

# CALIFORNIA PUBLIC UTILITIES COMMISSION

## Safety and Enforcement Division Electric Safety and Reliability Branch Incident Investigation Report

**Report Date:** 4/22/2021

**Incident Number:** E20190531-02

**Utility:** Pacific Gas and Electric Company (PG&E)

**Date and Time of the Incident:** 05/31/2019

**Location of the Incident:** Novato, San Rafael, Golden Gate National Recreation Area, and City of Sausalito

### **Summary of Incident:**

In March 2019, PG&E started to inspect the Ignacio-Alto-Sausalito transmission lines (IAS Lines) as part of its Wildfire Safety Inspection Program (WSIP). As a result of the WSIP and follow up inspections, PG&E found a total of 22 Priority Code A deficiencies. Priority Code A deficiencies are equivalent to the Level 1 potential violations as described in General Order (GO) 95, Rule 18.B.(1)(a)(i), which requires the deficiency to be corrected immediately. PG&E however, did not resolve these deficiencies in a timely manner and in accordance with its own Electric Transmission Prevention Maintenance (ETPM) Manual.<sup>1</sup> Thus these Priority Code A deficiencies risked the safety and reliability of PG&E's transmission facilities and jeopardized the safe and reliable delivery of electric power to the City of Sausalito.

In order to correct the 22 Priority Code A deficiencies, PG&E initiated the Sausalito Emergency Project (SEP) which involved replacing 10 towers (Group 1 towers) within the Golden Gate National Recreation Area (GGNRA) with two shoo-flies and repairing 12 towers (Group 2 towers) outside the GGNRA. PG&E completed replacing the Group 1 towers on September 3, 2019 and completed repairing the Group 2 towers on April 14, 2020. Through the completion of the SEP, PG&E corrected the deficiencies that impacted the safe and reliable delivery of electric power to the City of Sausalito.

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<sup>1</sup>PG&E Electric Transmission Prevention Maintenance Manual:  
[https://www.pge.com/pge\\_global/common/pdfs/safety/emergency-preparedness/natural-disaster/wildfires/wildfire-mitigation-plan/reference-docs/TD-1001M.pdf](https://www.pge.com/pge_global/common/pdfs/safety/emergency-preparedness/natural-disaster/wildfires/wildfire-mitigation-plan/reference-docs/TD-1001M.pdf) Table 5 p. 19.

PG&E also conducted mechanical and electrical tests and evaluations for insulators, tower members, and conductors sampled from the Group 1 towers. The results of the tests and evaluations indicated that no specific changes are needed for PG&E's inspection process and guidelines.

My investigation included visiting the GGNRA to observe PG&E replacing the Group 1 towers, visiting PG&E's Grid Control Center (GCC) to observe PG&E energizing one of the IAS Lines that included one of the shoo-flies, visiting PG&E's Applied Technology Services (ATS) test lab to observe PG&E testing and evaluating the tower components, interviewing with PG&E's subject matter experts and management on the progress of the SEP, and reviewing PG&E's responses to the data requests. As a result of my investigation, I found the following violations:

1. PG&E failed to thoroughly inspect the IAS Lines from 2009 through 2018. Had PG&E inspected the IAS Lines thoroughly during this time period, it would have identified the 22 Priority Code A deficiencies. PG&E failed to ensure that the IAS Lines were in good condition through its inspections. Therefore, PG&E is in violation of GO 95, Rule 31.2.
2. The 22 Priority Code A deficiencies significantly risked the IAS Lines and the safe and reliable delivery of electric power to the City of Sausalito. PG&E failed to maintain the IAS Lines to furnish safe, proper, and adequate service to the City of Sausalito. Therefore, PG&E is in violation of GO 95, Rule 31.1.
3. The 22 Priority Code A deficiencies posed an immediate risk to the safety of PG&E's transmission facilities and to the electric power supply for the City of Sausalito. Once PG&E identified the deficiencies as Priority Code A deficiencies which are equivalent to Level 1 potential violations of GO 95, Rule 18 B.(1)(a) (i), it failed to implement corrective actions to resolve these deficiencies immediately according to its Electric Transmission Preventive Maintenance Manual. Therefore, PG&E is in violation of GO 95, Rule 18.B.(1)(a)(i).

**Fatality / Injury:** None

**Property Damage:** None

**Utility Facilities Involved:** Ignacio-Alto-Sausalito 60 kV double circuit transmission lines

**Witnesses:**

No.	Name	Title	Contact
1	Charles Mee	CPUC Investigator	charles.mee@cpuc.ca.gov

2	██████████	PG&E Construction Supervisor	██████████
3	██████████	PG&E Regulatory Relation	██████████
4	██████████	PG&E Asset Manager	██████████

**Evidence:**

No.	Source	Description
1	CPUC	Lee Palmer’s May 31, 2019 email to Commissioners
2	CPUC	Photos taken during site visits
3	CPUC	Site Visit Observation Reports
4	PG&E	Response to ESRB’s Data Request Set 1
5	PG&E	Response to ESRB’s Data Request Set 2
6	PG&E	Response to ESRB’s Data Request Set 3
7	PG&E	Response to ESRB’s Data Request Set 4
8	PG&E	Response to ESRB’s Data Request Set 5
9	PG&E	Response to ESRB’s Data Request Set 6
10	PG&E	Response to ESRB’s Data Request Set 7
11	PG&E	Test Reports

**Observations and Findings:**

**1. Introduction of the IAS Transmission System**

The IAS Lines are double circuit 60 kV transmission lines that consist of IAS Line #1 and IAS Line #2. The IAS Lines are the only power source for the City of Sausalito. According to PG&E’s operating protocol, PG&E closes the circuit breaker to turn on one of the IAS Lines, for example IAS Line #1, to supply electricity to meet the full demand capacity of the City of Sausalito; PG&E sets the circuit breaker at “Normal Open” position for the other line, for example IAS Line #2, so it is disconnected and acts as a backup. If the IAS Line #1 is interrupted by a fault, PG&E could quickly close circuit breaker for the IAS Line #2, to continue power supply to the City of Sausalito. Under this operating protocol, the City of Sausalito would only experience a momentary power outage, which is acceptable in

the electric power utility industry. Please refer to Figure 1 for the IAS 60 kV transmission system.<sup>2</sup>

### **Figure 1 - redacted**

From Figure 1, we can see that the two IAS Lines share common towers (the black lines represent the 22 towers that PG&E replaced or repaired), which were installed circa 1916, more than a century ago. This common tower double circuit is not a full redundancy, i.e., if one of the towers fails and collapses, both lines would be impacted simultaneously, and the entire City of Sausalito would experience a sustained outage. Since replacing or repairing structural damages to steel towers is a time-consuming task, such a power outage will likely last for weeks if not for months.

## **2. PG&E's Inspections and Corrective Actions for the IAS Lines**

### **2.1. PG&E's inspections conducted from March through June 2019**

On March 1, 2019, PG&E conducted a climbing inspection for Tower # 15/107 under its WSIP. As a result of the inspection, PG&E found that Tower #15/107 had a Priority Code A deficiency. Please see Figure 2 for the identified deficiency on Tower # 15/107:

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<sup>2</sup> I created Figure 1 based on PG&E's response to SED Data Request 001-09.

**Figure 2: Identified Deficiencies on Tower # 15/107**



Please see the following for PG&E’s ETPM Manual, TD1001M, Table 5, which describes each Priority Code deficiency and allotted time requirements to take corrective actions for deficiencies for different priority levels:

<b>PG&amp;E Electric Transmission Preventive Maintenance Manual, TD1001M, November 20<sup>th</sup>, 2018, Revision 04, Priority Codes</b>	
<b>Priority Code</b>	<b>Priority Description</b>
<b>A</b>	The condition is urgent, and requires <b>immediate</b> response and continued action until the condition is repaired or no longer presents a potential hazard. SAP due date will be 30 days to allow time for post-construction processes and notification close-out.
<b>B</b>	Corrective action is required within <b>3 months</b> from the date the condition is identified. The condition must be reported to the transmission line supervisor as soon as practical.
<b>E</b>	Corrective action is required within <b>12 months</b> from the date the condition is identified.

<b>F</b>	Corrective action is recommended within <b>24 months</b> from the date the condition is identified, (due beyond 12 months, not to exceed 24 months). Requires director approval.
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1. QCRs (qualified company representatives) must report immediately any "Priority Code A" abnormal condition to the transmission line supervisor and GCC (grid control center).
2. In addition, QCRs must report any "Priority Code B" condition to the transmission line supervisor as soon as practical, to ensure that correction occurs within the appropriate time.

As one can observe from the table above, a Priority Code A deficiency requires an immediate response and “continued action until the condition is repaired or no longer presents a potential hazard”. This is equivalent to the Level 1 potential violation of GO 95, Rule 18.B.(1)(a)(i) which requires the utility to “take corrective action immediately, either by fully repairing or by temporarily repairing and reclassifying to a lower priority.” Both require the safety hazards to be corrected immediately.<sup>3</sup>

After PG&E identified the urgent deficiency with Tower #15/107, PG&E performed follow up inspections<sup>4</sup> of other towers for the IAS Lines and found 21 more Priority Code A deficiencies. From March through June 2019, PG&E identified a total of 22 Priority Code A deficiencies.

Figures 3 through 6 show some of the identified deficiencies:

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<sup>3</sup> **GO 95, Rule 18.B.(1)** states in part:

*“(a) The maximum time periods for corrective actions associated with potential violation of GO 95 or a Safety Hazard are based on the following priority levels:*

*(i) Level 1 -- An immediate risk of high potential impact to safety or reliability:*

- Take corrective action immediately, either by fully repairing or by temporarily repairing and reclassifying to a lower priority.”*

<sup>4</sup> The WSIP follow up inspection included ground, climbing, and drone inspections.

**Figure 3: Identified Deficiencies (1)**



**Tower 009/065: Damaged tower members**



**Tower 011/079: Rusted bolts and worn C-hook**

**Figure 4: Identified Deficiencies (2)**





Figure 5: Identified Deficiencies (3)

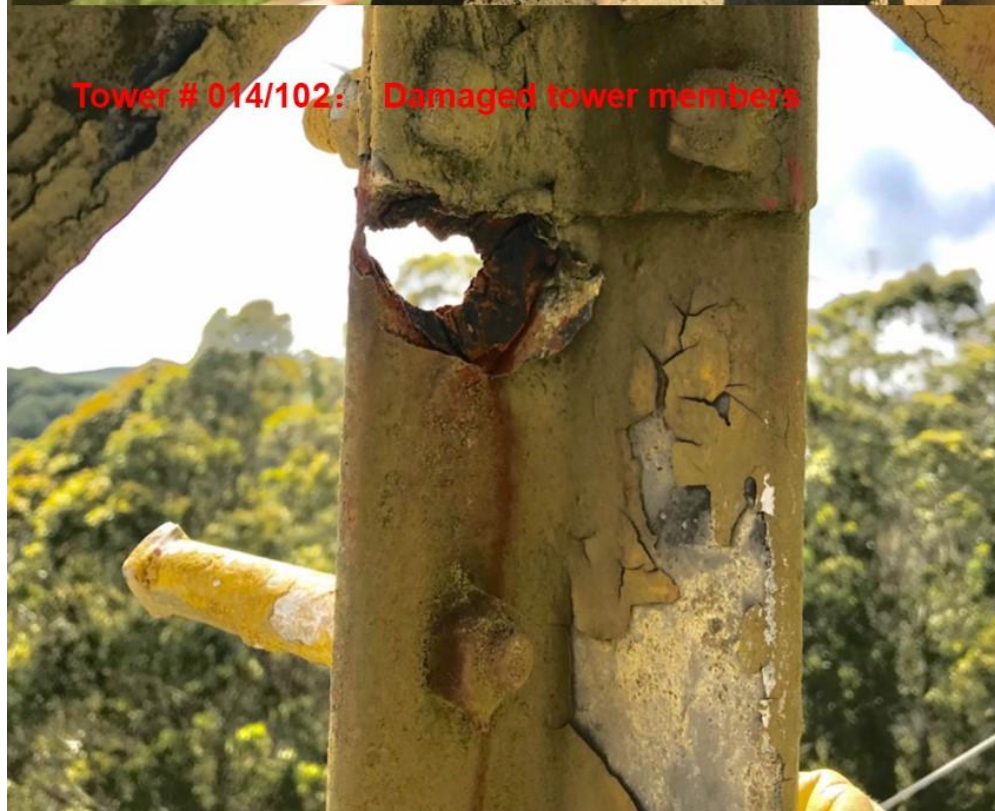


Figure 6: Identified Deficiencies (4)



Table 1 lists the 22 Priority Code A deficiencies and the 22 corresponding Line Correction (LC) Notifications PG&E created based on the identified deficiencies.<sup>5</sup>

<b>Table 1: PG&amp;E WSIP Follow Up Inspection in 2019</b>				
<b>Tower #</b>	<b>Inspection Date</b>	<b>Conditions Identified</b>	<b>LC Notification Number</b>	<b>Within GGNRA</b>
001/013	6/5/2019	C leg 85% material loss at stub, D leg 80% material loss at stub, B leg 65% material loss at stub, C leg rusted out bolt at stub 1, circuit bottom arm internal bent.	117393857	No
004/037	6/4/2019	Rusted and damaged tower joints, hanger plates, and towers members	117391195	No
004/038	6/5/2019	Rusted and damaged tower joints and towers members	117394273	No
009/065	6/1/2019	Rusted and damaged tower joints and towers members	117372276	No
011/079	6/4/2019	Rusted and damaged tower joints and towers members, wore C-hook	117390706	No
013/088	5/29/2019	Broken foundation, one leg 80% material loss, rusted joints.	117336285	No
013/089	5/24/2019	Rusted tower members	117317004	No
013/091	5/24/2019	Rusted joints, one leg 50% material loss	117316669	No
013/092	5/21/2019	Rusted tower members and joints, mis-shaped splice, legs 40% material loss	117298066	No
			117307041	
013/093	5/21/2019	Rusted, damaged, and bended tower members.	117298064	No
014/095	5/21/2019	Rusted and damaged tower joints and tower members	117298062	No
014/098	5/23/2019	Rusted and damaged tower joints and tower members.	117305604	No

<sup>5</sup> Data Source: PG&E response to SED Data Request.

014/099	5/23/2019	Tower legs 50% material loss, rusted tower joints and tower members.	117305260	Yes
014/100	5/21/2019	Rusted tower joints and tower members	117304876	Yes
014/101	5/20/2019	Rusted and damaged tower joints and tower members	117290073	Yes
014/102	5/20/2019	Rusted and damaged tower members and tower legs	117288536	Yes
015/104	5/23/2019	Rusted tower joints	117305651	Yes
015/105	5/23/2019	Rusted hanger plate, damaged tower members	117305128	Yes
015/106	5/23/2019	Rusted and damaged tower members and tower joints	117305040	Yes
015/107	5/15/2019	Tower member bended, damaged insulators.	116624078	Yes
015/108	5/20/2019	Rusted and damaged tower joints and tower members	117290087	Yes

To correct the 22 Priority Code A deficiencies identified with the 22 LC notifications, PG&E initiated the SEP. The 22 Priority Code A deficiencies were identified from 21 towers. PG&E divided these 21 towers into two groups: Group 1 consisted of nine towers that were within the GGNRA, and Group 2 consisted of 12 towers that were outside the GGNRA.

## 2.2. Replacement of Group 1 Towers in the GGNRA

Since the Group 1 towers were in Oakwood Valley of the GGNRA where there are many high trees that grow along and into the right of way (ROW), PG&E decided to replace these towers with two temporary shoo-flies<sup>6</sup>, Shoo-fly A and Shoo-fly B. The shoo-flies would be constructed along the Alta Fire Road, which is on the east side of the Oakwood Valley.

As can be seen from Table 1 above, Tower #14/103 was not originally included in Group 1. With the construction of the shoo-flies, Tower # 14/103, along with the

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<sup>6</sup> A shoo-fly is constructed in parallel with an existing line section, so the lines on the shoo-fly can replace the existing line section. At the beginning, PG&E asserted that it would construct the shoo-fly as a temporary solution. As of today, it appears that PG&E does not have a plan to construct a permanent solution to replace the shoo-fly soon.

other nine (9) old towers, would not be needed, so PG&E decided to replace Tower #14/103 as well. With Tower #14/103 included, there were 10 towers in Group 1.

PG&E decided to use 16 poles for each shoo-fly and a total of 32 poles for the two shoo-flies. Figure 7 shows the geographic location of the Group 1 towers and the 32 poles forming the two shoo-flies:

**Figure 7 - redacted**

As of July 26, 2019, PG&E completed the following tasks:

- 1) Installed the 32 poles to form Shoo-fly A and Shoo-fly B on the Alta Fire Road and installed wires on the shoo-flies.
- 2) Deenergized IAS Line #2 and disconnected IAS Line #2's line section on the 10 old towers.
- 3) Continued to use IAS Line #1 to supply power to the City of Sausalito.

As of August 5, 2019, PG&E completed the following tasks:

- 4) Interconnected wires on Shoo-fly B to IAS Line #2, so IAS Line #2 started to include the newly constructed Shoo-fly B.
- 5) Closed the circuit breaker for IAS Line #2, which included the newly constructed Shoo-fly B, so the upgraded IAS Line #2 started to supply power to the City of Sausalito.
- 6) Set circuit breaker for IAS Line #1 as "Normal Open", so it acted as back up for IAS Line #2.

As of September 3, 2019, PG&E completed the following tasks:

- 7) Deenergized IAS Line #1 and disconnected IAS Line #1's line section on the 10 old towers.
- 8) Conducted vegetation management under the Shoo-fly A wires. Interconnected Shoo-fly A wires into the IAS Line #1, so IAS Line #1 started to include the newly constructed Shoo-fly A.
- 9) Set circuit breaker for IAS Line #1 as "Normal Open", so it acted as back up for IAS Line #2.

Table 2 shows the Group 1 towers that PG&E replaced to correct the identified nine Priority Code A deficiencies.

<b>Table 2: Replaced Group 1 Towers In the GGNRA</b>			
<b>Tower Number</b>	<b>Deficiency Identification Date</b>	<b>Correction Completion Date</b>	<b>Days for the Correction</b>
014/099	5/23/2019	9/3/2019	103
014/100	5/21/2019	9/3/2019	105
014/101	5/20/2019	9/3/2019	106
014/102	5/20/2019	9/3/2019	106
014/103*	2/28/2019	9/3/2019	-
015/104	5/23/2019	9/3/2019	103
015/105	5/23/2019	9/3/2019	103
015/106	5/23/2019	9/3/2019	103
015/107	5/15/2019	9/3/2019	111
015/108	5/20/2019	9/3/2019	106
<p>* Tower 014/103 was inspected in the initial WSIP inspection on February 28, 2019. Through the WSIP inspection, PG&amp;E did not identify Priority Code A condition for Tower 014/103, so this tower was not included in the WSIP follow-up inspections completed in May--June of 2019. Since PG&amp;E decided to remove the other nine towers, Tower 014/103 would not be needed any more, PG&amp;E decided to remove Tower 014/103 as well.</p>			

Figure 8 below shows the IAS Lines with the Group 1 towers deenergized, disconnected, and removed and with the shoo-flies installed, interconnected, and energized.

**Figure 8 - redacted**

**2.3. Corrective Actions for the Group 2 towers Outside of the GGNRA**

PG&E also repaired Group 2 towers outside of the GGNRA to correct the identified 13 Priority Code A deficiencies. Table 3 below shows PG&E's Priority Code A

deficiency identification and correction dates along with the number of days PG&E was past due to correct each deficiency. As shown in Table 3, PG&E corrected the 13 Priority Code A deficiencies starting from June 17, 2019, but did not finalize its completion of all corrections until April 14, 2020.

<b>Table 3: Repaired Group 2 Towers Outside the GGNRA</b>			
<b>Tower Number</b>	<b>Deficiency Identification Date</b>	<b>Correction Completion Date</b>	<b>Days for the Correction</b>
001/013	6/5/2019	6/28/2019	23
004/037	6/4/2019	4/14/2020	315
004/038	6/5/2019	4/14/2020	314
009/065	6/1/2019	9/26/2019	117
011/079	6/4/2019	6/18/2019	14
013/088	5/29/2019	6/19/2019	21
013/089	5/24/2019	6/19/2019	26
013/091	5/24/2019	6/17/2019	24
013/092	5/21/2019	6/21/2019	31
	5/21/2019	8/7/2019	78
013/093	5/21/2019	6/24/2019	34
014/095	5/21/2019	6/20/2019	30
014/098	5/23/2019	6/26/2019	34

After PG&E completed the SEP, PG&E completed its correction of the 22 Priority Code A deficiencies. Figure 9 shows the IAS transmission system after the completion of the SEP.

**Figure 9 - redacted**

### **3. PG&E's Test Results for the Group 1 Tower Components**

After the Group 1 towers were removed from Oakwood Valley of the GGNRA, PG&E sampled some of the insulators, tower members, and conductors for testing and research. Tests were conducted because PG&E intended to verify the inspectors' condition rating methodologies. PG&E conducted the tests in its Applied Technology Services (ATS) lab in San Ramon.

#### **3.1. Insulator Tests**

From September 2019 through February 2020, PG&E tested and analyzed 18 insulator strings sampled from Towers 015/107 (a suspension tower) and 014/100 (a

dead-end tower). Tower 015/107 was on a ridge overlooking the bay waters and 014/100 was lower down on the hill and not exposed to those same conditions directly. The purpose of the test was to better understand the relationship between the condition ratings of the insulators assigned by the PG&E inspection team and the condition parameters based on the tests.

PG&E evaluated the insulators in the following five ways:

- 1) Visual Evaluation
- 2) Megger Testing
- 3) Flashover Evaluation
- 4) Mechanical & Electrical (M&E) Testing
- 5) Mechanical Tension Testing

The results of the testing indicated:

- The insulator strings received from the IAS 60 kV transmission lines meet the mechanical and electrical engineering requirements.
- The dominate mechanical failure mode for these insulators was the cap being pulled or separated from the shell. Fractures were observed in the cement that adheres the cap to the shell.
- The condition rating by the company inspection team was in alignment with the laboratory evaluation.
- Based on these results, ATS did not recommend changes to PG&E's guidelines for its condition rating.

### **3.2. Lattice tower member tests**

In July 2020, PG&E tested and analyzed 14 tower members sampled from towers 015/107 (a suspension tower) and 014/100 (a dead-end tower). Tower 015/107 was on a ridge overlooking the bay waters and 014/100 was lower down on the hill and not exposed to those same conditions directly. The purpose of the test was to compare the condition ratings of the towers assigned by the PG&E inspection team and the condition parameters of the tests.

PG&E tested the tower members in the following ways:

- 1) Visual Corrosion Evaluation
- 2) Tower leg angle material property evaluation
- 3) Bolt material property evaluation
- 4) Mechanical testing of tower lap splice joints



The results of the testing indicate:

- All joints exceeded the extreme wind engineering requirements.
- The dominate failure for bolted lap splice joints is bolt shear failure mode.
- There were no specific changes needed to PG&E's condition rating. Engineering evaluation of degraded tower members is appropriate due to the complex nature of the steel lattice tower systems.

### **3.3. Conductor tests**

In February 2021, PG&E conducted mechanical strength test to some conductor samples removed from the Group 1 towers. The conductors were installed approximately 40 years ago. The purpose of the test was to check the mechanical strength of the conductors removed from the IAS transmission lines. PG&E tested two (2) samples and they both passed the mechanical strength test.

## **4. My Investigation**

The following presents important dates related to this investigation:

- On May 21, 2019, PG&E notified the Safety and Enforcement Division (SED) regarding the immediate safety concern of the IAS Lines.<sup>7</sup>
- On the same day, Andie Biggs and I, representing Electric Safety and Reliability Branch (ESRB) of SED, visited the GGNRA and observed the conditions of the Group 1 towers at Oakwood Valley of the GGNRA.
- On July 24 and 25, 2019, Emily Fisher, representing the CPUC's Legal Division, and I visited the GGNRA and observed PG&E disconnecting the IAS Line #2 from the Group 1 towers and installing Shoo-fly A and Shoo-fly B.
- On August 5, 2019, I visited PG&E's GCC in Vacaville and observed PG&E energizing the upgraded IAS Line #2, which included Shoo-fly B.
- On August 29, September 3, and September 11, 2019, Matthew Yunge, Ogeonye Enyinwa, and I, representing ESRB, went to the GGNRA and observed PG&E removing the Group 1 towers from Oakwood Valley and

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<sup>7</sup> According to an email of the Director of SED on May 21, 2019, PG&E determined that 11 transmission towers for the IAS lines that are located in the GGNRA would require high-priority safety work. With PG&E's request, the GGNRA administrator closed certain trails that run in close proximity to the transmission towers that would be replaced. PG&E planned to construct a temporary replacement line that would take 30-45 days.

sampling some tower components for test and research.

- On December 17 and 18, 2019, I went to the ATS lab in San Ramon and observed PG&E's mechanical tests of the insulators sampled from the Group 1 towers.
- On February 20, 2020, I went to the ATS lab in San Ramon and observed PG&E's electrical test of the insulators sampled from the Group 1 towers.
- On July 16, 2020, I went to the ATS lab in San Ramon and observed PG&E's mechanical test of the tower members sampled from the Group 1 towers.
- On February 9, 2021, I went to the ATS lab in San Ramon and observed PG&E's mechanical strength tests of the conductors sampled from the Group 1 towers.
- From June 2019 to February 2021, ESRB issued seven sets of data requests and interviewed PG&E's subject matter experts and management regarding this case.

Based on the above investigation, I identified the following:

1. PG&E failed to thoroughly and properly inspect the 21 towers of the IAS Lines.
  - PG&E conducted two detailed inspections from 2009 through 2014; however, PG&E failed to identify any deficiencies for the 21 towers during those inspections.
  - PG&E conducted three patrols in 2015, 2017, and 2018; however, PG&E failed to identify any deficiencies for the 21 towers during those three patrols.
  - PG&E conducted an air patrol in 2016 and identified only four Priority Code E deficiencies.<sup>8</sup>

Table 4 below shows the detailed patrol and inspection records:

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<sup>8</sup> According to PG&E's *Electric Transmission Preventive Maintenance Manual, TD1001M*, November 20<sup>th</sup>, 2018, Revision 04, Priority Code E requires "Corrective action...within 12 months from the date the condition is identified."

Table 4: PG&E Patrol and Inspection History (2009-2018) for the 21 towers							
Structure Number	2009 Inspection Date	2014 Inspection Date	2015 Air Patrol Date	2016 Air Patrol		2017 Air Patrol Date	2018 Air Patrol Date
				Patrol Date	LC Notification		
001/013	8/27/09	8/20/14	7/8/15	7/20/16		7/21/17	9/20/18
004/037	8/27/09	8/20/14	7/8/15	7/20/16		7/21/17	9/20/18
004/038	8/27/09	8/20/14	7/8/15	7/20/16		7/21/17	9/20/18
009/065	8/27/09	8/25/14	7/8/15	7/20/16		7/21/17	9/20/18
011/079	8/27/09	8/25/14	7/8/15	7/20/16		7/21/17	9/20/18
013/088	8/27/09	8/21/14	7/8/15	7/20/16		7/21/17	9/20/18
013/089	8/27/09	8/21/14	7/8/15	7/20/16		7/21/17	9/20/18
013/091	8/27/09	8/21/14	7/8/15	7/20/16	111846806	7/21/17	9/20/18
013/092	8/27/09	8/21/14	7/8/15	7/20/16		7/21/17	9/20/18
013/093	8/27/09	8/21/14	7/8/15	7/20/16		7/21/17	9/20/18
014/095	8/27/09	8/21/14	7/8/15	7/20/16		7/21/17	9/20/18
014/098	8/27/09	8/20/14	7/8/15	7/20/16		7/21/17	9/20/18
014/099	8/27/09	8/20/14	7/8/15	7/20/16		7/21/17	9/20/18
014/100	8/27/09	8/20/14	7/8/15	7/20/16		7/21/17	9/20/18
014/101	8/27/09	8/20/14	7/8/15	7/20/16		7/21/17	9/20/18
014/102	8/27/09	8/20/14	7/8/15	7/20/16		7/21/17	9/20/18
015/104	8/27/09	8/20/14	7/8/15	7/20/16	111846872	7/21/17	9/20/18
015/105	8/27/09	8/20/14	7/8/15	7/20/16		7/21/17	9/20/18
015/106	8/27/09	8/20/14	7/8/15	7/20/16		7/21/17	9/20/18
015/107	8/27/09	8/20/14	7/8/15	7/20/16	111846876	7/21/17	9/20/18
015/108	8/27/09	8/20/14	7/8/15	7/20/16	111846877	7/21/17	9/20/18

- Even for the four Priority Code E conditions, PG&E did not perform the climbing inspections as recommended by PG&E’s inspectors. Table 5 shows details regarding the four Priority Code E deficiencies and PG&E’s corrective actions.

Table 5: PG&E's Actions for the Four Priority Code E LC Notifications				
Tower #	13/91	15/104	15/107	15/108
LC Notification #	111846806	111846872	111846876	111846877

<b>Deficiencies</b>	Rusty, broken steel top of tower, also need to perform climbing inspection	In GGNRA, trail access only, rusty hardware hanging off tower, climbing inspection required	In GGNRA, rusty members, climbing inspection required	In GGNRA, rusty members, climbing inspection required, trails can get you close to tower; climbing inspection required
<b>Identification Date</b>	7/20/2016	7/20/2016	7/20/2016	7/20/2016
<b>Due Date</b>	7/20/2017	7/20/2017	7/20/2017	7/20/2017
<b>Correction Date</b>	1/31/2017	10/24/2017	3/9/2017	3/9/2017
<b>Correction Action</b>	Installed top 90 degrees	Completed	Resealed stubs and footings	Resealed stubs and footings
<b>Note</b>	PG&E did not conduct the climbing inspection	PG&E did not tell what it did to correct this deficiency. PG&E did not correct this deficiency on time	PG&E did not conduct the climbing inspection	PG&E did not conduct the climbing inspection

- According to Table 11 of PG&E’s ETPM Manual: “Overhead Inspection Frequencies”, PG&E is required to perform detailed climbing inspections as triggered.<sup>9</sup> However, PG&E did not conduct the required climbing inspections until the WSIP in 2019.

<sup>9</sup> The following is related portion of PG&E’s ETPM Manual, November 20<sup>th</sup>, 2018, Revision 04, Table 11:

<b>Voltage</b>	<b>Inspection Type</b>	<b>Structure Type</b>	<b>Inspection Frequency</b>
(kV)	Detailed inspection (ground or aerial)	Steel	5
60/70	Detailed climbing or aerial lift	Steel	As Triggered
	Bay Waters Foundation Inspection	Steel	5
	Detailed inspection (ground or aerial)	Wood	2
	Climbing or aerial lift	Wood	As Triggered
	Infrared	Steel or Wood	5 (and as triggered)

- From March through June 2019, as part of the WSIP, PG&E identified 22 Priority Code A conditions for the 21 towers.<sup>10</sup>

PG&E installed the towers for the IAS Lines more than 100 years ago. For steel towers that are more than 100 years old, the Priority Code A deficiencies must be the results of the towers being exposing to weather conditions for many years. Please see the above Figures 3 through 6 as a reference to the damages of the tower members, tower legs, and tower joints. These damages must be the results of many years of deterioration and development from lower level deficiencies. But PG&E failed to identify them through patrol and detailed inspections from 2009 through 2018.<sup>11</sup> Therefore, I determined that PG&E failed to thoroughly and properly inspect the 21 towers of the ISA Lines from 2009 through 2018.

2. PG&E risked the safety and reliability of its own transmission facilities and jeopardized the safe and reliable delivery of electric power to the City of Sausalito.

Because PG&E failed to thoroughly and properly inspect the 21 towers of the ISA Lines from 2009 through 2018, PG&E did not identify the 22 Priority Code A deficiencies timely. Therefore, from 2009 through 2018, PG&E risked the IAS transmission facilities and the safe and reliable delivery of electric power to the City of Sausalito.

3. After identified the 22 Priority Code A deficiencies in May 2019, PG&E failed to correct the deficiencies immediately and in accordance with its own ETPM Manual.

According to PG&E's ETPM Manual, TD1001M, November 20th, 2018, Revision 04, Table 5, for the identified Priority Code A deficiencies, PG&E is required to correct the deficiencies immediately (within 30 days). However, PG&E failed to correct the 22 Priority Code A deficiencies identified from the 21 towers in a timely manner. For the nine (9) Priority Code A deficiencies identified from the Group 1 towers, PG&E did not correct them until more than 100 days later. For the 13 Priority Code A deficiencies identified from Group 2 towers, PG&E did not correct seven of these deficiencies within 30 days. Among the seven late corrections, PG&E used more than 100 days to correct three of the deficiencies. Therefore, PG&E failed to correct the 22 Priority Code A deficiencies timely and further risked the IAS transmission facilities and the safety and reliability of the electric

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<sup>10</sup> Please refer to Table 1.

<sup>11</sup> Please refer to Table 4.

power supply to the City of Sausalito.

**Preliminary Statement of Pertinent General Order, Public Utilities Code Requirements, and/or Federal Requirements**

No.	Public Utility Code / GO	Code/Rule No.	Violation?
1	GO 95	18.B.(1)(a)(i)	Yes
1	GO 95	31.1	Yes
2	GO 95	31.2	Yes

**GO 95, Rule 18.B.(1)** states in part:

*“(a) The maximum time periods for corrective actions associated with potential violation of GO 95 or a Safety Hazard are based on the following priority levels:*

- (i) Level 1 -- An immediate risk of high potential impact to safety or reliability:
  - Take corrective action immediately, either by fully repairing or by temporarily repairing and reclassifying to a lower priority.”*

**GO 95, Rule 31.1 Design, Construction and Maintenance** states in part:

*“Electrical supply and communication systems shall be designed, constructed, and maintained for their intended use, regard being given to the conditions under which they are to be operated, to enable the furnishing of safe, proper, and adequate service.”*

**GO 95, Rule 31.2 Inspection of Lines** states in part:

*“Lines shall be inspected frequently and thoroughly for the purpose of ensuring that they are in good condition so as to conform with these rules. Lines temporarily out of service shall be inspected and maintained in such condition as not to create a hazard.”*

**Conclusion**

1. PG&E failed to thoroughly inspect the IAS Lines from 2009 through 2018. Had PG&E inspected the IAS Lines thoroughly during this time period, it would have identified the 22 Priority Code A deficiencies. PG&E failed to ensure that the IAS Lines were in good condition through its inspections. Therefore, PG&E is in violation of GO 95, Rule 31.2.

2. The 22 Priority Code A deficiencies significantly risked the IAS Lines and the safe and reliable delivery of electric power to the City of Sausalito. PG&E failed to maintain the IAS Lines to furnish safe, proper, and adequate service to the City of Sausalito. Therefore, PG&E is in violation of GO 95, Rule 31.1.
3. The 22 Priority Code A deficiencies posed an immediate risk to the safety of PG&E's transmission facilities and to the electric power supply for the City of Sausalito. Once PG&E identified the deficiencies as Priority Code A deficiencies which are equivalent to Level 1 potential violations of GO 95, Rule 18.B.(1)(a) (i), it failed to implement corrective actions to resolve these deficiencies immediately, according to its Electric Transmission Preventive Maintenance Manual. Therefore, PG&E is in violation of GO 95, Rule 18.B.(1)(a)(i).