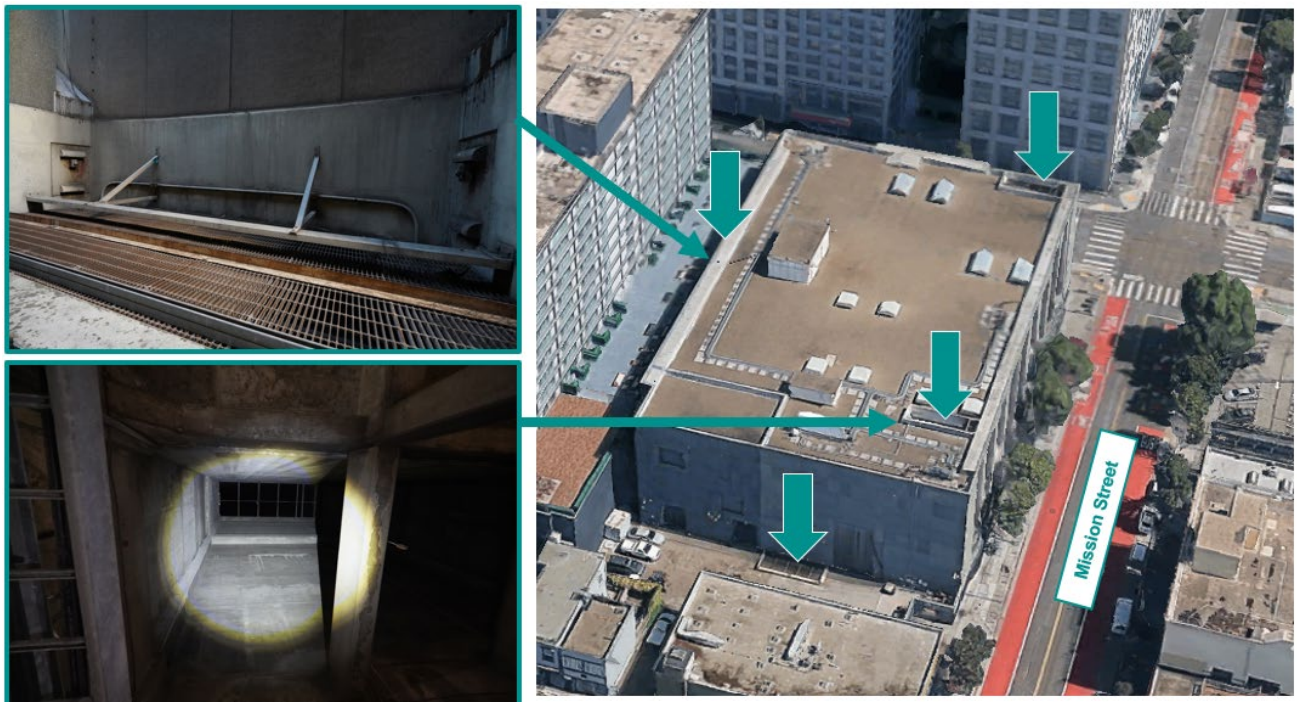


Figure 8. North is to the left of the aerial image. Indicated by vertical arrows are four exterior intake locations; two large openings at the roof and two below grade locations (one along the north elevation and one at the west elevation).

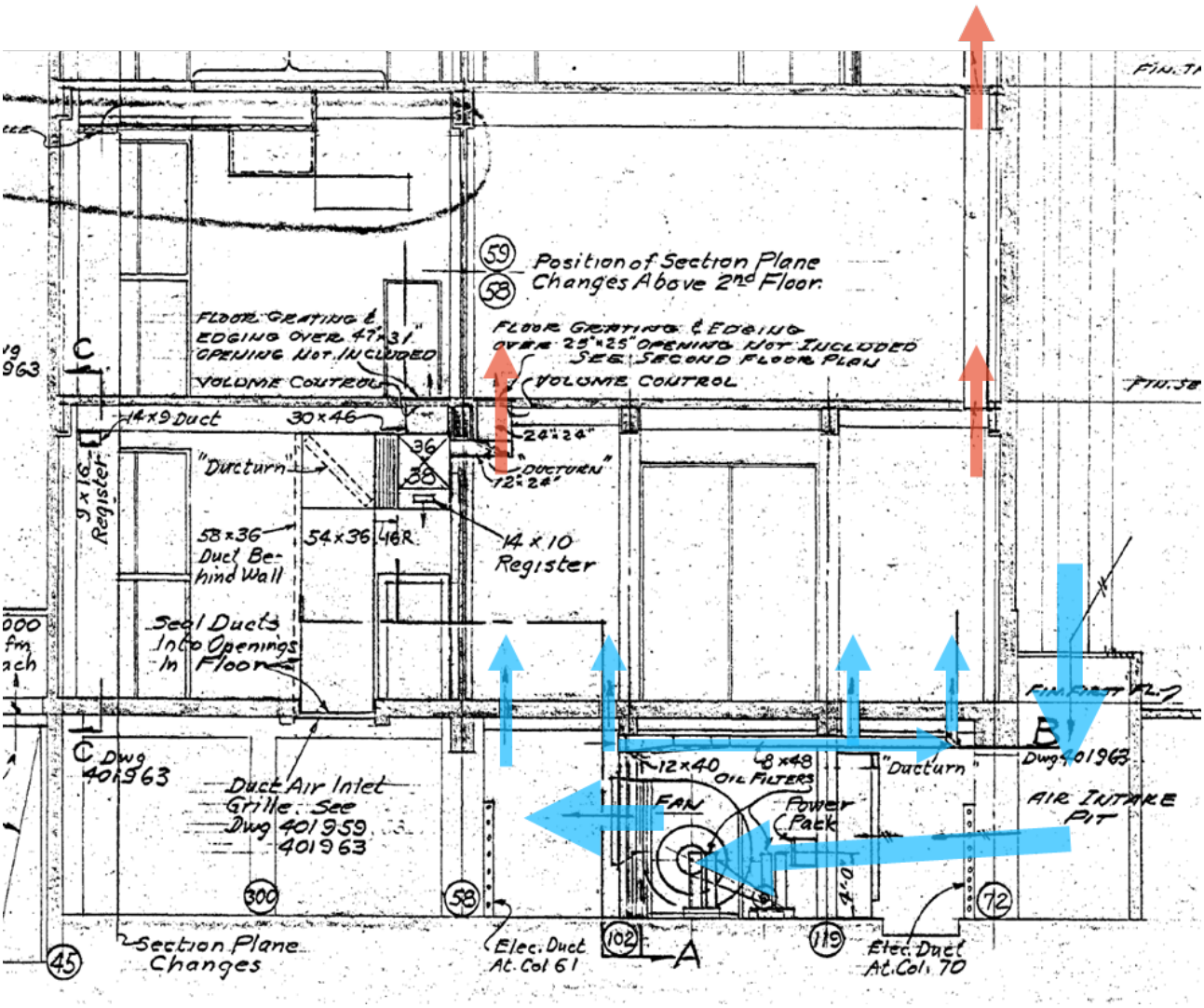


Figure 9. Diagram of intended outside air flow path for the ventilation of the switchgear room.[35]

Because the ventilation air is unconditioned, there is no control over the temperature or moisture content of the ventilation air, and it will have similar properties (temperature, humidity, dew point, etc.) to the outside air. The lack of heating, cooling, and humidity control exposes the building interior to the variability of the outdoor climate, including high relative humidity, large/uncontrolled temperature swings, and potentially condensation under certain conditions. For example, it is known[36] that condensation can occur on building surfaces and electrical equipment in the event of a

[35] From Cross Section E-E on PG&E Drawing 401964, Change 3, dated 10-23-87 (file "00367241.pdf"). Colored arrows were added on top of existing arrow on the drawing for clarity.

[36] IEEE Std C37.100.1-2018, IEEE Standard for Common Requirements for High-Voltage Power Switchgear Rated Above 1000V.

weather pattern with a long period of cold/dry weather (during which the high thermal inertia equipment and concrete cool) followed by a warmer, rainy period in which high dew point air enters the building before the building components can warm to a temperature above the dew point.

As shown in Figure 10, this is exactly the weather pattern that preceded the arc-flash event: two weeks of cool temperatures (averaging around 50°F) from December 1 through December 15, followed by a storm front that brought in higher temperatures (close to 60°F) and rain starting on December 17. The high dew points associated with that warmer rain event (close to 60°F) may have resulted in condensation on cool, unheated surfaces within the building that had come into thermal equilibrium with the approximate 50°F temperatures of the prior two weeks and were below the dew point of the ventilation air. Such cool surfaces could include electrical equipment that is either de-energized and/or not supplied with supplemental heat (as was the case for the Incident Cubicle). Weather data collected from the official National Weather Service San Francisco Airport Weather Station (NWS Code: KSFO), located approximately 13 miles from Mission Substation, indicate that the conditions at the time of the arc-flash event were around 57°F and 94% humidity, which corresponds to a dew point of 55°F.[37] A dew point of 55°F means that condensation will occur on any surface that is below 55°F. It should be noted that weather data from a personal weather station (PWS Code: KCASANFR1753[38]) located less than one mile from Mission Substation indicates the conditions at the time of the event were around 59.9°F and 99% humidity, with a dew point of 59.5°F.[39]

---

[37] National Weather Service. (2025, December 20–21). *Time series observations for KSFO (San Francisco International Airport)*. National Oceanic and Atmospheric Administration. Retrieved March 25, 2026, from https://www.weather.gov/wrh/timeseries?site=KSFO&hours=72&units=english&chart=on&headers=on&obs=tabular&hourly=false&pview=standard&font=12&history=yes&start=20251220&end=20251221&plot=

[38] This information is gathered from a personal weather station (PWS) via wunderground.com. It is not officially certified or maintained by the National Weather Service or the NOAA. Accuracy cannot be verified.

[39] Weather Underground. (2025, December 20). *Personal weather station KCASANFR1753 daily observations*. Retrieved March 25, 2026, from https://www.wunderground.com/dashboard/pws/KCASANFR1753/table/2025-12-20/2025-12-20/daily

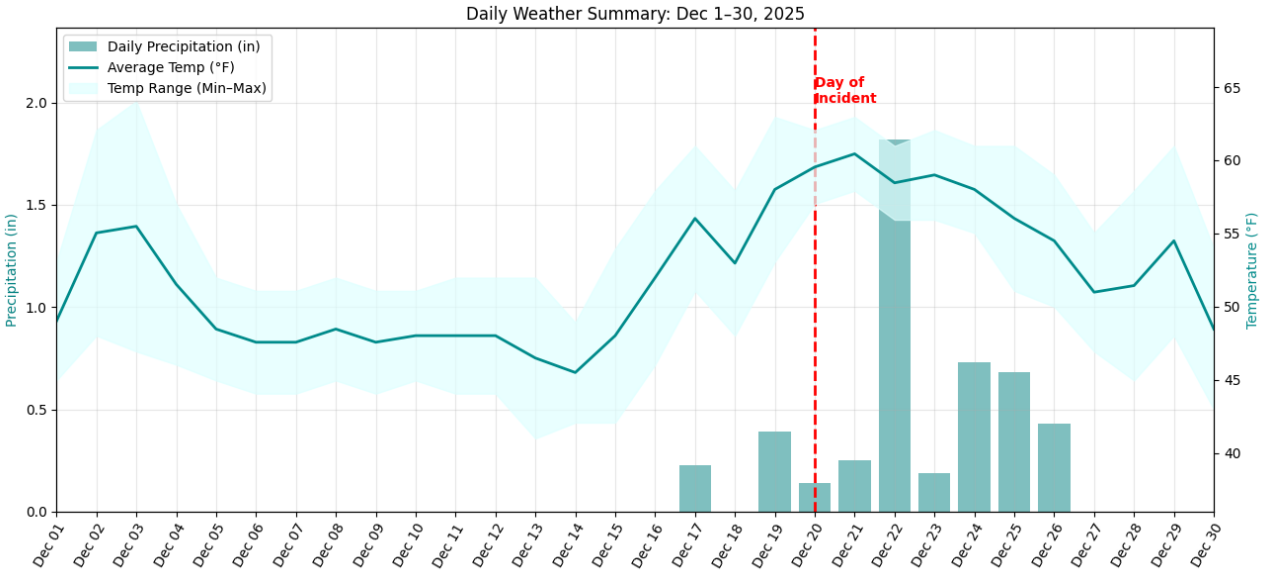


Figure 10. Daily Precipitation and Temperature data.[40]

It is also known that elevated humidity can also result from the evaporation of rainwater that enters and becomes trapped in subterranean locations (e.g., liquid water entering through cable conduits connected to the equipment.)[41] Given that the incident switchgear room receives ventilation air via the basement and Exponent observed ponded water in portions of the basement, it is possible that increased humidity in the basement due to the evaporation of ponded water further increased the humidity in the switchgear room, thus increasing the likelihood of condensation in the switchgear room.

Exponent's investigation also found that the filters for the ventilation system were in poor/degraded condition due to water saturation and were not providing filtration of the outside ventilation air for the incident switchgear room.[42] The resultant lack of filtration may have contributed to higher-than-normal accumulation of particulates on surfaces in the building.

[40] NOAA National Centers for Environmental Information (NCEI). (2024). *Global Historical Climatology Network – Daily (GHCN-D)*. [Dataset]. U.S. Station ID: USW00023272. Accessed via NCEI Climate Data Online web services.

[41] IEEE Std C37.100.1-2018, IEEE Standard for Common Requirements for High-Voltage Power Switchgear Rated Above 1000V.

[42] Exponent Site Visit, dated January 2, 2026.

5 Evidence Examination and Data Analysis

This section details the various evidence examination and data analysis activities relevant to the determination of the probable direct cause of the initiating arc flash event. The relevant activities related to determining the cause of the initiation are:

- Examination of physical evidence and analysis of the results
- Asset operational and maintenance history

5.1 Examination of Physical Evidence

This report section addresses the physical evidence collected and subsequently examined. Both non-destructive and destructive examination techniques were used to gain insight into the failure mechanism that occurred on December 20.

Key Physical Evidence Examined

- Incident Breaker No. 52 and associated damaged Incident Insulating Board
- Circuit Breaker No. 56
- Circuit Breaker No. 79 and associated barrier insulating board
- Circuit Breaker No. 94 and associated barrier insulating board
- Incident Cubicle
- Additional Insulating Boards from the 12 kV bus section D.

Examination Techniques

- Visual
- Digital photography
- X-Ray
- Computed Tomography (CT)
- Light Detection and Ranging (LiDAR)
- Scanning Electron Microscopy (SEM)
- Energy-Dispersive Spectroscopy (EDS)
- Cross sectioning and optical microscopy

Physical Evidence Collected

During Exponent's visits to Mission Substation between December 23, 2025, and March 2, 2026, evidence was collected and inspected by PG&E and Exponent. PG&E Law Claims collected hardware from within the Mission Substation, tagged it, and ultimately transferred it to its ATS facility for inspection.

Exponent inspected the evidence at the PG&E ATS facility, including the Incident Breaker No. 52 and Cell No. 5, which contains two cubicles, including the upper 1112/12 breaker cubicle (the Incident Cubicle). Additional evidence included the circuit breaker from the lower cubicle of Cell No. 5 (Circuit Breaker No. 94) and a breaker that had been removed from the top of Cell No. 5 approximately one month before the arc-flash event (Circuit Breaker No. 56). Other collected items included the circuit breaker in Cell No. 19 associated with the station service transformer (Circuit Breaker No. 79), barrier insulating board from the bottom of Cell No. 19, collected bus work, damaged control cables, protective relays, and one of the heaters from Cell No. 5. Additionally, Exponent received barrier insulating boards from selected breaker cells at the 12 kV bus section D of the Mission Substation ("Additional Insulating Boards"). All Additional Insulating Boards were visually inspected, and a selected number of them were destructively examined in laboratory conditions. Photographs of some of the items inspected by Exponent are shown in Figure 11.

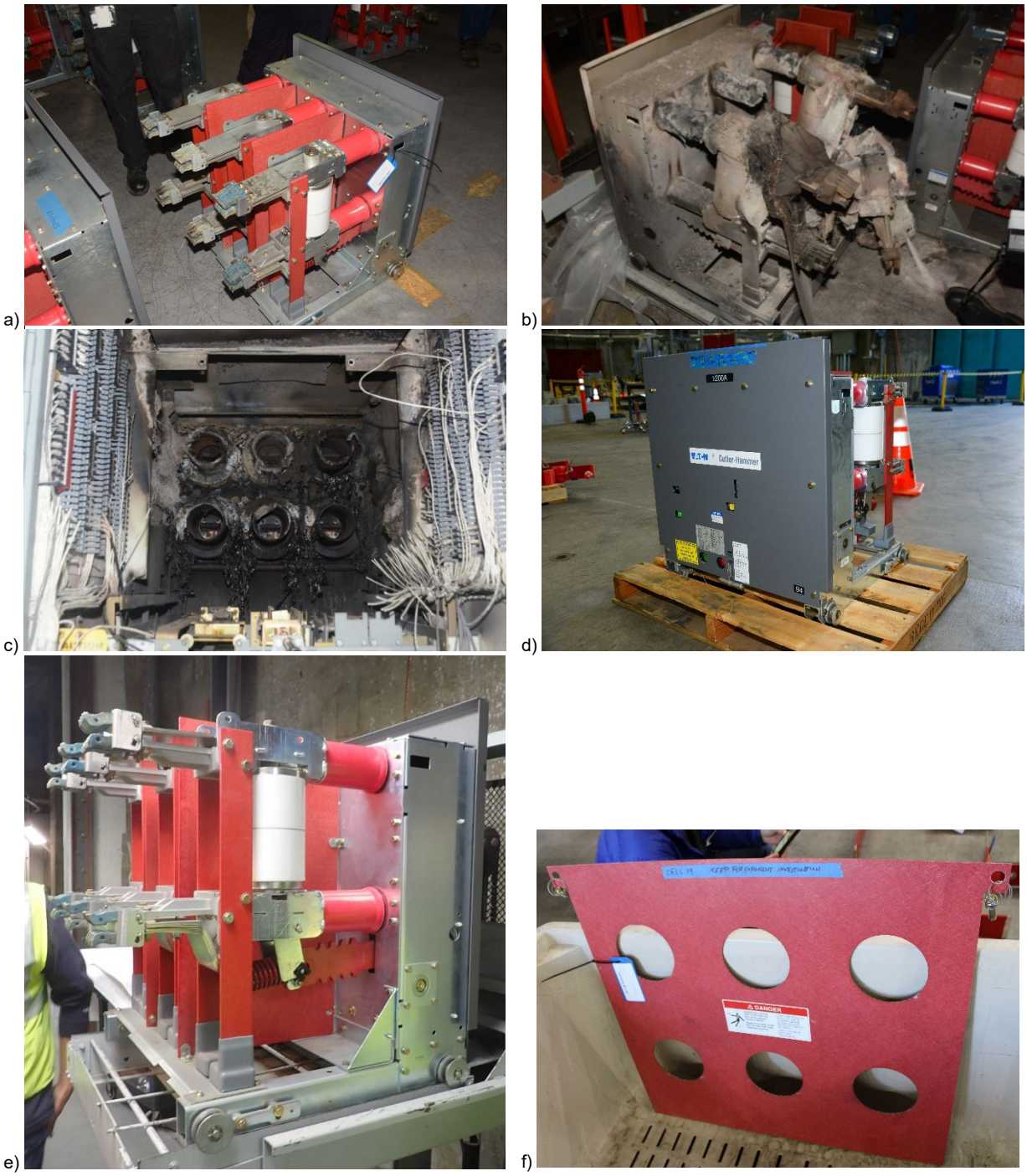


Figure 11. Examples of evidence collected by PG&E: a) Circuit Breaker No. 56 - Replaced from Top of Cell No. 5 prior to Incident; b) Circuit Breaker No. 52 from Top of Cell No. 5 (Incident Breaker No. 52); c) Cell No. 5 top cubicle (Incident Cubicle); d) Circuit Breaker No. 94 from the lower cubicle of Cell No. 5; e) Circuit Breaker No. 79 from Bottom of Cell No. 19; and f) Barrier insulating board from Bottom of Cell No. 19.

Evidence Observations

Exponent conducted evidence inspections on December 23, 26, 27, and 29 at the Mission Substation. The collected evidence was then transferred by PG&E to its Advanced Technology Services (ATS) facility in San Ramon, where Exponent performed additional examinations. Non-destructive, minimally destructive, and destructive techniques were used to clean debris and inspect the incident hardware. Exponent further received Additional Insulating Boards from selected breaker cells at the 12 kV bus section D of the Mission Substation and performed destructive laboratory examinations on selected boards.

As part of the evidence inspection at ATS, the front portion of Cell No. 5 that contains the Incident Cubicle was separated to get better access to the back of the cell, and the electrical-insulating surfaces were separated for closer inspection. Incident Breaker No. 52 and debris from that cabinet were packaged and transported to Waygate Technologies[43] for CT scanning. The process was thoroughly documented for future reference. The CT scan of Incident Breaker No. 52 did not show metal erosion or melting at the breaker's open contacts inside the vacuum bottles (Figure 12).

The CT scan of Incident Breaker No. 52 also showed evidence of metal erosion on the breaker arms, suggesting contact with the Incident Insulating Board. However, the location of the metal erosion appeared slightly lower than what was observed on Circuit Breaker No. 56. This difference in contact location may be attributed to variations in the position of the Incident Insulating Board within the cubicle or to movement of the board resulting from contact with the breaker arms.

[43] Waygate Technologies USA LP, Customer Solutions Center, 11988 Tramway Drive, Cincinnati, Ohio 45039.

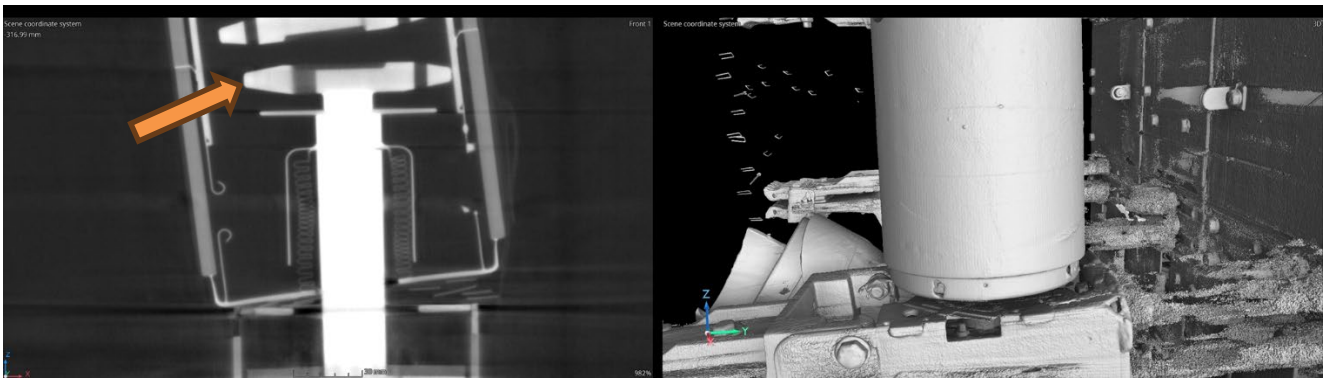


Figure 12. CT Scan imaging of the Incident Breaker No. 52's Vacuum bottle showing the condition of the breaker contacts (orange arrow).

Incident Breaker No. 52 suffered significant thermal damage. On the front face, there is smoke deposition just above the midplane of the breaker. Discoloration and clean burn patterns can be observed on the top third of the front face (see Figure 13).

Figure 13. Discoloration and clean burn patterns on the top third of the front face on Incident Breaker No. 52 (red arrow).

The vacuum bottle on the B-phase was entirely detached from the insulators. The ceramic exterior of the B-phase vacuum bottle was damaged with a large crack on the bottom half that separated part of the exterior. A crack was also visible on the top half of the B-phase vacuum bottle that separated part of the ceramic exterior. The contacts were visible on this cracked vacuum bottle and did not appear damaged by arcing. The A and C phase vacuum bottles were detached at the top insulator but appeared loosely connected at the bottom. The C-phase vacuum bottle had a crack on the lower half of the ceramic exterior. The A, B, and C phase vacuum bottles had clear damage patterns on the front-facing side of the ceramic exterior (see Figure 14).

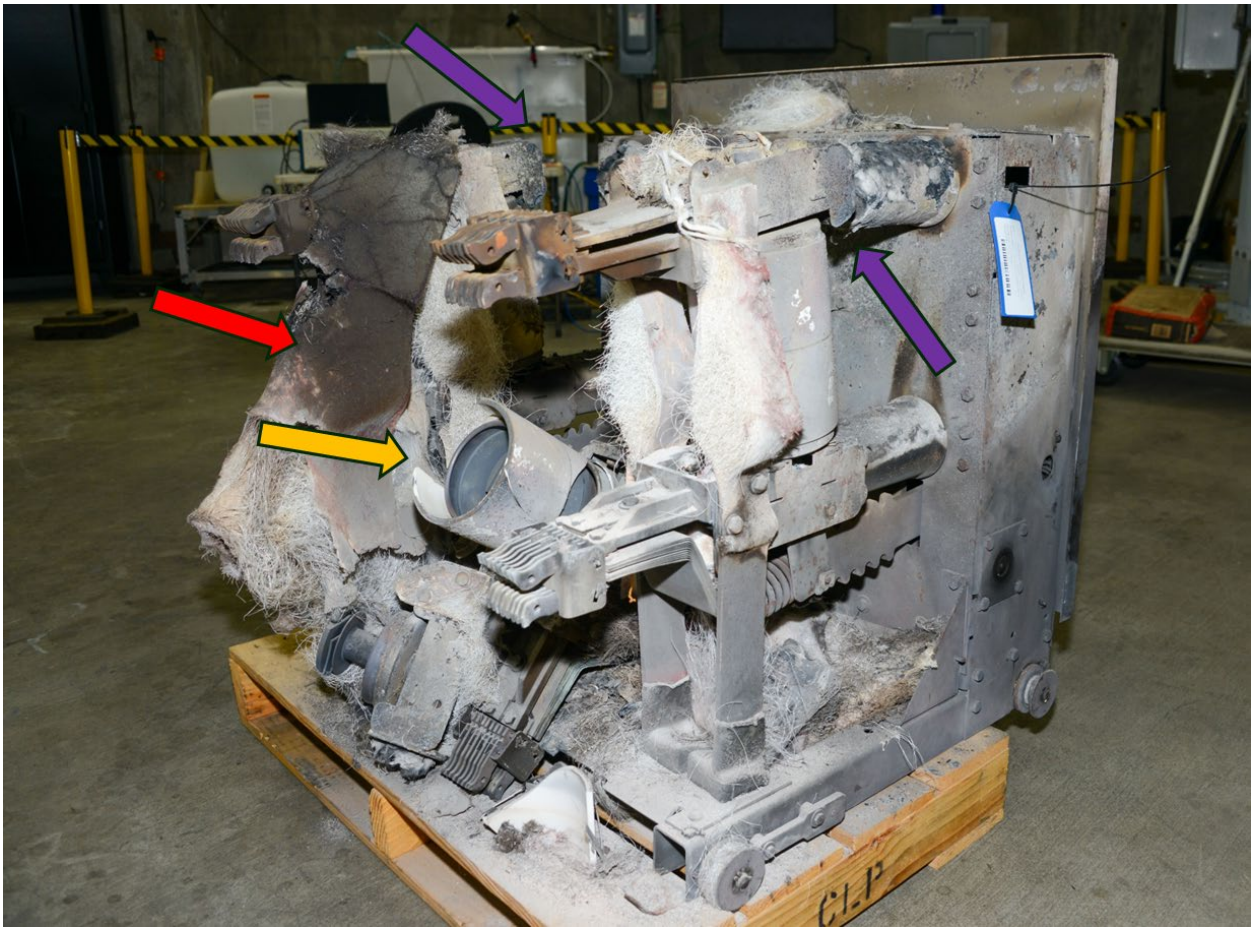


Figure 14. Incident Breaker No. 52 showing detached insulators (purple arrows), damage to the B-phase vacuum bottle (yellow arrow), and burned Incident Insulating Board (red arrow).

The electrical insulators for electrically isolating the vacuum bottles were thermally damaged, suffering mass loss with fibrous material remaining in places. The thinner vertical boards between phases were almost entirely consumed. The vertical bars, two connected per phase, were

significantly damaged on the top half of the A and C phase sides, while the B-phase bars were consumed by fire. Rubber insulators at the bottom had minor melt damage on the front and upward-facing side (Figure 15). Melted aluminum was found in various locations throughout the breaker.

Figure 15. Thermally damaged electrical insulators for electrically isolating the vacuum bottles (orange arrows), damaged vertical insulating bars at each phase (red arrow), and rubber insulators at the bottom (blue arrow).

Figure 16. A-phase vacuum bottle detached from the top insulator. Evidence of arcing to the bottom metallic cap and connecting arm (green arrows). Clean burn pattern on the front-facing side (red arrow).

Significant metal erosion and melting were observed at all three phases of the breaker arms and at the outer ends of the vacuum bottles (Figure 16), while the front grounded plates exhibited substantially less damage. The steel connecting arms were damaged above and below the vacuum bottles, showing melting damage and mass loss. The top B-phase connecting arm showed the most significant melting damage and mass loss. Damages to the connecting bolts, washers, and surrounding area on the top were particularly severe on all three phases, with washers missing and bolt heads melted. The A, B, and C phase vacuum bottles also had mass loss and melting spots on the bottom metallic cap and corresponding evidence of arcing on the bottom connector arms nearby. Melting and mass loss were also observed on the back side of the top B-phase metallic cap. There was no evidence of beading on the steel teeth that connect to the bus work on any phase.

Figure 17. Detached top B-phase connecting arm showing evidence of arcing on the arm and metallic cap of the vacuum bottle (red arrows). No evidence of arcing on connecting teeth or vacuum bottle contacts (blue arrows).

Circuit Breaker No. 56 had been installed in the Incident Cubicle until approximately one month before the event. It was removed on November 2, 2025, and upon inspection, it showed metal erosion and discoloration on the connecting arms above and below the vacuum bottles. The bottom of the phase B and C connecting arms showed evidence of metal loss and discoloration, consistent with copper corrosion. The top of phases A, B, and C connecting arms each had discoloration and metal loss spots on the underside near the vacuum bottles. Circuit Breaker No. 56 was subsequently replaced by Incident Breaker No. 52 in November 2025 (see Figure 18). Circuit Breaker No. 56 was taken out of service after the observed damages and reported as "water damage" (see section 5.2.1 of this report for more details). However, Exponent's evidence examination after the arc-flash event indicated that the damage and metal loss at the breaker arms were likely due to arcing at the contact points with the Incident Insulating Board and not water intrusion.

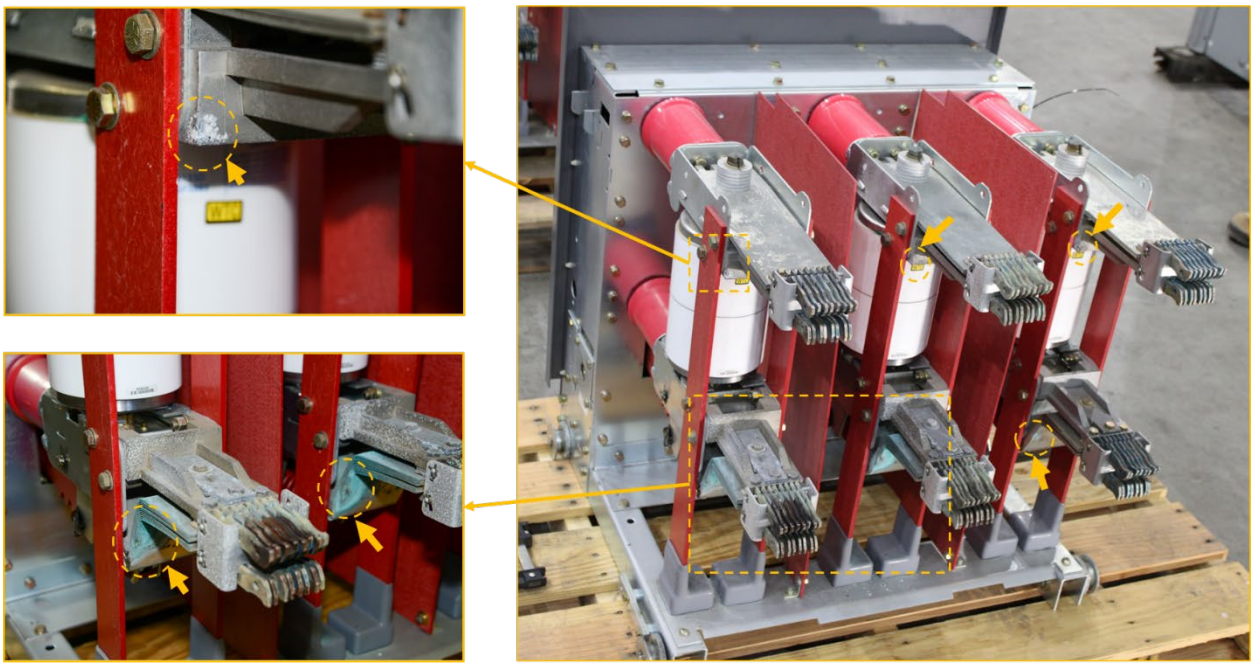


Figure 18. Metal erosion and damage at the top and lower breaker arms of Circuit Breaker No. 56 (previously racked in the Incident Cubicle).

Furthermore, placing the barrier insulating board recovered from cubicle X-1112/22 (Cell No. 5, bottom cubicle) against the circuit breaker that had previously been racked in the Incident Cubicle (Circuit Breaker No. 56) shows that the sides of the through-holes align with points of contact on the breaker arms where metal erosion and damage are observed (see Figure 19). This indicates the likelihood of contact between the edge of the through holes and the breaker arms between the

Incident Insulating Board and the Incident Breaker No. 52. Contact between the edge of the through-holes and the breaker arms is further supported by similar damage patterns on other barrier insulating boards recovered from the switchgear (see Figure 20).

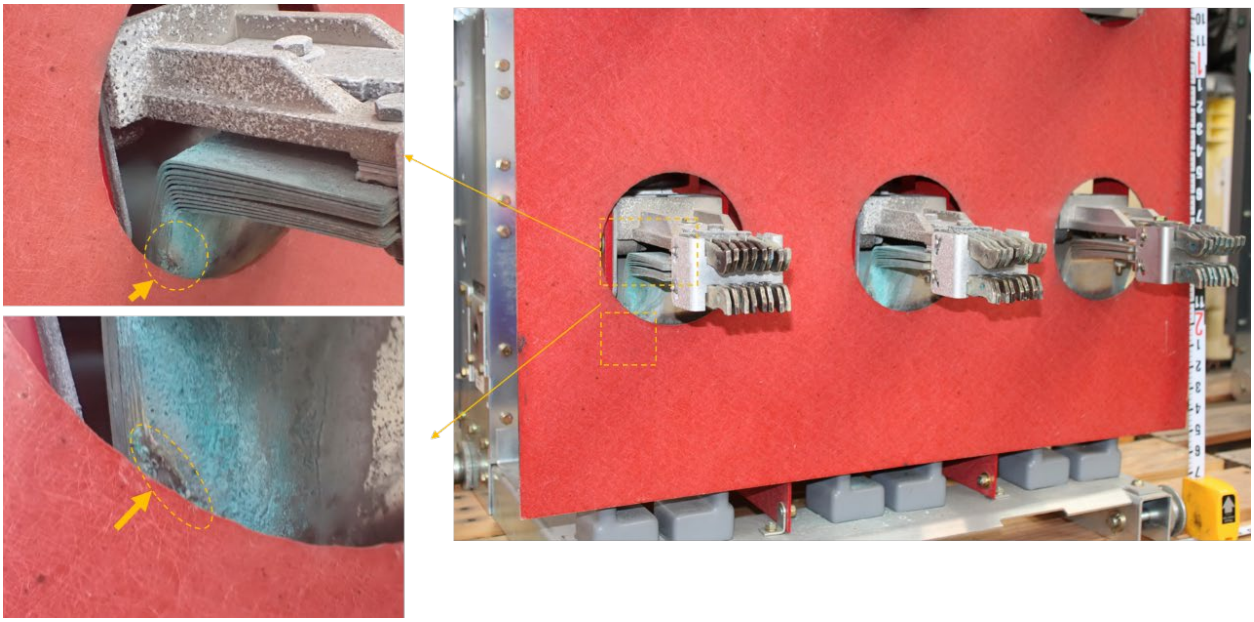


Figure 19. Sides of the through-holes align with points of contact on the breaker arms where metal erosion and damage observed on the arms of Circuit Breaker No. 56.

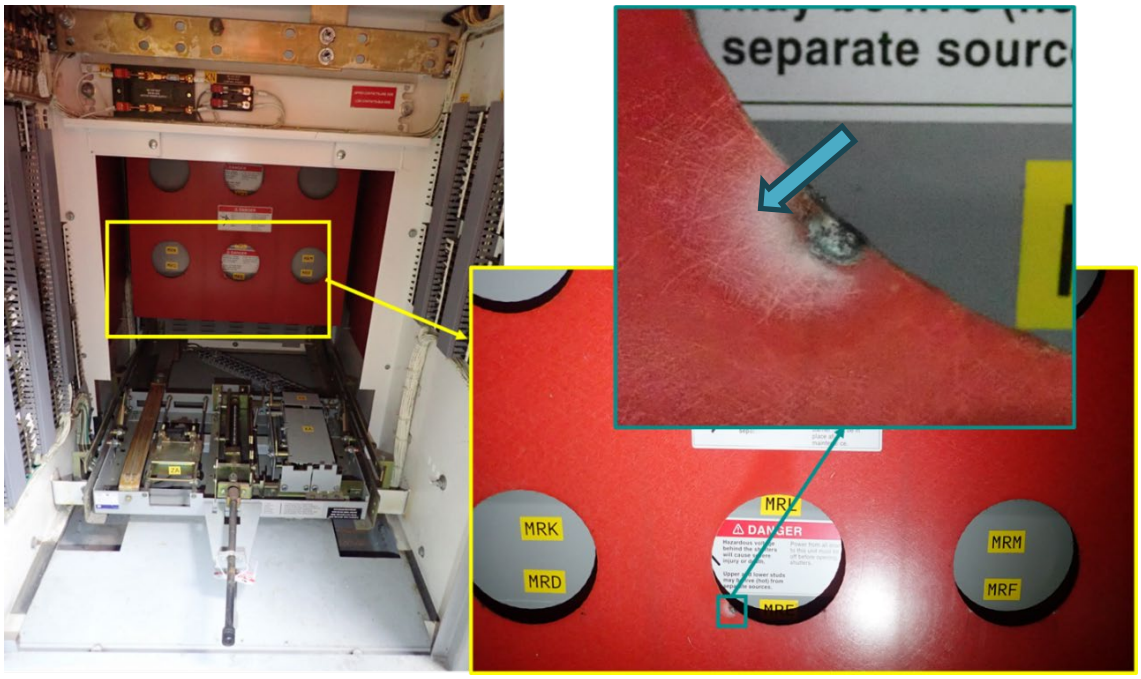


Figure 20. Evidence of contact between the barrier insulating board and circuit breaker arm at another cubicle (NX-2/22, Cell No. 6) (blue arrow)

Additionally, barrier insulating boards retrieved from other breaker cells within the 12 kV bus section D switchgear at the Mission Substation exhibit similar damage patterns, indicating contact between the edges of the through-holes and the breaker arms. The similarity in contact locations and damage patterns across multiple cells further supports that the breaker arms contacted the edges of the through-holes (Figure 21).

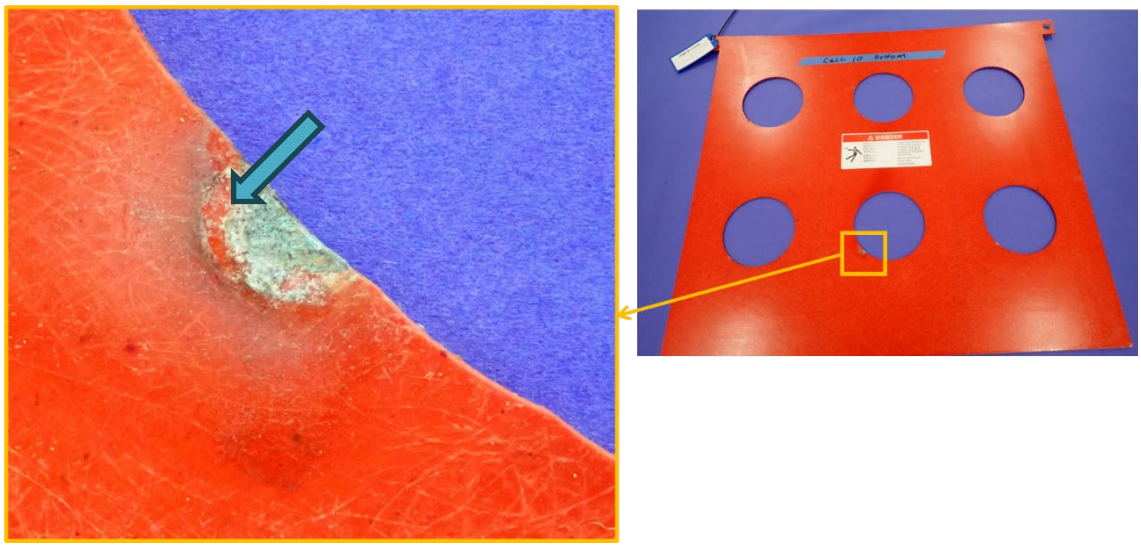


Figure 21. Barrier insulating board from Cell No. 9, bottom cubicle (blue arrow).

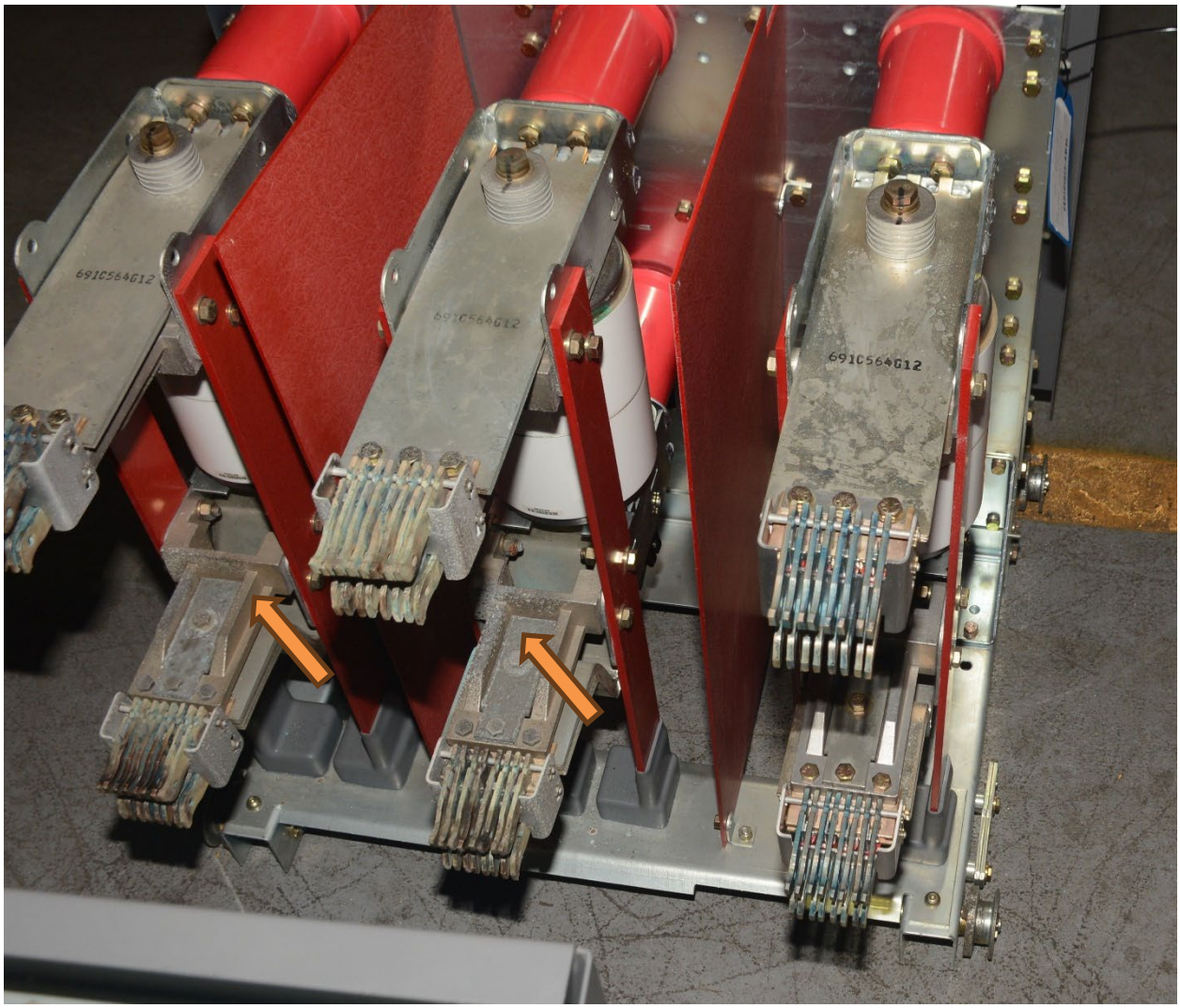


Figure 22. Metal damage and discoloration on lower connecting arms Circuit Breaker No. 94 (orange arrows).

Circuit Breaker No. 94 (Figure 22) was racked in below Incident Breaker No. 52 at the time of the arc-flash event (X-1112/22 cubicle). No significant metal erosion or damage was observed at this breaker. Black marks were observed on the bottom through-holes of the barrier insulating board behind Circuit Breaker No. 94.

Cell No. 5 housed Incident Breaker No. 52 in the top cubicle (X-1112/12 cubicle) and Circuit Breaker No. 94 in the bottom cubicle (X-1112/22 cubicle) at the time of the incident. Significant thermal damage occurred to the top cubicle of Cell No. 5. Damage generally increased from front to back (see Figure 23 and Figure 24).

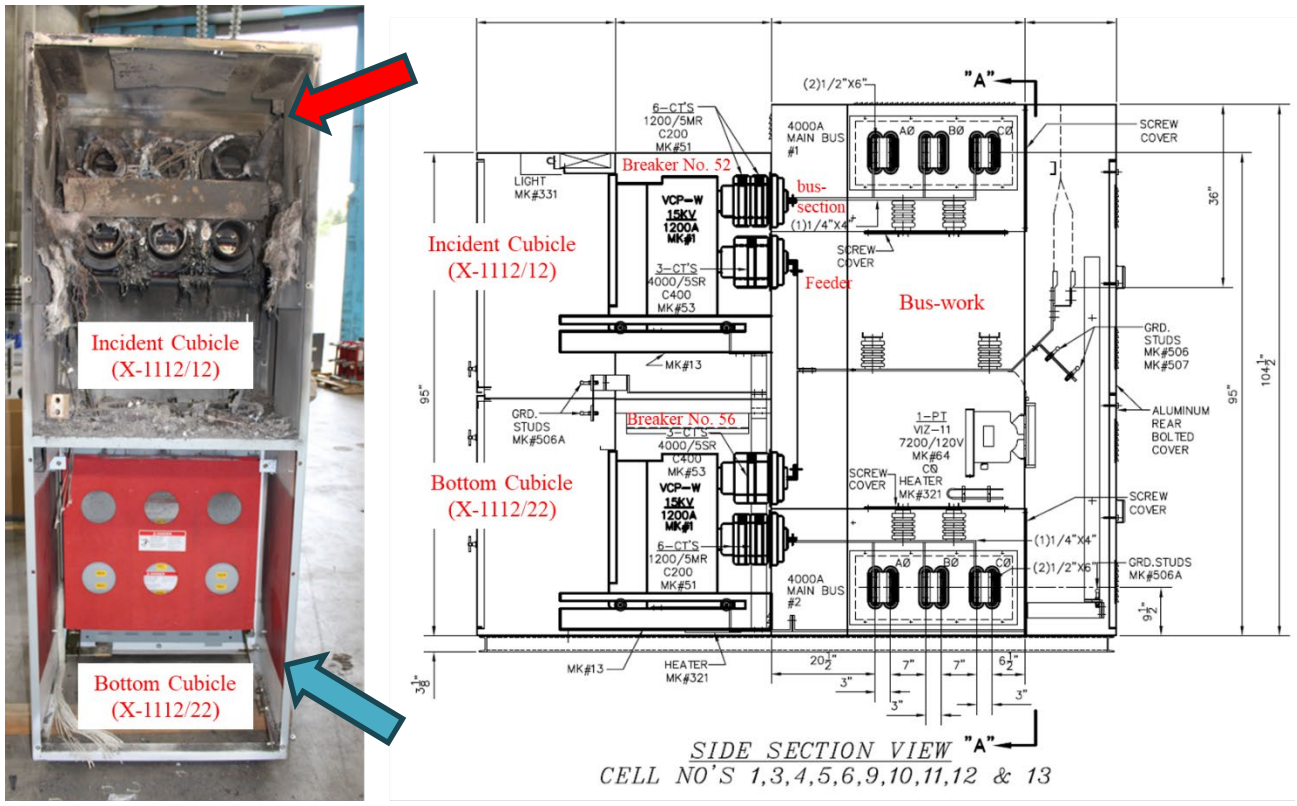


Figure 23. Cell No. 5 with the top cubicle that housed the Incident Breaker No. 52 (red arrow) and the relatively undamaged bottom cubicle (blue arrow).

Three Current Transformers (CTs) on the bus side A and B phases fell down during the incident and subsequent transportation as their housings melted during the incident and were found on the floor of the top cabinet at the time of the inspection. The internal wiring of these three CTs did not show visible evidence of copper erosion or melting. Housings of the CTs that did not fall down also partially melted and exposed internal windings. These exposed CT areas also did not show visible evidence of internal arcing. However, beading of copper wires was observed away from the CTs. Attempts to trace the wires were halted due to the fragility of the wires; however, the location of the beaded wires suggests that they are most likely CT wires.

Figure 24. Back, top, A-phase side of Cell No. 5 with most severe damage. No evidence of arcing on bus work connections (blue arrow).

Figure 25. Evidence of electrical arcing on CT wires (green arrows).

The bus work connections in the top of Cell No. 5 did not show metal erosion or evidence of arcing. There was light smoke and debris in the bottom compartment of Cell No. 5. Bus work and insertion taps in the back of Cell No. 5 also did not show evidence of arcing. This was further confirmed by X-ray imaging and destructive examination of the Incident Cubicle.

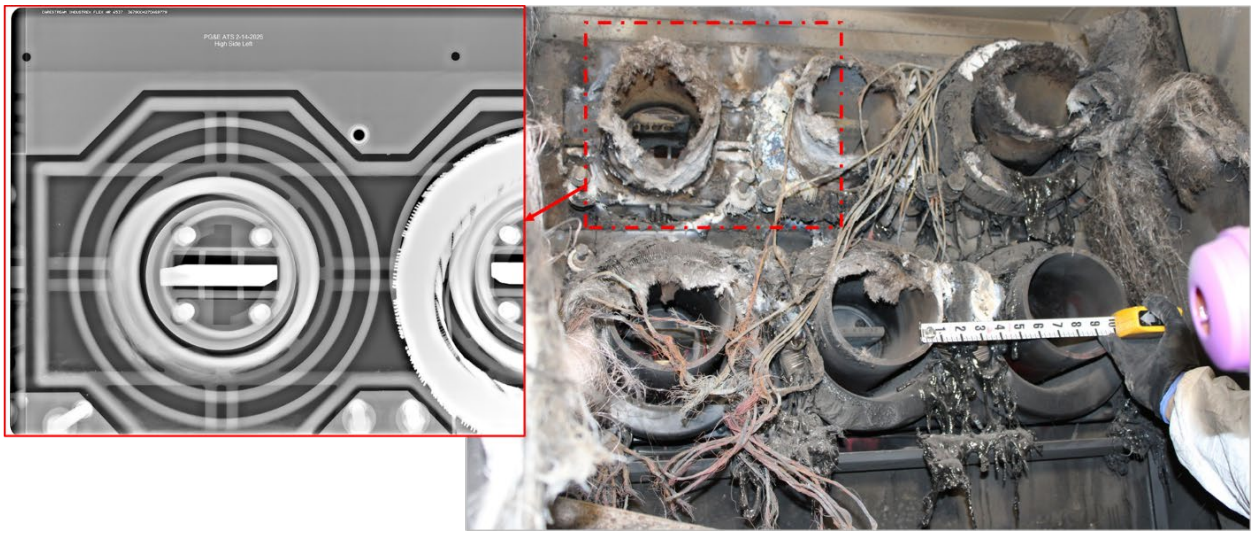


Figure 26. X-ray imaging at the back of the Incident Cubicle did not show evidence of metal erosion and arcing at the current transformers or the busbar tabs entering the cubicle.

Figure 27. Cubicle's rear electrical-insulation system and components (lower row) showing CT insulating tubes (orange arrows), busbar penetration wall (blue arrow), and current transformers (green arrows).

Additional Insulating Board Examinations

PG&E removed barrier insulating boards from several non-incident cells within the 12 kV bus section D at the Mission substation as part of the investigation into the arc-flash event that occurred in December 2025. The barrier insulating boards were subsequently transferred to Exponent for further examination and testing. Figure 28 shows a photograph of the Additional Insulating Boards in the Exponent laboratory.

Figure 28. Additional Insulating Boards from the 12 kV bus section of the Mission Substation transferred to Exponent for laboratory examination.

Several of the barrier insulating boards exhibited signs of mechanical damage as well as thermal damage, consistent with previously observed damage patterns indicating contact between the breaker arms and the edges of the through-holes. Two boards showing more pronounced damage, specifically the barrier insulating boards from Cell No. 6 and Cell No. 10, bottom cubicles, were selected for additional examination (Figure 29 and Figure 30). The barrier insulating board from Cell No. 10, bottom cubicle, also showed signs of mechanical damage indicating physical contact with the breaker arm (Figure 31).

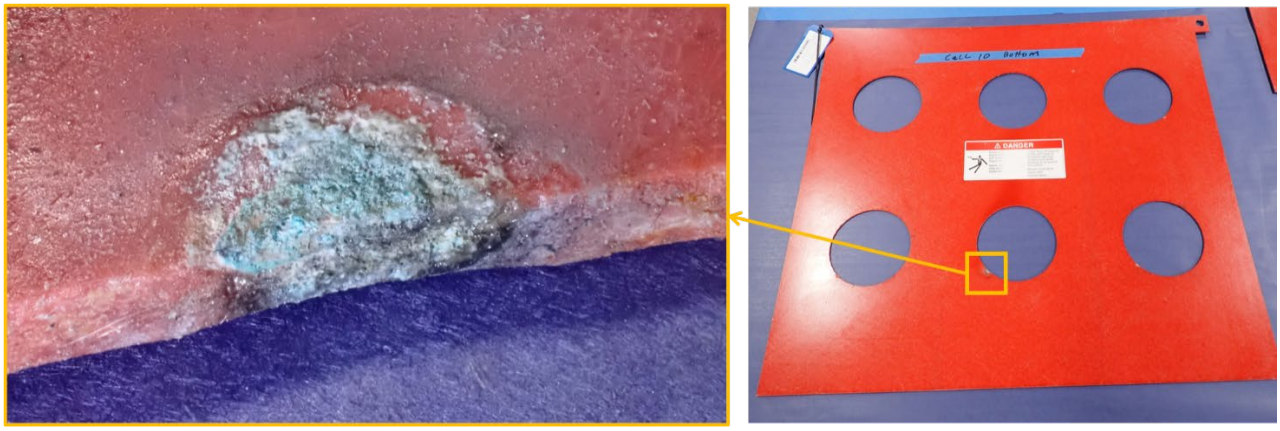


Figure 29. Thermal damage on the barrier insulating board from Cell No. 10 (bottom) of the 12 kV bus section D.

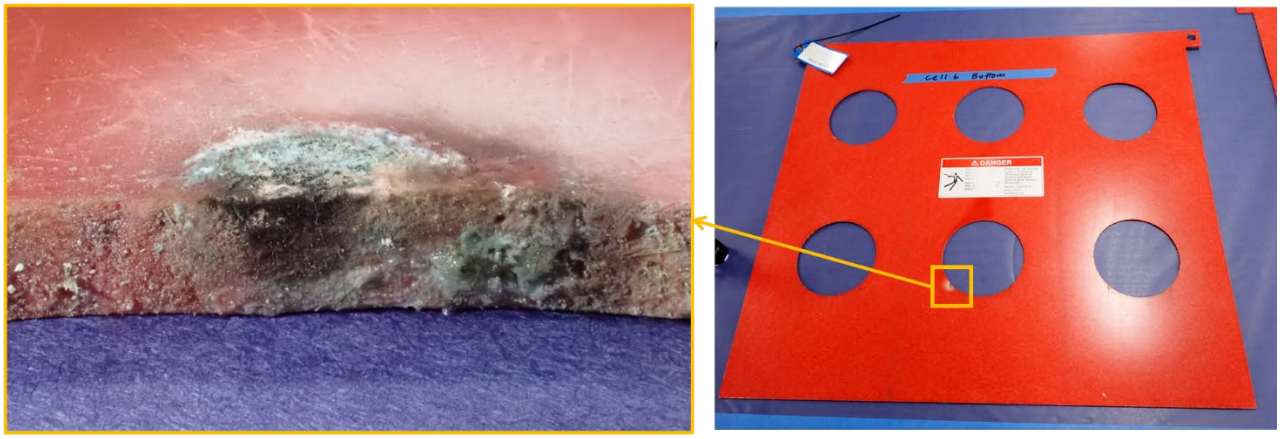


Figure 30. Thermal damage on the barrier insulating board from Cell No. 6 (bottom) of the 12 kV bus section D.

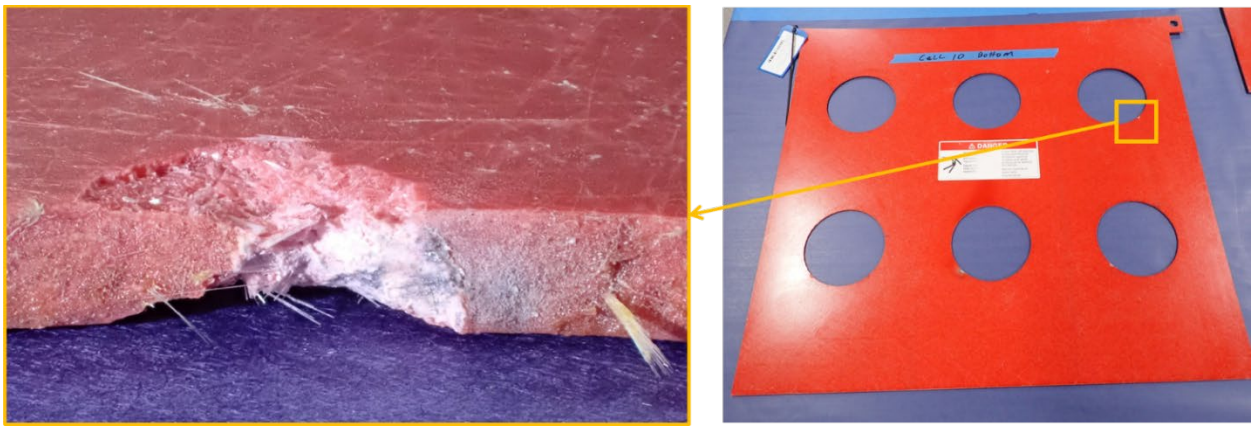


Figure 31. Mechanical damage on the barrier insulating board from Cell No. 10 (bottom) of the 12 kV bus section D.

Exponent performed X-ray imaging on the barrier insulating boards from Cell No. 6 and Cell No. 10, focusing on the areas with visible physical damage. However, the damaged locations did not appear clearly in the X-ray scans due to the low-density composition of the boards and the nature of the damage. Figure 32 shows a barrier insulating board positioned inside the X-ray machine.

Figure 32. Barrier insulating board positioned inside the X-ray machine.

Exponent also performed insulation-resistance testing between selected locations near the edges of the through-holes on the barrier insulating boards from Cell No. 6 and Cell No. 10. Figure 33 shows the general setup for the insulation-resistance testing using a calibrated insulation tester. Figure 34 depicts the selected test locations on the barrier insulating boards. The marked locations corresponding to the insulation-resistance measurements for the barrier insulating boards from Cell No. 10 and Cell No. 6 are presented in Table 1 and Table 2, respectively. The insulation resistance tests were performed at 5 kV DC for the duration of one minute. The measured insulation resistances were all in the range of Gita Ohms (billion Ohms). Therefore, no meaningful differences between damaged and undamaged locations could be observed.

Figure 33. Insulation resistance test set up between selected locations on a barrier insulation board.

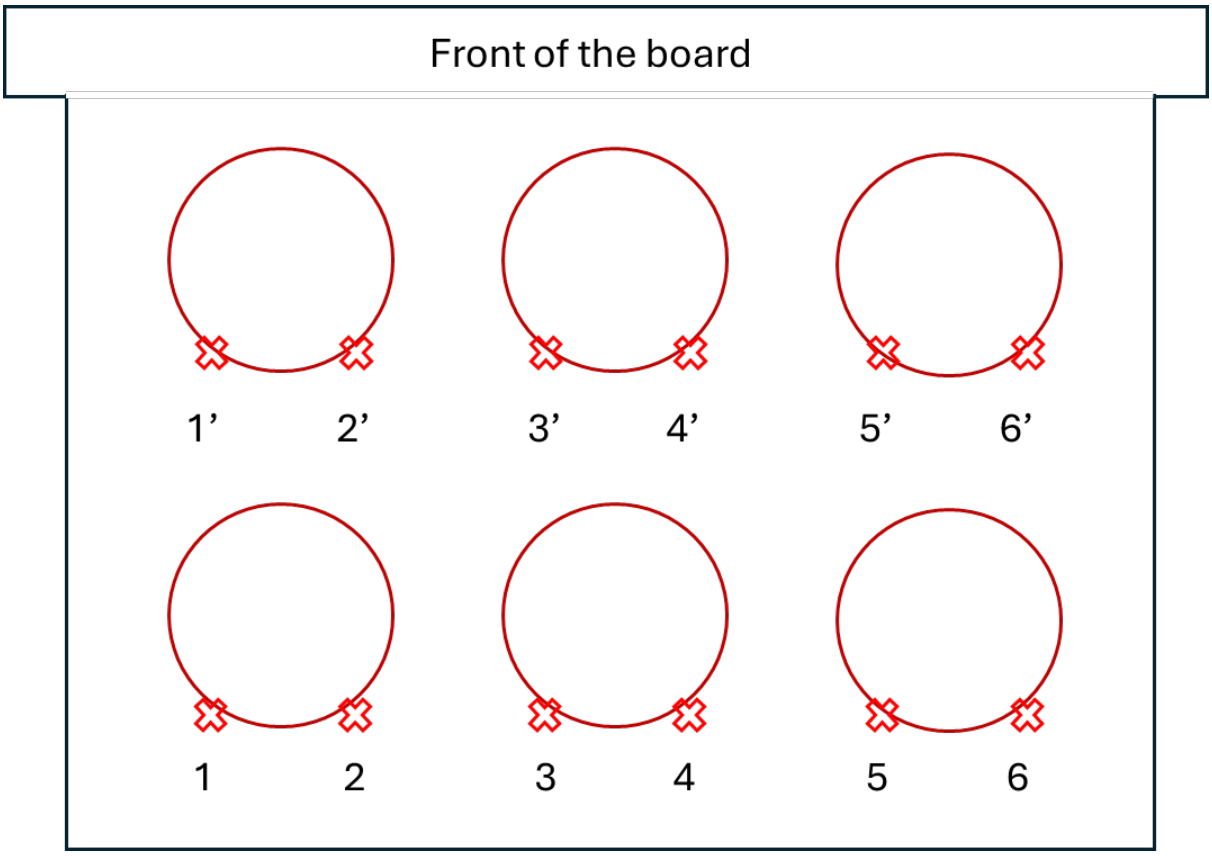


Figure 34. Schematic diagram of a barrier insulating board with numbering of the select locations for insulation resistance testing.

Table 1. Cell No. 10 (bottom) barrier insulating board insulation resistance measurements

Bottom Row		Top Row	
Measurement points	Resistance in Giga Ohms	Measurement points	Resistance in Giga Ohms
1’ – 3’	141	1’ – 3’	158
1’ – 4’	277	1’ – 4’	159
2’ – 3’	96	2’ – 3’	95
2’ – 4’	214	2’ – 4’	93
3’ – 5’	41	3’ – 5’	96
3’ – 6’	108	3’ – 6’	124
4’ – 5’	75	4’ – 5’	103
4’ – 6’	173	4’ – 6’	135

Table 2. Cell No. 6 (bottom) barrier insulating board insulation resistance measurements

Bottom Row		Top Row	
Measurement points	Resistance in Giga Ohms	Measurement points	Resistance in Giga Ohms
1’ – 3’	92	1’ – 3’	167
1’ – 4’	263	1’ – 4’	196
2’ – 3’	77	2’ – 3’	148
2’ – 4’	253	2’ – 4’	185
3’ – 5’	110	3’ – 5’	148
3’ – 6’	122	3’ – 6’	143
4’ – 5’	296	4’ – 5’	172
4’ – 6’	281	4’ – 6’	186

Next, the areas with the most visible damage at the edges of the through-holes on the barrier insulating boards from Cell No. 6 and Cell No. 10 were carefully cut out of the boards. The cuts were made sufficiently far from the visible damage locations to preserve the integrity of the damaged regions within the extracted samples (Figure 35 and Figure 36). No visible carbonization channels or internal material charring indicative of insulation degradation were observed at the cut edges (Figure 37). This suggests that the insulation failure at the Incident Insulating Board was external to the board rather than within its width.

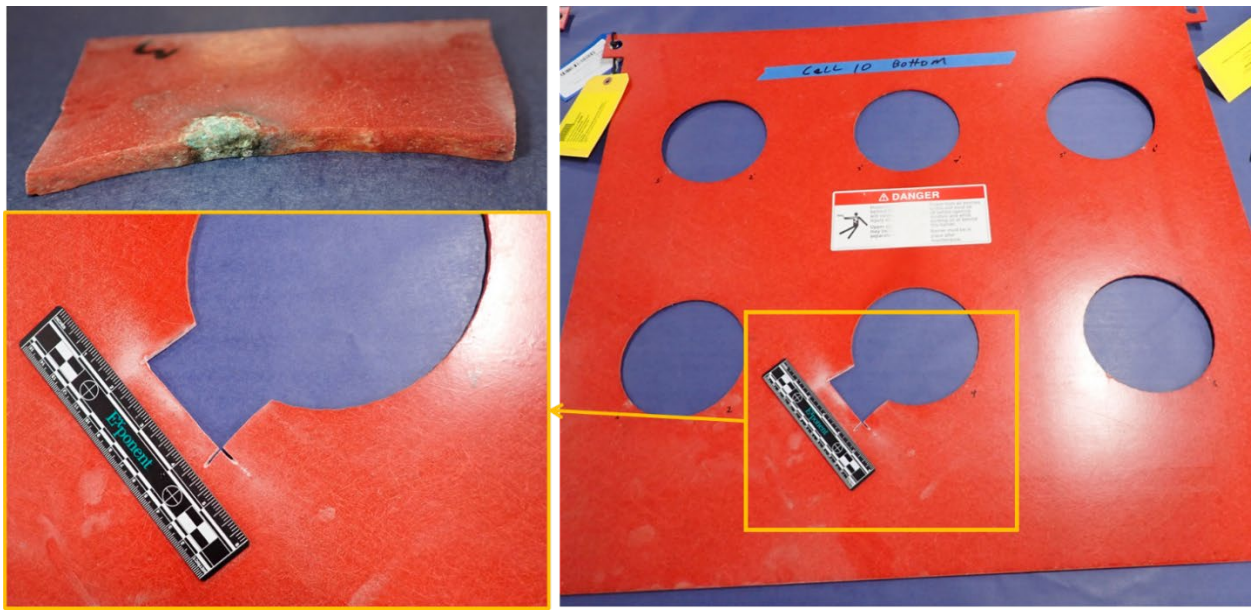


Figure 35. Area with most damage cut from the Cell No. 10 (bottom) barrier insulating board

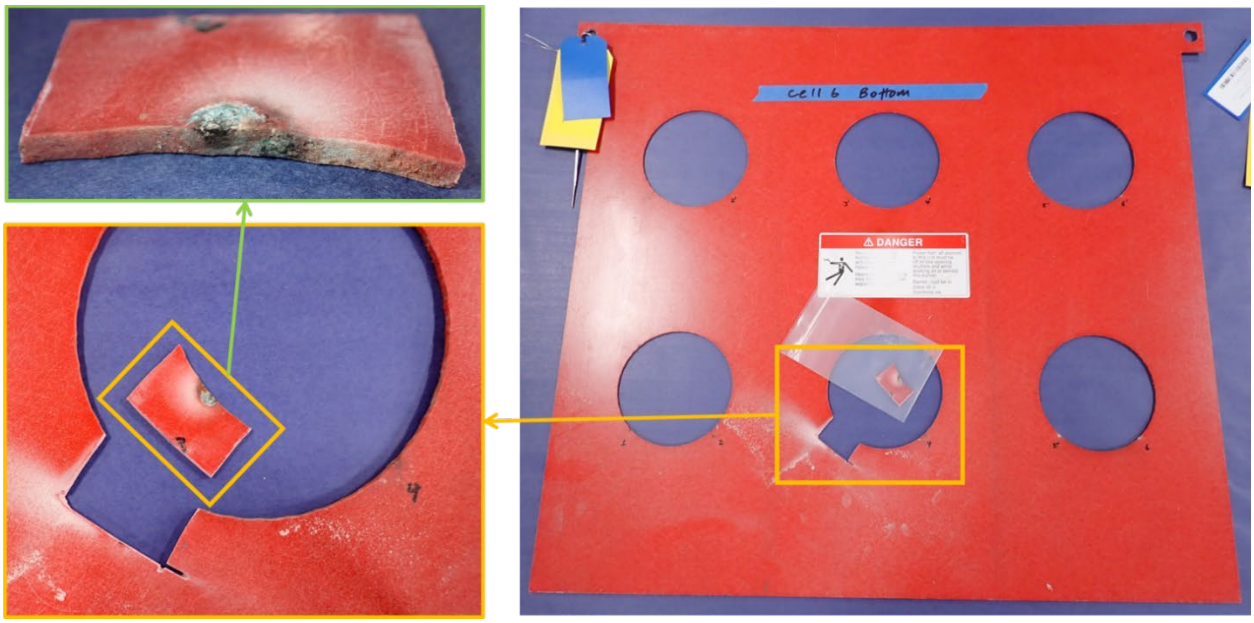


Figure 36. Area with most damage cut from the Cell No. 6 (bottom) barrier insulating board

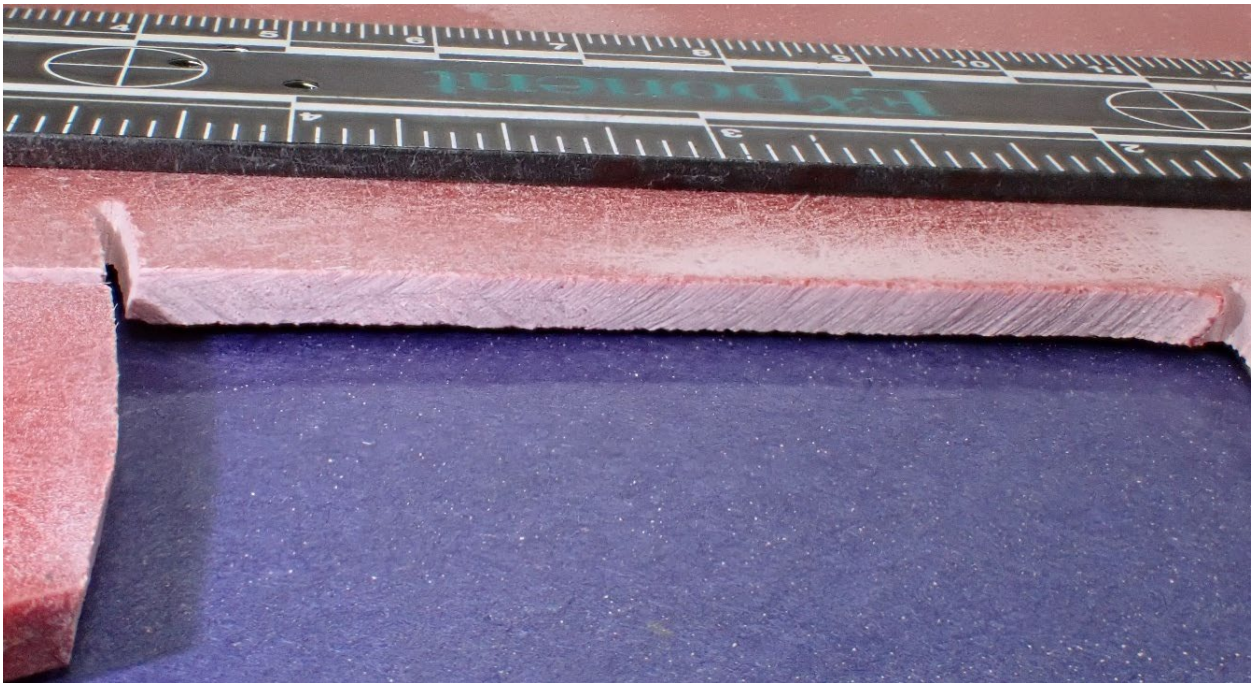


Figure 37. No visible evidence of carbonization channels at the cut edges of the examined barrier insulating boards

Scanning Electron Microscopy (SEM) and Energy Dispersive Spectrometry (EDS) were performed on selected surfaces of the cut samples. Figure 38 shows an image of the damaged surface of the Insulating Board from Cell No. 10 under SEM. The resulting EDS spectrum and the identified

elements at a selected surface of the cut samples are presented in Figure 39. The elemental composition analysis did not reveal any unusual foreign species in the tested samples.

The cut samples were then mounted in epoxy and polished to target surfaces. The polished cross sections indicate that the observed damage originated from the outside of the board inward (Figure 40). This further suggests that the insulation failure at the Incident Insulating Board was external to the board.

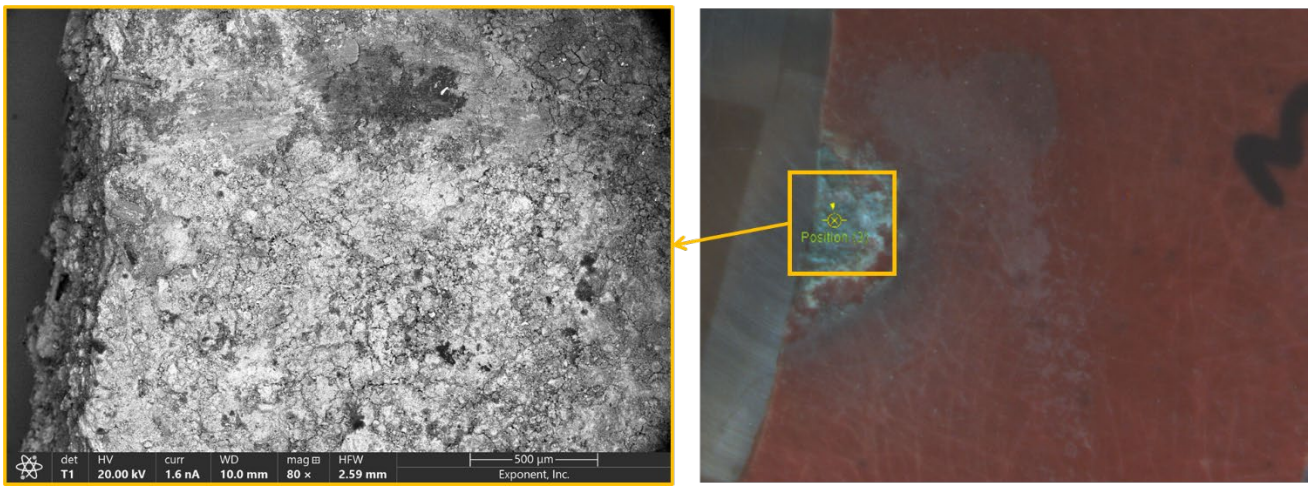


Figure 38. SEM image of the damaged surface of the barrier insulating board from Cell No. 10 (bottom)

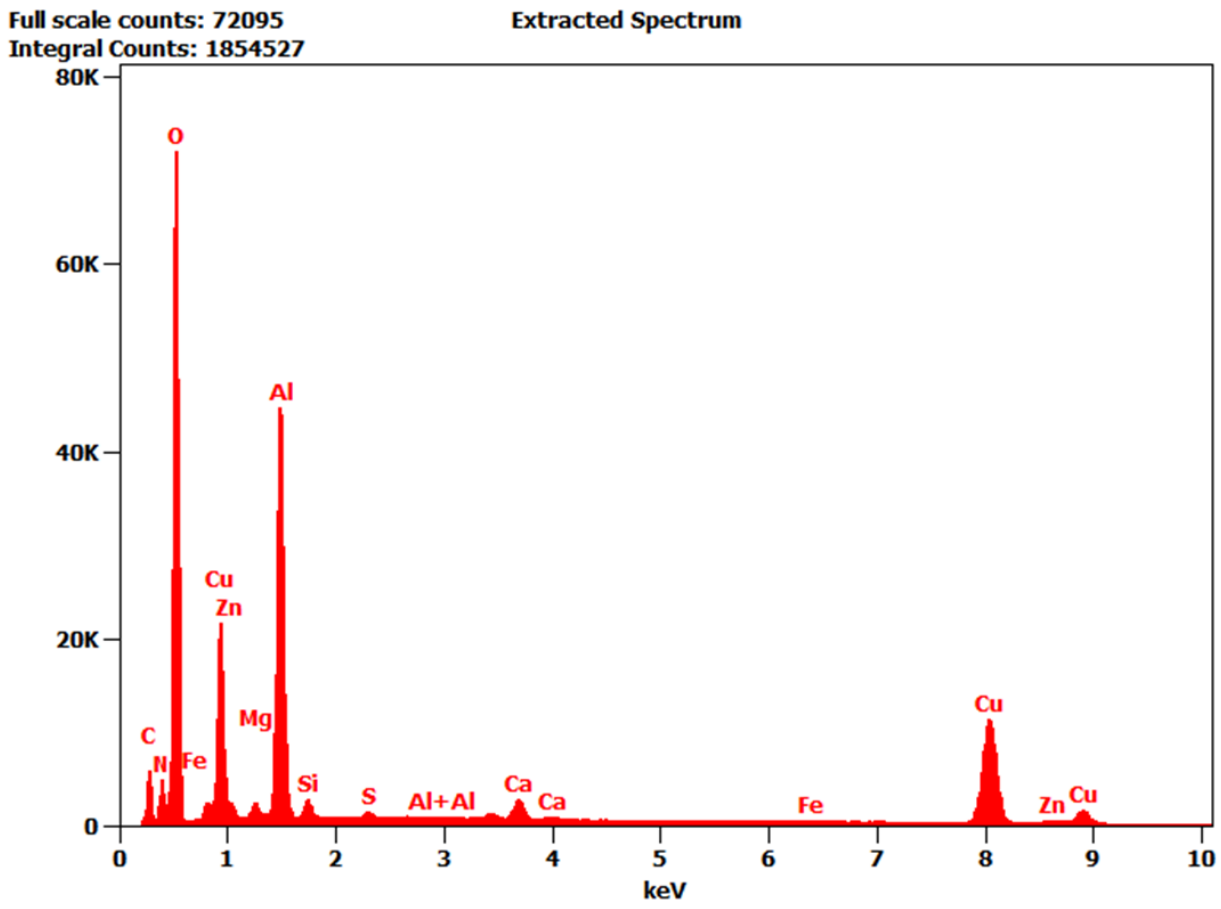


Figure 39. The EDS spectrum and the identified elements at a selected surface on the damaged area of the barrier insulating board from Cell No. 10 (bottom)

Figure 40. Mounted samples of the barrier insulating board from Cell No. 10 (bottom), showing cross section of the damaged area.

5.2 Asset Operational and Maintenance History

Exponent reviewed PG&E's Computerized Maintenance Management Systems, including Systems Applications and Products (SAP) and Bentley Systems Asset Performance Management (APM), and the Supervisory Control and Data Acquisition (SCADA) Data Historian (EDPI) to characterize the operational and maintenance history of the Incident Breaker No. 52, Incident Cubicle 1112/12, and the incident 12 kV switchgear bus section D in an effort to discover any preconditions or precursors for the observed failure.

From this review, the following observations were made:

- Incident Breaker No. 52 [44] and Circuit Breaker No. 56[45] were manufactured in 2008 and initially installed in 2009 under phase 1 of the Mission Substation Rebuild, PM order 30603611.[46]
- At the time of initial installation, Incident Breaker No. 52 received a visual examination of the breaker, contact erosion measurements, megger testing, high-pot testing, and operating timing tests. The installation testing did not identify any abnormal conditions that would require correction prior to operation.[47]
- Incident Breaker No. 52 was originally located in cubicle 1106/12 at its 2009 installation[48] and was moved to 1106/22 at some point prior to February 2016, where it remained until December 2017.[49] There was no observed record of Incident Breaker No. 52 being installed in any other cubicle until it replaced Circuit Breaker No. 56 in cubicle X-1112/12 in November 2025 as a spare. [50]
- CB X-1112/12 was normally in the open position, whereas CB X-1112/22 was normally in the closed position.

---

[44] SAP equipment ID 42633985.

[45] SAP equipment ID 42634583.

[46] Mission-Sub-IH08.xlsx.

[47] CB 52 New BRKR Installation Form 5.2.2009.pdf.

[48] CB 52 New Equipment Form.pdf. The form does not specify the breaker number but lists a serial number, 080303091, matching the serial number in SAP.

[49] APM indicates Incident Breaker No. 52 was located in cubicle 1106/22 at least from February 2016 (earliest data available).

[50] CB 52 New Equipment Form.pdf. The form does not specify the breaker number but lists a serial number, 080303091, matching the serial number in SAP.

- Heater position (normally off) was designed not to turn on in a cell if breakers are racked in and one of the breakers is closed.[51]

Data in APM is organized into "checksheets," each of which contains multiple "indicators" recording various data points. Each station inspection documents the breaker's counter reading. Different indicators note the number of operations, with fault operations tracked distinctly from switching and maintenance operations. There also are indicators for counter discrepancies.[52] Figure 41 summarizes the operational history of Incident Breaker No. 52, including the counter history over time. When non-zero operations were noted in APM, they are shown next to the counter reading. All operations in APM for Incident Breaker No. 52 were under the "ACC – Switching or Maintenance Ops" indicator; any fault operation or counter discrepancy indicators had values of zero.[53] In most cases, the number of recorded operations matches the change in the counter readings between successive inspections, but in 2017, when the Incident Breaker No. 52 was installed in 1106/22, there are changes in the counter not explained by the operations indicators. EDPI data for the Incident Breaker No. 52 while it was installed in 1106/22 was not available; therefore, the possibility of fault operations occurring during this time cannot be ruled out. After the removal of the Incident Breaker No. 52 from 1106/22, all changes in the counter coincided with preventative maintenance (exercise or mechanism service) at the intervals described in Section 5.2.1. The number of fault operations of Incident Breaker No. 52 has no direct relevance to this failure, as the identified failure mode is associated with the Incident Insulating Board rather than the circuit breaker itself.
Figure 42 contains EDPI data from the year prior to the arc-flash event.[54] After installation of Incident Breaker No. 52 on November 16, 2025, the reference date for the LC notification to replace Circuit Breaker No. 56, EDPI shows no operation until after the incident.

---

[51] Interviews with PG&E personnel and review of the PG&E As-Built Drawing No. 4050371, Rev. 1.

[52] EI251220A_San Fran X Updated_Received01032026.xlsx, EI251220A_San Fran X. Updated_Received01112026.xlsx, Mission CB 52.xlsx, and 2019 APM Station Inspections.xlsx.

[53] Counter readings are entered during station inspections. The electrician documents the reasoning for the counter change, either fault operations or switching and maintenance. If this information is not entered, it generates an alarm for the supervisor to acknowledge and research. Note that although the indicator name for Switching or Maintenance Ops has a prefix of "ACC," this does not mean that these are fault operations.

[54] SF X 1112_12 Position - 01-14-2026 14-57-52 - 12-01-2015 15-56 to 01-01-2026 15-57.csv.

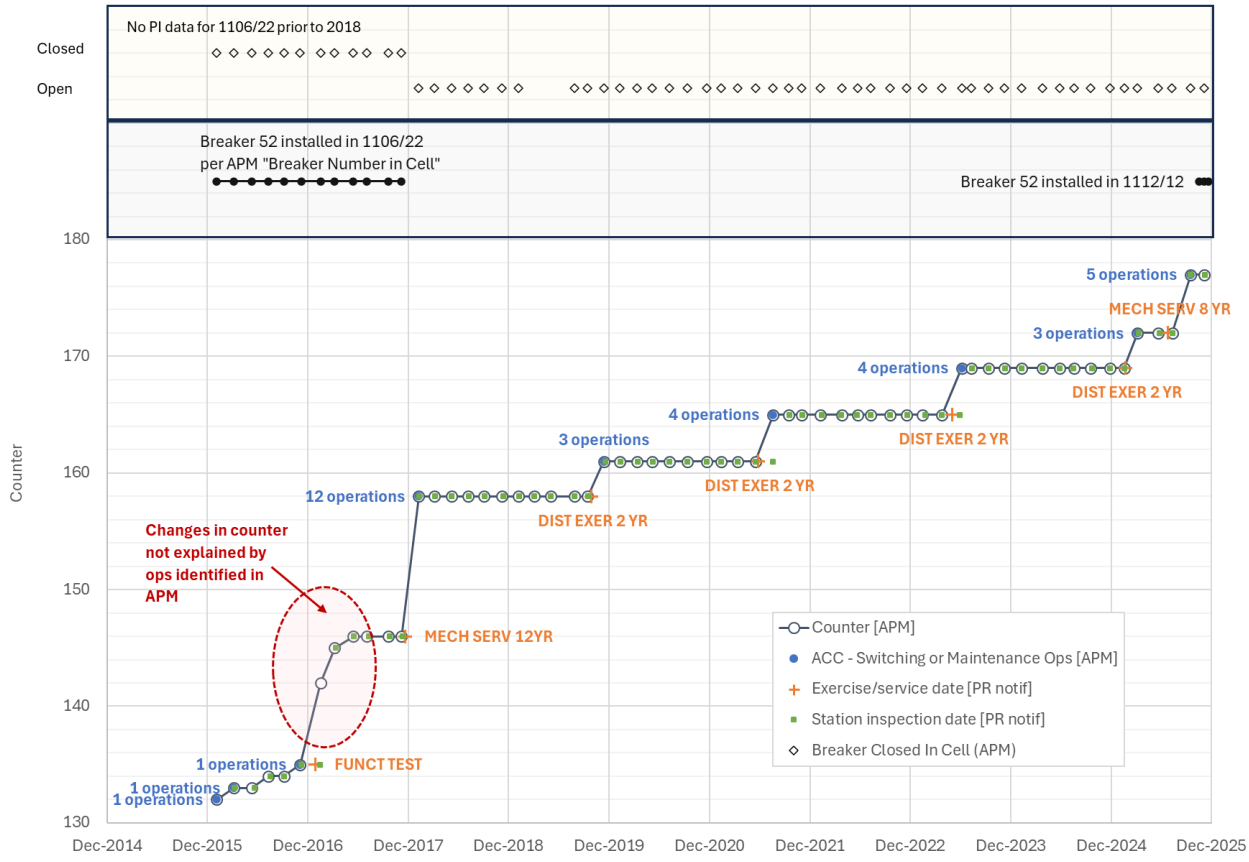


Figure 41. Incident Breaker No. 52's operational history.

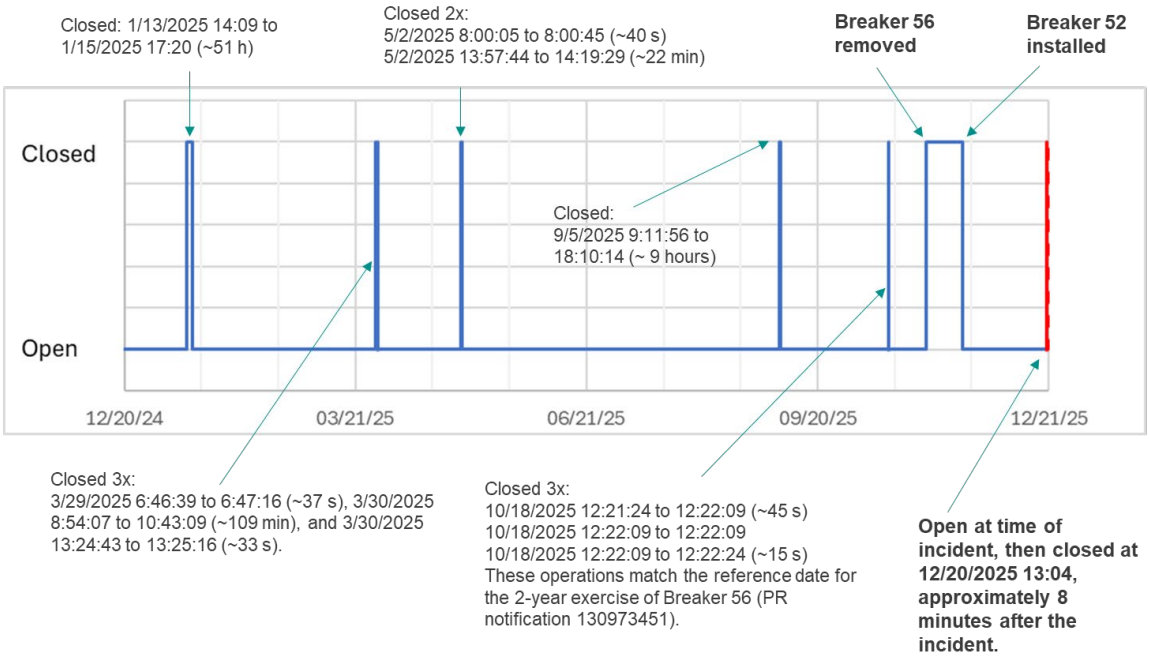


Figure 42. 1112/12 switching history in the year prior to the arc-flash event. Close Breaker position after the arc-flash event cannot be verified.

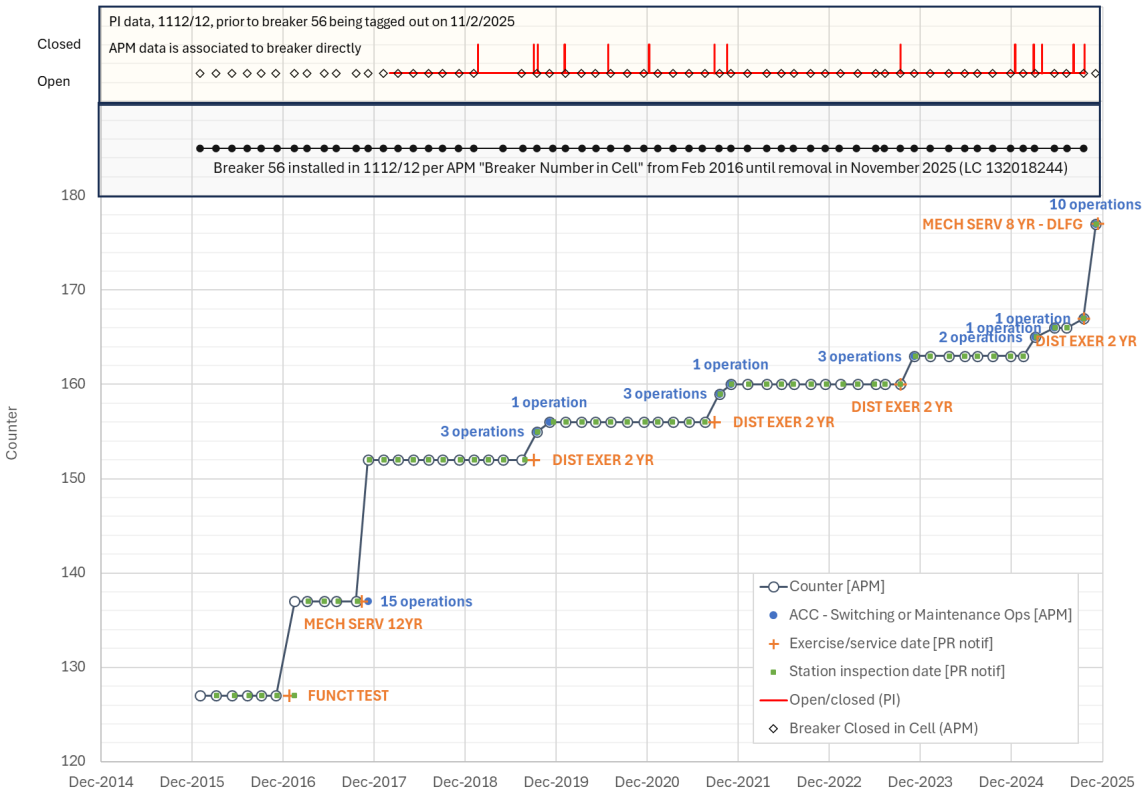


Figure 43. Circuit Breaker No. 56's operational history.

Figure 43 summarizes the operational history of Circuit Breaker No. 56. All operations in APM for Circuit Breaker No. 56 were under the "ACC – Switching or Maintenance Ops" indicator; any fault operation or counter discrepancy indicators had values of zero. In all cases, the number of recorded operations matches the change in the counter readings between successive inspections, and all changes in the counter coincide with preventative maintenance (exercise or mechanism service) at the intervals described in Section 5.2.1 below. EDPI shows that the breaker was only closed for short durations, consistent with the station inspection data in APM showing the breaker position as open (also see the details of the previous year in Figure 42). While most operations in EDPI occur at a similar time as counter changes reported in APM, there are some operations, such as in early 2019, that do not appear to have a corresponding change in the APM counter.

Maintenance History

PG&E Utility Standard TD-3322S and its attachments define preventative and corrective maintenance requirements applicable to the incident equipment.[55]

Station inspections are required on a monthly or bimonthly interval under TD-3322S, Attachment 11, depending on the station categorization.[56] Preventative maintenance (PR) notifications for Mission substation document completed station inspections monthly from February 2013 to August 2014 and every two months thereafter. The two-month frequency is consistent with Type 2 substations in Attachment 11. The PR notifications in SAP track completed station inspections at a high level; detailed results for each of the indicators are stored in APM. The months in which APM data is available are consistent with the completion months of the station inspection PRs.[57] APM checksheets for the breakers included indicators for "Bus Work and Conductors" and "Insulators" through February 2019. All inspections reported no problems found.[58] Data for subsequent station inspections did not include these indicators, as conditions related to these items transitioned to exception-based reporting, in which a record is generated only when an issue is found.

---

[55] Utility Standard TD-3322S, Rev. 10, "Substation Equipment Maintenance Requirements," 6/6/2024.

[56] Utility Standard TD-3322S, Attachment 11, Rev. 3, "PG&E Substation Inspection Program Summary," 3/3/2022.

[57] EI251220A_San Fran X Updated_Received01032026.xlsx, EI251220A_San Fran X Updated_Received01112026.xlsx, Mission CB 52.xlsx, 2019 APM Station Inspections.xlsx.

[58] No problems were reported for Incident Breaker No. 52 and Circuit Breaker No. 56, or for any of the other 12 kV switchgear, in 5168 different indicator readings.

TD-3322S Attachment 7 contains additional maintenance requirements for circuit breakers, including an exercise requirement every two years if the breaker was not operated within 24 months and a mechanism service requirement every eight years.[59] Section 1.3 of TD-3322S states that preventative maintenance with a cycle of 1 year or longer must be completed before the first day of the year following the year containing the required end date for the PR notification. PR notifications in SAP since 2017 show that the maintenance history of Incident Breaker No. 52 and Circuit Breaker No. 56 is consistent with these requirements.[60]

Both breakers have exercise PRs at 2-year intervals, in 2019, 2021, 2023, and 2025.[61] Additionally, two "Circuit Breaker Exercise Record" forms were provided for the 2019 and 2021 tests of Incident Breaker No. 52.[62] These forms indicated that the breaker was operated, but they do not contain further notes. The requirement for circuit breaker exercise started in June 2017, when it replaced the previous Functional Performance Testing.[63] Both breakers received a Functional Performance Test in January 2017.

Incident Breaker No. 52 received its most recent mechanism service in July 2025, with the previous service occurring in December 2017, consistent with the 8-year required interval.[64] Forms TD-3322M-F13, "Distribution Circuit Breaker Functional Performance Test Form," and -F14, "Circuit-Breaker Maintenance Form, Metalclad Circuit Breaker Mechanism Service," documented the 2017 service.[65] These forms did not indicate any conditions requiring correction; however, the insulation resistance testing was listed as unavailable for reading and not completed in both the 2017 and 2025 services. The 2025 mechanism service records are in APM and consist of indicators in three separate

[59] Utility Standard TD-3322S, Attachment 7, Rev. 14, "Circuit Breaker Maintenance Template," 3/3/2022. The time-based triggers in Table 1 of the attachment depend on the breaker characteristics. Distribution breakers without current trip coils and not ABB Type R-MAG and AMVAC have the intervals listed above. The breaker manual, IB131006EN, "Instructions for installation, operation, and maintenance of type VCP-W vacuum circuit breakers," indicates the breaker uses shunt trip coils rather than current trip coils.

[60] SFX_DR019 All 12kV Switchgear Notifications.xlsx.

[61] Ibid.

[62] CB 52 EXER 10.27.2019.pdf, CB 52 EXER 6.25.21.pdf.

[63] Utility Bulletin TD-3322B-060, Rev. 0, "Updated Distribution Circuit Breaker Exercise Requirements," 5/5/2017, effective 6/1/2017.

[64] SFX_DR019 All 12kV Switchgear Notifications.xlsx.

[65] CB 52 Mech SVC & FPT 12.20.2017 (2).pdf.

checksheets.[66] Notes state that the breaker was not installed in a cell and was a spare "on the floor." Consequently, all indicators in the "Metalclad Cubicle Maintenance" checksheet and the indicators associated with the cell in the "BRKR Metalclad Oper Mechanism Service" checksheet were marked as "Unavailable for Reading." These unavailable indicators include "Corrosion/Rust," "Cubicle Cleaning," "Cubicle Moisture," "Cubicle Ventilation," and "Cabinet Seals, Filters, and Heaters."

The 2025 mechanism service included various test and measurement results in the "BRKR Metalclad Oper Mechanism Service" and "BRKR Vacuum Interrupter Measurements" checksheets. Both checksheets contain contact erosion/wear measurements, but there are differences that may be due to incorrect transcription of the results. In the "BRKR Metalclad Oper Mechanism Service" checksheet, "Metalclad - Contact Wear - CB Closed Dimension" and associated reference dimension indicators were recorded as 0.12%, but the "Metalclad - Interrupter Wear" indicators were 0.00% for all three phases. In the "BRKR Vacuum Interrupter Measurements," the "Contact Erosion Meas" and reference dimension indicators were 0.125 inches, and the "% Of Erosion" was 0.00%, which also matches the results in the 2017 service. Finally, the manual states that when contact erosion reaches ⅛ inches, the interrupter must be replaced, further suggesting that the 0.12% values should have been 0.125 inches.[67]

During the service, the breaker passed high potential testing at a 27 kV test voltage. Minimum-to-trip and minimum-to-close tests also were documented. TD-3322M-F14 states that these tests are performed to verify the breaker will trip and close at the lowest voltage levels on the nameplate's operating voltage range.[68] These tests passed with values of 40 V, showing that the breaker would trip and close below the lowest voltage levels on the nameplate, 70 V and 100 V, respectively. Contact timing tests yielded values of 30.60-30.95 ms to trip and 40.00-40.20 ms to close. Indicators in APM for the ranges are provided and are consistent with the breaker manual, which states that "opening and closing times for the circuit breakers vary depending on the control voltage and the power rating" and lists ranges of 30-45 ms to trip and 45-60 ms to close in a table under

[66] CB 52 Mech Service.xlsx.

[67] Section 5.2.2 of IB131006EN, "Instructions for installation, operation, and maintenance of type VCP-W vacuum circuit breakers."

[68] TD-3322M-F14, R 13, Metalclad Circuit Breaker Mechanism Service.pdf.

"Milliseconds (maximum)."[69] The time to trip was within the manufacturer's range, while the time to close was outside (faster than) the manufacturer's range.

Circuit Breaker No. 56 received a mechanism service in November 2017, which did not result in any corrective notifications. On November 2, 2025, Circuit Breaker No. 56 reportedly failed the high pot test during its 8-year mechanism service. The interrupter bottles were reported as "bad" with "condensation seen coming from CB 56 vacuum bottles during the high-pot test," damaged flex connectors, suspected hard water mineral deposits, and signs of damage on the X-1112/12-line side center phase female contact. "Minor" damage to the Incident Cubicle was reported, including debris and surface rust on hardware within the cubicle, and "burned spots" and "warping" of the Insulation Board (Figure 44 and Figure 45). PG&E reportedly performed several visual inspections of the reported damage, including an inspection of Bus 1 Section D on November 16, 2025. As a result, PG&E created corrective notification LC 132018244 on Circuit Breaker No. 56, noting it had water damage, replaced it with Incident Breaker No. 52, and reportedly cleaned the cubicle, including wiping down the breaker-facing (front) surface of the Incident Insulating Board and vacuuming the interior of the Incident Cubicle. The Incident Insulating Board was not reportedly removed, and consequently the CT-facing side (back) was neither inspected nor cleaned. The inspections did not identify any sources of water intrusion into the Incident Cubicle.

The PR notification for the 2025 mechanism service of Circuit Breaker No. 56 was given a "Deletion Flag" status after the incident with a comment stating that the breaker was removed from service and being sent to ATS.[70] The PR was closed in SAP on December 12, 2025, before the January 1, 2026 compliance date derived using the guidance in TD-3322S from its November 11, 2025 required end date. Because the mechanism service for Circuit Breaker No. 56 was not completed before its removal from the cubicle and the mechanism service for Incident Breaker No. 52 was performed while it was still a spare, there is no recent data available for the portion of the mechanism service related to the cubicle.

[69] Section 5.4.1 of IB131006EN, "Instructions for installation, operation, and maintenance of type VCP-W vacuum circuit breakers." Eaton states that the interval shall be within the range specified.

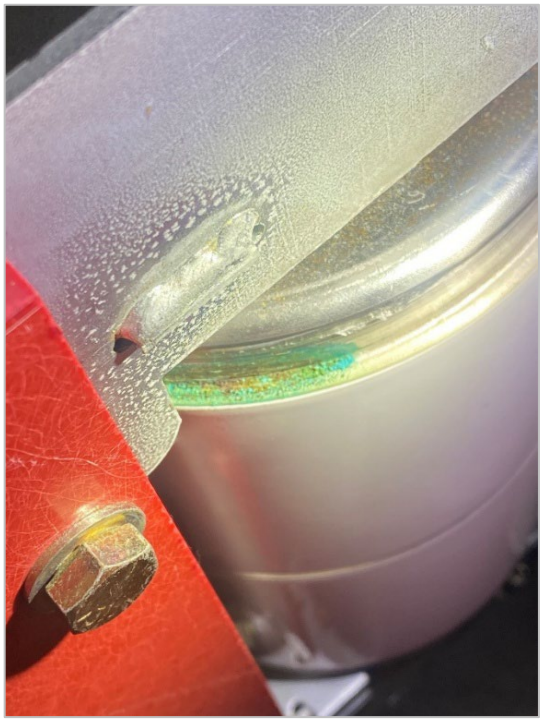
[70] CB 56 PRs.xlsx.

Figure 44. Incident Cubicle (X-1112/12). Photo taken November 6, 2025 (courtesy PG&E).

a)

b)

c)



d)

Figure 45. Photos of identified damage to Incident Cubicle and Circuit Breaker No. 56. a) Incident Insulating Board feeder side (bottom row) B-phase (middle) through-hole, b) Line side (top row) B-phase bus contact, c) B-phase vacuum bottle- top view, d) Feeder side (bottom row) C-phase breaker arm. Photo taken November 2, 2025 (courtesy PG&E).

Prior to the arc-flash event, the only corrective maintenance for the equipment located in 1112/12 was LC notification 132018244, dated November 14, 2025, which noted that Circuit Breaker No. 56 had water damage.[71] Removal and replacement with Incident Breaker No. 52 occurred under this LC.[72] The subsequent station inspection on December 3, 2025, had two indicators related to this LC.[73] The "Bushing Damage and Contamination" indicator had a value "3-Adjustments, repairs, or replace required," with notes specifying that it failed high-pot testing, had water contamination, and was out of service. The "Corrosion/Rust" indicator had a value of "3-Moderate corrosion (cont. monitoring)," and notes specified "corrosion on the stabs." The history of these two indicators for Circuit Breaker No. 56 prior to its removal from service always had values "1-No problems found."

While the Incident Breaker No. 52 had no previous LC notifications, station inspections between April and December 2016 had the "Protective Relay Conditions" indicator value "2-Abnormal conditions found," with notes "SET A RELAY TROUBLE LIGHT ON: BAD IRIG SIGNAL."[74] Starting with the February 2017 inspection, this indicator specified "1-No problems found." BAD IRIG refers to a bad IRIG-B GPS clock signal for accurate relay timestamps, but in this application has no positive or negative impact on the ability of the relay to perform its protection system functions.

PR and LC notifications for all 12 kV circuit breakers at the Mission substation were reviewed. Over 99% of PR notifications were completed by the compliance deadlines calculated from their required end dates. Out of 185 PRs for mechanism service, only one was completed after the compliance date, but had an approved deferral noted in the long text, and the intervals between completed mechanism services did not exceed eight calendar years.[75] Out of 772 PRs for exercise (or "function testing" prior to 2017), only four were completed after their compliance dates, all with approved

---

71 Although moisture may have contributed to the observed damage at Circuit Breaker No. 56, direct water intrusion is unlikely given the location of the damage and the absence of similar conditions at adjacent locations.

72 SFX_DR019 All 12kV Switchgear Notifications.

73 EI251220A_San Fran X Updated_Received01112026.xlsx.

74 Ibid.

75 SFX_DR019 All 12kV Switchgear Notifications.xlsx, CB 56 PRs.xlsx. Notification 113743533, for the 2017 mechanism service of CB 90, had a required end date of 12/31/2017, yielding an out-of-compliance date of 1/1/2018. The work was completed on 1/8/2018. A long text comment states that the work was "deferred per approval from acting superintendent and specialist, pending receipt of documentation to attach to order"; however, the order and notification do not contain any attached documentation.

deferrals noted in the long text.[76] PRs for exercise of a given breaker sometimes occurred more than two calendar years apart, but exercising the breakers as a preventative maintenance activity is not required if the breaker has been operated recently.

Review of historic LC notifications on 12 kV switchgear at the station did not reveal other corrosion or water issues apart from the LC on Circuit Breaker No. 56.[77] The most common issues were counter replacements (10 LCs identified between 2018 and 2022) and PT issues (9 LCs identified in 2018). Two out of 33 LCs reviewed were past their out-of-compliance dates.[78] Review of Material Problem Reports (MPR) since 2002 did not identify any reported issues applicable to Incident Breaker No. 52 .[79]

The station inspections documented in APM include a checksheet for "Yard and Building Conditions."[80] The available data contain different indicators depending on the year, several of which pertain to the building cleanliness and environmental conditions or the fire protection system.[81] Indicators for "Fire Protection Systems and Plans," "Other Substation Equipment," and "Temp F Ambient" were in the reviewed data between 2016 and 2025. The indicators for "Building Neat and Clean," "Corrosion/Rust," and "Ventilation and Sump Pump Equipment" were only present until August 2019, after which reporting on these issues became exception-based.

---

[76] SFX_DR019 All 12kV Switchgear Notifications.xlsx, CB 56 PRs.xlsx. Notifications 106952025 and 106952026, for CBs 88 and 89, had required end dates of 12/8/2013, yielding an out-of-compliance date of 1/1/2014. The work was completed on 5/24/2014 and 9/10/2014, respectively. Notifications 107565059 and 107565060, for CBs 126 and 127, had required end dates of 7/19/2014, yielding an out-of-compliance date of 1/1/2015. The work was completed on 3/15/2015 for both breakers.

[77] SFX_DR019 All 12kV Switchgear Notifications.xlsx.

[78] LC 129694862, stating that breaker 109 "won't close in cell," with a required end date of 10/16/2025 and E-priority, yielding an out-of-compliance date of 1/1/2026, was completed on 1/26/2026 and closed in SAP on 2/5/2026. A long text comment on 1/8/2026 states there is an operational constraint. LC 114413857, for a PT replacement on 1117/12, with a required end date of 6/10/2018 and B priority, yielding an out-of-compliance date of 8/1/2018, was not completed until 9/8/2018.

[79] Data from PG&E SME in response to SFX_DR039.

[80] An additional checksheet for "Environmental Checks" focuses on hazmat and oil leakage.

[81] EI251220A_San Fran X Updated_Received01032026.xlsx, EI251220A_San Fran X Updated_Received01112026.xlsx, and 2019 APM Station Inspections.xlsx.

Fan issues are documented under several LC notifications and APM indicators, including issues with the south side transformer supply fans and the north side basement ventilation and roof exhaust fans.[82]

Focusing on the north side,[83] issues with the roof exhaust fans were noted in 2004, when dampers on the fans were replaced under order number 30409385; in March 2011 under LC notification 105244293, stating the fans were non-operational; and in station inspections between February 2022 and April 2023, noting a fan above the third floor was failing and noisy to the point that hearing protection was required.[84]

Three LC notifications were created between 2012 and 2016 for intake filter replacement.[85] The first was delete-flagged in 2012, and the remaining two were completed in 2016. Basement supply fan #4 was noted as noisy and needing lubrication during inspections between October 2016 and April 2017. An unspecified fan was noted under LC 112428192 as needing repair or replacement. Basement/intake fans were noted under LC 115001129 in September 2018 and in February 2022 and April 2022 station inspections as needing repair.[86] Basement supply fans #1 through #4 had broken fan belts documented during December 2023, August 2024, and October 2024 station inspections. LC 127654855 for repair of the basement fans was not completed until January 2026, after the arc-flash event and after the out-of-compliance date of the notification.

The "Building Neat and Clean" indicator documented general untidiness and dustiness due to ongoing construction between February 2016 and October 2016 and materials from old jobs requiring removal between February 2017 and December 2017.[87]

The "Corrosion/Rust" indicator reported no problems found from the start of the data in February 2016 to the final value for the indicator in February 2019. Temperatures were recorded during each

---

[82] While the air filtration fans have their own SAP equipment ID, 42676754, and their own PR notifications with the description "INDOOR FAN FILTRATION SYSTEM MAINT," there is not a separate checksheet for inspecting the fans, and all indicators in APM referencing the fans are in the checksheet for "Yard and Building Conditions."

[83] APM or LC comments specifying a bank are assumed to refer to transformer cooling fans on the south side.

[84] The LC was delete-flagged in 2013 without noting when the fans were repaired.

[85] LCs 106125137, 110532331, and 111593962.

[86] LC 115001129 was closed in the same month it was created.

[87] EI251220A_San Fran X Updated_Received01032026.xlsx, EI251220A_San Fran X Updated_Received01112026.xlsx, 2019 APM Station Inspections.xlsx.

bimonthly inspection, ranging from 45°F in February 2019 to 80°F in July 2022. While it is not clear why this particular indicator was used, the "Structures and Conductors" indicator in December 2025 stated that the sink from the second floor was draining into the main control room.[88]

[88] Ibid.

6 Conclusion

Based on Exponent's evaluation of the evidence, the following major conclusions were reached.

1- The most likely direct cause of the arc-flash event within the Incident Cubicle is surface breakdown of the Incident Insulating Board.
   a. Failure of Incident Breaker No. 52 or the cubicle's rear electrical insulation system[89] was ruled out as the initiating cause of the arc-flash.

2- The most likely failure mechanism is degradation of surface insulation of the Incident Insulating Board, likely assisted by moisture and surface contamination.

[89] For the purposes of this report, the Incident Insulating Board is not considered part of the Incident Cubicle's rear electrical-insulation system.

7 Recommended Next Steps

This section offers PG&E recommendations to reduce the likelihood of recurrence based on the direct cause evaluation of this incident. Additional recommendations may be offered as an outcome of the root cause evaluation.

R1. PG&E may consider inspecting, replacing, or removing the barrier insulating boards in the 12 kV switchgear. This recommendation is based on the conclusion that eventual surface breakdown of the Incident Insulating Board was the most likely direct cause of the incident. It is also supported by the switchgear manufacturer's impulse withstands (BIL) and low-frequency high-potential test results on the switchgear, both with and without the barrier insulating board.

R2. PG&E may consider laboratory testing of sample insulating boards under prescribed electrical stress and varying moisture and surface-contamination conditions to characterize how moisture and contamination may contribute to board failure when the board's through-hole sidewalls are in contact with energized conductors.

R3. PG&E may consider monitoring environmental conditions, including relative humidity. The installation of permanent data loggers for continuous monitoring of temperature and relative humidity may be considered to support long-term assessment of moisture behavior within the structure.

R4. PG&E may consider performing a comprehensive evaluation of the roof system and building envelope to identify and mitigate water intrusion pathways, including wall cracks, roof vents, and roof openings.

R5. PG&E may consider upgrading the Mission Substation HVAC systems to meet environmental requirements of the 12 kV switchgear and other electrical equipment within the building enclosure. This may include deployment of heaters and dehumidification equipment to reduce indoor humidity levels and minimize the potential for condensation formation, particularly in areas with known risk of moisture accumulation.

R6. PG&E may consider revisiting the existing switchgear heating control logic at Mission Substation to improve control of relative humidity inside the cubicles.

R7. PG&E may consider the installation of air filters in the cubicles in the 12 kV switchgear at Mission Substation to further protect cubicle electrical components and insulation surfaces from contamination.

R8. PG&E may consider performing an extent-of-condition analysis to identify and mitigate this failure mode in other switchgear units of similar design.

Introduction Form

(by a Member of the Board of Supervisors or the Mayor)

I hereby submit the following item for introduction (select only one):

- ☐ 1. For reference to Committee (Ordinance, Resolution, Motion or Charter Amendment)
- ☐ 2. Request for next printed agenda (For Adoption Without Committee Reference)
  (Routine, non-controversial and/or commendatory matters only)
- ■ 3. Request for Hearing on a subject matter at Committee
- ☐ 4. Request for Letter beginning with "Supervisor _____ inquires…"
- ☐ 5. City Attorney Request
- ☐ 6. Call File No. _____ from Committee.
- ☐ 7. Budget and Legislative Analyst Request (attached written Motion)
- ☐ 8. Substitute Legislation File No. _____
- ☐ 9. Reactivate File No. _____
- ☐ 10. Topic submitted for Mayoral Appearance before the Board on _____

The proposed legislation should be forwarded to the following (please check all appropriate boxes):

☐ Small Business Commission ☐ Youth Commission ☐ Ethics Commission

☐ Planning Commission ☐ Building Inspection Commission ☐ Human Resources Department

General Plan Referral sent to the Planning Department (proposed legislation subject to Charter 4.105 & Admin 2A.53):

☐ Yes ☐ No

(Note: For Imperative Agenda items (a Resolution not on the printed agenda), use the Imperative Agenda Form.)

Sponsor(s):

Wong, Mahmood, Chan, Sherrill, Melgar, Sauter

Subject:

Hearing on Widespread Power Outages Affecting San Francisco Neighborhoods

Long Title or text listed:

Hearing requesting Pacific Gas and Electric Company (PG&E) to report on the cause(s), escalation, response, and impacts of the widespread power outages that began on December 20, 2025, and which have disproportionately affected residents and small businesses in the Richmond, Sunset, Presidio, Civic Center, SOMA, and other San Francisco neighborhoods; to understand how a localized substation incident escalated to affect nearly one-third of the city; to assess communication failures and gaps in emergency response protocols; to evaluate economic impacts on small businesses and hardships faced by seniors, persons with disabilities, and other vulnerable residents; to discuss and understand the remedies, claims processes and support being provided to affected residents and businesses.

Signature of Sponsoring Supervisor: /s/ Alan Wong