

PUBLIC UTILITIES COMMISSION

505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102-3298



December 17, 2019

SA2019-852

Heide Caswell
Director-T&D Asset Performance
Pacific Power and Light Company (PacifiCorp)
825 NE Multnomah, Suite 1500
Portland, OR 97232

SUBJECT: Substation Audit of PacifiCorp's Klamath Falls-CA and Yreka Districts

Ms. Caswell:

On behalf of the Electric Safety and Reliability Branch (ESRB) of the California Public Utilities Commission (CPUC), Stephen Lee, Ivan Garcia, Samuel Mandell, and Matthew Yunge of my staff conducted a substation audit of PacifiCorp's Klamath Falls-CA and Yreka Districts from October 14, 2019 through October 17, 2019. The audit included a review of PacifiCorp's procedures, records, and field inspections of its substation facilities.

During the audit, my staff identified violations of General Order 174. A copy of the audit findings itemizing the violations is enclosed. Please provide a response no later than January 14, 2020, by electronic or hard copy of all corrective actions and preventive measures taken by PacifiCorp to correct the identified violations and prevent the recurrence of such violations.

If you have any questions concerning this audit, please contact Stephen Lee at (916) 713-4140 or Stephen.Lee@cpuc.ca.gov.

Sincerely,

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

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

Enclosures: CPUC Audit Findings

Cc: Lee Palmer, Deputy Director, Safety and Enforcement Division (SED), CPUC
Charlotte TerKeurst, Program Manager, ESRB, SED, CPUC
Rickey Tse, Senior Utilities Engineer Supervisor, ESRB, SED, CPUC
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Stephen Lee, Utilities Engineer, ESRB, SED, CPUC

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Ivan Garcia, Utilities Engineer, ESRB, SED, CPUC
Samuel Mandell, Utilities Engineer, ESRB, SED, CPUC
Matthew Yunge, Utilities Engineer, ESRB, SED, CPUC

AUDIT FINDINGS

I. Records Review

During the audit, ESRB staff reviewed the following standards, procedures, and records:

- Lists and locations of all PacifiCorp substations in the Klamath Falls-CA and Yreka Districts
- PacifiCorp Maintenance Intervals for Apparatus, Relays, Line Patrol/Inspections and Communications Equipment, Policy 001
- PacifiCorp Substation Inspection, Policy 034
- PacifiCorp Maintenance and Inspection Records Policy (and General Procedures), Policy 166
- Substation Inspection Form, 3274F
- Substation Security Inspection Form, 3274S
- Lists of equipment at the selected substations
- Single-line electrical diagrams for the selected substations
- A summary of substation inspection records from the last five years for all PacifiCorp substations in the Klamath Falls-CA District
- PacifiCorp Infrared Inspection Procedures
- PacifiCorp Oil Dissolved Gas Analysis and Oil Quality Sampling Procedures
- PacifiCorp Electrical Testing Maintenance Procedures
- PacifiCorp Battery Maintenance and Load Testing Procedures
- PacifiCorp Inspector Training Guidelines
- The last two detailed inspection checklists for the selected substations.
- All maintenance work order records for the selected substations in the last five years
- Infrared Testing records for the selected substations in the last five years
- The last four Oil Test Samples for transformers at the selected substations
- The last four substation electrical equipment testing results
- PacifiCorp Inspector training records in the last five years

II. Records Violations

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

1. GO 174, Rule 33.1, Records states:

“Electronic or hard copy records of completed Inspections shall include, at a minimum:

- *Inspector name or identification*
- *Inspection date*
- *Brief description of identified discrepancies*
- *Condition rating (where applicable)*
- *Scheduled date of corrective action (where applicable)”*

PacifiCorp does not have procedures to establish and record the condition rating and the scheduled date of corrective action for its Corrective Maintenance findings. Condition ratings and scheduled dates of corrective actions are necessary to prioritize equipment repairs and to ensure that PacifiCorp corrects all identified equipment deficiencies in a reasonable time frame. ESRB noted a total of 30 corrective work orders that were still open at the time of the audit. Table 1 below shows the breakdown by year.

Table 1: Breakdown of Open Corrective Maintenance Work Orders from the Last Five Years

Year	Number of Open Corrective Maintenance Work Orders
2014	12
2015	4
2016	12
2017	1
2018	0
2019	1

Table 2: Select Examples of Closed Work Orders that Lacked Prompt Completion Times

Corrective Work Order Number	Order Description	Date Created	Date Closed	Number of Days to Complete
15647253	ALTURAS-CAP452 LEAKING CELLS	7/21/2009	8/31/2016	2598
16177748	ALTURAS-5L86 REPL CONTROLLER	12/16/2013	8/26/2019	2079
16432981	Cedarville Ins Skirt Chipped Cntr Phase	9/1/2015	8/8/2019	1437
16205168	ALTURAS-BATTERY HARD GND POS SIDE	2/3/2014	5/8/2017	1190

Table 3: Select Examples of Pending Work Orders

Corrective Work Order Number	Order Description	Date Created	Date Closed	Number of Days Pending Completion*
16230814	MACDOEL-5L77 REPLACE B/O BROWN GLASS	4/21/2014	Open	1963+
16297658	DORRIS 3L135 SO5004 REPLACE TOGGLE SW	10/13/2014	Open	1788+
16301580	TULELAKE T3535 SOT004 REPLACE TOGGLE SW	10/21/2014	Open	1780+
16301583	CLEAR LAKE 5L66 SOT004 REPLACE TOGGLE SW	10/21/2014	Open	1780+
16301581	NEWELL 3L25 SOT004 REPLACE TOGGLE SW	10/21/2014	Open	1780+
16301582	PEREZ 5L70 SOT004 REPLACE TOGGLE SW	10/21/2014	Open	1780+
16550251	Alturas T-2952 b/o temp gauge	4/25/2016	Open	1228+
16584198	Macdoel Ground Grid Needs Repaired	7/13/2016	Open	1149+
16606972	Newell 5L68 blown arrestor on getaway	9/1/2016	Open	1099+

*Days Pending as of September 5, 2019

Table 2 shows select examples of the corrective maintenance work orders that PacifiCorp did not address in a reasonable time. The longest work order to complete was #15647253, which took 2598 days, or just over seven years, to close.

In Table 3, ESRB listed some examples of corrective maintenance work orders that were still pending at the time of the audit. As shown in Table 3, PacifiCorp has not completed many work orders that pertain to critical pieces of protective equipment, such as #16584198 and #16606972.

Specifically, PacifiCorp created work order #16584198 on July 13, 2016 after identifying issues with the neighboring agricultural equipment pulling up the ground grid at the Macdoel Substation. PacifiCorp only initiated remedial actions to install permanent property barriers under a new work order #17130089 when ESRB staff investigated the existing open work order #16584198 during the audit in October 2019.

Similarly, on September 1, 2016, PacifiCorp identified a blown lightning arrestor at the Newell Substation and created work order #16606972. PacifiCorp Inspectors continuously noted the blown arrestor during the August 15, 2019 and July 16, 2019 substation inspections, but the work order is still open at 1099 days and counting. Additionally, PacifiCorp has an ongoing toggle switch replacement program that has been open for almost five years.

Since PacifiCorp does not have procedures in its Inspection Program that establishes a prioritization system for assigning condition ratings and scheduling dates of corrective actions for its Corrective Maintenance work orders, PacifiCorp is unable to complete work orders that present critical safety issues in a timely fashion.

2. GO 174, Rule 12, General states in part:

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

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

PacifiCorp Maintenance Intervals for Apparatus, Relays, Line Patrol/Inspections and Communications Equipment, Policy 001 defines the priority codes and associated time frames for the regular preventative maintenance (PM) intervals as follows:

Table 4: Applicable PacifiCorp Preventative Maintenance Interval Requirements

Maintenance ID	Maintenance Task	Interval Years	Interval Months
XXX-RGOS-004	DGA & Oil Quality Tests	4 Months	4
XXX-SBIN-001	Sub Safety / Operational Inspection	Monthly	1
XXX-TCOS-004	DGA Tests	4 Months	4

ESRB staff reviewed PM work orders in the past five years, from January 2014 through September 2019, and determined that PacifiCorp did not address a total of three PM work orders by their assigned due dates, shown in Table 5.

Table 5: Late PM Work Orders

Order	Maintenance ID	Substation	Date Created	Past-Due Date (From Policy 001)	Actual Close Date
16545542	LOC-RGOS-004-002 ALTURAS REG0405	Alturas	5/1/2016	9/1/2016	10/4/2016
16398324	LOC-SBIN-001-003 ALTURAS	Alturas	7/1/2015	8/1/2015	8/4/2015
16545547	LOC-TCOS-004-002 ALTURAS REG1574	Alturas	5/1/2016	9/1/2016	10/4/2016

III. Field Inspection

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

Substation	Approximate Location	City	PacifiCorp District
Alturas	708 US Hwy 395	Alturas	Klamath Falls - CA
Perez	CA Route 139	Perez	Klamath Falls - CA
Clear Lake	Clear Lake Road	Clear Lake	Klamath Falls - CA
Newell	Intersection of CA Route 139 and Route 113	Newell	Klamath Falls - CA
Tulelake	Intersection of CA Route 139 and Volcanic Legacy Scenic Byway	Tulelake	Klamath Falls - CA
Tunnel	Volcanic Legacy Scenic Byway, West of Tule Lake	Tulelake	Klamath Falls - CA
Dorris	West of the intersection of US Hwy 97 and E 1 st St	Dorris	Klamath Falls - CA
MacDoel	Intersection of US Hwy 97 and San Blas St	MacDoel	Klamath Falls - CA
Weed	Intersection of US Hwy 97 and Alamo Ave	Weed	Yreka
Mt. Shasta	404 S Old Stage Road	Shasta	Yreka
Snowbrush	400 Microwave Road	Dunsmuir	Yreka
McCloud	North of McCloud	McCloud	Yreka

IV. Field Inspection –Violations List

ESRB staff observed the following violations during the field inspection:

GO 174, Rule 12, General states in part:

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

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

1. Alturas Substation

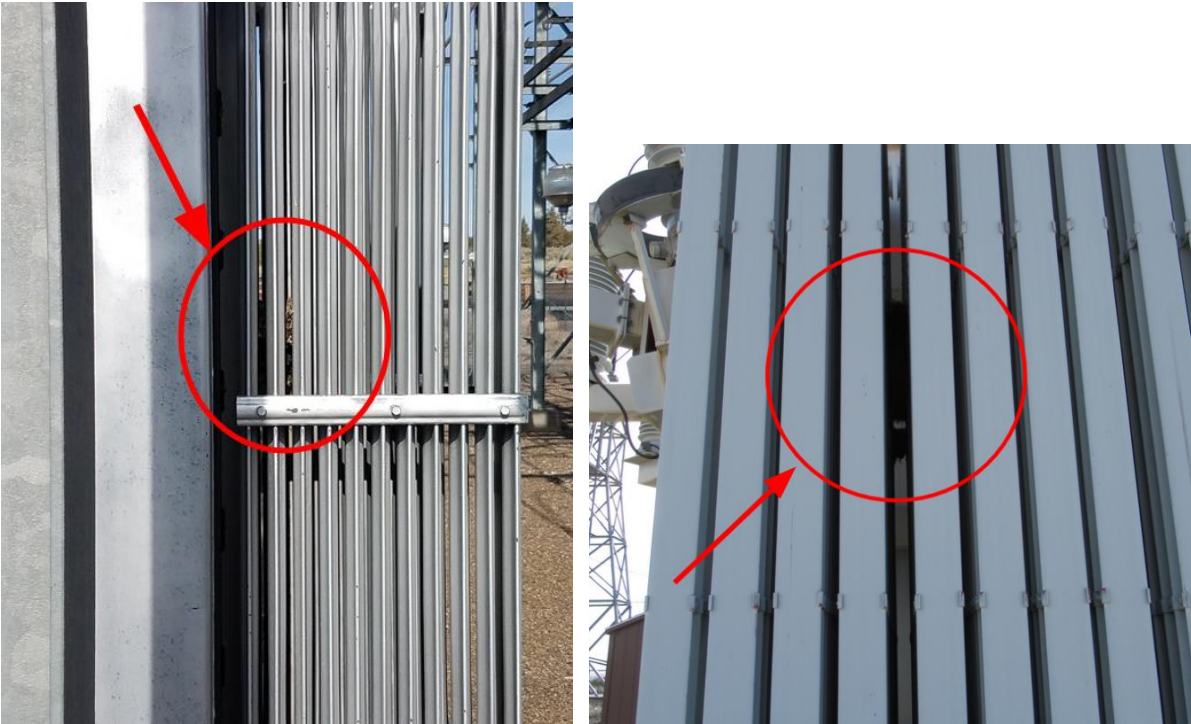
1.1. Multiple concrete foundations that support the substation equipment structures show evidence of deterioration.



1.2. There is an exposed 120V/240V service conductor bundle lying across the substation yard.



1.3. There are bird nests in the Transformer 3617 and Regulator 405 radiator fins.



1.4. The substation battery system lacks secondary containment.

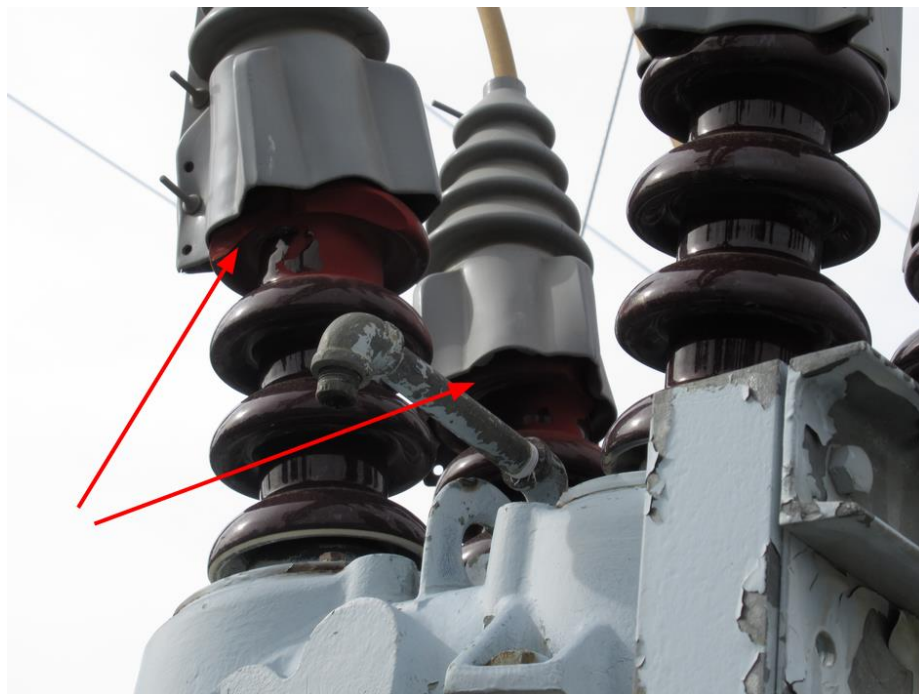


1.5. There is an exposed ground conductor from Transformer R1574.



2. Perez Substation

2.1. There are two damaged insulators under the animal abatement jackets on Breaker 5L70.



2.2. There are untightened nuts on the anchor bolts that support Breaker 5L70.



3. Clear Lake Substation

3.1. There are four untightened nuts on the anchor bolts that support Switch 4L68.



3.2. There is a chipped insulator bushing on Transformer 33-8306.

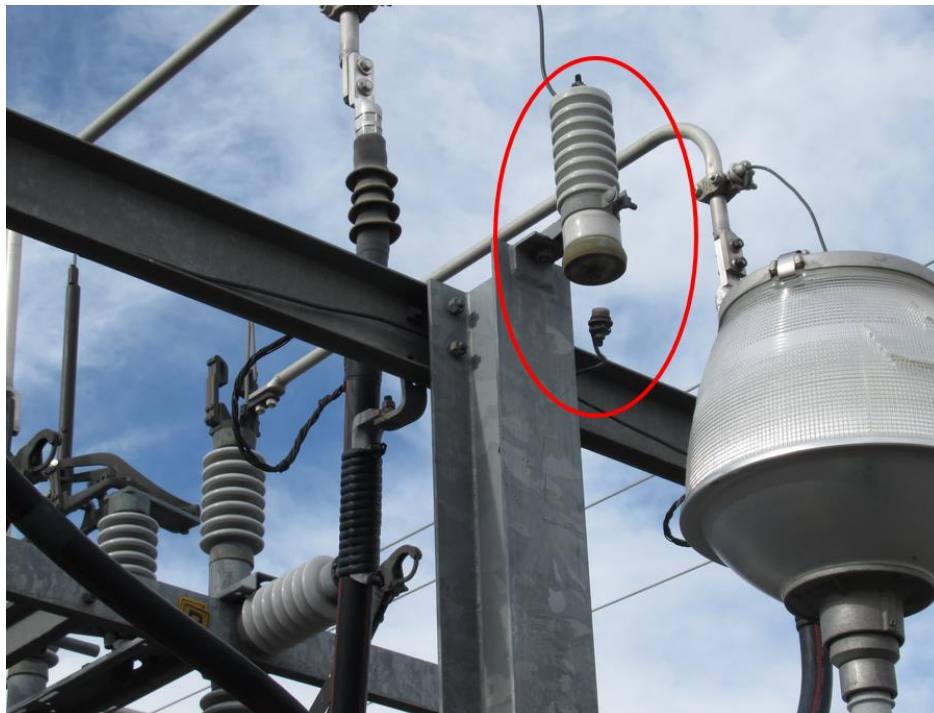


3.3. The substation battery system lacks secondary containment.

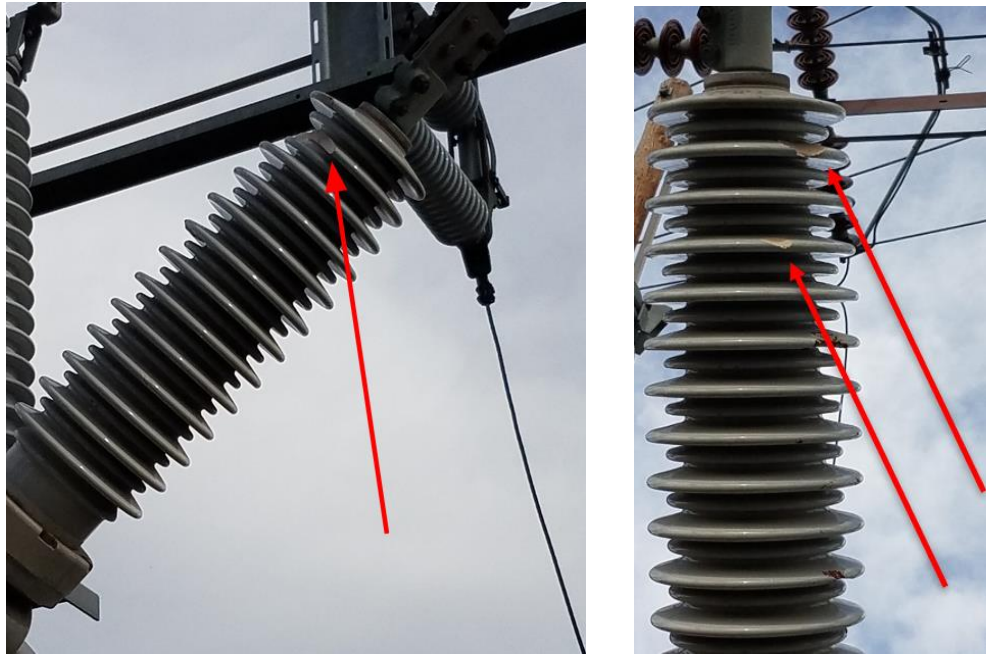


4. Newell Substation

4.1. Arrestor 5L68 is blown. ESRB observed this condition during the audit which PacifiCorp has identified in September 2016 under PacifiCorp's Corrective Maintenance Order #16606972.



4.2. There are damaged insulator bushings on Breaker 3L25.



4.3. There is an unsecured ground wire molding on a wooden pole near Breaker 3L25.



4.4. The substation battery system lacks secondary containment.



5. Tunnel Substation

5.1. There is an exposed ground conductor lying across the substation yard.



5.2. There are bird nests in the radiator fins of Regulator 2, Regulator 3, Transformer 2784, and Transformer 2786.



6. Dorris Substation

6.1. The substation battery system lacks secondary containment.



6.2. There is corrosion forming on the Battery Cell 1 terminal.

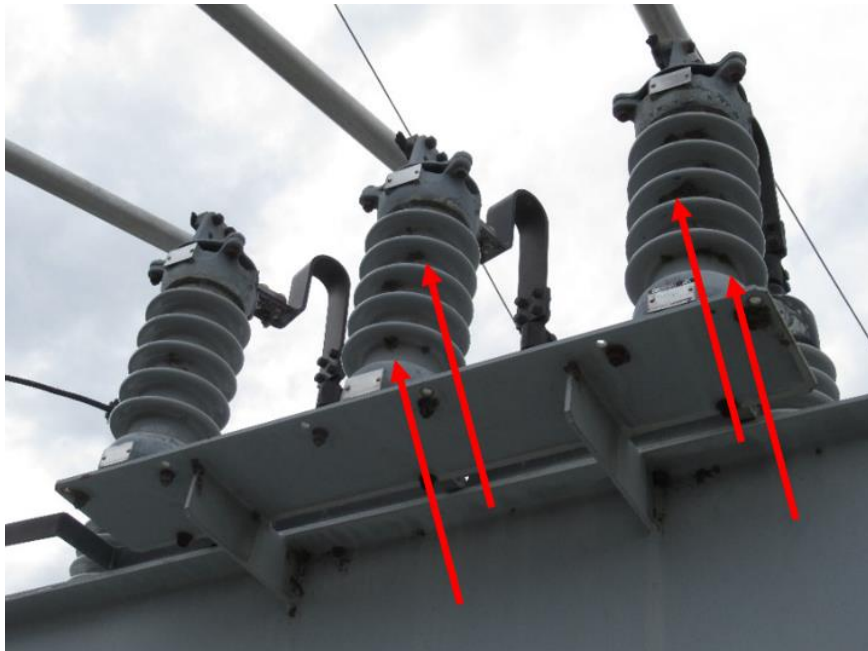


6.3. There is a low battery alarm on the meter for Breaker 5L64.



7. MacDoel Substation

7.1. Dirt tracking is forming on Transformer 3520's low-side insulator bushings.



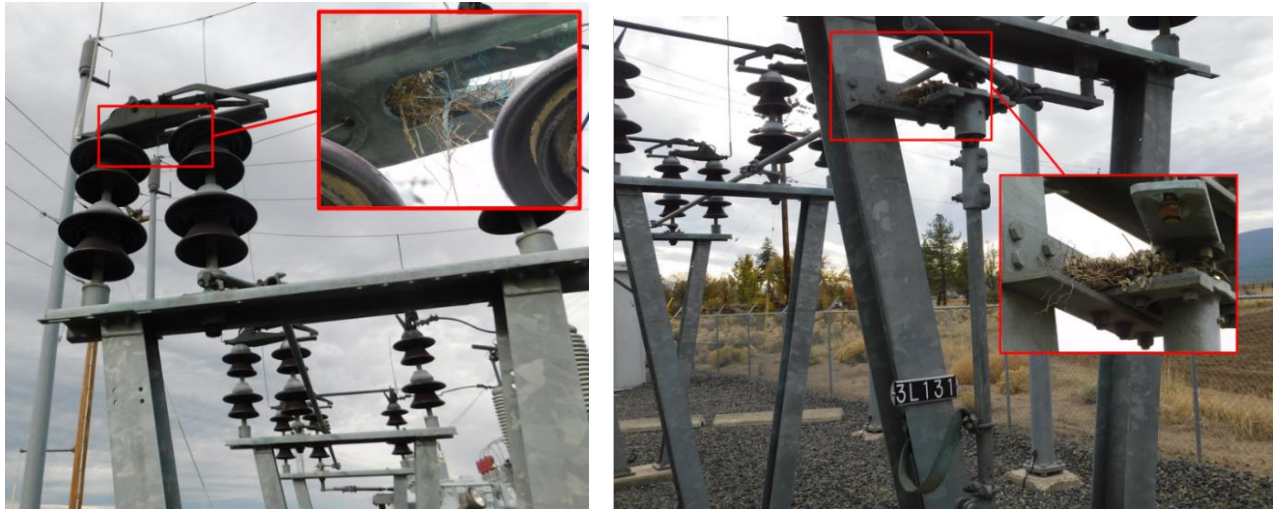
7.2. There is a ground wire on a wooden pole inside the substation yard that is missing a molding cover.



7.3. The position gauges on Regulator 391240 and Regulator 391239 are illegible.



7.4. There are bird nests that could obstruct the motion of Switch 3L131's linkages.



7.5. Multiple concrete foundations that support the low-side bus work from Transformer T-3520 show evidence of deterioration.



8. Mt. Shasta Substation

8.1. There is corrosion on the linkage between Battery Cells 9 and 10. There is also corrosion forming on the Battery Cell 24 terminal.



8.2. Many of the fluid levels on the 24-cell battery system are low.



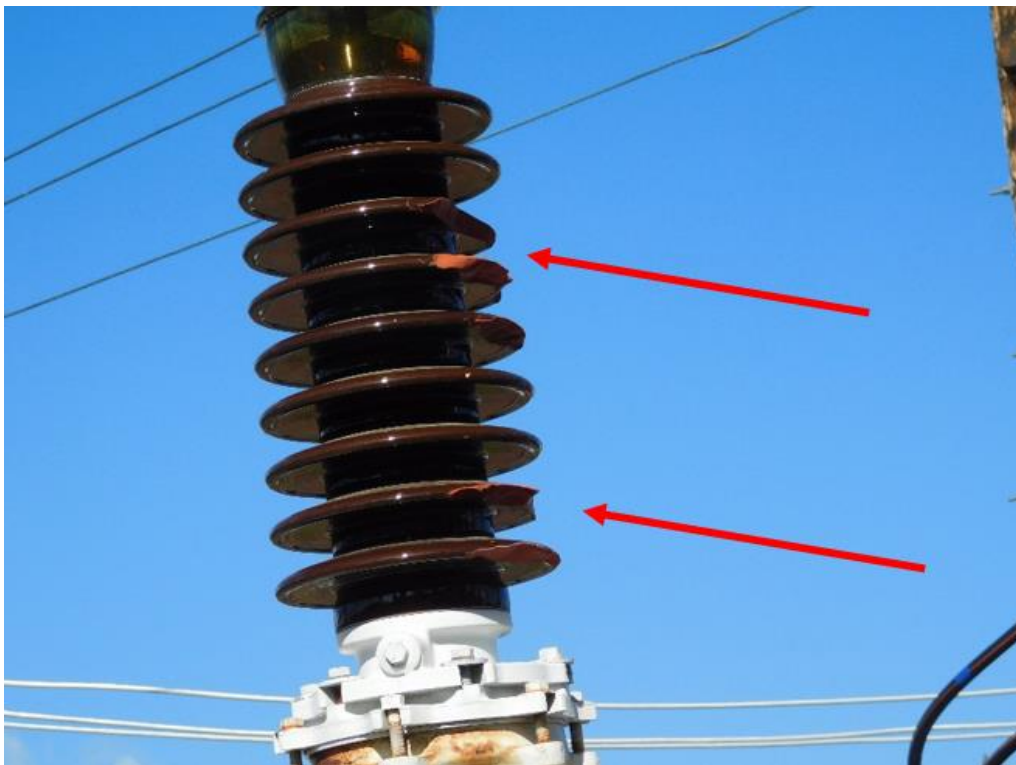
8.3. The substation battery system lacks secondary containment.



8.4. There is a broken ground molding cover on a wooden pole inside the substation yard.



8.5. There is a chipped insulator bushing on a potential transformer near the rear of the substation.



9. Snowbrush Substation

9.1. Transformer 3057 is missing its identification signage.

