Attachment A

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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

UNITED STATES OF AMERICA,

Plaintiff,

v.

PACIFIC GAS AND ELECTRIC COMPANY,

Defendant.

Case No. 14-CR-00175-WHA

RESPONSE TO FOLLOW-UP QUESTIONS RE CPUC REPORT ON CAMP FIRE, FURTHER QUESTIONS TO BE ANSWERED BY PG&E BY DECEMBER 19 AND SUPPLEMENTAL QUESTION 6a

Judge: Hon. William Alsup

Defendant Pacific Gas and Electric Company ("PG&E") respectfully submits this response to the Court's December 5, December 6 and December 16, 2019 requests for information relating to the November 8, 2019 Incident Investigation Report regarding the Camp Fire issued by the Safety and Enforcement Division ("SED") of the California Public Utilities Commission ("CPUC").

For clarity, PG&E uses the term "wear" and its variants throughout this submission to refer to material loss on a suspension hook or hanger plate resulting from relative sliding motion between those components. PG&E uses the term "hanger plate" throughout this submission to refer to any hardware on a transmission structure used to attach a C-hook or other type of suspension hook to the structure, including tower arms with "working eyes" or "rigging eyes" through which C-hooks pass. PG&E understands the terms "Incident Tower" and "Adjacent Tower", as used in the Court's December 5 and December 6, 2019 orders, to refer to Tower :27/222 and Tower :27/221, respectively, on the Caribou-Palermo 115 kV Transmission Line (the "Caribou-Palermo Line"). The C-hook on Tower :27/222 that broke was suspended from the left-phase transposition runner arm of the tower before it broke.

Question 1: On the Incident Tower, did the C-hook thread through the eye on the original runner arm or the eye on the added hanger plate or both? What was the point of two eyes?

PG&E Response:

Working eyes are openings on hanger plate surfaces through which insulator attachment hardware, including C-hooks, are threaded. The two C-hooks of interest on Tower :27/222 were each suspended from a transposition runner arm, and each attached a suspension insulator supporting a transposition jumper to the tower. As of November 8, 2018, each of those C-hooks passed through only the working eyes of the replacement hanger plates affixed to their respective runner arms. The two C-hooks did not pass through the working eyes of both the original runner arms and replacement hanger plates at the same time.

PG&E believes that the C-hooks supporting the transposition jumper previously passed through the working eyes of the transposition runner arms. Based on original design drawings for towers of the type corresponding to the Incident Tower (on which the replacement hanger plates do not appear), as well as recent photographs showing that the original working eyes on the left- and right-phase transposition runner arms are worn, PG&E believes that the replacement hanger plates may have been installed to address wear on the original working eyes of the left- and right-phase transposition runner arms.

Question 2: What was the condition of the C-hook on the second parallel runner arm on the Incident Tower (the one that did not detach during the storm)?

PG&E Response:

PG&E is providing as Exhibit A photographs showing the condition of the C-hook on the right-phase transposition runner arm on Tower :27/222 at the time the California Department of Forestry and Fire Protection ("CAL FIRE") collected it on November 14, 2018. At that time, PG&E assisted CAL FIRE's collection of, among other items of evidence, the C-hook that broke on Tower :27/222, the C-hook on the right-phase transposition runner arm that did not break, the transposition runner arms and the insulator strings to which the foregoing C-hooks were attached. CAL FIRE permitted PG&E to take photographs of the November 14, 2018 evidence collection. PG&E previously provided the photographs attached as Exhibit A to the CPUC, CAL FIRE, the Butte County District Attorney's office and the California Attorney General's office in connection with their investigations related to the Camp Fire.

Based on the photographs, PG&E believes that, as depicted in the photographs, the C-hook on the right-phase transposition runner arm had material loss of roughly 30%. Under the guidelines in PG&E's Electric Transmission Preventive Maintenance ("ETPM") Manual in effect at the time of the Camp Fire, material loss of between 30% and 50% on insulators and steel structures, including C-hooks, is a condition that should be assigned Priority Code E. Such conditions must be addressed within 12 months.

Question 3: What was the height above ground on the C-hook in question?

PG&E Response:

Using the area directly beneath the C-hook as a reference point, the C-hook on Tower :27/222 that broke on November 8, 2018 was, before it broke, approximately 47 feet above the ground. PG&E notes that the Incident Tower is located on a steep incline. The distance from the C-hook to the ground therefore varies (in some cases substantially) depending on the precise location used as the reference point for any measurement from the C-hook to the ground.

Question 4: How closely did any drone inspect the C-hook in question prior to the Camp Fire? Are the images available? If so, provide the ones that show the C-hook in question.

PG&E Response:

PG&E did not inspect the Incident Tower by drone before the Camp Fire. PG&E first used camera-equipped drones to inspect the Caribou-Palermo 115 kV Transmission Line and other lines in high fire-threat areas in connection with its Wildfire Safety Inspection Program ("WSIP"). That program was implemented after the Camp Fire. Prior to the Camp Fire, PG&E's routine inspection and patrol records for 115 kV lines typically did not include photographs of the specific tower components observed by the inspector, except where an abnormality was identified.

The most recent photographs of Tower :27/222 of which PG&E is aware were taken during a 2017 helicopter flight over the Caribou-Palermo Line in connection with PG&E's Transmission Coating Maintenance Program, and are attached to this submission as Exhibit B.

Question 5: Prior to the Camp Fire, did PG&E keep records from which PG&E could determine how long the C-hooks and/or hanger plates in question had been in place? Explain this history.

PG&E Response:

Prior to the Camp Fire, PG&E did not specifically track the length of time that individual C-hooks and hanger plates on its overhead power lines had been in place, but maintained records that enabled it to identify the installation date of components on transmission lines, including C-hooks and hanger plates, in certain circumstances described below. Such records include historical design drawings, manufacturer catalogs and work orders (also called "Line Corrective" or "LC" notifications) relating to the installation or replacement of insulators and insulator attachment hardware, including C-hooks and hanger plates.[1]

For various reasons, PG&E's records may not in every instance allow PG&E to determine how long any particular C-hook or hanger plate has been in place. For example, work orders relating to the replacement of attachment hardware that occurred several decades ago may be archived in hard copy or no longer be available, consistent with applicable record retention periods. *See* CPUC General Order 95, Section I, Rule 18(A)(1) (requiring that "corrective action" records "be preserved by the company for at least ten (10) years and . . . be made available to Commission staff upon 30 days notice"); 18 C.F.R. §§ 125.1-125.3 (regulations promulgated by the Federal Energy Regulatory Commission ("FERC") prescribing a five-year retention period for "maintenance work orders and job orders" for transmission and distribution facilities owned by public utilities subject to FERC's jurisdiction). In addition, PG&E's transmission system is composed of hundreds of lines, some of which (including the Caribou-Palermo Line) PG&E acquired nearly a century ago. Many of those lines were acquired from companies that did not keep records of when their towers were installed and, as a result, PG&E

[1] PG&E began keeping transmission line work orders in electronic form in approximately 2000-2001. Work orders generated before that time, to the extent they have been retained, are generally archived in hard copy with an offsite vendor.

is not always able to ascertain the length of time any particular C-hook or hanger plate had been in place at the time PG&E acquired those lines.

Question 6: Prior to the Camp Fire, had PG&E ever previously noticed *any* worn C-hooks and/or hanger plates on *any* of its transmission lines? Explain this history. Had worn C-hooks been preserved (as evidence or for any other purpose)?

PG&E Response:

There are hundreds of thousands of C-hooks and hanger plates across PG&E's system. Prior to the Camp Fire, reports of wear on C-hooks and hanger plates were infrequent. C-hooks and other types of suspension hooks are common hardware on transmission structures and occasionally are used on distribution structures. In PG&E's service territory, there are in excess of 50,000 steel transmission structures, most of which have multiple suspension hooks of some type supporting insulators and other equipment. There are also suspension hooks on many of the nearly 100,000 non-steel transmission structures and on a proportion of the more than two million distribution poles in PG&E's service territory.

At the request of government entities investigating the Camp Fire, PG&E has performed extensive searches of its data repositories for records potentially relating to worn, failed or otherwise defective hardware used to attach insulator strings to transmission structures, including C-hooks and hanger plates.[2] PG&E did not apply any date restrictions to its searches.

[2] Specifically, PG&E searched (1) Line Corrective and Electric Line maintenance notifications stored in its Systems, Applications and Products database of inspection and maintenance records for transmission lines; (2) reports on material testing performed by PG&E's Applied Technology Services ("ATS") department and predecessor groups; (3) PG&E's database of issues reported through its Corrective Action Program; (4) Material Problem Reports documenting potential issues with equipment; (5) reports of outages and incidents on transmission lines recorded in PG&E's Event Reporting Engine; (6) Electric Incident Reports submitted to the CPUC; (7) outage information stored in PG&E's Transmission Operation Tracking and Logging database; (8) outage reports submitted to the California Independent System Operator; and (9) the electronically stored information of certain PG&E personnel involved in PG&E's transmission inspection and maintenance program.

PG&E's search of those repositories yielded records identifying wear on only a limited number of C-hooks and hanger plates out of the hundreds of thousands of such components in service on PG&E transmission lines.[3]

Specifically, PG&E records prior to the Camp Fire identified the following instances of worn C-hooks or hanger plates:

- In 1987, PG&E tested the strength of two suspension hooks and their attaching plates removed from the Oleum-G 115 kV Transmission Line. The hooks and attaching plates showed signs of wear and were taken out of service for testing. This testing is discussed further below in PG&E's response to Question 6a.

- As a result of an aerial patrol in September 2000, PG&E noted "mild rust and wear" on C-hooks and hanger plates on Tower 44/174 on the Pittsburg-San Mateo 230 kV Transmission Line. PG&E records indicate that the equipment was replaced by June 2003 and was monitored prior to replacement.

- In August 2002, PG&E generated a work order noting potentially worn C-hooks on approximately 30 towers along the Las Positas-Newark 230 kV Transmission Line. According to PG&E records, PG&E personnel recommended the entire line be monitored. PG&E records indicate that C-hooks "at several locations" along the line were reassessed in December 2007 and determined not to require corrective action.

- Between August 2002 and August 2005, PG&E identified rust and some wear (material loss of approximately 25%) on C-hooks and hanger plates on certain structures on the Jefferson-Hillsdale 60 kV Transmission Line. PG&E records indicate that, in response to these findings, PG&E personnel conducted detailed climbing inspections of multiple structures along the approximately 15-mile line to assess the prevalence of the condition along that line. PG&E records further indicate that, following those inspections, PG&E replaced insulators and attachment hardware (including C-hooks) on approximately 30 structures along that line.

[3] PG&E's search also yielded records relating to conditions on C-hooks and hanger plates other than wear, such as rust, corrosion and fatigue cracking. Those records are not described in this response unless it appeared from the record that wear on the C-hook or hanger plate was also observed.

- In January 2004, PG&E conducted testing on a ball-hook that had failed. The analysis concluded that "the hook failure was the result of a single overload event that produced excessive stresses in the hook body and caused it to fracture" and noted "[e]vidence of normal wear, with no significant section loss", on the ball-hook.

- In August 2004, PG&E generated a work order to replace worn working eyes on crossarms on four towers on the Pittsburg-Martinez #1 115 kV Transmission Line. PG&E records indicate that the working eye plates were replaced in September 2004.

- In December 2004, PG&E generated a work order to address worn C-hooks on a structure on the Jefferson-Martin 230 kV Transmission Line. The entire structure was replaced in May 2006.

- In August 2011, PG&E generated a work order for the replacement of a C-hook on a transmission tower on the Brighton-Bellota 230 kV Transmission Line that was not in its proper position, possibly due to wear or faulty installation. PG&E records indicate that the C-hook was replaced by December 2011.

- In August 2011, PG&E generated a work order noting that C-hooks on a tower on the Martin-Millbrae #1 115 kV Transmission Line were "rusty and worn". In September 2012, the condition was identified for monitoring during the next routine inspection.

- In September 2015, PG&E generated a work order noting that a crew had identified "worn out suspension eye plates" on a structure along the Humboldt-Bridgeville 115 kV Transmission Line. That same work order notes that the suspension plates were replaced.

- In May 2016, PG&E generated a work order identifying for replacement "worn through 'C' hooks and eye nuts" on two structures along the Cordelia Interim Pumps Tap 60 kV Transmission Line. PG&E records indicate that the work was completed in May 2017.

- In March 2018, PG&E's Applied Technology Services department examined and reported on "severe wear" observed on six hanger plates that PG&E personnel removed from a double-circuit tower that supported the Parkway-Moraga and Bahia-Moraga 230 kV Transmission Lines. Based on the ATS report's recommendation, PG&E inspected multiple other adjacent towers to determine whether the hanger plates on those towers also showed signs of wear. PG&E records indicate that those inspections did not identify any conditions requiring repair.

PG&E records identified two failures of C-hooks in the field in the 10 years before the Camp Fire, not including the C-hook on the Incident Tower that broke. Neither failure appears to have resulted from wear on the hook or plate.[4]

PG&E has been storing the worn hanger plates removed from the tower supporting the Parkway-Moraga and Bahia-Moraga 230 kV Transmission Lines, noted above, since before the Camp Fire. In addition, to comply with a March 2019 evidence preservation request, PG&E has also collected and stored as evidence C-hooks and hanger plates removed from multiple transmission lines (including the Caribou-Palermo Line) as a result of WSIP inspections or other maintenance work.

Since the Camp Fire, PG&E has conducted climbing and drone inspections of the approximately 50,000 transmission structures in Tier 2 and Tier 3 High Fire-Threat District areas under its WSIP. These inspections identified over 50,000 conditions on transmission lines, including conditions relating to wear or other damage to C-hooks and hanger plates. All of the highest-priority conditions identified as a result of those inspections have been repaired or made safe.

Question 6a: With respect to the extent to which PG&E had been aware of the C-hook problem, please respond specifically to the attached news story stating PG&E was so aware as early as 1987.

PG&E Response:

The NBC Bay Area article titled "PG&E Alerted to Risk of Worn Hooks Back in 1987", dated December 12, 2019 and attached to the Court's December 16, 2019 order, refers to and quotes from a PG&E Department of Engineering Research report titled "Evaluation of J-

[4] One of the failures, on the Pittsburg-Tesla 230 kV Transmission Line, appears to have resulted from "side loading stress" leading to a fracture near the base of the hook (*i.e.*, near the ball of the hook, not where the hook and hanger plate touch). The other failure, on the Bellota-Cottle 230 kV Transmission Line, appears to have resulted from the separation of the C-hook from the insulator string due to wear on the insulator string socket that held the ball of the C-hook, as opposed to wear on the hook or hanger plate.

Hooks and Eyes from 115 kV Oleum G-Line", dated February 9, 1987. Attached as Exhibit C is a full copy of that report.

As explained in the report, PG&E's Department of Engineering Research, a predecessor of PG&E's Applied Technology Services department, performed tests on two suspension hooks (described as "J-hooks" in the report) and attaching plates removed from PG&E's 115 kV Oleum-G Transmission Line (the "Oleum-G Line"). The report noted that "[b]oth of the J-Hooks and their attaching plates had grooves worn in them and there was a concern that they may not be able to hold the weight of insulator strings that are suspended from them." The objective of the report "was to establish the tension required to fail the hook or the attaching plate". The hooks had an ultimate strength rating of 30,000 pounds. The testing resulted in the failure of the two worn hooks at 11,500 pounds, the failure of the eye on one of the attaching plates at 19,600 pounds, and the failure of an additional hook that "had no visible grooves or scratching in the surface as the two samples in the original test did" at 6,900 pounds. In other words, the two hooks with wear exhibited greater strength than the unworn hook. The report recommended "that a test be done on some random samples of different manufacturers' hooks from PG&E stores to check their strength against their specifications." PG&E has searched for records relating to any such strength testing during the late 1980s but has not located any such records that have been retained.

The testing proposed in the 1987 report does not appear to have been prompted by wear on the hooks or hanger plates. As reflected in the report, the proposal for testing a number of randomly chosen hooks from PG&E's stores appears to have been prompted by the failure of the hook without visible wear at 6,900 pounds (more than three-quarters below its strength rating of 30,000 pounds).

PG&E denies the conclusions drawn in the NBC Bay Area article, including that PG&E "was aware of a big problem and did nothing to solve that problem" or that it "knew there was a problem for 30 years". As can be seen from PG&E's response to Question 6 above, the occasions on which PG&E records noted wear on C-hooks or working eyes were limited in the

context of the overall number of such components in PG&E's system, and PG&E followed up on identified issues. Moreover, the article ignores PG&E's inspection and maintenance programs that existed prior to the Camp Fire and PG&E's investments in its transmission system. PG&E refers the Court to its prior submissions on those subjects for additional information. (*See* PG&E's Response to Notice Re California Wildfires, Ex. A, Camp Fire Incident Description and Factual Summary, dated December 31, 2018 (Dkt. 956-1) at 1-6, 8-15; PG&E's Response to Order to Show Cause Why PG&E's Conditions of Probation Should Not Be Modified, dated January 23, 2019 (Dkt. 976) at 42-46; PG&E's Response to Request for Information, dated July 31, 2019 (Dkt. 1078) at 2-34.)

Question 7: What was the purpose of the hold-down anchor on the Adjacent Tower?

PG&E Response:

A hold-down anchor is a type of insulator assembly used when there is a substantial difference in elevation between two adjacent towers along the same transmission line. The difference in elevation can result in the insulators at lower elevation being pulled upwards by the tension of the conductors on the span that they support. The upward pull can impair the proper functioning of the insulator by causing it to hang improperly. The hold-down anchor provides downward force to counter the upward pull on the insulator string holding the conductor. In addition, the hold-down anchor may limit side-to-side movement or sway on the conductor supported by the suspension insulator that it holds down. Hold-down anchors are not energized.

The Adjacent Tower on the Caribou-Palermo Line, Tower :27/221, was downhill from Tower :27/222, the tower at which a C-hook broke on November 8, 2018, and was fitted with three hold-down anchors, one of which disconnected at the turnbuckle, as described in PG&E's response to Question 8 below. The turnbuckle is a component that can be tightened or loosened to adjust the amount of downward force being applied to the suspension insulator above.

Question 8: Was that hold-down anchor used on the Caribou-Palermo Transmission Line? If so, was there any support between the C-hook that lost the anchor and the C-hook that failed?

PG&E Response:

Hold-down anchors were used on Tower :27/221 on the Caribou-Palermo 115 kV Transmission Line.

PG&E's records indicate that during the most recent routine aerial patrol of the Caribou-Palermo Line, in September 2018, a new finding was reported for Tower :27/221 because an insulator hold-down anchor's turnbuckle had become disconnected and required repair. As noted above, an insulator hold-down anchor is not energized. As a result of the September 2018 aerial patrol, PG&E generated a notification to repair the insulator hold-down anchor within 12 months. That notification was open at the time of the Camp Fire in November 2018.

The C-hook supporting the hold-down anchor on Tower :27/221 with the disconnected turnbuckle did not provide support to the C-hook on Tower :27/222 that broke. The conductor supported by the suspension insulator on Tower :27/221 that was held down by the hold-down anchor continued toward two "dead-end" insulators on Tower :27/222 and terminated at a clamp attached to those dead-end insulators. The C-hook on Tower :27/222 that broke did not support that conductor. Rather, the C-hook on Tower :27/222 that broke supported a transposition jumper that connected that conductor to a conductor on the other side of the tower.

Question 9: In what possible ways did the failure of the hold-down anchor on the Adjacent Tower contribute to the failure of the C-hook on the Incident Tower?

PG&E Response:

PG&E does not believe that the disconnection of the hold-down anchor at Tower :27/221 contributed in any non-negligible way to wear on the C-hook that broke on Tower :27/222 or its connection point. The C-hook on Tower :27/222 that failed did not directly

support the conductor supported by the hold-down anchor on Tower :27/221 and was separated from that conductor by other components.

Question 10: Generally, what factors exacerbate the gouging of the C-hooks (like sway, vibration, weight) and to what extent were these factors known by PG&E before the Camp Fire?

PG&E Response:

A variety of factors can influence the rate of wear on a particular C-hook or hanger plate, including the degree of tension on the conductor supported by the insulator assembly; the hardness, thickness and other material properties of the C-hook and hanger plate; the weight of the load supported by the C-hook; and environmental conditions. Relevant environmental conditions include elevation, average and maximum wind speeds in the area, the amount of time the C-hook and hanger plate are subjected to high-wind conditions, and the proximity of the equipment to coastal areas or other corrosive environments. In connection with some of the instances identified in response to Question 6 above, PG&E personnel noted that metal-on-metal rubbing caused or exacerbated by wind conditions could result in wear of C-hooks and hanger plates.

Following the Camp Fire, at the request of the CPUC's Safety and Enforcement Division, PG&E retained Exponent, Inc. ("Exponent"), an independent third-party scientific and engineering consulting firm, to conduct a records-based review of the Caribou-Palermo Line. Exponent's final report has now been made public and discusses the factors that may cause or exacerbate wear on C-hooks and hanger plates. *See* CPUC Incident Investigation Report, Nov. 8, 2019, Attachment N, Exponent Report on PG&E Caribou-Palermo Asset Condition Investigation, Nov. 1, 2019, at 29-61.

Dated: December 19, 2019

Respectfully Submitted,

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EXHIBIT A


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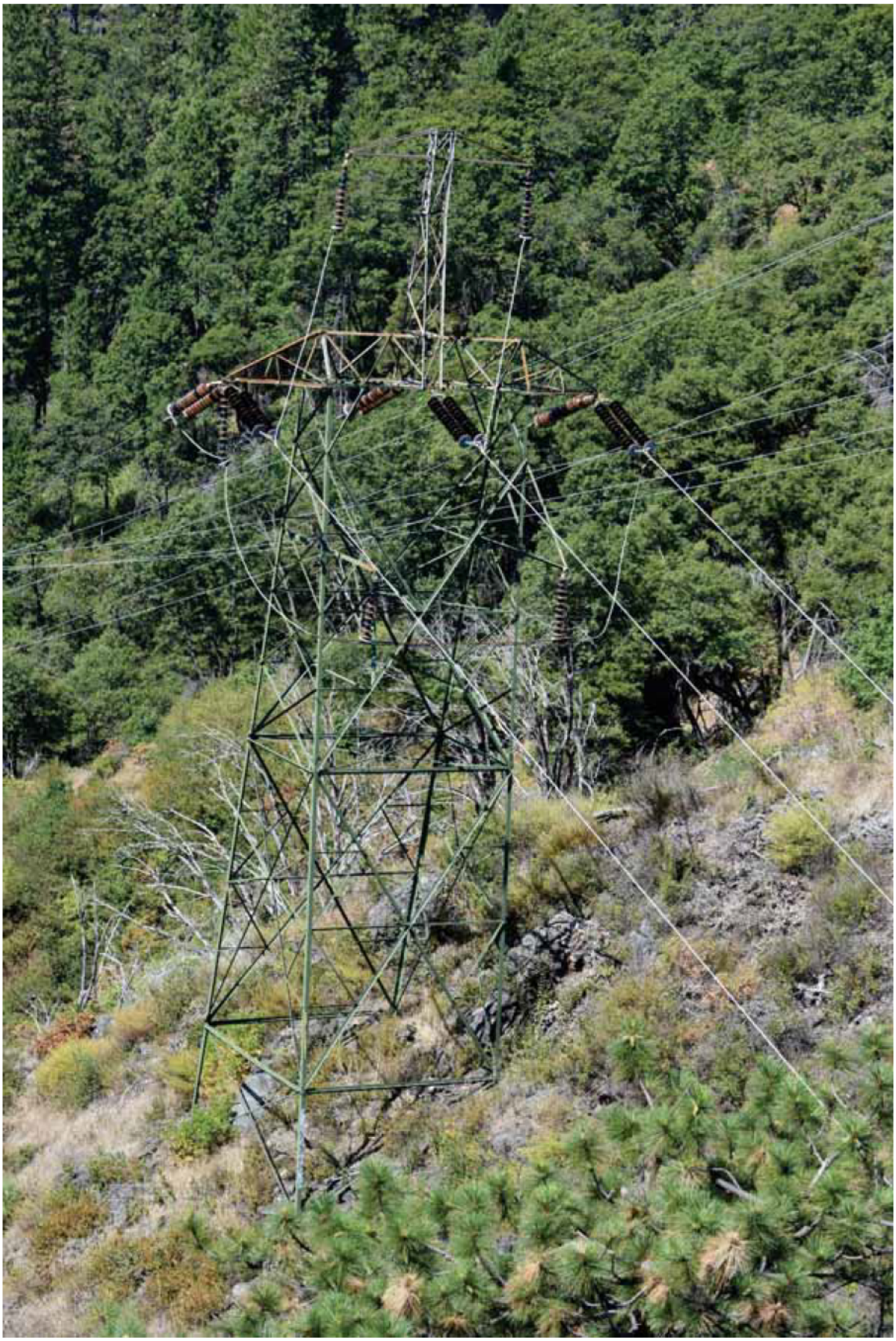
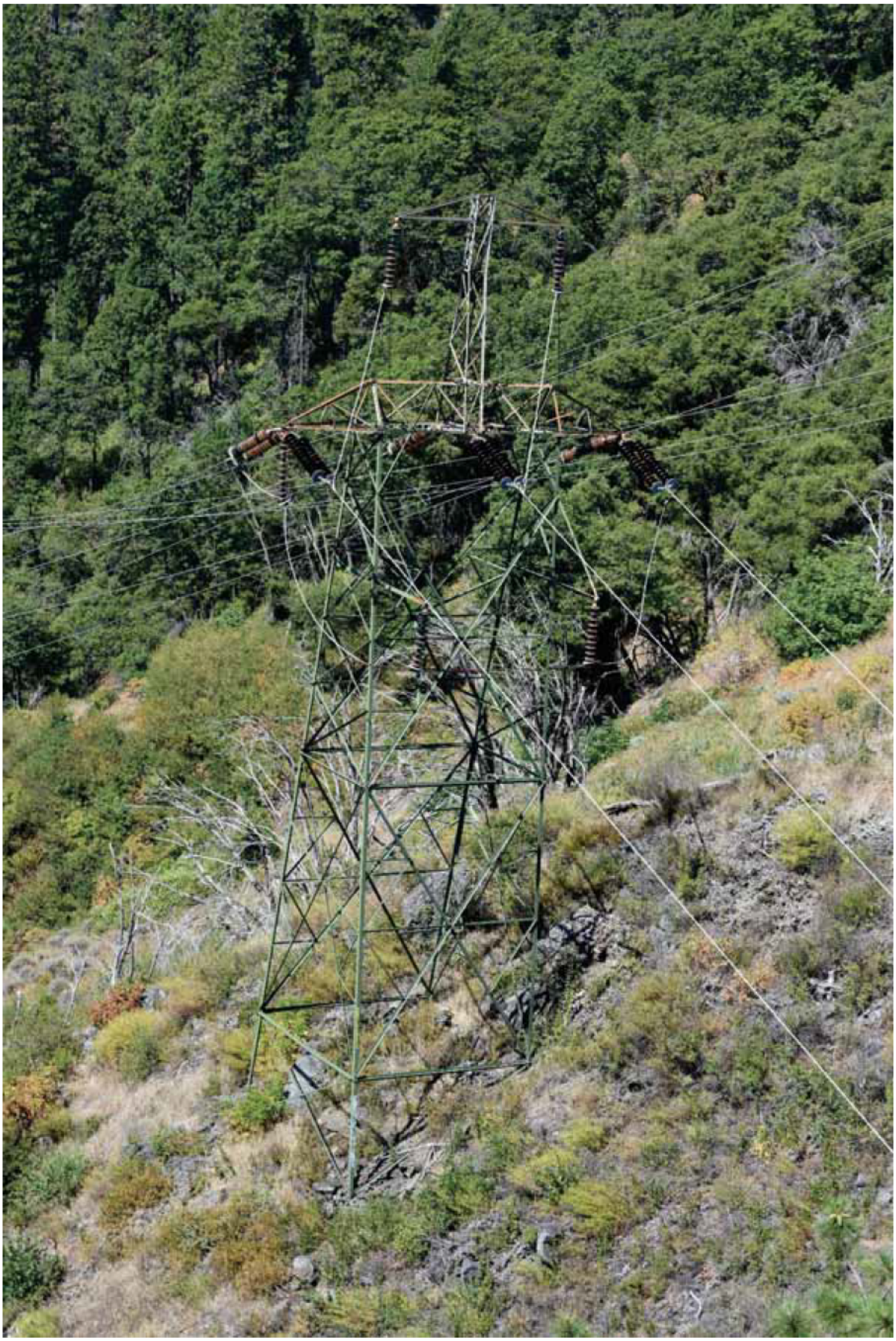
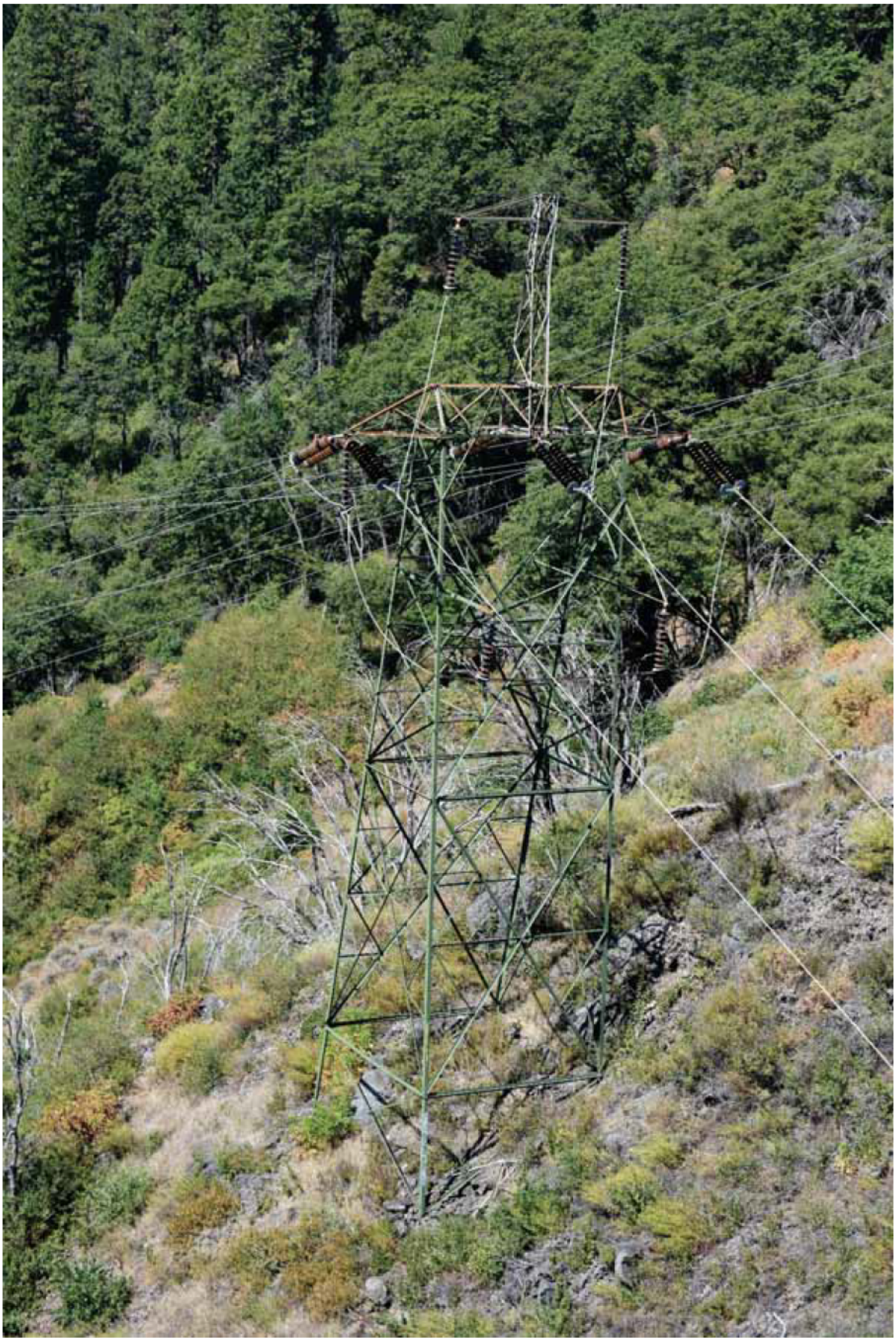
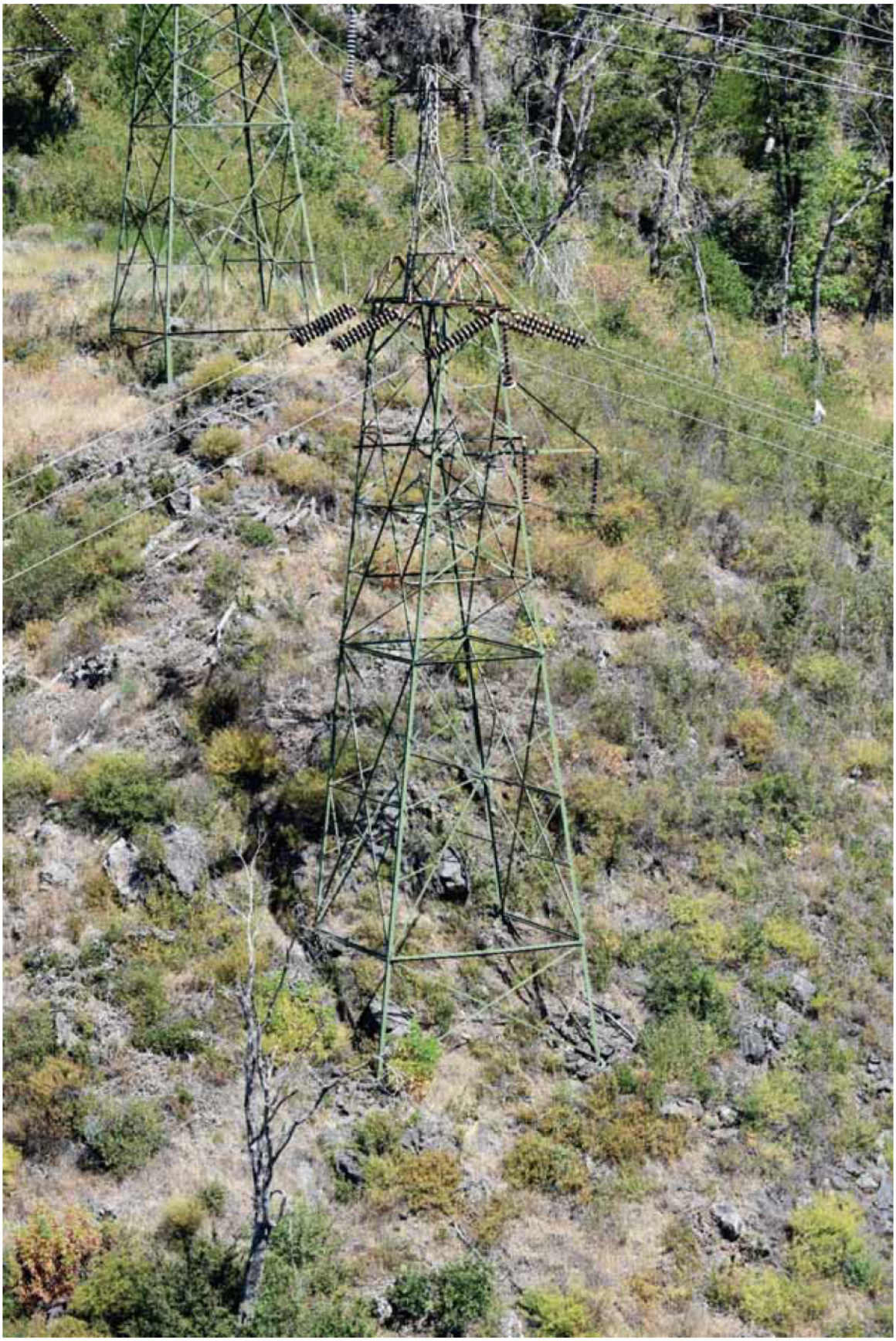
EXHIBIT B









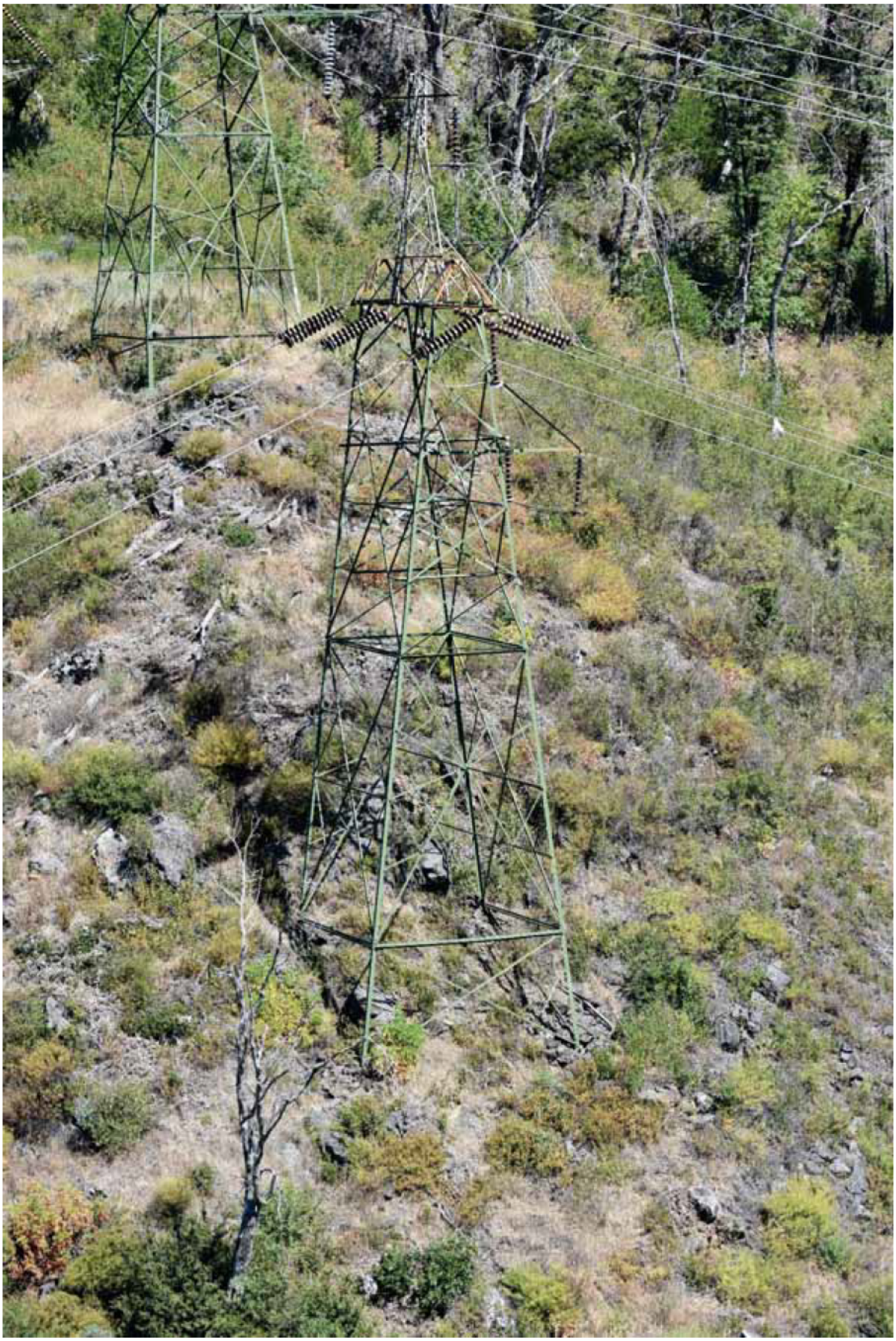


EXHIBIT C

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Report Issued: FEB 9 1987 Report 500-87.25

PACIFIC GAS AND ELECTRIC COMPANY
DEPARTMENT OF ENGINEERING RESEARCH
3400 Crow Canyon Road
San Ramon, California 94583

LABORATORY TEST REPORT

SUBJECT: EVALUATION OF J-HOOKS AND EYES FROM 115KV OLEUM G-LINE

Introduction

Tests were conducted on two J-Hooks and two attaching plates taken from a 115 KV Oleum G-Line tower.

Both of the J-Hooks and their attaching plates had grooves worn in them and there was a concern that they may not be able to hold the weight of insulator strings that are suspended from them,(See Figures 1 and 2).

Tests were requested by Mr. G. Schauer of East Bay Region T&D.

Objective

The objective was to establish the tension required to fail the hook or the attaching plate. The ultimate rating for 115 KV lines is 30,000 Lbs., (See Manufacturers' Literature in Appendix A).

Test Procedure

The tensile test was accomplished by making a fixture to hold the hook and the plate in the same position it would be while in service and applying tension using the Tinius Olsen universal test machine, (See Figure 3). American National Standards Institute, (ANSI), B30.10-1975 was used as a guideline, (See Appendix B).

Test Results

Both hooks failed at 11,500 lbs., (See Figures 4 and 5). Since the plates did not fail during this test an additional test was done on one of the plates. A shackle was attached to the eye of the plate and tension was applied. The eye failed at 19,600 lbs., (See Figure 6).

Distribution: ESElliott
CDPaquin
GSchauer
CBScott

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Conclusion

As shown in the results the hooks failed at 11,500 Lbs. tension. According to the Manufacturers' drawings, the rating of a 115 KV line supporting hook is 30,000 Lbs. Because of the low failure points of the two hooks, an additional hook was brought in and tested. This hook had no visible grooves or scratching in the surface as the two samples in the original test did.

The hook failed at 6900 Lbs.

Recommendation

The hook without visible flaws failed at 6900 Lbs. and the rating for these hooks is 30,000 Lbs.. This would suggest that a test be done on some random samples of different manufacturers' hooks from PG&E stores to check their strength against their specifications.

Figure 1. As shown in the Figure above a wear pattern was formed in the bowl-saddle of the J-Hook. This was possibly caused by the insulator string swinging in the wind over a period of time.

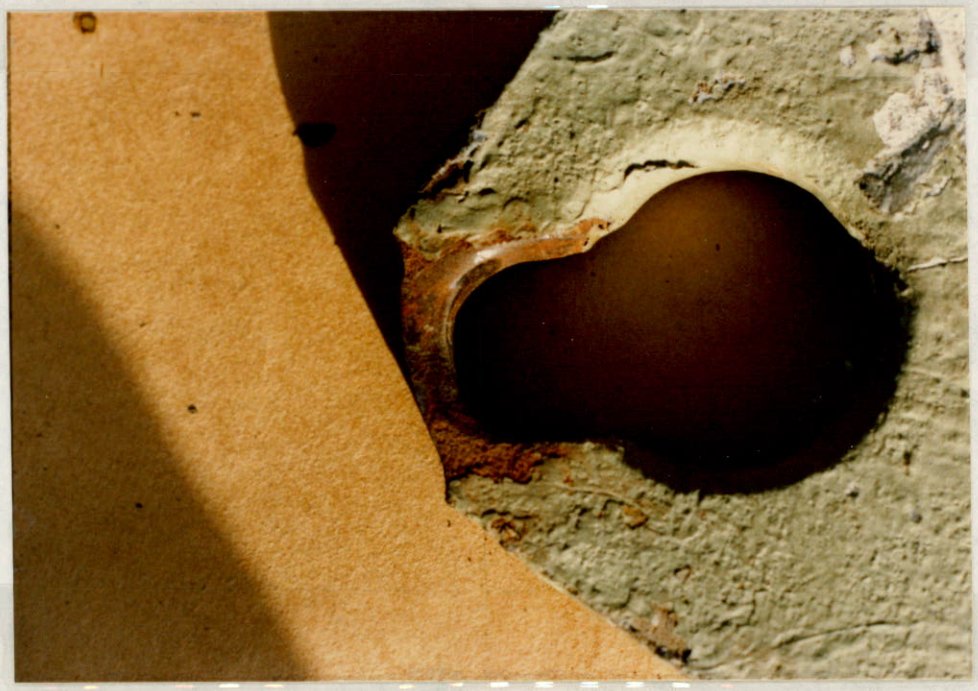


Figure 2. This Figure shows the key-hole wear in the plate eye caused by the J-Hook while in service.

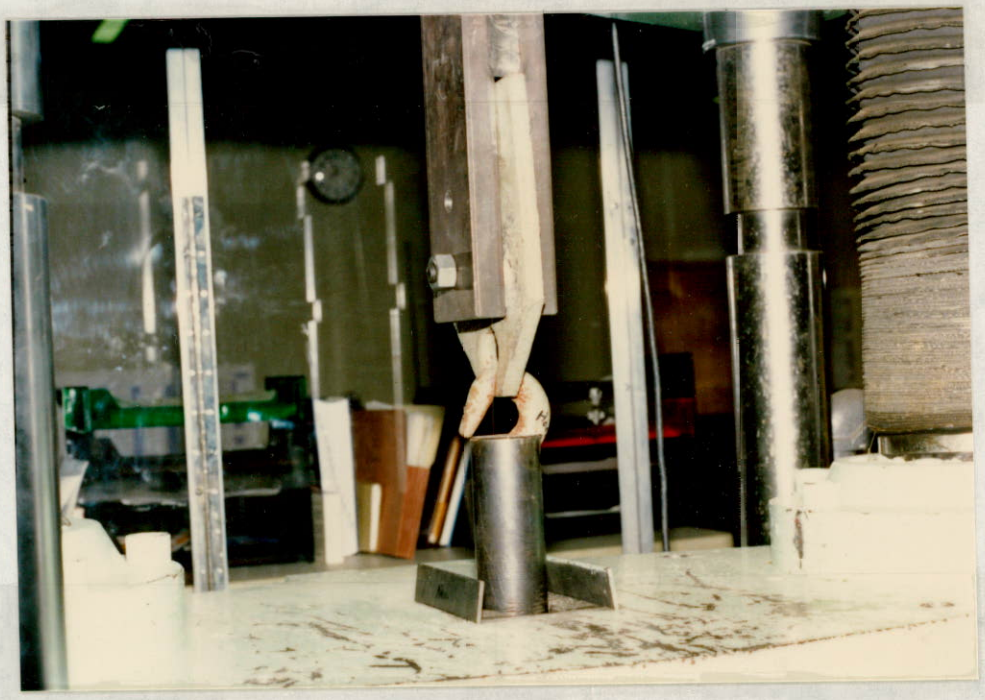


Figure 3. This shows the fixture holding the plate and J-Hook in the simulated position it would be in service.

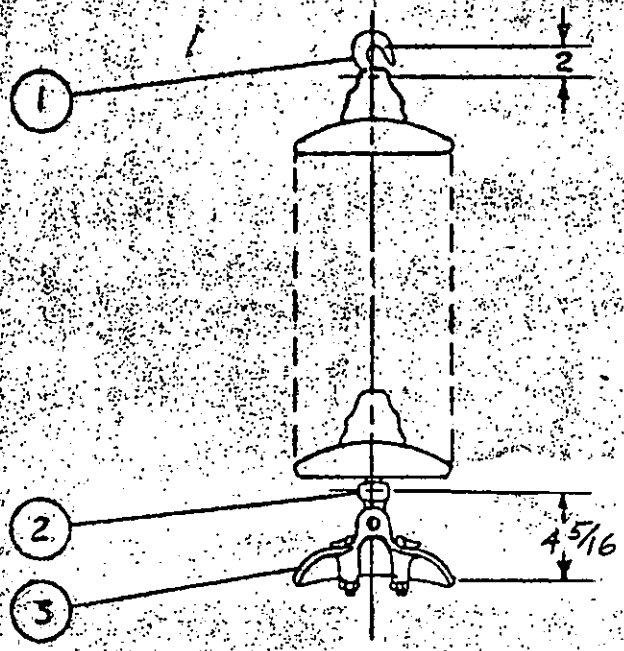
Figure 4. This hook shows the point of failure to be in the worn section of the bowl-saddle.

Figure 5. This hook failed at the heel even though it had approximately the same wear pattern in the bowl-saddle as the hook in Figure 4.

Figure 6. This Figure shows the failure of the eye in the plate when a shackle was pulled through it.

APPENDIX A

Manufacturers Literature and Company Standards



PG&E CODE	CAT. NO.	TYPE
11-0145	C-11075	SC

NOTES:

1. REFERENCE: PACIFIC GAS & ELECTRIC DWG. NO.-056414 SHT. 3 TYPE-SC
2. ASSEMBLY RATING- 16,000 LBS.
3. CLAMPING RANGE- .200-.600

P. G. & E. DRAWING NO. 690134

ITEM NO.	PART NO	DESCRIPTION	MATERIAL	ULT. STR. LBS.	QTY	SPEC. NO.	WEIGHT
1	HB-30	HOOK BALL	GALV. FORGED STEEL	30,000	1	ASTM A-273-64	1.00
2	SA-04	EYE SOCKET	GALV. DUCTILE IRON	20,000	1	ASTM A536-65T	1.25
3	BRS-60-N	SUSP. CLAMP	112 ALUM. BRZ.	16,000	1	ANDERSON 2000	2.90

MR-1960

R/O

REVISIONS

NO.	DESCRIPTION	DATE	BY

DATE 3-4-76
DWN BY JGL CKD BY
APPROVED HEL
SCALE DO NOT

44-115 KV SINGLE STRING
SINGLE CONDUCTOR
SUSPENSION ASSY.

ANDERSON ELECTRIC CORP.
LEEDS ALABAMA

CAT. NO. C-11075 DWG. NO. C-11075

APPENDIX B

ANSI B30.10-1975

AMERICAN NATIONAL STANDARD

SAFETY STANDARDS FOR CABLEWAYS, CRANES, DERRICKS, HOISTS, HOOKS, JACKS, AND SLINGS

HOOKS

ANSI B30.10 - 1975

SECRETARIAT

NAVAL FACILITIES ENGINEERING COMMAND,
U.S. DEPARTMENT OF THE NAVY
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

PUBLISHED BY

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

United Engineering Center 345 East 47th Street New York, N. Y. 10017

FOREWORD

This American National Standard, Safety Standards for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks and Slings, has been developed under the procedures of the American National Standards Institute (formerly the United States of America Standards Institute). This specific standard had its beginning in December 1916, with a Code of Safety Standards for Cranes, prepared by an ASME committee on the Protection of Industrial Workers, was presented to the annual meeting of the ASME.

Meetings and discussions regarding safety on cranes, derricks and hoists were held from 1920 to 1925, involving the ASME Safety Code Correlating Committee, the Association of Iron and Steel Electrical Engineers, the American Museum of Safety, the American Engineering Standards Committee (later changed to American Standards Association and subsequently to the USA Standards Institute). Department of Labor, State of New Jersey, Department of Labor and Industry, State of Pennsylvania, and Locomotive Crane Manufacturers Association. On June 11, 1925 the American Engineering Standards Committee approved the ASME Safety Code Correlating Committee's recommendation and authorized the project with U.S. Department of the Navy, Bureau of Yards and Docks and the ASME as sponsors.

In March 1926 invitations were issued to 50 organizations to appoint representatives to a Sectional Committee. The call for organization of this Sectional Committee was sent out October 2, 1926 and the Committee organized November 4, 1926 with 57 members representing 29 national organizations. From the 3-page document, referred to in the first paragraph, came the Safety Code for Cranes, Derricks, and Hoists ASA B30.2-1943. This document was reaffirmed in 1952 and widely accepted as a Safety Standard.

Due to the changes in design, advancement in techniques, and general interest of labor and industry in safety, the Sectional Committee now known as the American National Standards Committee, under joint sponsorship of the ASME and the Naval Facilities Engineering Command–U.S. Department of the Navy–was reorganized on January 31, 1962 with 39 members representing 27 national organizations. At the time B30.3 was approved by the Committee, the membership had increased to 57 members and alternates representing 36 organizations.

The format of the previous Code was changed so that separate Standards, each complete as to construction and installation; inspection, testing, and maintenance; and operation, will cover the different types of equipment included in the scope of B30.

This Standard presents a coordinated set of rules which may serve as a guide to government and other regulatory bodies and municipal authorities responsible for the guarding and inspection of the equipment falling within its scope. The suggestions leading to accident prevention are given both as mandatory and advisory provisions and compliance with both types may be required by employers of their employees.

This Standard, which was approved by the American National Standards Committee B30 and by the two sponsor organizations, was approved and designated as an American National Standard by the American National Standards Institute on November 14, 1975.

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CONTENTS

AMERICAN NATIONAL STANDARD

SAFETY STANDARDS FOR CABLEWAYS, CRANES, DERRICKS, HOISTS, HOOKS, JACKS AND SLINGS

INTRODUCTION

General

This Standard is one of a series of safety standards on various subjects which have been formulated under the general auspices of the American National Standards Institute. One purpose of the Standard is to serve as a guide to governmental authorities having jurisdiction over subjects within the scope of the Standard. It is expected, however, that the Standard will find a major application in industry, serving as guide to both manufacturers of the equipment and to the purchasers and users of the equipment.

For the convenience of the user, the Standard has been divided into separate volumes such as the following:

B30.1 Jacks
B30.2 Overhead & Gantry Cranes
B30.3 Hammerhead Tower Cranes
B30.4 Portal, Tower and Pillar Cranes
B30.5 Crawler, Locomotive and Truck Cranes
B30.6 Derricks
B30.7 Base Mounted Drum Hoists
B30.8 Floating Cranes and Floating Derricks
B30.9 Slings
B30.10 Hooks
B30.11 Monorail Systems and Underhung Cranes
B30.12 Handling Loads Suspended from Rotorcraft
B30.13 Controlled Mechanical Storage Cranes
B30.14 Side Boom Tractors
B30.15 Mobile Hydraulic Cranes
B30.16 Overhead Hoists
B30.17 Single Girder Top Running Cranes
B30.18 Overhead Stacker Cranes
B30.19 Cableways
B30.20 Below the Hooklifting Devices

If adopted for governmental use, the references to other national codes and standards in the specific volumes may be changed to refer to the corresponding regulations of the governmental authorities.

The use of cranes, derricks, hoists, hooks, jacks and slings is subject to certain hazards that cannot be met by mechanical means, but only by the exercise of intelligence, care and common sense. It is therefore essential to have competent and careful operators, physically and mentally fit, trained in the safe operation of the equipment and the handling of the loads. Serious hazards are overloading, dropping or slipping of the load caused by improper hitching or slinging, obstruction to the free passage of the load, using equipment for a purpose for which it was not intended or designed.

The standards committee fully realizes the importance of proper factors of safety, minimum or maximum sizes and other limiting dimensions of wire rope and their fastenings, sheaves, drums and similar equipment covered by the Standard, all of which are closely connected with safety. Safe sizes, strengths, and similar criteria are dependent on many different factors, often varying with the installation and uses. These factors also depend on the condition of the equipment or material; on the loads; on the acceleration, or speed of the ropes, sheaves or drums; on the type of attachments; on the number, size and arrangement of sheaves, or other parts; on weather, and other atmospheric conditions tending toward corrosion, or wear; and on so many variable factors that must be considered in each individual case. The rules given in the Standard must be interpreted accordingly and judgment used in deter-

mining their application.

The standards committee will be glad to receive criticisms of the Standard requirements and suggestions for the improvement, especially such as are based on actual experience in the application of the rules. Revised editions will be issued from time to time with such changes as experience in its application and improvements in the arts may dictate.

Section I Scope

This Standard applies to the construction, installation, operation, inspection and maintenance of jacks; power operated cranes, monorails and crane runways; power operated and manually operated derricks and hoists; lifting hooks and slings.

This Standard does not apply to track and automotive jacks, railway or automobile wrecking cranes, shipboard cranes, shipboard cargo handling equipment, well drilling derricks, skip hoists, mine hoists, truck body hoists, car or barge pullers, lever operated pulling devices, conveyors, excavating equipment nor to equipment coming within the scope of the following American National Standards Committees: A10, A17, A90, A92, A113, A120, B56 and B77.

Section II Purpose

This Standard is designed (1) to guard against and minimize injury to workers and otherwise provide for the protection of life, limb, and property by prescribing minimum safety requirements, (2) to provide direction to owners, employers, supervisors and others concerned with, or responsible for its application and (3) to guide governments and other regulatory bodies in the development, promulgation, and enforcement of appropriate safety directives.

Section III Exceptions and Interpretations

In case of practical difficulties or new developments, or unnecessary hardship, the administrative or regulatory authority may grant exceptions from the literal requirements or permit the use of other devices or methods, but only when it is clearly evident that an equivalent degree of protection is thereby secured.

NOTE: To secure uniform application and interpretation of this Standard, administrative or regulatory authorities are urged, before rendering decisions on disputed points, to consult the committee which formulated it through the office of The American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, New York 10017.

Section IV New and Old Installations

One year after the date on which this Standard becomes effective, all new construction and installations shall conform to its rules. The performance of any equipment installed prior to one year after the effective date shall be evaluated by a qualified person selected by the user. If past performance discloses actual circumstances that have caused or might have caused property/equipment damage or injuries to personnel resulting from functional performance or from the configuration of the equipment that result from deviation of the equipment from the Standard the equipment shall be evaluated to determine specifically how it deviates from this Standard. A qualified person, having made this evaluation, shall then recommend the degree to which changes should be made to bring the equipment into compliance with the intent of this Standard and changes should be accomplished within two years from the effective date. A complete record of the evaluations, recommended changes and actual changes shall be retained.

Section V Mandatory and Advisory Rules

Mandatory rules of this Standard are characterized by the use of the work "shall". If a provision is of an advisory nature it is indicated by the use of the word "should" and is a recommendation considered to be the advisability of which depends on the facts in each situation.

CHAPTER 10-0
SCOPE, DEFINITIONS, REFERENCES

Section 10-0.1 Scope of B30.10

Within the general scope defined in Section I, American National Standard B30.10 applies to all types of hooks used in conjunction with equipment described in other volumes of the B30 standards. This applies to all hoisting hooks that support a load in a direct-pull configuration and such load is carried in the base (bowl-saddle) of the hook. This also applies to other hooks specifically defined within this chapter that do not support a load in a direct-pull configuration.

Section 10-0.2 Definitions

10-0.2.1 Administrative or Regulatory Authority Governmental Agency or the employer in the absence of governmental jurisdiction.

10-0.2.2 Appointed. Assigned specific responsibilities by the employer or the employer's representative.

10-0.2.3 Crack. A crevice type discontinuity of the material.

10-0.2.4 Designated. Selected or assigned by the employer or the employer's representative as being qualified to perform specific duties.

10-0.2.5 Dye Penetrant Testing. A non-destructive test method for detecting surface discontinuity based on capillary action. A liquid penetrant is applied to the surface. The excess penetrant is then removed and any subsequent bleeding indicates seams, laps, and cracks.

10-0.2.6 Forging Lap. A defect caused by folding over surface metal and then forging into the material surface without cohesion.

10-0.2.7 Heavy Service. Service which involves operating at 85 percent to 100 percent of rated capacity as a regular specified procedure.

10-0.2.8 Hot Tear. A defect caused by the rupture of metal while cooling from the molten to the solid state.

10-0.2.9 Latch. A device used to bridge the throat opening of a hook.

10-0.2.10 Load. The total weight imposed on the hook.

10-0.2.11 Magnetic Particle Testing. A non-destructive test method for revealing discontinuities in ferromagnetic materials, by means of finely divided magnetic particles applied to the magnetized part.

10-0.2.12 Nick or Gouge. Sharp notch in hook surface which may act as stress raiser in the area of the notch.

10-0.2.13 Normal Service. Service which involves operating at less than 85 percent rated capacity except for isolated instances.

10-0.2.14 Proof Load. The specific load applied in performance of the proof test.

10-0.2.15 Proof Test. A non-destructive load test made by the hook manufacturer to verify construction and workmanship of the hook.

10-0.2.16 Qualified. A person who, by possession of a recognized degree, certificate or professional standing or who by extensive knowledge, training, and experience, has demonstrated the ability to solve problems relating to the subject matter and work.

10-0.2.17 Radiography. A non-destructive test employing x-ray or gamma radiation for revealing internal discontinuities.

10-0.2.18 Rated Load (R/L). The maximum allowable working load.

10-0.2.19 Seam. A crack-like discontinuity caused by rolling or working in defects.

10-0.2.20 Severe Service. Heavy service coupled with the possibility of abnormal unforeseen conditions.

10-0.2.21 Ultrasonic Testing. A non-destructive test method for revealing discontinuities in dense homogenous materials, by means of acoustic waves of frequencies above the audible range.

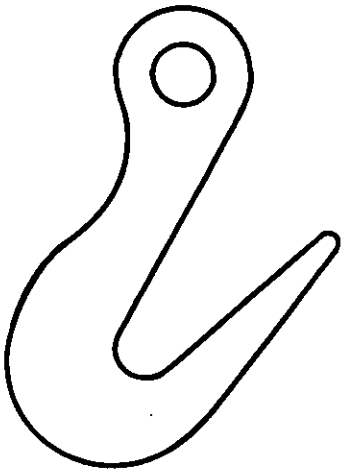

FIG. 1 SORTING HOOK

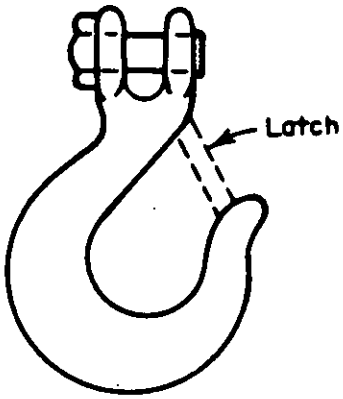

FIG. 2 CLEVIS HOOK
(Latch is optional)

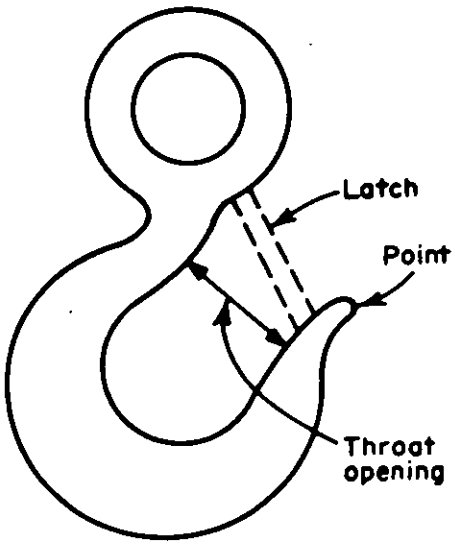

FIG. 3 EYE HOOK
(Latch is optional)

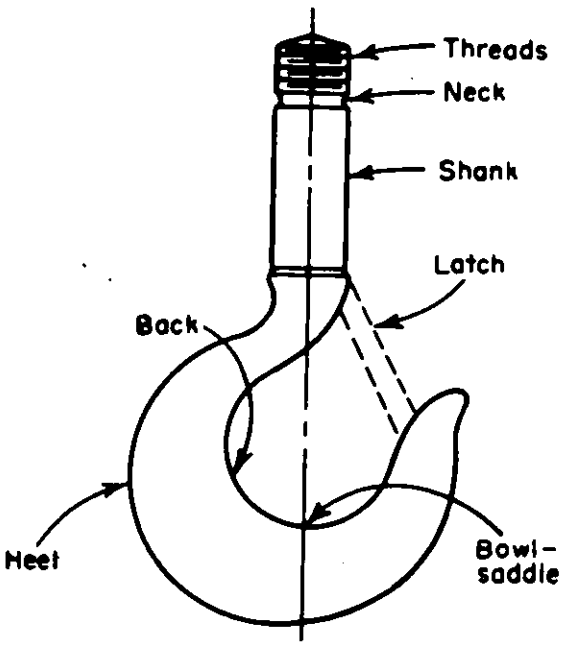

FIG. 4 SHANK HOOK
(Latch is optional)

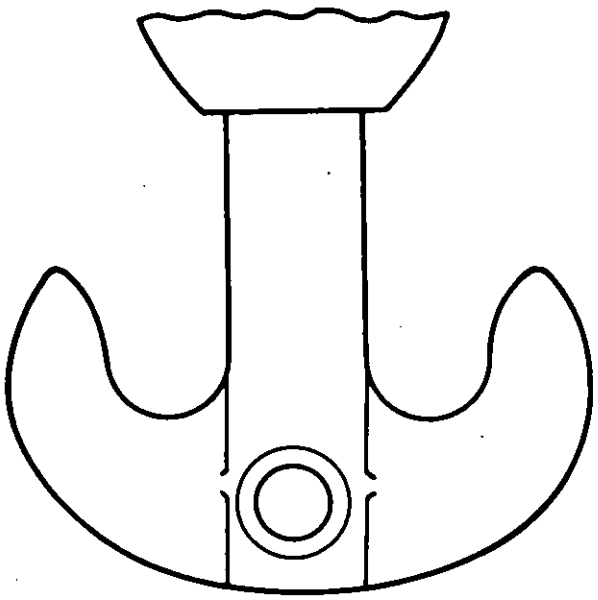

FIG. 5 DUPLEX HOOK (SISTER)
(Pinhole is optional)

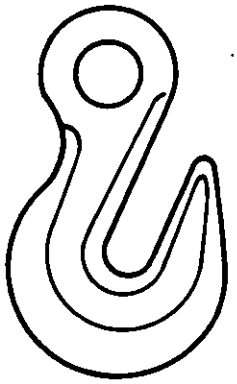

FIG. 6 EYE GRAB HOOK

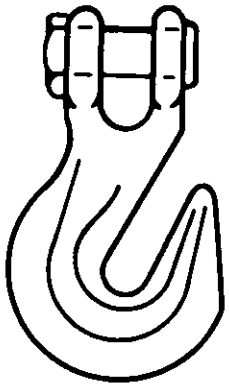

FIG. 7 CLEVIS GRAB HOOK

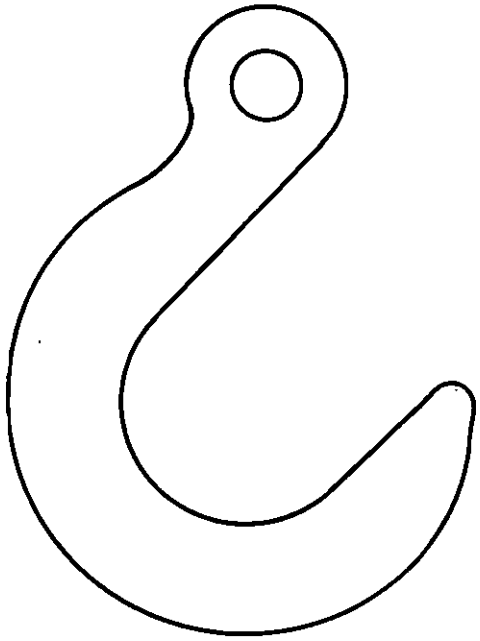

FIG. 8 FOUNDRY HOOK

FIG. 9 LAMINATED HOOK

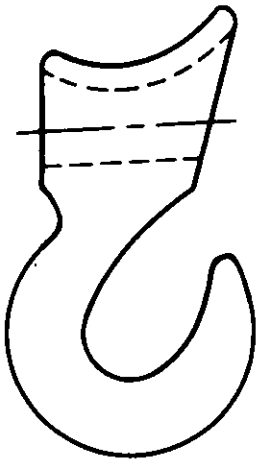

FIG. 10 CHOKER HOOK

CHAPTER 10-1
HOOKS, HOISTING

This chapter applies to all hooks that support a load in a direct pull configuration and such load is carried in the base (bowl-saddle) of the hook. Refer to Figures 2, 3, 4, 5 and 9.

Section 10-1.1 Hook Characteristics

10-1.1.1 The hook material shall have sufficient ductility to permanently deform before failure at the temperatures at which the specific hook will be used.

10-1.1.2 When proof tests are used to verify manufacturing process, material or configuration, the hooks shall be able to withstand the proof load application without permanent deformation when the load is applied for a minimum of 15 seconds. This condition shall be considered to have been satisfied if the permanent increase in the throat opening does not exceed 1/2 percent. For such tests, Table 1 states the proof load that shall be applied to a hook with a rated load capacity.

10-1.1.3 For a duplex (sister) hook having a pin eye, the proof load for the eye shall be in accordance with Table 1.

Section 10-1.2 Hook Identification

Manufacturer's identification should be forged, cast or die stamped on a low stress and non-wearing area of the hook.

Section 10-1.3 Attachments

10-1.3.1 Where required, a latch shall be provided, or a hook's design shall be used to retain such items as, but not limited to, slings and chains under slack conditions.

10-1.3.2 When a handle or latch support is welded to a hook, whose design requires heat treating, welding shall be done prior to final heat treating.

Table 1 Proof Test Load

Rated Load		Proof Load (Minimum)		
Tons (2000 lbs)	Kg	Percent of R/L	Tons (2000 lbs)	Kg
1/2	453.6	200	.1	907.2
1	907.2	200	2	1814.4
5	4536	200	10	9072
10	9072	200	20	18144
15	13608	200	30	27216
20	18144	200	40	36288
25	22680	200	50	45360
30	27216	200	60	54432
35	31752	200	70	63504
40	36288	200	80	72576
45	40824	200	90	81648
50	45360	200	100	90720
60	54432	193	116	105235.2
75	68040	183	137	124286.4
100	90720	166	166	150595.2
125	113400	150	188	170553.6
150	136080	133	200	181440
175	158760	133	233	211377.6
200	181440	133	266	241315.2
250	226800	133	333	302097.6
300	272160	133	399	361972.8
350	317520	133	465	421848
400	362880	133	532	482630.4
450	408240	133	598	542505.6
500	453600	133	665	603288
Above 500	>453600	133		

Note: 1 ton (short, 2000 lbs) = 907.2 Kg

For hooks with rated load ratings not shown in the above table, use the next lower rated load rating for determining the percent of rated load to be applied as excess load.

Section 10-1.4 Inspection, Performance Testing and Maintenance

10-1.4.1 Inspection Classification

a. *Initial Inspection.* Prior to initial use, all new and repaired hooks shall be inspected to assure compliance with the provisions of **10-1.4.2.**

b. Inspection procedure for hooks shall be governed by the kind of equipment in which they are used. When such requirements for hooks are stated in standards for these specific equipments, they shall take precedence over the following. Otherwise there shall be two general classifications based upon intervals at which examination shall be performed. The classifications are herein designated "frequent" and "periodic" with intervals between examinations as defined below:

1. *Frequent Inspection*–Visual examinations by the operator other designated personnel with records not required of items listed in **10-1.4.2**:

a. Normal service–Monthly
b. Heavy service–Weekly to Monthly
c. Severe service–Daily to Weekly
d. Special or infrequent service as authorized by qualified person–before and after each occurrence with records of the operation.

2. *Periodic Inspection*–Visual inspections by appointed person making records of apparent external contidions to provide the basis for continuing evaluation as noted in **10-1.4.3**:

a. Normal Service–Equipment in place–Yearly.
b. Heavy Service–As in **10-1.4.1**.b.2a unless external conditions indicate that disassembly should be done to permit detailed inspection–Yearly.
c. Severe Service–As in **10-1.4.1**.b.2b except that the detailed inspection may show the need for use of non-destructive type of testing–Quarterly.
d. Special or infrequent service as authorized by a qualified person–before the first such occurrence and as directed by the qualified individual for any subsequent occurrences.

10-1.4.2 Frequent Inspection

Hooks in regular use should be examined for the following items as noted in **10-1.4.1** (See **10-1.4.6**)

a. Distortion such as bending, twisting or increased throat opening.
b. Wear
c. Cracks, severe nicks or gouges.
d. Latch engagement, damaged or malfunctioning latch (if latch is provided).
e. Hook attachment and securing means.

10-1.4.3 Periodic Inspection

Hooks in regular use should be inspected for the deficiencies listed in **10-1.4.2.**

10-1.4.4 Hooks not in regular use

Hooks not in regular use should be inspected in accordance with **10-1.4.2** before being returned to service.

10-1.4.5 Performance Testing

No performance testing of hooks shall be required except as is necessary to conform to the requirements for the equipment of which they are a part.

10-1.4.6 Maintenance

a. Hooks having any of the following deficiencies shall be removed from service, unless a qualified person approves their continued limited use:

1. Crack(s)
2. Wear exceeding 10 percent (or as recommended by the manufacturer) of the original dimension.
3. A bend or twist exceeding 10 degrees from the plane of the unbent hook.
4. Increase in throat opening exceeding 15 percent or as recommended by the manufacturer.
5. If a latch is provided and it becomes inoperative because of wear or deformation, or fails to fully bridge the throat opening, the hook should be removed from service until the device has been repaired or replaced.
6. If hooks are painted, a visual inspection should take this coating into consideration. Surface variations can disclose evidence of heavy or severe service to require more detailed analysis of paragraph **10-1.4.1**.b.2b or **10-1.4.1**.b.2c. The surface condition may then call for stripping the paint in such instances.

b. Repair of nicks and gouges may be carried out by a designated person by grinding longitudinally following the contour of the hook, provided that no di-

mension is reduced more than 10 percent (or as recommended by the manufacturer) of its original value (A qualified person may authorize continued use if the reduced area is not critical.)

c. All other repairs shall be performed by the manufacturer or other qualified person.

Section 10-1.5 Operating Practices

Personnel using hooks shall be instructed in the following practices:

a. Determine that the weight of the load to be lifted does not exceed the load rating of the hook.

b. Shock loading shall be avoided.

c. Load shall be centered in the base (bowl-saddle) of the hook to prevent point loading of the hook.

d. Hooks shall not be used in such a manner as to place a side or backload on the hook.

e. When using a device to bridge the throat opening of the hook, care shall be used that the load in no way is carried by the bridging device.

f. Hands and fingers shall be kept from between hook and load.

g. Duplex (sister) hooks shall be loaded equally on both sides unless the hook is specifically designed for single loading.

h. The pin hole in Duplex (sister) hooks shall not be loaded beyond the rated load of the hook.

CHAPTER 10-2
HOOKS, MISCELLANEOUS

This chapter applies to all hooks that do not support a load in a direct pull configuration; such as, grab hooks, foundry hooks, sorting hooks, and choker hooks. Refer to Figures 1, 6, 7, 8 and 10.

Section 10-2.1 Hook Properties

10-2.1.1 The hook material shall have sufficient ductility to permanently deform before failure at the temperatures at which the specific hook will be used.

10-2.1.2 Rated loads for a hook, when used in the manner for which intended, shall be equal to or exceed the rated load of the chain, wire rope or other suspension members to which it is attached. In those instances when this is not feasible, special precautions shall be taken to assure that the rated load limit of the hook is not exceeded.

Section 10-2.2 Hook Identification

Manufacturer's identification should be forged, cast or die stamped on a low stress and non-wearing area of the hook.

Section 10-2.3 Inspection, Performance Testing and Maintenance

10-2.3.1 Inspection Classification

a. *Initial Inspection.* Prior to initial use, all new and repaired hooks shall be inspected to assure compliance with the provisions of **10-2.3.2.**

b. Inspection procedure for hooks shall be governed by the kind of equipment in which they are used. When such requirement for hooks are stated in standards for these specific equipments, they shall take precedence over the following. Otherwise there shall be two general classifications based upon intervals at which examination shall be performed. The classifications are herein designated "frequent" and "periodic" with intervals between examinations as defined below:

1. *Frequent Inspection*–Visual examinations by the operator or other designated personnel with records not required of items listed in **10-2.3.2**:

a. Normal service–Monthly
b. Heavy service–Weekly to Monthly
c. Severe service–Daily to Weekly
d. Special or infrequent service as authorized by qualified person before and after each occurrence with records on the operation.

2. *Periodic Inspection*–Visual inspections by appointed person making records of apparent external conditions to provide the basis for continuing evaluation as noted in **10-2.3.3**:

a. Normal service–Equipment in place–Yearly.
b. Heavy service–as in **10-2.3.1**.b.2a unless external conditions indicate that disassembly should be done to permit detailed inspection–Yearly.
c. Severe service–as in **10-2.3.1**.b.2b except that the detailed inspection may show the need for use of non-destructive type of testing–Quarterly.
d. Special or infrequent service as authorized by a qualified person–before the first such occurrence and as directed by the qualified person for any subsequent occurrences.

10-2.3.2 Frequent Inspection

Hooks in regular use should be examined for the following items as noted in **10-2.3.1**.b.1. (See **10-2.3.6**)

a. Distortion such as: bending, twisting, or increased throat opening.

b. Wear.

c. Cracks, severe nicks or gouges.

d. Hook attachment and securing means.

10-2.3.3 Periodic Inspection

Hooks in regular use should be inspected for the deficiencies listed in **10-2.3.2** as noted in **10-2.3.1**.b.2.

10-2.3.4 Hooks not in regular use

Hooks not in regular use should be inspected in accordance with **10-2.3.2** before being returned to service.

10-2.3.5 Performance Testing

No performance testing of hooks shall be required except as is necessary to conform to the requirements for the equipment of which they are a part.

10-2.3.6 Maintenance

a. Hooks having any of the following deficiencies shall be removed from service, unless a qualified person approves their continued limited use:

1. Crack(s)
2. Wear exceeding 10 percent (or as recommended by the manufacturer) of the original dimension.
3. A bend or twist exceeding 10 degrees from the plane of the unbent hook, or as recommended by the manufacturer.
4. Increase in throat opening exceeding 15 percent, or as recommended by the manufacturer.

b. Repair of nicks and gouges may be carried out by a designated person by grinding longitudinally following the contour of the hook, provided that no dimension is reduced more than 10 percent (or as recommended by the manufacturer) of its original value (A qualified person may authorize use if the reduced area is not critical).

c. All other repairs shall be performed by the manufacturer or other qualified person.

Section 10-2.4 Operating Practices

10-2.4.1 Personnel using miscellaneous hooks shall be instructed in the following practices:

a. Determine that the load or force required does not exceed the rated load of the hooks assembly, especially when any special conditions, such as choking or grabbing, are considered.

b. Shock loading shall be avoided.

c. A hook shall not be used in a manner other than that for which it was intended.

d. Hands and fingers shall be kept from between load and hook.

* * * NOTICE * * *

THIS REPORT CONTAINS ADDITIONAL MEDIA!

MEDIA COULD BE IN THE FORM OF:
PHOTOS, CHARTS, DIAGRAMS, FILM, MAPS ETC.

ADDITIONAL MEDIA IS MAINTAINED WITH THE:
ORIGINAL HARD COPY REPORT

PG & E (ATS)

The following document(s) was not scanned by DataBank due to:

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  - Video Device
- ☐ Customer Requirements
- ☐ Other

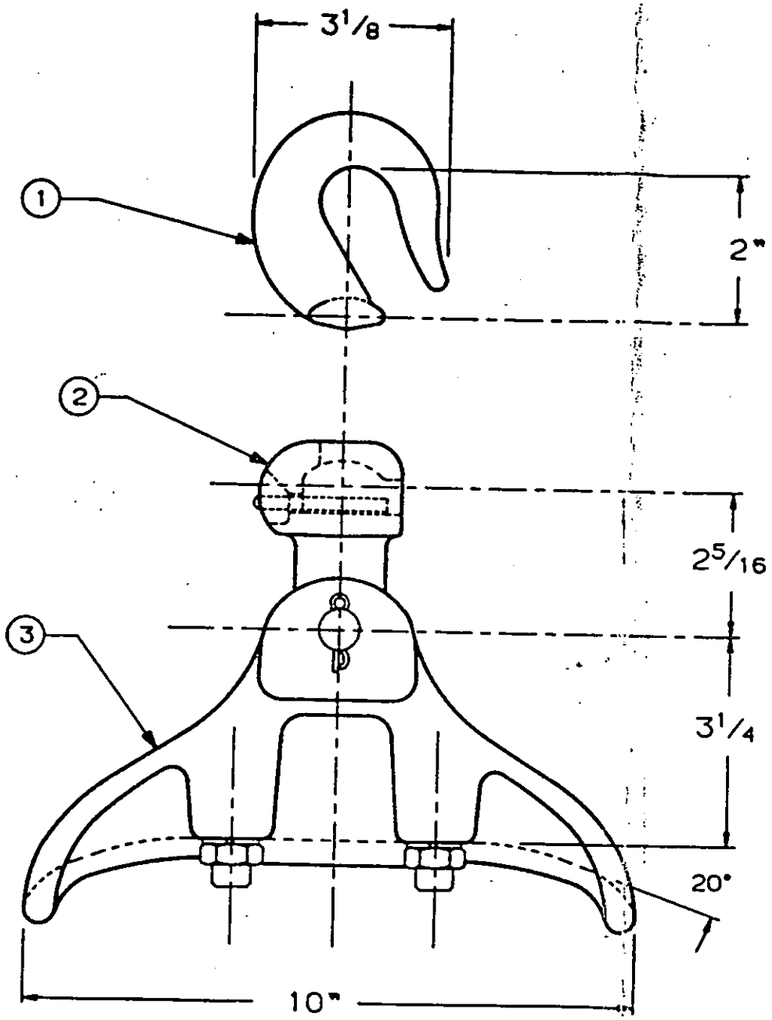
Box Number:
144

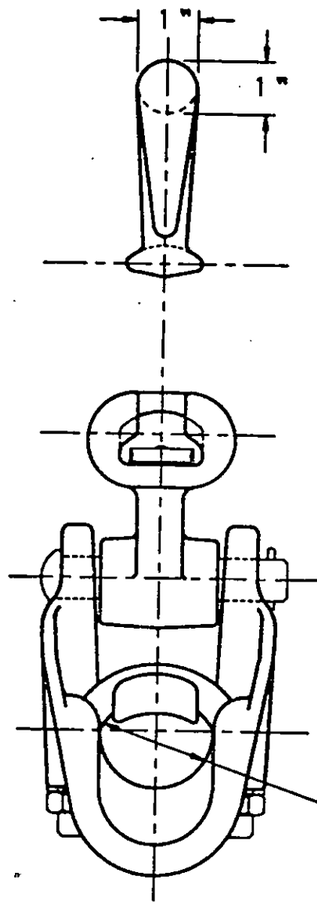
File/Folder Description:

Report number SD 87-28
lot of Negatives

50-87.25

ITEM NO.	QTY.	LINDSEY PART NO.	DESCRIPTION	MAT'L	ASTM	WT. EA.
1	1	3310	30 KIP BALL HOOK	FS	A-576	
2	1	3361	30 KIP SOCKET EYE	DI	A-536	
3	1	1346	25 KIP SUSP. CLAMP	AL	B-26	





COND. RANGE:
1.21 TO 1.82 DIA.

690157

GENERAL NOTES:

1. ALL FERROUS PARTS ARE HOT DIP GALVANIZED PER ASTM A-123.
2. ALL FERROUS FASTNERS ARE HOT DIP GALVANIZED PER ASTM A-153.
3. ALL BALL AND SOCKET FITTINGS TO FIT ANSI CLASS 52-3 AND 52-5.
4. ALL COTTER KEYS ARE HUMPBACK STAINLESS STEEL (TYPE 304).

NO.	DATE	BY	APP.	DESCRIPTION
B	10-23 86	KS	MC	ADDED NOTE 3 REVISED AND UPDATED
A	2-4 85	MC		3-1/4 WAS 3-1/8 3361 WAS 3365, 10" WAS 11"

REVISIONS

USED ON NUMBERS

ULT —STRENGTH— 25,000 LBS. REQ. 8,000

TOLERANCES UNLESS OTHERWISE NOTED	FRACTIONS	DECIMALS	ANGLES
CAST			
FORGE			
MACHINE			
FABRICATION			

INNOVATIONS IN TRANSMISSION AND DISTRIBUTION

LINDSEY MANUFACTURING COMPANY
760 N. GEORGIA / AZUSA, CA 91702 / (818) 969-3471

WEIGHT			APP.	MC
A&MB—	RAW	FIN.	10-23-86	
MATERIAL	FINISH		CHK.	
SEE CHART	SEE NOTES			
NOTE!	DO-NOT SCALE DRAWING		DRG.	KCS
	BREAK ALL SHARP EDGES		10-23-86	

TITLE: 44-115KV SINGLE STRING SUSPENSION

SCALE	NUMBER
NONE	TYPE SAA
LAST REVISION NO. B DATE 10-23-86	DRAWING-NUMBER R-3053

500-82.25

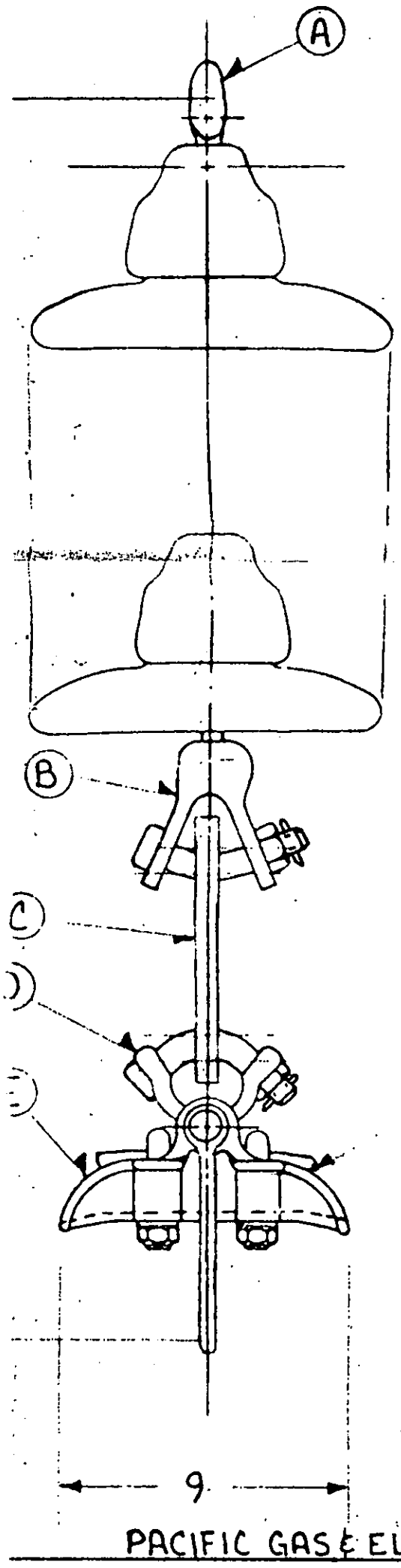
3001

LIST OF MATERIAL

DRAWING NUMBER 60282

ITEM	PART NO.	MATERIAL	DESCRIPTION
1 A	78420-2000	F.S.	HOOK
1 B	92802-2000	M.I.	SOCKET Y-CLEVIS
1 C	99844-4001	STL.	YOKE PLATE
2 D	93885-3003	M.I.	Y-CLEVIS EYE
2 E	87144-3006	ALUM.	SUSPENSION CLAMP
2 F	88017-2000	F.S.	CHAIN SHACKLE

SHIP UNASSEMBLED



ITEM	WEIGHT*	ULT. STR.*	A.S.T.M.
A	1.7 #	30,000 #	A-576
B	2.3 #	30,000 #	A-47
C	13.9 #	30,000 #	A-283
D	2.2 #	25,000 #	A-47
E	5.1 #	25,000 #	B-108
F	1.3 #	10,000 #	A-576

PACIFIC GAS AND ELECTRIC CO. REC'D FEB 1981 ENGINEERING RECORDS DESIGN - DRAFTING

TYPE 2SJ

- CLAMP SUITABLE FOR 1.00 TO 1.47 DIA. CONDUCTOR.

697677

APPROVED FOR FEB 5 - 1981 MICROFILMING

PACIFIC GAS & ELECTRIC

DATE	BY	DATE	BY
12-15-78	GB		MFG. ENG.
12-18-78	WS		TECH. DIRECTOR
12-18-78	WS		PATENT ATTORNEY
12-18-78	WS		CHIEF ENG.
DEVELOP. ENG.			

OHIO BRASS
MANSFIELD, OHIO

115 KV JUMPER ASSEMBLY
TYPE 2SJ

	M & T SALES		4	
	VALVE SALES		83	
*	P. U. SALES			
	PURCHASING			
✓	PRODUCTION		✓	

DRAWING NO. 60282
FILE 30-C SCALE

Attachment B

ESRB Site Visit Observation Report

Date: 8/13/19

Time: 0730 hours

Incident ID: E20171026-01 (Tubbs Fire)

Utility Involved: PG&E

Investigator: Ivan Garcia

Date and Time of Incident: 10/8/2017; 2145 hours

Location of Incident: 1128 Bennett Lane, Calistoga, CA

Summary of Initial Report: On Wednesday, October 26, 2017, near the City of Calistoga, Napa County, CalFire took possession of a set of three in-service distribution line fused cutouts at Fused Cutout 773 on the Calistoga 1101 (12kV) circuit, two sets of in-service transformer fused cutouts, and a secondary service line that had detached from the fire-damaged home at 1128 Bennett Lane. CalFire also took possession of multiple sections of customer-owned overhead conductor that served multiple pieces of customer-owned equipment on the property. No damage to PG&E equipment was readily apparent. This information is preliminary and PG&E is fully cooperating with Cal Fire.

On Thursday, August 8, 2019, ESRB staff learned that plaintiffs' investigators planned to inspect evidence taken down my PG&E. ESRB staff was sent to the incident site for the week of August 12, 2019 to witness this evidence collection.

Reason for Reporting: Fatality

Field Findings:

On August 13, I continued the evidence viewing for the Tubbs Fire at 1128 Bennett Lane in Calistoga at 0730 hours. We began the day with a tailboard with all the people that are listed in the table below. In the tailboard the group discussed the plan to bring down the sections of all three phase #6 copper conductors from Poles 1 through 7 from Figure 1. In addition, PG&E was to also top off 5 feet of each of the seven poles and collect all transformers, fuses, etc. for evidence.

The crew began their work at approximately 0830 hours. The topped off the first pole, Pole 7 and collected three jumpers in addition to the three #6 copper conductors. The conductors from Pole 7 to Pole 6 measured approximately 151 feet and we saw no evidence any damage or burn marks.

On the next pole, Pole 6 the crew brought down a transformer and two fuse cutouts from the 5-foot cut. The section of #6 copper conductors for this span from Pole 6 to Pole 5 had two minor scuffs along the field side conductor. I spoke to Scott Hylton about the marks and he said they were minor but would still document them. This span measured approximately 156 feet.

By this time it was 11 am, PG&E had only topped off two poles and brought down two sections of the conductors. To expedite the evidence collection the plaintiffs stated that their main concern was to photograph and measure the 3 phases of #6 copper conductors from Poles 1 to 7. The also wanted to photograph and document the transformer located at Pole 10 once on the ground. PG&E agreed to stop topping off the 5 feet of each pole after the second pole.

For the next section, Pole 5 to Pole 4, only the #6 conductors were examined and collected. I did not observe any marks on this section of conductors. This span measured approximately 141 feet.

From Pole 4 to 3, the #6 conductors were examined and collected. I did not observe any marks on this section of conductors. This span measured approximately 160 feet.

From Pole 3 to 2, the #6 conductors were examined and collected. I also did not observe any marks on this section of conductors. This span measured approximately 212 feet.

From Pole 2 to 1, the #6 conductors were examined and collected. I observed several burn marks on this section of conductor for all phases. This section of conductors leads up to the tap line at Pole 10. The tap line from Pole 2 to 10 is where CAL FIRE found the where the Tubbs Fire originated from. I took several pictures of this section of conductor and also found several splices on this section. It seems as if this section had been repaired several times in the past due to the number of splices found. I worked with Scott Hylton in identifying the marks and splices. Because there were so many people looking at this section of conductor, Scott said he would provide me with the total number of splices and burn marks found. In either case, PG&E would be taking this section of conductor along with all other conductors to their evidence collection location, Iron Mountain in Oakland for us to view.

The last equipment PG&E collected was the transformer at the top of Pole 10. This transformer was collected, photographed and documented and was to be taken to PG&E's transformer storage facility in Emeryville. I did not see any abnormal conditions with this transformer.

We ended the work day just after 1700 hours. PG&E and the crew members planned to be back at the site location the following day at 0730 hours. There plan was to top of the remaining five poles and collect the equipment associated with each top off. As they would do this, PG&E would also start removing the poles and installing the newer poles in the same process. Brandon Vazquez would be attending the evidence viewing collection the next day.

Witnesses/Person(s) Involved:

Name	Title	Phone Number	Email
Ivan Garcia	Utilities Engineer, CPUC		
Stephen Lee	Utilities Engineer, CPUC	(916) 230-6426	stp@cpuc.ca.gov
Kenneth How	PG&E Event Lead, Principal	(415) 385-8669	kkhb@pge.com
Dan Gracia	PG&E General Foreman		
David Matson	PG&E Foreman		
Jorge Estrada	PG&E AP Source Power		
Ryan Lance	PG&E Journeyman Lineman		
Caleb Hernandez	PG&E Journeyman Lineman		

Robert Trumbull	PG&E		
Jodi Zamora	PG&E Investgator		
Ahmad Shahsiah	Exponent		
Edgar Myer	Crauath		
Don Russell	PG&E Expert		
Greg Magstad	City Rise Traffic		
Jared Cravy	City Rise Traffic		
Scott Hylton	TSH Consulting		
Daniel Luporiup	Crane Operator		
Nick Devere	Crane Rigger		
Ted Hoppe	Cameraman		
Juanita Greentree	Baker Hostetler		
Mark Felling	Electrical Engineer (Plaintiffs)		
Ron Simmons	Electrical Engineer (Plaintiffs)		
Mike Cole	G&G -MTCI		
Jeff Sellon	Electrical Engineer (Plaintiffs)		

Drawing/Photos: *See below. More photos can be found at* *\\sf5filesrv146\esrb\Incidents\2017\2017-10-9 through 10-11 NorCal Fire Incidents\0-Incidents\E20171026-01 - Tubbs\06 - Photos\2019-08-13 Tubbs Field Photos*

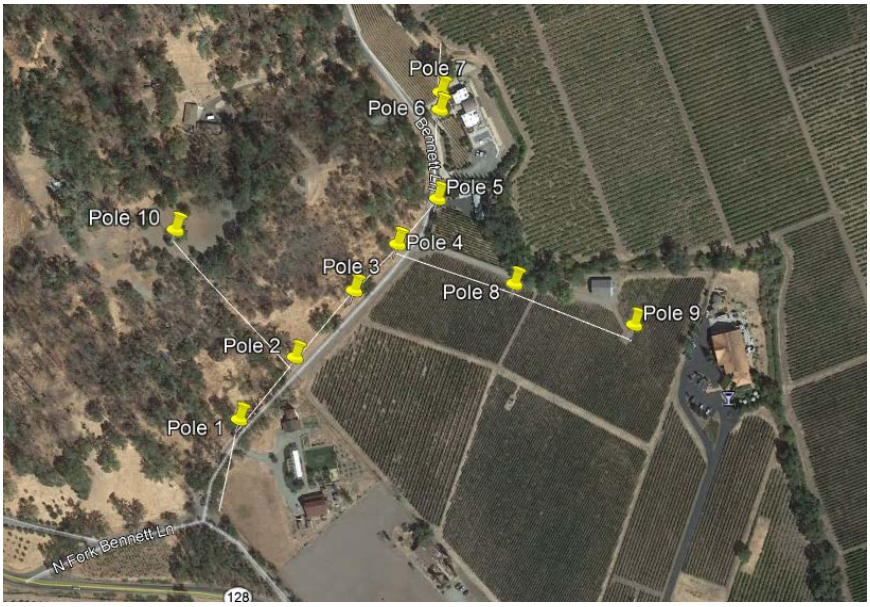


Figure 1: View of the Scene