

SOUTHERN CALIFORNIA EDISON
TRANSMISSION AND DISTRIBUTION

Distribution
Inspection and Maintenance
Program
(DIMP)

2021 — FIRST QUARTER ISSUE
January 29, 2021

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Distribution Inspection and Maintenance Program (DIMP)

Revision Summary

2021 First Quarter Issue

Effective Date: January 29, 2021

Overview

The main purpose of this revision summary is to describe new revisions to this manual. (Some or all of the information may have been previously communicated to field personnel by other means.)

[Table 1](#) lists the revisions. Clickable page/sheet numbers link directly to individual revisions or the first of a series of revisions.

[Table 2](#) defines four types of revisions: (1) Admin (Administrative), (2) Technical, (3) New, and (4) Pilot.

Note: **Admin** and **Technical** revisions to existing standards or existing **Pilot** projects are identified with change bars **|** in the left margin. **New** standards (as well as new pilot projects) do not receive change bars. Editorial revisions, such as corrections to spelling, do not receive change bars.

A [Getting Help](#) section provides contact information.

Table 1: Revisions

Chapter	Page	Description	Type
CG-2	8	Added insulator condition description for primary post-type insulators above 750 volts with universal clamping mechanism.	Admin

Table 2: Revision Types

Type	Definition
Admin	Administrative revisions do not significantly affect design, construction, maintenance or operation of the electrical distribution, substation, and transmission systems. They do not require Standards Review Team (SRT) or management approval; however, they have been approved by other organizations, as appropriate. They may include updates to material codes, updates to references, updates to standards for clarity, or deletions of outdated information.
Technical	Technical revisions are engineering changes to existing standards. They affect the design, construction, maintenance or operation of the electrical distribution, substation, and transmission systems. They require SRT and management approval.
New	Refers to a new standard. New technical standards require SRT and management approval.
Pilot	A <i>Pilot</i> is an in-field evaluation of a piece of equipment or work method, with the intention of approving for standardized use. Pilot standards will have a PILOT watermark so that they are easily identified throughout this manual.

Getting Help

Technical Issues

If you have any comments, corrections, questions, or suggestions concerning manual revisions, please contact one of the following individuals at the numbers provided, or click on the name to send an email:

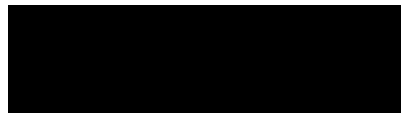
• 

Address Corrections

Send address changes to:

Southern California Edison
7400 Fenwick Lane
Westminster, CA 92683-5288

ATTN: Alaira Bilek



Russell Ragsdale
Director, Asset and Engineering Strategy


GE-TOC: General

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GE-1: General Overview of Distribution Inspection and Maintenance Program

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GE–1: General Overview of Distribution Inspection and Maintenance Program

1.0 Introduction

1.1 Mission Statement

The Distribution Inspection and Maintenance Program (DIMP) seeks to ensure public and worker safety and regulatory compliance by completing scheduled Detailed Inspections and Grid Patrols, as described in Chapter IM-2 of the Distribution Operations Maintenance Policies and Procedures (DOM) Manual and in conformity to the California Public Utilities Commission's (CPUC) General Order (G.O.) 165 and performing Distribution Maintenance, as described in Chapter IM-3 of the DOM, in accordance with G.O. 95, G.O.128, SCE standards, and good utility practice.

The purpose of this manual is to provide guidance to the field inspectors who perform detailed inspections and patrols. This manual also provides the guidelines for G.O. 95/128 infractions and maintenance activities to be properly identified, correctly rated, and recorded in a timely manner.

1.2 Program Overview

The DIMP is an ongoing Company-wide program established to maintain the distribution system in accordance with good utility practices and the CPUC's G.O. 95, G.O. 128, and G.O. 165.

SCE has developed and improved its various maintenance and inspection programs to ensure the safety of its workers and the general public, as well as to provide reliable service to our customers.

General Order 165 was enacted on March 31, 1997 to establish maximum time intervals of inspection frequency of all electric distribution facilities within the jurisdiction of the CPUC. The basic premise of G.O. 165 is that all distribution assets must be patrolled every year for safety and reliability issues and the identification of significant G.O. 95 and 128 discrepancies. General Order 165 also requires these same assets to have a close up detailed inspection every 5 years (or less) to identify safety and reliability issues as well as all G.O. 95 and 128 discrepancies.

DIMP is SCE's approach to combining these two worthwhile endeavors into one efficient and cost effective program. This is a very large undertaking for SCE as there are over 2 million assets to be inspected and numerous SCE organizations involved.

1.3 Organizational Responsibilities

A. Maintenance and Inspection

Maintenance and Inspection (M&I) is responsible for oversight and improvement of the DIMP, including:

- ☐ Resolving all CPUC audits of G.O. 95/128/165
- ☐ Submitting G.O. 165 report annually
- ☐ Strategic direction of the M&I program and governance of policies, including frequency, scope, inspection criteria, corrective action time frames, and documentation of inspection and repair requirements
- ☐ Providing technical advisory staff

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- ☐ Providing annual and informal training
- ☐ Developing performance measures
- ☐ Analyzing and tracking program department performance
- ☐ Providing staff to manage audits conducted by the CPUC

B. Distribution Construction and Maintenance

Distribution Construction and Maintenance is responsible for identifying and scheduling resources to achieve program goals and seeking to ensure:

- ☐ Detail Inspections are completed correctly and timely
- ☐ Annual Grid Patrols (AGPs) are completed correctly and timely
- ☐ Discrepancies are identified and rated correctly
- ☐ Rated discrepancies are recorded timely
- ☐ Priority 2 rated discrepancies are reviewed prior to Work Management System (WMS) upload
- ☐ Resultant Maintenance is scheduled properly
- ☐ Maintenance is completed safely and according to policy

C. Apparatus Division

Apparatus Division is responsible for identifying equipment in [IN-1, Attachment 1-1](#) to allocate resources for achieving program goals and seeking to ensure:

- ☐ Assigned inspections are completed correctly and timely
- ☐ Infractions and maintenance activities are identified, rated correctly, and recorded timely
- ☐ Maintenance is completed safely and according to policy


D. Performance Management and Analysis

Performance Management and Analysis is responsible for identifying and allocating resources to achieve DIMP goals and seeking to ensure:

- ☐ Work Management System (WMS) inspection and maintenance documentation errors are identified and corrected
- ☐ Pending and completed inspection and maintenance activities are tracked
- ☐ Tracking and reporting on the following G.O. 165 mandated activities:
 - Annual Grid Patrols
 - Overhead Detailed Inspections
 - Underground Detailed Inspections
 - Streetlight Patrols
 - Intrusive Pole Inspections

E. System Support and Administration

System Support and Administration is responsible for identifying and allocating resources to achieve DIMP goals by ensuring recording devices and the Work Management System are functioning properly.

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F. Oversight and Quality Control

Oversight & Quality Control is responsible for administering an effective quality assurance program, assessing compliance with regulatory requirements and supporting continuous improvement of the DIMP.

G. Environmental Requirements

For equipment inspection activities that occur in open space areas and/or on public lands, activities must follow the applicable environmental requirements. Activities conducted in natural areas, areas with historic or cultural resources, or areas in or adjacent to wetlands or waters have the highest potential for impacts. It is important to avoid impacts to the greatest extent possible on private or public lands; but we must be particularly sensitive when working on public lands such as U.S. Forest Service, National or State Parks, and Bureau of Land Management properties. Of special concern are sensitive species and their habitats, waterways, associated upland areas, and archaeological resources.

To reduce potential impacts to environmental resources and to ensure public land management agencies are notified as appropriate, engage the Environmental Services Department (ESD) [REDACTED] or (833) 723-2362. Additionally, contact the ESD for further guidance if these guidelines cannot be followed to complete inspections in a safe manner, or if there is a change in inspection scope. For inspections occurring within public lands, contact Government Lands for applicable access requirements [REDACTED]. Refer to [DOM IM-8](#) for environmental guidelines.

2.0 Action Prioritization

There are three basic elements to the overall inspection program: 1) Identification of actionable items, 2) Risk assessment and action prioritization, and 3) Actual repairs

2.1 Identification and Repair of Actionable Items

Information required to identify and repair actionable items (Items 1 and 3 above) are contained in the various SCE standards manuals as well as G.O. 95 and 128. The Condition Tables included in this document provide typical conditions, criteria and tests that have associated Priority 1 and 2 ratings. These tables are intended only to serve as aids, and do not, nor cannot, contain all the possible safety and reliability issues and/or General Order discrepancies that the inspector is expected to identify.

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2.2 Risk Assessment and Action Prioritization

Risk assessment and prioritization of repair efforts for these actionable items (Item 2 above) requires evaluation of site and equipment specific conditions by the inspector to determine the appropriate priority rating and action time frame.

A. Rating System

The program utilizes three priority ratings. The three priority rating system is designed to identify those action items that are obvious 'safety and reliability' issues (defined as a condition which presents a hazard to workers or the public, or may cause a system failure), and to set action time frames that result in appropriate overall time frames for repair. The three priority system uses "1" as the highest maintenance priority progressing down to "3" as the lowest. The three priorities are as follows:

1. Priority 1

- Immediate action required to address high risk safety or reliability issues

2. Priority 2

- Zero to 24 months, based on the Risk Assessment principles
- Zero to 12 months, based on the Risk Assessment principles within High Fire Risk Areas.

3. Priority 3

- General Order 95/128 infractions that are not an imminent safety and/or reliability risk
- Flag for various replacement programs

B. Maintenance Priority Accuracy

Maintenance priorities will be thoroughly evaluated and accurately assigned and maintained. Training and continuing analysis will take place to prevent premature maintenance, and to prevent failure prior to repair or the next scheduled inspection.

A discrepancy not yet entered into WMS can be re-rated when being reviewed by a Gatekeeper (supervisor with qualified electrical worker knowledge) who clearly demonstrates that it was prioritized incorrectly. The discrepancy should then be entered into WMS with the appropriate priority.

2.3 Actual Repairs

Repairs shall be made in conformance with established internal standards. When performing Priority 2 maintenance work, all pending Priority 2 and Priority 3 work on the structure shall be repaired as long as it does not exceed the qualifications of the crew.

3.0 Attachments

[Attachment 1–1: Assigning Priority Levels](#)

[Attachment 1–2: Risk Assessment Matrix — Things to Consider when Assessing a Condition](#)

[Attachment 1–3: Risk Assessment Matrix](#)

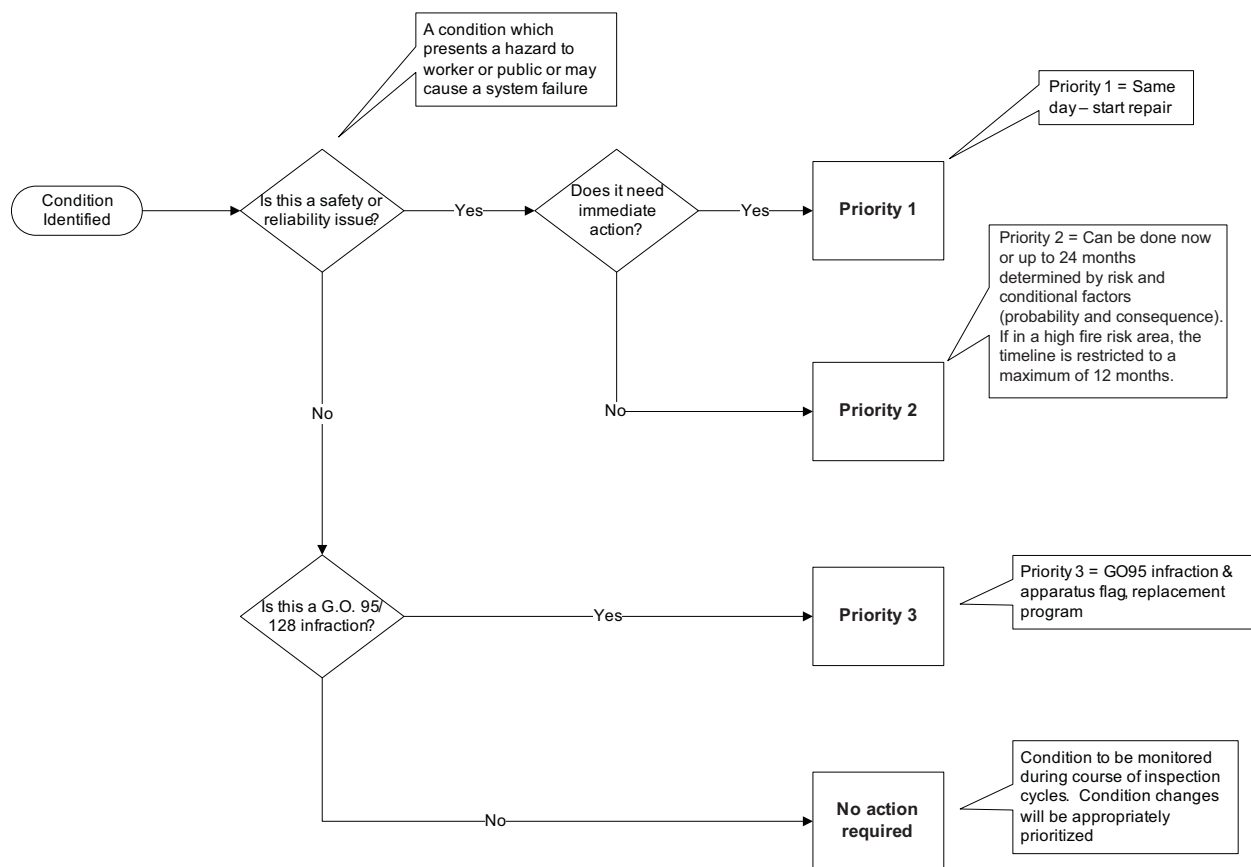
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Attachment 1–1: Assigning Priority Levels

Once a condition is identified, the following questions should be answered to determine the prioritization:

- ☐ Is this a risk to safety and/or reliability?
- ☐ If “Yes,” does this require immediate action?
 - If “Yes,” then Priority 1
 - If “No,” then Priority 2
- ☐ If “No,” is this a specific G.O. 95/128 infraction?
 - If “Yes,” then Priority 3
 - If “No,” then no action is required

Figure 1–1: Priority Inspection Decision Flowchart



Once a condition has been determined to be a Priority 2, the inspector performs a risk assessment to properly establish a reasonable time frame within zero (0) to 24 months. This is done by assessing the condition through determination of the safety and reliability factors in accordance with [Attachment 1–2: Risk Assessment Matrix — Things to Consider when Assessing a Condition](#), and then applying this information to the risk assessment, [Attachment 1–3: Risk Assessment Matrix](#).

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Attachment 1–2: Risk Assessment Matrix — Things to Consider when Assessing a Condition



NOTE

Each problem or condition is independent from each other.

Determine Safety Factors

Factors to Consider when Assessing the Safety Risk

Public Worker Safety	Property	Environmental
<ul style="list-style-type: none"> •Near a school/park •In front of a mall •Rear property line •Behind a commercial strip center •In a vacant field •Minor pedestrian traffic •Major intersection •Impossible climbing space 	<ul style="list-style-type: none"> •In a parking lot •In an agricultural area •In a vacant field 	<ul style="list-style-type: none"> •In the desert •In coastal areas •Mountainous •Urban/Rural •Time of season <ul style="list-style-type: none"> –High wind –Rainy –High heat –Snow •Protective habitats •Hazardous spills •In a high fire risk area
<p>It is important to note that no one factor weighs more than another. Only after you have considered all your surroundings, People/Property/Environment, can you make a true assessment of the risk. Refer to DOM IM-8 for environmental guidelines.</p>		

Identifying the Safety Risk Impact Levels

No/Slight Safety Impact	Any Condition which has <i>LITTLE/NO</i> safety risk to public or worker safety/Property/Environment.
Minor Safety Impact	Any Condition which has <i>MINOR</i> safety risk to public or worker safety/Property/Environment.
Moderate Safety Impact	Any Condition which has <i>MODERATE</i> safety risk to public or worker safety/Property/Environment.
High Safety Impact	Any Condition which has <i>HIGH</i> safety risk to public or worker safety/Property/Environment.

Attachment 1–2: Risk Assessment Matrix — Things to Consider when Assessing a Condition
(Continued)



NOTE

Each problem or condition is independent from another.


Determine Reliability Factors

CONSTRUCTION TYPE

- ☐ What is the component the condition is associated to?
- ☐ What is the construction type of the component?
- ☐ Is there any electrical equipment associated to the component?
- ☐ Where is the condition located on the component?
- ☐ What is the stress factor?
 - Weight: high/medium/low
 - Span length: long/medium/short

CIRCUIT TYPE/LOCATION

- ☐ What is the highest voltage “Directly” associated to the component?
- ☐ What is the highest voltage “Indirectly” associated to component?
- ☐ What is the load factor: High/Medium/Low
- ☐ Is component located behind any fusing?

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Attachment 1–3: Risk Assessment Matrix

Reliability (Failure Risk)	Component Failure could lead to System Failure	Priority 2 Action Required 13-24 Months	Priority 2 Action Required 4-12 Months	Priority 2 Action Required 0-3 Months	Priority 1 Action Required Immediately
	Component Has Failed No significant risk to system	Priority 3/No Action Required Only 95/128 Infractions Recorded	Priority 2 Action Required 13-24 Months	Priority 2 Action Required 4-12 Months	Priority 2 Action Required 0-3 Months
	Potential Component Failure	Priority 3/No Action Required Only 95/128 Infractions Recorded	Priority 3/No Action Required Only 95/128 Infractions Recorded	Priority 2 Action Required 13-24 Months	Priority 2 Action Required 4-12 Months
		No/Slight Impact	Minor Impact	Moderate Impact	High Impact
Safety (People/Property/Environment)					

Note(s):

1. This "Risk Assessment Matrix" is a training tool intended to give inspectors guidelines to assign a reasonable time frame for the

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GE-2: Inspection and Maintenance Training

1.0 Purpose

Training for the SCE Distribution Inspection and Maintenance Program will promote safety and circuit reliability on all electrical distribution facilities for both underground and overhead systems through routine inspections.

2.0 Training Objectives

Initial training and annual refresher training is mandatory and will be provided to all personnel inspecting distribution assets to ensure SCE will meet all inspection and maintenance objectives. These objectives include:

- Using proper field inspection procedures
- Accurately and timely documenting and reporting findings via the Work Management System (WMS)
- Prioritizing items identified for follow-up maintenance
- Compliance with CPUC-required maintenance cycles on structures, equipment, conductors and/or components

Inspectors will be tested at completion of training.

3.0 Operations

The Manager of Maintenance and Inspection is responsible for determination of training program requirements.

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4.0 References

- 4.1 [CPUC G.O. 95, Rules for Overhead Electric Line Construction](#)
- 4.2 [CPUC G.O. 128, Rules for Construction of Underground Electric Supply and Communication Systems](#)
- 4.3 [CPUC G.O. 165, Inspection Cycles for Electric Distribution Facilities](#)
- 4.4 [SCE Distribution Overhead Construction Standards \(DOH\)](#)
- 4.5 [SCE Distribution Underground Construction Standards \(DUG\)](#)
- 4.6 [SCE Distribution Operations and Maintenance Policies and Procedures \(DOM\)](#)
- 4.7 [SCE Accident Prevention Manual \(APM\)](#)
- 4.8 [SCE Environmental Policies and Procedures \(EN\)](#) and [ESD Waste Management Manual](#)
- 4.9 Distribution Maintenance Program
- 4.10 Work Management System
- 4.11 Underground Corrosion Inspection and Maintenance Manual
- 4.12 SCE Training Manual for Performing Grid Patrol, Detail Inspection and Intrusive Inspection of Wood Pole Structures

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IN-1: Overhead Detail Inspections

1.0 Purpose

The purpose of the overhead detail inspection (ODI) is to visually evaluate SCE's overhead electrical distribution facilities with the intent to identify and document obvious discrepancies and validate accuracy of asset information and facility inventory mapping references for appropriate corrective action. Inspectors also identify and perform certain maintenance tasks during the course of a detailed inspection. Overhead detail inspections also accomplish the annual patrol of the grid.

2.0 Methods and Procedures

The inspector performs a close in-depth visual inspection of all the overhead electrical distribution facilities within the assigned inspection area. The frequency of ODI is directed elsewhere in this chapter, and in the Distribution Operations and Maintenance Policies and Procedures (DOM) manual.

3.0 Duties of the Inspector

The inspector performs the following tasks for each facility detailed inspection:

3.1 Identification of Discrepancies per the OH Detailed Inspection Guidelines

The ODI inspector performs an in-depth visual examination of each overhead distribution facility using the following Detailed Inspection Guidelines as a guideline. This list is a high level summary of the items and areas to inspect. Additional information showing typical conditions requiring corrective action (Priorities 1 and 2) is shown in the applicable overhead equipment and component Condition Guide attached.

The inspector also identifies and reports any G.O. 95/128 infractions created on or near Distribution facilities by non-utility third parties that are not subject to CPUC jurisdiction.

3.2 Establishment of Priorities per the Priority Decision Flowchart


Once the inspector has identified a condition requiring action, a risk assessment is performed using the Priority Decision Flowchart. This process helps identify the appropriate priority of the condition. The highest priorities are for those items that pose a safety hazard to the public or employees or could present a reliability threat to the system.

3.3 Establishment of Action Time Frames for Each Identified Priority 2 Condition per the Condition Guides, Condition Risk Assessment Matrix

Only Priority 1 and 2 conditions have action time frames for mitigation. Priority 1 requires same day or immediate action thus no action time frame decision is required from the inspector. As discussed in the General Section of this manual, Priority 2 conditions have zero (0) to 24-month time frame options depending on the severity of the situation (unless in a high fire risk area.)

3.4 Performance of Appropriate Minor Repairs at the "Public" Level

The ODI inspector makes minor repairs at the Public level while at the site for the detailed inspection, rather than having other SCE personnel return at a later time to make the repairs.

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The following is a list of repairs that the ODI inspector performs:

- ☐ Repair damaged ground molding.
- ☐ Install new and/or repair existing guy guard.
- ☐ Repair damaged visibility strips or install new strips in locations where necessary.
- ☐ Install or repair riser strap.
- ☐ Install pole number.
- ☐ Remove unauthorized attachments when safe to do so.

Overhead structures present unique public safety exposure and work conditions depending on the height of the necessary repairs from the ground level where public exposure exists.

3.5 Validation of Accuracy of Asset Information and Facility Inventory Mapping References

While at the facility site, the ODI inspector performs the following:

- ☐ Records corrections—found assets, missing assets, asset corrections.
- ☐ Mapping corrections

3.6 Document in the Field Tool

Refer to the Work Management System (WMS) procedures manual.


4.0 References

- 4.1 [CPUC G.O. 95, Rules for Overhead Electric Line Construction](#)
- 4.2 [CPUC G.O. 165, Inspection Cycles for Electric Distribution Facilities](#)
- 4.3 [SCE Distribution Overhead Construction Standards \(DOH\)](#)
- 4.4 [SCE Distribution Operations and Maintenance Policies and Procedures \(DOM\)](#)
- 4.5 [SCE Accident Prevention Manual \(APM\)](#)
- 4.6 [SCE Environmental Policies and Procedures \(EN\)](#) and [ESD Waste Management Manual](#)
- 4.7 Distribution Maintenance Program
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5.0 Attachments

[Attachment 1–1: Overhead Detailed Inspection Guideline](#)

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Attachment 1–1: Overhead Detailed Inspection Guideline

1. Condition of Equipment, Apparatus, and Hardware


- ☐ Broken, chipped, or severely contaminated insulators/Primary insulator or pin above 750 V (cracked/damaged/loose)
- ☐ Pole switch indicating need for repair
- ☐ Indication of equipment oil leak
- ☐ Bulged or discolored capacitor units
- ☐ Blown or dry fuses, blown surge arresters, broken fuseholders
- ☐ Streetlights broken or damaged
- ☐ Animals, birds, foreign material interfering with operation
- ☐ Evidence of tracking or burning
- ☐ Broken pins or squatters (primary or secondary)
- ☐ Broken, bent pole steps
- ☐ Damaged or missing ground wire molding or ground wire exposed
- ☐ Condition of transformer's Internal Fault Detector (IFD), if so equipped; see [DOM](#), TR–9.

2. Condition of Pole and Structures

- ☐ Damage/deteriorated pole
- ☐ Crossarm broken, split, or extremely canted
- ☐ Washout or excavation around pole or anchor
- ☐ Check pole setting depth marked from brand. (Brands are at 10 feet on 60-foot poles and less; at 13 feet for poles taller than 60 feet.)
- ☐ Damage down guys, guy guard missing (Install guard where required.)
- ☐ Excessive slack on down guys or span guys
- ☐ Six-foot Fiberglass Guy Strain Insulator installed (upgrade to standard 12-foot version)
- ☐ Visually check pad-mounted equipment for movement and cabinet secured or locked.
- ☐ Visually check BURD lids, vault lids, vent pipes, and handhole lids.

3. Conductors and Covered Conductors

- ☐ Inadequate primary, secondary, or service ground clearances
- ☐ Exposed conductor (covering falling off) – service drops, secondary, and primary
- ☐ Excessive slack in primary conductors in high wind areas
- ☐ Clearance from building, television or radio antenna, billboard signs, scaffolding, streetlights, communication cable or hazardous locations for primary, secondary or services
- ☐ Trees touching or above primary conductors or covered conductors (overhangs) unless special encased aerial bundled cable (18 inches required)
- ☐ Hazardous tree conditions, limbs over wire, dead or decaying trees, palm fronds
- ☐ Foreign objects in line, such as kites, Mylar balloons
- ☐ Bare conductors in rack construction
- ☐ Bare service drops
- ☐ Deflection, strain or abrasion on service drops and secondaries
- ☐ Abandoned conductors

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4. Risers

- ☐ Riser straps, blocks broken
- ☐ Opening in riser conduit coupling, damaged
- ☐ Riser in climbing space in rack construction

5. Climbing Space

- ☐ Obstructions in climbing space (bolts, wire)
- ☐ Climbing space obstructed by cable TV or phone, and a hazard to climb

6. General Conditions


- ☐ Unlocked substations, pole switches, equipment
- ☐ Verify circuit-to-circuit map for additional equipment and tap lines not identified.
- ☐ Check status of fault indicators with circuit map inventory.
- ☐ Validate asset information – maps, asset characteristics, location
- ☐ Unauthorized attachments
- ☐ Foreign attachments to SCE ground

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Attachment 1–2: Frequency of Apparatus Inspections

Facility/Equipment ^{a/}	Inspection Frequency (yr)	DOM Section
<u>Apparatus</u>		
Capacitors, Fixed (Overhead)	5	CA–1
Capacitors,. Fixed (Padmounted)	5	CA–1
Capacitors,. Switched (Overhead)	5	CA–2, CA–3, CA–4
Capacitors, Switched (Padmounted)	5	CA–2, CA–3, CA–4
Fault Interrupters (Padmounted)	5	SW–9, SW–12
Fault interrupters (Underground)	3	SW–9
Network Protectors	1	PD–3
Preferred Emergency Equipment (Overhead & Padmounted)	5	SW–8
Preferred Emergency Equipment. (Underground)	3	SW–8
Reclosers (Overhead)	5	SW–1
Reclosers (Padmounted)	5	SW–13
Regulators	5	TR–4
Remote Controlled Switches (Underground)	3	SW–11
Remote Controlled Switches (Overhead & Padmounted)	5	SW–11

^{a/} For inspection frequencies of equipment located in customer substations, co-generation interface sub-stations and small power-production interface substations, see [DOM SC-1](#).

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IN-2: Inspection Procedures — Grid Patrols

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IN-2: Inspection Procedures — Grid Patrols

1.0 Purpose

The purpose of the grid patrol is to visually evaluate SCE's electrical distribution facilities with the intent to identify and document obvious discrepancies that require corrective action.

2.0 Methods and Procedures

The grid patrol inspector performs a simple visual inspection of publicly accessible electrical distribution facilities within the assigned inspection area. The frequency of ODI is directed elsewhere in this chapter, and in the [Distribution Operations and Maintenance Policies and Procedures \(DOM\) manual](#).

The inspections can be performed from vehicles, on foot, or by aircraft. The vehicle method is the most used as it provides the required accuracy while being cost effective. The problem conditions can generally be seen adequately by the naked eye or through the use of binoculars. The Patrol does not require the climbing of overhead structures (poles) or the opening of underground structures and equipment. Inspectors shall attempt to inspect all assigned structures from the ground when safe and practical to do so. If a portion of the circuit cannot be safely and/or cost effectively inspected from the ground, then that portion shall be bypassed and clearly documented in red on the inventory maps for follow-up air patrol.

Underground facilities such as pad-mounted transformers, BURD enclosures, vent pipes, handholes, and subsurface structure lids are also included as items to be visually observed for public safety hazards during a Grid Patrol. Underground portions of the circuit, including pad-mounted equipment, that are located on rear property lines, within private property, or in limited access communities do not require a patrol as these structures and equipment are in a controlled environment. In these cases the Underground Detail Inspection will be used to ensure compliance.

3.0 Duties of Grid Patrol Inspector


The grid patrol inspector performs the following tasks for each facility in the grid:

3.1 Identification of Hazards and/or Discrepancies per the Grid Patrol Guideline

The grid patrol inspector shall perform a routine visual examination of each overhead distribution facility using the following Grid Patrol Guideline as a guideline. This list is a high level summary of the items and areas to inspect. Additional information showing typical conditions requiring corrective action (Priorities 1 and 2) is shown in the applicable equipment and component Condition Guide attached. Priority 3 conditions are generally not identified or documented as part of a grid patrol.

3.2 Establishment of Priorities per the Priority Decision Flowchart

Once the inspector has identified a condition requiring action, a risk assessment is performed using the Priority Decision Flowchart. This process helps identify the appropriate priority of the condition. The highest priorities are for those items that pose a safety hazard to the public or employees or could present a reliability threat to the system.

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3.3 Establishment of Action Time Frames for Each Identified Priority 2 Condition per the Condition Guides, Condition Risk Assessment Matrix

Only Priority 1 and 2 conditions have action time frames for mitigation. Priority 1 requires same day or immediate action thus no action time frame decision is required from the inspector. As discussed in the General Section of this manual, Priority 2 conditions have zero (0) to 24-month time frames (unless in a high fire risk area).

3.4 Performance of Appropriate Routine Repairs

The inspector also repairs or installs new guy guard/markers on down guys in general public proximity or exposed to pedestrians, areas easily accessible to the general public, parking lots, or areas exposed to vehicular contact. Any repair by inspector during a patrol will be recorded in the field tool.

3.5 Document in the Field Tool


Refer to the Work Management System (WMS) procedure manual.

4.0 References

- 4.1 [CPUC G.O. 95, Rules for Overhead Electric Line Construction](#)
- 4.2 [CPUC G.O. 165, Inspection Cycles for Electric Distribution Facilities](#)
- 4.3 [SCE Distribution Overhead Construction Standards \(DOH\)](#)
- 4.4 [SCE Distribution Operations and Maintenance Policies and Procedures \(DOM\)](#)
- 4.5 [SCE Accident Prevention Manual \(APM\)](#)
- 4.6 [SCE Environmental Policies and Procedures \(EN\) & ESD Waste Management Manual](#)
- 4.7 Distribution Maintenance Program
- 4.8 Work Management System

5.0 Attachments

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Attachment 2–1: Grid Patrol Guideline

1. Condition of Equipment, Apparatus, and Hardware

- ☐ Broken, chipped, or severely contaminated insulators/Primary insulator or pin above 750 V (cracked/damaged/loose)
- ☐ Pole switch indicating need for repair
- ☐ Indication of equipment oil leak
- ☐ Bulged or discolored capacitor units
- ☐ Blown or dry fuses, blown surge arresters, broken fuse-holders
- ☐ Streetlights broken or damaged — public hazard
- ☐ Animals, birds, foreign material interfering with operation
- ☐ Evidence of tracking or burning
- ☐ Broken pins or squatters (primary or secondary)

2. Condition of Pole and Structures

- ☐ Damage/deteriorated pole
- ☐ Crossarm broken, split, or extremely canted
- ☐ Washout or excavation around pole or anchor
- ☐ Damage down guys, guy guard missing — public hazard
- ☐ Excessive slack on down guys or span guys — clearance problem or pole integrity issue
- ☐ Visually check pad-mounted equipment for movement and cabinet secured or locked.
- ☐ Visually check BURD lids, subsurface structure lids, vent pipes, and handhole lids.

3. Conductors

- ☐ Inadequate primary, secondary, or service ground clearances
- ☐ Excessive slack in primary conductors in high wind areas
- ☐ Clearance from building, television or radio antenna, billboard signs, scaffolding, streetlights, communication cable or hazardous locations for primary, secondary or services
- ☐ Trees touching or above primary conductors (overhangs) unless special encased tree cable (18 inches required)
- ☐ Hazardous tree conditions, limbs over wire, dead or decaying trees, palm fronds
- ☐ Foreign objects in line, such as kites, Mylar balloons

4. Risers

- ☐ Riser straps, blocks broken, unattached — public hazard
- ☐ Opening in riser conduit coupling, damaged conductor — public hazard

5. General Conditions

- ☐ Unlocked substations, pole switches, equipment

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IN-3: Inspection Procedures — Underground Detail Inspections

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IN-3: Inspection Procedures — Underground Detail Inspections

1.0 Purpose

The purpose of the underground detail inspection (UDI) is to give a visual evaluation of SCE's underground electrical distribution assets with the intent to identify and document obvious discrepancies and/or California Public Utility Commission (CPUC) General Order (G.O.) 128 discrepancies for appropriate corrective action.

2.0 Methods and Procedures

The UDI inspector performs a close in-depth visual inspection of all the underground electrical distribution assets per inspection orders. UDI frequency is identified in the Distribution Operations and Maintenance Policies and Procedures (DOM) manual, Chapter IM-1: Distribution Inspection and Maintenance Program.

3.0 Duties of Underground Detail Inspector

The UDI inspector performs the following tasks as appropriate for each facility detailed inspection:

3.1 Identification of Discrepancies per the Underground Detailed Inspection Guidelines.

The UDI inspector performs an in-depth visual examination of each underground distribution facility using the following UG Detailed Inspection Guidelines (Structure, Equipment and Apparatus Equipment) as minimum guides. These lists are high level summaries of the items and areas to inspect. Additional information regarding the extent of the condition is shown in underground equipment and component Condition and Corrosion Guides attached. Inspectors will inspect and report on all equipment within a structure, and confirm the configuration numbering of the equipment.

The UDI inspector also identifies and reports any G.O. 128 infractions created on or near Distribution facilities by non-utility third parties that are not subject to CPUC jurisdiction.



NOTE


Inspectors will comply with the Confined Space Safety Initiative (CSSI), when inspectors are entering a Confined Space/Other Confined Space (CS/OCS).

3.2 Establishment of Priorities per the Priority Decision Flowchart

Once the inspector has identified a condition requiring action, a risk assessment is performed using the Priority Decision Flowchart. This process helps identify the appropriate priority of the condition. The highest priorities are for those items that pose a safety hazard to the public or employees or could present a reliability threat to the system.

3.3 Establishment of Action Time Frames for Each Identified Priority 2 Condition per the Condition and Corrosion Guides, Condition Risk Assessment Matrix

Only Priority 1 and 2 conditions have action time frames for mitigation. Priority 1 requires same day or immediate action thus no action time frame decision is required from the inspector. As discussed in the General Section of this manual, Priority 2 conditions have a zero (0) to 24-month time frame (unless in a high fire risk area).

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3.4 Performance of Appropriate Routine Repairs

- ☐ The UDI inspector will make routine repairs while at the site for the detailed inspection, rather than having other SCE personnel return at a later time to make the repairs.
- ☐ Inspectors will perform structure cleanup of debris or materials prior to leaving the structure.

3.5 Validation of Accuracy of Asset Information and Facility Inventory Mapping references

It is extremely important that SCE's records be as accurate as possible. The UDI inspector is a valuable force in realizing this goal. While at the facility site, the UDI inspector shall perform the following:

- ☐ Records corrections—found assets, missing assets, asset corrections
- ☐ Mapping corrections

3.6 Document in the Field Tool


Refer to the Work Management System (WMS) Procedure Manual.

4.0 References

- 4.1 [CPUC G.O. 128, Rules for Construction of Underground Electric Supply and Communication Systems](#)
- 4.2 [CPUC G.O. 165, Inspection Cycles for Electric Distribution Facilities](#)
- 4.3 [SCE Distribution Underground Construction Standards \(DUG\)](#)
- 4.4 The following chapters of [SCE Distribution Operations and Maintenance Policies and Procedures \(DOM\)](#)
 - CP-3 Vault Sump Pumps
 - TE-5 Infrared Heat Sensing Devices-Underground Equipment
 - TE-6 Safe-T-Mate/GT-2400 Gas and Oxygen Monitors
 - TR-7 Vault Blowers
- 4.5 [SCE Accident Prevention Manual \(APM\)](#)
- 4.6 [SCE Environmental Policies and Procedures \(EN\)](#) and [ESD Waste Management Manual](#)
- 4.7 Distribution Maintenance Program
- 4.8 Work Management System
- 4.9 Underground Corrosion Inspection and Maintenance Manual

5.0 Attachments

[Attachment 3–1: Underground Structure Detail Inspection Guideline](#)

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Attachment 3–1: Underground Structure Detail Inspection Guideline


EXTERNAL PROCEDURE CHECKLIST

- ☐ Prior to and after entering a structure, perform a general thermal scan for hot spots in structure and all equipment, cable, terminations, and splices.
- ☐ Check for missing or damaged manhole lid gasket/seal rope.
- ☐ Check air vents for damage and presence of shields around vent standpipe in landscaped areas.
- ☐ Check vault lid (equipment cover) seal (felt) and lifting hole plugs.
- ☐ Check manhole and vault lid for any openings where small objects can be inserted.
- ☐ Check for any visual damage to manhole cover.
- ☐ Check for evidence of water ponding on top of the structure.
- ☐ Check for missing/damaged bolts or penta bolts.
- ☐ Check for debris in or around structures.(Good Housekeeping)
- ☐ Check for visual hazards.
- ☐ Check for structure movement.
- ☐ Verify that HIGH VOLTAGE signs and the structure number are legible.
- ☐ Check for exterior damage to structure.
- ☐ Check for sufficient work space around structure.
- ☐ Check that traffic barrier(s) are in place and that adequate clearance exists in front of structure.
- ☐ Check for deterioration of concrete.
- ☐ Check for signs of corrosion (specifically inspect weld seams, corners, door hinges, and enclosure roof.).
- ☐ Check that the structure is sound and secure.]
- ☐ Check for openings in structure which may allow the passage of wire, or other conducting material into the structure from the outside.
- ☐ Check for exterior damage to adjacent service handholes or splice boxes.
- ☐ Secure lids/covers prior to leaving site.
- ☐ Check for 3-inch backfill of soil on pads.



NOTE

The above list is to be used as a guide only and inspection should not be limited to the list.

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Attachment 3–1: Underground Structure Detail Inspection Guideline (*Continued*)

INTERNAL PROCEDURE CHECKLIST

- ☐ Check that restraint system is intact (connected per UGS MH 319, VA 410, FC 670, or FC 626).
- ☐ Check for water inside the structure.
- ☐ Check for sand, dirt, mud, signs of vermin, and debris.
- ☐ Verify cable tags.
- ☐ Verify that cable clearances are adequate, not rubbing on sharp edges.
- ☐ Check that duct plugs are installed and in good working order in all necessary ducts.
- ☐ Check if the vent is leaking, or shows signs of previous leaking.
- ☐ Check for corrosion of ground rods and cables and all ground connections are proper.
- ☐ Check for concrete spalling and exposed rebar per UGS MC 860.
- ☐ Remove debris and loose materials from inside structure.
- ☐ Inspect shoring (if present) for signs of delamination, discoloration, or corrosion of metal components.


ADDITIONAL CHECKLIST (VOLTEK STRUCTURE)

- ☐ Signs of splitting or fraying and swelling on any of the composite panels.
- ☐ Check column beams between the wall panels for signs of warping and deterioration.
- ☐ Signs of loose embedded unistrut.
- ☐ Check duct bank and grade rings for deterioration. Any part of the walks or ceiling bulging (out of plumb.)



NOTE

The above lists are to be used as guides only and inspection should not be limited to the lists.

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Attachment 3–1: Underground Structure Detail Inspection Guideline (*Continued*)


EQUIPMENT CHECKLIST

- ☐ Prior to and after entering a structure, perform a detailed thermal scan for hot spots on structure and all equipment, cable, terminations, and splices.
- ☐ Check for signs of termination overheating or distortion.
- ☐ Check for signs of corrosion, oil leakage, and low oil levels.
- ☐ Check for signs of severe rusting of all restraint hardware (that is, turnbuckle, chains, anchors, and shackles).
- ☐ Check operation of vault blower (transformer structures) and perform maintenance.
- ☐ Check operation of sump pumps and perform maintenance.
- ☐ Check for scratches or abrasion to bare metal on equipment.
- ☐ Inspect weld seams.
- ☐ Inspect external operating mechanism.
- ☐ Inspect operating shaft seals.
- ☐ Inspect gaskets (cover, cableheads).
- ☐ Inspect oil fill plug and sight gauge seals.
- ☐ Inspect tightness of hold-down bails.
- ☐ Inspect condition of marine-coating.
- ☐ Inspect fuse carriers for proper locking and sealing.
- ☐ Check for sufficient work space around equipment.
- ☐ Verify appropriate signs are legible, that is, signs for ownership, clearance requirements, ferroresonant condition, switch feeding a capacitor bank.
- ☐ Check for signs of contamination, tracking, or deterioration of insulating barriers and arc interrupting chutes.
- ☐ Verify electrical clearances are maintained between barriers, live front or exposed terminations, and other insulated components.
- ☐ Verify that phase barriers are securely attached.
- ☐ Verify that the ground conductor is the correct size and is attached to the ground pad on the tank.
- ☐ Check safety barrier installation and condition on live front equipment (for example, pothead skirt in the PMH switch in contact with the protective barrier).
- ☐ In live-front equipment, verify that the fuse clips are in good condition (no signs of heating, arcing, or corrosion)
- ☐ Verify that locking devices are in place.
- ☐ Inspect mounting bolts for the correct size and number, tightness and corrosion.



NOTE

The above list is to be used as a guide only and inspection should not be limited to the list.

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Attachment 3–1: Underground Structure Detail Inspection Guideline (*Continued*)

APPARATUS CHECKLIST


The following list is designed for non-technicians to use while performing their normal work in and around apparatus equipment, such as network protectors, P.E. gear, fault interrupters, automatic circuit reclosers, regulators, sectionalizers, and capacitor banks.

- ☐ Check for bulging, ruptured, or discolored capacitor units.
- ☐ Inspect fuseholders, cutouts, or fused disconnects.
- ☐ Check for blown fuses.
- ☐ Check cable and cable terminations for signs of deterioration or damage (underground).
- ☐ Heat scan the cable, terminations, and equipment (underground).
- ☐ Check for corrosion or other damage.
- ☐ Check for oil or compound leaks.
- ☐ Check clearances, barriers, and grounding.
- ☐ Check weld seams.
- ☐ Inspect operating shaft seals.
- ☐ Check oil fill and sight gauge seals (underground)
- ☐ Check oil fill and sight gauge seals (underground)
- ☐ Check to see if relay tripped (if applicable).
- ☐ Check for loose connections (arcing or burning).
- ☐ Check for damaged or blown control transformer.
- ☐ Check for approved locking devices in place and locked.
- ☐ Check for exterior/interior damage to enclosure (underground).
- ☐ Check for washout or excavation around enclosure (underground).
- ☐ Check all decals for legibility.
- ☐ Check that enclosure mountings are securely bolted to structure (underground).
- ☐ Check for signs of rodents or other animals (underground).
- ☐ Check for any signs of water or oil within the apparatus housing (underground).
- ☐ Enter the status of equipment, counter and load reads, any abnormal conditions, and the names of all inspection personnel in the log provided at equipment.



NOTE

The above list is to be used as a guide only and inspection should not be limited to the list.

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CG-1: Overhead Equipment Condition Guide

1.0 Attachments

Attachment 1-1: Wood and Composite Poles

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Attachment 1–1: Wood and Composite Poles


Pole Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
<u>Wood Poles</u>			
Unstable structure due to damage caused by splits, decay, hole or boring, exterior mechanical damage, or foot setting depth no longer supports the pole; failure is imminent Priority 1	X		
Pole leaning; public hazard Priority 1	X		
Leaning more than 1' per 10' pole height		X	X
Split or decay at critical attachment; bolt pulling through pole	X		
Split or decay within 6" of critical attachment; bolt not pulling through pole		X	X
Split, decay, or hole below highest attachment allows light through the pole	X		
Hole greater than 2" and extends past pole center	X		
Hole greater than 2" and possible cavity in high stress area		X	X
Three or more holes >2" diameter within 18" vertical at a high stress area	X		
Exposed decay pocket at ground line where part of shell is gone	X		
Insect borings or droppings		X	X
Compression wood peeling off, >2"	X		
Compression wood peeling off, 1–2"		X	X
Exterior damage >2" depth and > 1/4 pole circumference	X		
Exterior damage 1–2" depth and > 1/4 pole circumference		X	X
Depth in soil >20% shallow with heavy equipment	X		
Depth in soil 10–20% shallow with heavy equipment		X	X
Leaning more than 1' per 10' pole height with heavy equipment		X	X
Cavity with <1" shell thickness	X		
Decay within 6" of critical attachment; not pulling through		X	X
Three or more holes >2" diameter within 18" vertical		X	X
Rotten top		X	X
Animal/bird's nest near circuitry/equipment	X		
Steel stub banding is damaged or missing		X	X

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Attachment 1–1: Wood and Composite Poles (Continued)

Pole Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
<u>Composite Poles</u>			
Fracture or buckling of exterior wall	X		
Visual cracks or rupture of exterior laminates on any location of the exterior wall exposing interior laminates	X		
Excessive lean at the top of the pole due to insufficient embedment caused by erosion of soil at groundline or due to eccentricity of heavy equipment (horizontal displacement at the tip of the pole greater than 10% of the pole height above the groundline).	X		
Elongated bolt holes, cracks or rupture around the hardware connection to equipment and guy attachments (bolts pulling through, sharp edges cutting into surface of wall)		X	X
Cutting or drilling within "No-Drill-Zone"	X		
Exposed fiberglass due to exposure of fire ^{a/}			X
Surface gouging on exterior of pole larger than 2-inches in length		X	X
Surface discoloration or fiberblooming ("fuzzing") greater than 20% of total exterior surface area		X	X
Pole embedded on soil with heavy ponding (accumulation of water)		X	X
Depth of embedment less than 10% + 1 ft of the pole height with heavy equipment		X	X
Leaning at the top of pole greater than 5% of the height of the pole above ground with heavy equipment		X	X
Bowing of the pole at or near the mid-height due to heavy load from guys		X	X
Animal/bird's nest near circuitry/equipment		X	X
Missing or damaged pole cap		X	X

^{a/} Contact Distribution Apparatus Engineering and Standards for immediate review.

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Attachment 1–2: Transformers

Overhead Transformer Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Excessive oil leakage, oil reaches ground or public access or environmentally sensitive area Priority 1	X		
Minor leakage, oil remains on equipment, does not reach ground or public access or environmentally sensitive area		X	X
Oil weepage indicated by oily film on tank surface			X
Transformer damaged	X		
Transformer extremely rusted or corroded		X	X

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Attachment 1–3: Capacitors

Overhead Capacitor Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Ruptured or severely bulged capacitor units Priority 1	X		
Capacitor units or capacitor oil switches leaking, oil reaches ground or public access or environmentally sensitive area Priority 1	X		
Minor leakage from capacitor units or oil capacitor switches, oil remains on equipment, does not reach ground or public access or environmentally sensitive area			X
Signs of tracking or arcing on capacitor units			X
Broken/damaged bushings or terminals on capacitor units, capacitor switches, fuseholders or control power transformer		X	
Single phase condition with bank still energized ^{a/} Priority 1	X		
Capacitor bank damaged, not functioning		X	
Floating connections Priority 1	X		
Catastrophic or severely damaged capacitor switches, safety or reliability issue Priority 1	X		
Capacitor switches not secure, damaged, not functioning		X	X
Capacitor controller damaged			X
Antenna damaged		X	
Animal nest			X
Blown fuse		X	
Incorrect fuse size		X	
Damage to control power transformer		X	

^{a/} A single phase condition can occur when one phase fuse is blown or when switch position indicators are not synchronized (that is, all open or all closed).

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Attachment 1–4: Switches


Overhead Switch Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure

Manually Operated

Pole switch mechanism broken/missing/damaged/loose	X		
Pole switch damaged	X		


Remote Controlled

Remote control actuator broken, missing or worn out		X	
Control damaged		X	

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Attachment 1–5: Apparatus Equipment

Overhead Apparatus Equipment Condition Description (Reclosers, PE Gear, Regulators, Sectionalizers)	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Any fuse operation Priority 1	X		
Excessive oil leakage, oil reaches ground or public access or environmentally sensitive area Priority 1	X		
Minor leakage, oil remains on equipment, does not reach ground or public access or environmentally sensitive area			X
Oil weepage indicated by oily film on tank surface			X
Equipment damaged			X
Tree/vegetation interfering with apparatus equipment operation	X		
Equipment extremely rusted or corroded		X	X

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Attachment 1–6: Branch Line Fuse

Branch Line Fuse Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Dry or low liquid levels dropped more than one inch below the bottom of the upper ferrule		X	
Corroded, missing or broken hardware		X	X
Holder burned		X	
Tracking	X		

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Attachment 1–7: Fuse Dip

Fuse Dip Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Dry or low liquid levels dropped more than one inch below the bottom of the upper ferrule		X	
Corroded, missing or broken hardware		X	X
Holder burned		X	
Tracking	X		

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Attachment 2–1: HIGH VOLTAGE Signs

HIGH VOLTAGE Sign Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
HIGH VOLTAGE sign broken or missing in critical public awareness/hazardous situation		X	

Attachment 2-2: Hardware/Framing

Overhead Hardware/Framing Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Corroded, missing or broken hardware		X	X
Holder burned or tracking		X	X
Major equipment bracket broken/missing/worn out (including damaged Scott brackets)		X	X
Equipment brackets or braces cracked/damaged/loose		X	X
Scott brackets with no visible damage			X


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Attachment 2–3: Crossarms

Crossarm Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
<u>Wood Crossarms</u>			
Complete fracture or partial fracture causing significant deflection Priority 1	X		
Partial fracture causing <5" deflection		X	X
Primary crossarms bowed >5" and splintering	X		
Primary arm bowed >5", but no splintering		X	X
Secondary arm bowed >5" with or without splintering		X	X
Canting, through bolt pulled out Priority 1	X		
Canting, through bolt pulling out		X	X
Significant damage at a stress point	X		
Significant damage at insulator pin/bolt and pin/bolt ready to separate from arm	X		
Significant damage at attachment or insulator pin/bolt and pin/bolt may or may not be pulling through arm; if multiple X-arms and bolt at damaged area have not pulled through either arm, no damage on second arm		X	X
Crossarm tracking — cross section missing >50% Priority 1	X		
Crossarm tracking - cross section missing <50%		X	X
Braces broken/missing/worn out		X	

Attachment 2–3: Crossarms (Continued)

Crossarm Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
<u>Composite Crossarms</u>			
Significant deflection (greater than 10% of overhang length) on either side of the crossarm due to fracture, buckling or excessive unbalanced tension	X		
Visual cracks or rupture of exterior laminates on any location of the exterior wall exposing interior laminates	X		
Any signs of charring, “blister”, “bubble” or distortion of exterior surface due to exposure to fire	X		
Fractured mounting bracket and associated hardware	X		
Elongated bolt holes, cracks or rupture around the hardware connection (bolts pulling through, sharp edges cutting into surface of wall)		X	X
Surface discoloration or fiberblooming (“fuzzing”) greater than 20% of total exterior surface area		X	X
Bent mounting bracket and associated hardware		X	X

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Attachment 2–4: Insulators

Insulator Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Primary insulator above 750 volts missing Priority 1	X		
Primary insulator above 750 volts broken/worn out Priority 1	X		
Primary insulator above 750 volts cracked, damaged or loose		X	X
Tie wire broken/missing/damaged or loose		X	X
Primary side tie insulator touching arm		X	X
Secondary insulator <750 volts cracked, damaged or loose		X	X
Secondary insulator - squatter		X	X
Primary insulator chipped		X	X
Primary post-type insulator above 750 volts with universal clamping mechanism showing signs of corrosion at clamp	X		

Attachment 2–5: Grounds

Ground Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Ground wire broken/missing/worn out		X	

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Attachment 2-6: Guys

Guy Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure

Span Guys

Span guy cracked/damaged or loose		X	X
Span guy clearance issue		X	X
Span guy sagging or extremely slack		X	X

Down Guys

Guys broken/missing/worn out, pole leaning, public hazard	X		
Priority 1			
Guys broken/missing/worn out, pole not leaning		X	X
Down guy clearance issue, pedestrian/vehicle traffic		X	X
Down guy sagging or extremely slack		X	X
Anchor rods broken/missing/worn out, pole leaning, public hazard	X		
Priority 1			
Anchor rods broken/missing/worn out, pole not leaning		X	X

Attachment 2-7: Risers/Conduits

Riser/Conduit Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Primary/secondary riser and cable damage in the public level Priority 1		X	
Primary/secondary riser damaged but cable intact		X	X
Primary/secondary riser uncoupled/gap, cable exposed, no damage		X	X
Riser coming loose from pole			X

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Attachment 2–8: Cutouts/Fuses

Cutout/Fuse Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Dry or low liquid levels dropped more than one inch below the bottom of the upper ferrule		X	
Corroded, missing or broken hardware		X	X
Holder burned		X	
Tracking	X		

Attachment 2–9: Bonds

Bond Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Bonding has loosened or separated from pole/crossarm or is broken/missing		X	X

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Attachment 2–10: Surge Arresters

Surge Arrester Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Blown ground lead isolator	Priority 1	X	
Surge arrester broken but not blown, including corroded, missing or broken hardware, housing		X	X

Attachment 2–11: Terminations

Overhead Termination Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure

Potheads

Pothead sparking, arcing, or noisy during normal 'dry' weather conditions	X
Priority 1	
Pothead swollen	X
Pothead not properly attached to supporting structure	X
Pothead leaking	X
Pothead showing signs of tracking such as discoloration	X
Porcelain pothead insulators chipped or broken	X

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Attachment 2–12: Conductors and Service Drops

Overhead Conductor Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure

Primary Conductors

Contact with other conductors or where contact is imminent	Priority 1	X	
Metal debris in conductors	Priority 1	X	
Vegetation arcing or in contact with bare or covered conductor	Priority 1	X	
Conductors not in good condition, broken, missing, worn out		X	X
More than 10% reduction in radial or vertical clearance		X	X
Vegetation <18" from energized conductors (bare or covered)	X		
Growth on pole >18" but <48" from conductors (bare or covered)		X	X
Trees with <4' clearance in high fire risk area	X		
Foreign material in lines	X		
Tie wire broken/missing/damaged or loose	X		

Secondary Conductors

Extreme safety hazard to the public such as reachable, wire down, bare wires touching anything, wires touching each other at bare spots	Priority 1	X	
More than 10% reduction in radial or vertical clearance		X	X
Bare conductors in rack construction and through tree		X	X
Tree condition causing significant strain and/or visible abrasion damage - either open wire or Triplex		X	X
Conductor has less than appropriate radial clearance with contact, no public safety hazard		X	X
Vegetation growth within secondary level		X	X
Conductors not in good condition, broken, missing, worn out		X	X
Tie wire broken/missing/damaged or loose	X		
Foreign material in lines		X	X

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Attachment 2–12: Conductors and Service Drops (Continued)

Overhead Conductor Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Service Drops			
Greater than 15% reduction in vertical clearance	Priority 1	X	
Bare drop with >10% reduction in vertical clearance	Priority 1	X	
Bare drop arcing	Priority 1	X	
Greater than 10% but less than 15% reduction in vertical clearance		X	X
Bare drop with <10% reduction in vertical clearance			
Drop with <radial clearance and contact		X	X
Tree condition causing significant strain and/or visible abrasion damage — either open wire or Triplex		X	X
Bare drop		X	X
Drop connector bare at weatherhead		X	X
Service attachment broken		X	X
Service termination damage		X	X
Mid-span service clearance		X	X

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Attachment 2–13: Streetlights

Overhead Pole-Mounted Streetlight Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Access plate missing — conductor exposed Priority 1	X		
Broken glass ready to fall Priority 1	X		
Fixture or fixture door ready to fall Priority 1	X		
Structural/mechanical failure/vehicle hit pole Priority 1	X		
Fixture/door cover missing		X	X
Visible cracks in fixture		X	X
Broken/missing glass but no public safety hazard		X	X
Mast arm weak and unsecured, but no public safety hazard		X	X
Unauthorized attachments		X	X
Pole mechanical damage and may fail soon		X	
Anchor bolts missing/rusted through		X	
Large multiple holes			X
Anchor bolts corroded, unremovable			X

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Attachment 3–1: BURD Structures

BURD Structure Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Debris or vegetation blocking proper access to structure			X
BURD cylinder damaged		X	X
Debris in structure requiring removal		X	X

Attachment 3–2: Enclosures

Enclosure Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Structure roof or walls in immediate danger of collapse, showing evidence of structural compromise, load cracks, flexing concrete Priority 1	X		
Casting frame/plug broken with dangerous traffic and/or pedestrian condition Priority 1	X		
Broken non-concrete covers of concrete structures in public area exposing the structure opening Priority 1	X		
Heavy Traffic — Roof has >20% delamination in any precast section		X	X
Heavy Traffic — Casting frame and plug have exposed rebar and/or failure cracking		X	X
Light Traffic — Roof has >30% delamination with exposed rebar at multiple corners and in the neck area		X	X
Light Traffic — Casting frame and plug have exposed rebar and/or failure cracking		X	X
Light Traffic — Wall concrete deteriorated with spalling, exposed rebar, and switch supports coming out of the wall		X	X
Light Traffic — Other structure conditions presenting an immediate danger to the public or workers		X	X
Vent pipes cracked, damaged, loose or missing		X	X
Structure settlement has caused pavement failure in traffic area; pavement still drivable but deteriorated			X
Light Traffic — Structure roof has spalling concrete at roof neck and/or joints with exposed rebar at any roof joint and/or delaminations in 10% or more of any roof section			X
Light Traffic — Concrete spalls have come off of walls at over 5 feet of any corner surface with accompanying areas of delamination, 25% or more in any section			X
Light Traffic — Casting frame and plug show cracking or minor spalling			X
Non-Traffic — Heavily deteriorated structure has spalling concrete and delaminations on 30+% of any wall and roof section, or over 15 feet of exposed rebar in the roof section			X
Spalled concrete in danger of falling on equipment	X		
Roof/grate damaged or missing	X		
Door damaged, unsecurable or cannot lock	X		
Enclosure structure damaged	X		

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Attachment 3–3: Handholes

Handhole Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Damaged handhole in public area	X		
High/low tripping hazard	X		

Attachment 3–4: Manholes

Manhole Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Pavement in street has collapsed causing dangerous traffic conditions Priority 1	X		
Structure roof or walls in immediate danger of collapse, showing evidence of structural compromise, load cracks, flexing concrete Priority 1	X		
Casting frame/plug broken with dangerous traffic and/or pedestrian condition Priority 1	X		
Broken non-concrete covers of concrete structures in public area exposing the structure opening Priority 1	X		
Heavy Traffic — Roof has >20% delamination in any precast section		X	X
Heavy Traffic — Casting frame and plug have exposed rebar and/or failure cracking		X	X
Light Traffic — Roof has >30% delamination with exposed rebar at multiple corners and in the neck area		X	X
Light Traffic — Casting frame and plug have exposed rebar and/or failure cracking		X	X
Light Traffic — Wall concrete deteriorated with spalling, exposed rebar, and switch supports coming out of the wall		X	X
Light Traffic — Other structure conditions presenting an immediate danger to the public or workers		X	X
Structure settlement has caused pavement failure in traffic area; pavement still drivable but deteriorated			X
Light Traffic — Structure roof has spalling concrete at roof neck and/or joints with exposed rebar at any roof joint and/or delaminations in 10% or more of any roof section			X
Light Traffic — Concrete spalls have come off of walls at over 5 feet of any corner surface with accompanying areas of delamination, 25% or more in any section			X
Light Traffic — Casting frame and plug show cracking or minor spalling			X
Non-Traffic — Heavily deteriorated structure has spalling concrete and delaminations on 30+% of any wall and roof section, or over 15 feet of exposed rebar in the roof section			X
Spalled concrete in danger of falling on equipment	X		

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Attachment 3–5: Primary Splice Boxes

Primary Splice Box Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Debris or vegetation blocking proper access		X	X
Unable to secure Priority 1	X		
Structure damaged		X	X
Debris in structure requiring removal		X	X
Pavement in street has collapsed causing dangerous traffic conditions Priority 1	X		
Structure roof or walls in immediate danger of collapse, showing evidence of structural compromise, load cracks, flexing concrete Priority 1	X		
Casting frame/plug broken with dangerous traffic and/or pedestrian condition Priority 1	X		
Broken non-concrete covers of concrete structures in public area exposing the structure opening Priority 1	X		
Heavy Traffic — Roof has >20% delamination in any precast section		X	X
Heavy Traffic — Casting frame and plug have exposed rebar and/or failure cracking		X	X
Light Traffic — Roof has >30% delamination with exposed rebar at multiple corners and in the neck area		X	X
Light Traffic — Casting frame and plug have exposed rebar and/or failure cracking		X	X
Light Traffic — Wall concrete deteriorated with spalling, exposed rebar, and switch supports coming out of the wall		X	X
Light Traffic — Other structure conditions presenting an immediate danger to the public or workers		X	X
Structure settlement has caused pavement failure in traffic area; pavement still drivable but deteriorated			X
Light Traffic — Structure roof has spalling concrete at roof neck and/or joints with exposed rebar at any roof joint and/or delaminations in 10% or more of any roof section			X
Light Traffic — Concrete spalls have come off of walls at over 5 feet of any corner surface with accompanying areas of delamination, 25% or more in any section			X
Light Traffic — Casting frame and plug show cracking or minor spalling			X

Attachment 3–5: Primary Splice Boxes (Continued)

Primary Splice Box Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Non-Traffic — Heavily deteriorated structure has spalling concrete and delaminations on 30+% of any wall and roof section, or over 15 feet of exposed rebar in the roof section			X
Spalled concrete in danger of falling on equipment	X		

Attachment 3–6: Pads

Pad Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Any tilt, lean, or structure movement causing strain on electrical connectors or adverse oil level	X		
Pad Damaged — > 25% of surface area. Deep cracks were observed that propagate from one end of the pad to the other.		X	X
Grade change requiring pad relocation			X
Pad Surface Area Deterioration (< 25%) — Cracks, spalls, delamination (loose concrete), exposed rebar			X

Attachment 3–7: Subsurface Structure

Subsurface (CST) Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Pavement in street has collapsed causing dangerous traffic conditions Priority 1	X		
Structure roof or walls in immediate danger of collapse, showing evidence of structural compromise, load cracks, flexing concrete Priority 1	X		
Casting frame/plug broken with dangerous traffic and/or pedestrian condition Priority 1	X		
Broken non-concrete covers of concrete structures in public area exposing the structure opening Priority 1	X		
Heavy Traffic — Roof has >20% delamination in any precast section		X	X
Heavy Traffic — Casting frame and plug have exposed rebar and/or failure cracking		X	X
Light Traffic — Roof has >30% delamination with exposed rebar at multiple corners and in the neck area		X	X
Light Traffic — Casting frame and plug have exposed rebar and/or failure cracking		X	X
Light Traffic — Wall concrete deteriorated with spalling, exposed rebar, and switch supports coming out of the wall		X	X
Light Traffic — Other structure conditions presenting an immediate danger to the public or workers		X	X
Structure settlement has caused pavement failure in traffic area; pavement still drivable but deteriorated			X
Light Traffic — Structure roof has spalling concrete at roof neck and/or joints with exposed rebar at any roof joint and/or delaminations in 10% or more of any roof section			X
Light Traffic — Concrete spalls have come off of walls at over 5 feet of any corner surface with accompanying areas of delamination, 25% or more in any section			X
Light Traffic — Casting frame and plug show cracking or minor spalling			X
Non-Traffic — Heavily deteriorated structure has spalling concrete and delaminations on 30+% of any wall and roof section, or over 15 feet of exposed rebar in the roof section			X
Spalled concrete in danger of falling on equipment	X		
Vent pipes cracked, damaged, loose or missing	X		
Debris or vegetation blocking proper access		X	X


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Attachment 3–8: Vaults

Vault Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Pavement in street has collapsed causing dangerous traffic conditions Priority 1	X		
Structure roof or walls in immediate danger of collapse, showing evidence of structural compromise, load cracks, flexing concrete Priority 1	X		
Casting frame/plug broken with dangerous traffic and/or pedestrian condition Priority 1	X		
Broken non-concrete covers of concrete structures in public area exposing the structure opening Priority 1	X		
Heavy Traffic — Roof has >20% delamination in any precast section		X	X
Heavy Traffic — Casting frame and plug have exposed rebar and/or failure cracking		X	X
Light Traffic — Roof has >30% delamination with exposed rebar at multiple corners and in the neck area		X	X
Light Traffic — Casting frame and plug have exposed rebar and/or failure cracking		X	X
Light Traffic — Wall concrete deteriorated with spalling, exposed rebar, and switch supports coming out of the wall		X	X
Light Traffic — Other structure conditions presenting an immediate danger to the public or workers		X	X
Structure settlement has caused pavement failure in traffic area; pavement still drivable but deteriorated			X
Light Traffic — Structure roof has spalling concrete at roof neck and/or joints with exposed rebar at any roof joint and/or delaminations in 10% or more of any roof section			X
Light Traffic — Concrete spalls have come off of walls at over 5 feet of any corner surface with accompanying areas of delamination, 25% or more in any section			X
Light Traffic — Casting frame and plug show cracking or minor spalling			X
Non-Traffic — Heavily deteriorated structure has spalling concrete and delaminations on 30+% of any wall and roof section, or over 15 feet of exposed rebar in the roof section			X
Spalled concrete in danger of falling on equipment	X		
Vent pipes cracked, damaged, loose or missing	X		

Attachment 3–9: Vault Shoring

Vault Shoring Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Wood members (columns, beams, or ceiling decking) are broken	X		
Wood members showing signs of severe deterioration, heavy discoloration present (confirmed by sounding with tool)	X		
Delamination is present on wood members	X		
Gap is present between ledger plate and structure wall (not due to curvature of wall)			X
Severe corrosion is present on steel components (metal flaking, severe pitting)			X

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Attachment 3–10: Underground Transformers

Underground Transformer Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
No oil at gauge and major leakage Priority 1	X		
No oil at gauge and minor leakage		X	X
No oil at gauge but no evidence of leakage			X
Excessive oil leakage, oil reaches ground or public access or environmentally sensitive area Priority 1	X		
Minor leakage, oil remains on equipment, does not reach ground or public access or environmentally sensitive area		X	X
Oil weepage indicated by oily film on tank surface			X
Tank wall temperature > 265°F	X		
Tank wall temperature > 155°F above ambient			X
Indications of overload, past or present (burned spades, paint)			X
Hole > 1/8" diameter	X		
Transformer damaged		X	X
Corrosion per Corrosion Guide		X	X
Excessive noise			X

Attachment 3–11: Underground Capacitors

Underground Capacitor Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Ruptured or severely bulged capacitor units Priority 1	X		
Capacitor units or capacitor oil switches leaking, oil reaches ground or public access or environmentally sensitive area Priority 1	X		
Minor leakage from capacitor units or oil capacitor switches, oil remains on equipment, does not reach ground or public access or environmentally sensitive area			X
Signs of tracking or arcing on capacitor units			X
Broken/damaged bushings or terminals on capacitor units, capacitor switches, fuseholders or control power transformer		X	
Single phase condition with bank still energized ^{a/} Priority 1	X		
Capacitor bank damaged, not functioning		X	
Loose or floating connections Priority 1	X		
Catastrophic or severely damaged capacitor switches, safety or reliability issue Priority 1	X		
Capacitor switches not secure, damaged, not functioning		X	X
Capacitor controller damaged			X
Antenna damaged		X	
Animal nest			X
Thermal criteria exceeded per DOM TE–5		X	X
Obstacles restricting operating clearance/access to compartments			X
Corrosion per Corrosion Guide		X	X
Blown fuse		X	
Incorrect fuse size		X	
Damage to control power transformer		X	
Damaged fiberglass boards or plexiglas panels		X	

^{a/} A single phase condition can occur when one phase fuse is blown or when switch position indicators are not synchronized (that is, all open or all closed).

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Attachment 3–12: Underground Switches

Underground Switches Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure

Oil — Subsurface

Field oil test failure (<15kV) <i>Priority 2 (90 days) — see DOM TS–4</i>	X		
No oil at gauge and major leakage Priority 1	X		
No oil at gauge and minor leakage		X	X
No oil at gauge but no evidence of leakage			X
Oil leak in wet structure Priority 1	X		
Oil leak in dry structure	X		
Thermal failure per DOM TE–5 Priority 1	X		
Mechanism frozen, inoperable	X	X	X
G&W RA style switches with aluminum cableheads manufactured from 1970–1973			X
Corrosion per Corrosion Guide		X	X

Solid Dielectric Vacuum Switch — Subsurface

Switch Temperature >40°F above Cable Temperature Priority 1	X		
Mechanism frozen, inoperable	X	X	X
Corrosion per Corrosion Guide		X	X

Oil — Padmount

Field oil test failure (<15 kV) <i>Priority 2 (90 days) — see DOM TS–4</i>	X		
No oil at gauge and major leakage Priority 1	X		
No oil at gauge and minor leakage		X	X
No oil at gauge but no evidence of leakage			X
Excessive oil leakage, oil reaches ground or public access or environmentally sensitive area Priority 1	X		
Minor leakage, oil remains on equipment, does not reach ground or public access or environmentally sensitive area		X	X
Oil weepage indicated by oily film on tank surface			X
Thermal failure per DOM TE–5 Priority 1	X		
Mechanism frozen, inoperable	X	X	X
Corrosion per Corrosion Guide		X	X

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Attachment 3–12: Underground Switches (Continued)

Underground Switches Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure

Gas Switches


Gas switch: 0 psi in wet structure (DOM, SW–5)	X		
Priority 1			
Gas switch: < 5 psi or in red zone in wet structure (DOM, SW–5)	X		
Gas switch: < 5 psi or in red zone in dry structure (DOM, SW–5)		X	
Corrosion per Corrosion Guide		X	X

PMH/PME

Hole > 1/8" diameter	X		
Evidence of previous electric flashover	Priority 1	X	
Thermal failure per DOM TE–5	Priority 1	X	
Vegetation or debris inside structure		X	
Electrical clearance < 1-1/2" between barriers and energized parts		X	
Moisture barrier missing		X	
Mechanism frozen		X	
Corrosion per Corrosion Guide		X	X
ARC compressor caps missing or damaged		X	X

Remote-Controlled Switches

Control damaged		X	X
Actuator damaged		X	


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Attachment 3–13: Sump Pumps

Sump Pump Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Sump pump damaged and not operating		X	

Attachment 3–14: Underground Apparatus

Underground Apparatus Condition Description (Automatic Reclosers, Fault Interrupters, Network Protectors, Regulators, and Sectionalizers)	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Thermal failure per DOM TE–5 Priority 1	X		
No oil at gauge and major leakage Priority 1	X		
No oil at gauge and minor leakage		X	X
No oil at gauge but no evidence of leakage			X
Excessive oil leakage, oil reaches ground or public access or environmentally sensitive area Priority 1	X		
Minor leakage, oil remains on equipment, does not reach ground or public access or environmentally sensitive area		X	X
Oil weepage indicated by oily film on tank surface			X
Hole > 1/8" diameter	X		


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Attachment 3–15: Blowers

Blower Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Blower damaged and not operating		X	

Attachment 3–16: Fault Indicator

Fault Indicator Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Unit has malfunctioned or has failed to operate when tested		X	
Visible damage that has caused a malfunction under test		X	
Units > 20 years in service			X

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Attachment 3–17: Junction Boxes

Junction Box Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Debris or vegetation blocking proper access		X	X
Unable to secure Priority 1	X		
Structure damaged		X	X
Debris in structure requiring removal		X	X
Pavement in street has collapsed causing dangerous traffic conditions Priority 1	X		
Structure roof or walls in immediate danger of collapse, showing evidence of structural compromise, load cracks, flexing concrete Priority 1	X		
Casting frame/plug broken with dangerous traffic and/or pedestrian condition Priority 1	X		
Broken non-concrete covers of concrete structures in public area exposing the structure opening Priority 1	X		
Heavy Traffic — Roof has >20% delamination in any precast section		X	X
Heavy Traffic — Casting frame and plug have exposed rebar and/or failure cracking		X	X
Light Traffic — Roof has >30% delamination with exposed rebar at multiple corners and in the neck area		X	X
Light Traffic — Casting frame and plug have exposed rebar and/or failure cracking		X	X
Light Traffic — Wall concrete deteriorated with spalling, exposed rebar, and switch supports coming out of the wall		X	X
Light Traffic — Other structure conditions presenting an immediate danger to the public or workers		X	X
Structure settlement has caused pavement failure in traffic area; pavement still drivable but deteriorated			X
Light Traffic — Structure roof has spalling concrete at roof neck and/or joints with exposed rebar at any roof joint and/or delaminations in 10% or more of any roof section			X
Light Traffic — Concrete spalls have come off of walls at over 5 feet of any corner surface with accompanying areas of delamination, 25% or more in any section			X
Light Traffic — Casting frame and plug show cracking or minor spalling			X

Attachment 3–17: Junction Boxes (Continued)


Junction Box Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure

Non-Traffic — Heavily deteriorated structure has spalling concrete and delaminations on 30+% of any wall and roof section, or over 15 feet of exposed rebar in the roof section

X

Spalled concrete in danger of falling on equipment

X

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Attachment 3–18: Oil Fuse Cutouts

Oil Fuse Cutout Condition Description ^{a/}	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Corroded fuseholder		X	X
Oil leak not repairable		X	
Mechanism frozen	X		
Minor oil leak, but repairable			X

^{a/} Oil fuse cutouts are obsolete. Replacement fuses are no longer available. The units must be replaced whenever opportunity exists.

Attachment 3–19: PE Gears

Underground PE Gear Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure

Oil — Subsurface Type Switches

No oil at gauge and major leakage	Priority 1	X	
No oil at gauge and minor leakage			X
No oil at gauge but no evidence of leakage			X
Excessive oil leakage, oil reaches ground or public access or environmentally sensitive area	Priority 1	X	
Minor leakage, oil remains on equipment, does not reach ground or public access or environmentally sensitive area		X	X
Oil weepage indicated by oily film on tank surface			X
Thermal failure per DOM TE–5	Priority 1	X	
Mechanism frozen, inoperable		X	X
G&W RA style switches with aluminum cableheads manufactured from 1970–1973			X
Corrosion per Corrosion Guide		X	X

Oil — Padmount Switches

No oil at gauge and major leakage	Priority 1	X	
No oil at gauge and minor leakage		X	X
No oil at gauge but no evidence of leakage			X
Excessive oil leakage, oil reaches ground or public access or environmentally sensitive area	Priority 1	X	
Minor leakage, oil remains on equipment, does not reach ground or public access or environmentally sensitive area		X	X
Oil weepage indicated by oily film on tank surface			X
Thermal failure per DOM TE–5	Priority 1	X	
Mechanism frozen, inoperable		X	X
Corrosion per Corrosion Guide		X	X

Gas Switches

Gas switch: 0 psi in wet structure (DOM, SW–5)	Priority 1	X	
Gas switch: <5 psi in wet structure (DOM, SW–5)		X	
Gas switch: <5 psi in dry structure (DOM, SW–5)		X	X
Corrosion per Corrosion Guide		X	X


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Attachment 3–19: PE Gears (Continued)

Underground PE Gear Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
<u>PMH/PME Switches</u>			
Hole > 1/8" diameter	X		
External evidence of previous electric flashover	X		
Priority 1			
Corrosion per Corrosion Guide		X	X
<u>Remote-Controlled PE Gear</u>			
Control damaged		X	X
Actuator damaged		X	

Attachment 3–20: Fuse Cabinets

Fuse Cabinet Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Access or load-break elbow operational issue		X	X
Door does not secure (not sealed)	X		
External visual inspection failure		X	X
Hole > 1/8" diameter	X		
Corrosion per Corrosion Guide		X	X
Elbow not properly seated or attached; that is, bail is missing Priority 1	X		
Elbow sparking, arcing, or noisy Priority 1	X		
Elbow swollen	X		
Elbow showing signs of tracking such as discoloration	X		
Elbow temperature > 40°F above cable temperature Priority 1	X		
Elbow temperature 10–39°F above cable temperature		X	X

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Attachment 4-1: Hardware/Framing

Underground Hardware/Framing Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Major equipment bracket broken/missing/worn out Priority 1	X		
Equipment brackets or braces cracked/damaged/loose		X	X
Cable, equipment, or termination failure due to lack of rack support Priority 1	X		
Cable racks and other equipment supports cracked, damaged or loose, or are hanging in concrete separated from the rebar		X	X
Racks and/or through bolts corroded but can still support cable and/or equipment			X
Ladder broken/missing/worn out; cracked, damaged or loose	X		
Corroded, missing or broken hardware		X	X

Attachment 4–2: Grounds

Ground Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Ground grid has lost all embeds, or ground rod connection is gone			X
Grounds/bonds broken, missing or worn out		X	
Grounding of insufficient capacity			X

Attachment 4–3: Lids and Frames

Lid/Frame Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Lids/covers broken, missing, worn out and cannot be secured; subject to pedestrian traffic Priority 1	X		
Grade ring broken, missing, worn out and cannot be secured; subject to pedestrian traffic Priority 1	X		
Lids/covers cracked, damaged or loose, structure temporarily secured		X	
Grade ring damaged or missing, structure temporarily secured		X	
Corroded restraint hardware (turnbuckle, chains, anchors, and shackles)		X	X

Attachment 4-4: Retaining Walls

Retaining Wall Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Retaining wall damaged or undermined, requiring repairs		X	

Attachment 4–5: Terminations

Underground Termination Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure

Potheads

Pothead sparking, arcing, or noisy during normal “dry” weather conditions Priority 1	X		
Pothead swollen	X		
Pothead not properly attached to supporting structure	X		
Pothead leaking	X		
Pothead showing signs of tracking such as discoloration	X		
Porcelain pothead insulators chipped or broken	X		

Elbows

Elbow not properly seated or attached; that is, bail is missing Priority 1	X		
Elbow sparking, arcing, or noisy Priority 1	X		
Elbow swollen; subject to water intrusion between cable entrances and bushing interface	X		
Elbow showing signs of tracking such as discoloration	X		
Elbow temperature > 40F above cable temperature Priority 1	X		
Elbow temperature 10-39F above cable temperature		X	X

Attachment 4–6: Barrier Posts

Barrier Post Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Traffic barrier broken or missing and equipment contact imminent		X	X

Attachment 4–7: Pedestals

Pedestal Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Damaged, unable to secure or lock	X		
Corrosion per Corrosion Guide	X		

Attachment 4–8: Handholes

Handhole Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Damaged handhole in public area	X		
High/low tripping hazard	X		

Attachment 4–9: Cables

Cable Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
50% or less of concentric neutrals remain		X	X
Visual and serious damage (open cracks) on the semiconducting shield		X	X
Cable temperature exceeds 240 degrees	X		
Wet, contaminant condition that could damage cable			X
Cable temperature exceeds 175 degrees			X
Secondary/service cable damaged		X	X
Visible signs of incorrect positioning of cable causing contact and/or damage (that is, cable movement, rubbing points)			X
Visible signs of burning of materials or external heat damage to cable or any of the visible layers	X		

Attachment 4–10: Streetlights

Streetlight Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Access plate missing — conductor exposed Priority 1	X		
Broken glass ready to fall Priority 1	X		
Fixture or fixture door ready to fall Priority 1	X		
Structural/mechanical failure/vehicle hit pole Priority 1	X		
Fixture/door cover missing		X	
Visible cracks in fixture		X	X
Broken/missing glass but no public safety hazard		X	
Mast arm weak and unsecured, but no public safety hazard		X	X
Unauthorized attachments		X	X
Pole mechanical damage and may fail soon		X	
Anchor bolts missing/rusted through		X	
Large multiple holes			X
Anchor bolts corroded, unremovable			X

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Attachment 4–11: Splices

Splice Condition Description	Reliability/Failure Risk		
	Component Failure Could Lead to System Failure	Component Has Failed No Significant Risk to System	Potential Component Failure
Ruptured lead splice	Priority 1	X	
Splice not properly seated or attached, that is, T-splice not secure	Priority 1	X	
Splice sparking, arcing, or noisy	Priority 1	X	
Splice swollen; subject to water intrusion between cable entrances and bushing interface		X	
Splice showing signs of tracking such as discoloration		X	
Splice temperature >40°F above cable temperature	Priority 1	X	
Splice temperature 10–39°F above cable temperature		X	X
Leaking splice		X	

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CG-5: Underground Equipment Corrosion Condition Guide

1.0 Corrosion Evaluation Overview

Listed below are guidelines to assessing corrosion conditions. Utilize the Risk Assessment Matrix to determine reasonable time frame for any required action needed.

1.1 Severe Corrosion (Priority 1)

- ☐ Severe corrosion or pitting has eroded 100% of the wall thickness.
- ☐ Cable terminations hold down bolts have corroded where they no longer support the cable.
- ☐ Equipment oil leak in a wet structure.
- ☐ Any condition that would indicate that a severe hazard exists.

1.2 Very Heavy Corrosion (Priority 2)

- ☐ There is very heavy corrosion over most of the equipment's surface, or the pitting exceeds 50% of the wall thickness.
- ☐ The cable termination hold-down bolts have corroded to a point where the threads have been obliterated.
- ☐ Equipment oil leak in a dry structure.
- ☐ Any other condition of the equipment that would indicate that a hazard exists.

1.3 Heavy Corrosion (Priority 2)

- ☐ There is discoloration, loss of paint, and deep pitting over 50% of the equipment's surface.
- ☐ There is pitting greater than 25% of wall thickness, but less than 50% of wall thickness.
- ☐ Switch operators are frozen and cannot be freed with simple field repair.

1.4 Moderate Corrosion


No action required; monitor during next inspection cycle.

- ☐ There is discoloration, some loss of paint, and slight pitting (pencil-point-sized pits less than 25% wall thickness—that is, 1/16" maximum on R.A. switches).
- ☐ No sign of oil leaks.
- ☐ Switch operators are temporarily frozen but can be made operational with a minimum amount of effort.
- ☐ Bottom of equipment, or 25% of surface area is not accessible and corrosion is likely to occur (that is, wet structure and equipment does not have marine coating).

1.5 Light Corrosion

No action required; monitor during next inspection cycle.

- ☐ Equipment may be dirty but there is no sign of corrosion.
- ☐ There is some discoloration and disruption to painted surfaces, but no serious pitting or scaling is present over 75% of the equipment's surface.
- ☐ Switch operators work freely.
- ☐ No signs of oil leaks.

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NOTE

Once a corrosion evaluation has been established, that evaluation should not be changed as a result of cleaning, repairing, or painting. This policy is established since pitting cannot be repaired and the back, as well as the bottom, of the switch cannot always be cleaned and repainted.

2.0 Corrosion Examples

2.1 Severe Corrosion (Priority 1)

- ☐ Severe corrosion or pitting has eroded 100% of the wall thickness.
- ☐ Cable terminations hold down bolts have corroded where they no longer support the cable.
- ☐ Equipment oil leak in a wet structure.
- ☐ Any condition that would indicate that a severe hazard exists.



NOTE

Severe corrosion is described above. There are no pictures of severe corrosion in this manual revision. Corrosion conditions exceeding the conditions identified in Priority 2 images are considered Priority 1.



WARNING

When a severe corrosion condition exists, the structure shall be closed and a sign shall be posted stating "DO NOT ENTER WHILE EQUIPMENT IS ENERGIZED." The situation shall be made safe and the equipment shall be replaced as soon as possible.

2.2 Very Heavy Corrosion (Priority 2)

- ☐ There is very heavy corrosion over most of the equipment's surface, or the pitting exceeds 50% of the wall thickness.
- ☐ The cable termination hold-down bolts have corroded to a point where the threads have been obliterated.
- ☐ Equipment oil leak in a dry structure.
- ☐ Any other condition of the equipment that would indicate that a hazard exists.



WARNING

When A Very Heavy Corrosion condition exists, the structure shall be closed and a sign shall be posted stating "DO NOT ENTER WHILE EQUIPMENT IS ENERGIZED." The situation shall be made safe and the equipment shall be replaced within 90 days. See [Figure 5-1](#).

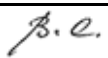
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Figure 5-1: Severe/Very Heavy Corrosion — CAUTION Sign

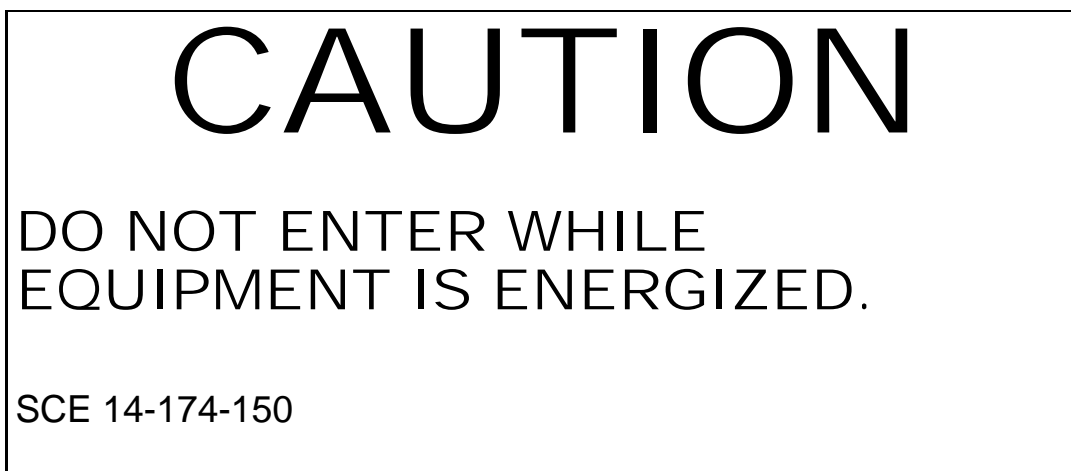
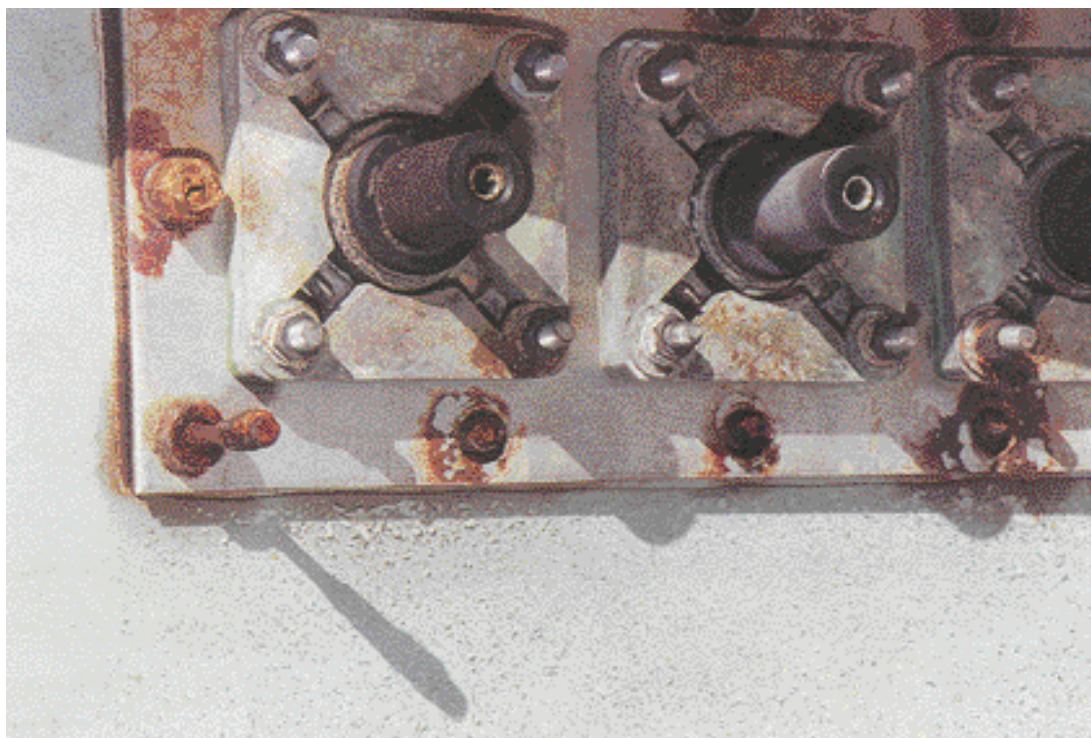
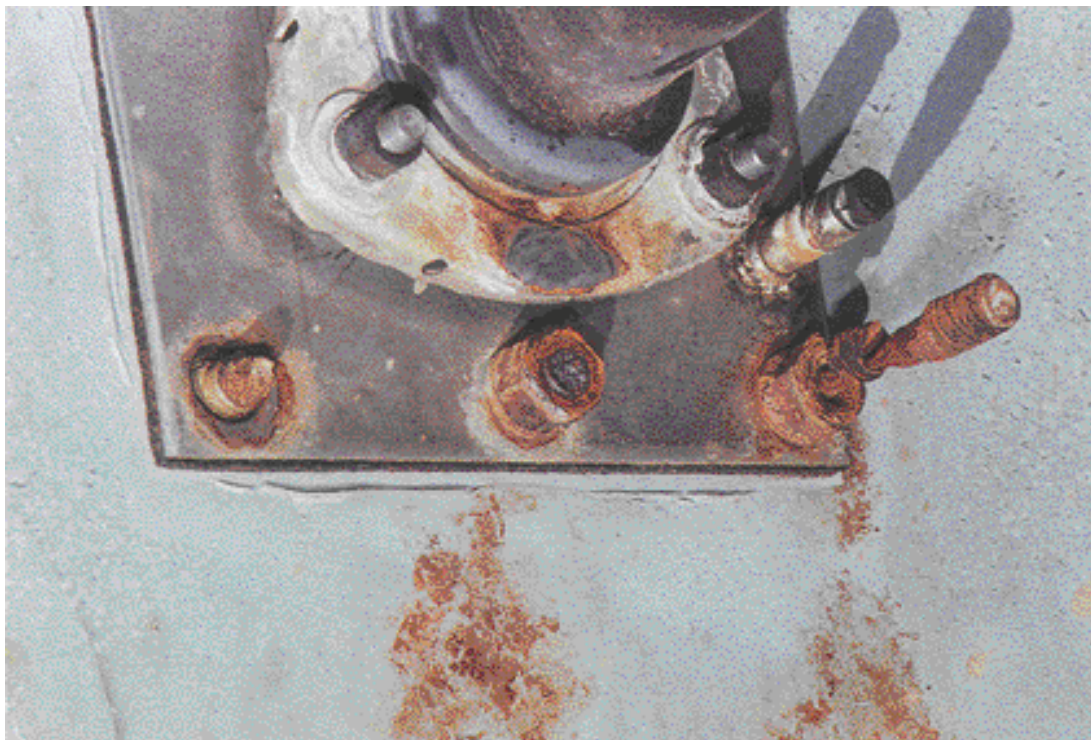


Figure 5-2: Very Heavy Corrosion — Example 1 of 2



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Figure 5–3: Very Heavy Corrosion — Example 2 of 2



2.3 Heavy Corrosion

- ☐ There is discoloration, loss of paint, and deep pitting over 50% of the equipment's surface.
- ☐ There is pitting greater than 25% of the wall thickness, but less than 50% of the wall thickness.
- ☐ Switch operators are frozen and cannot be freed with simple field repair.
- ☐ There is minor oil leakage, but it is repairable.

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Figure 5–4: Heavy Corrosion — Example 1 of 3



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Figure 5-5: Heavy Corrosion — Example 2 of 3



Figure 5-6: Heavy Corrosion — Example 3 of 3



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2.4 Moderate Corrosion

- ☐ There is discoloration, loss of paint, and slight pitting (pencil point-sized pits less than 25% of the wall thickness – that is, R.A. switches – 1/16" maximum depth).
- ☐ No signs of oil leaks.
- ☐ Switch operators are temporarily frozen but can be maintained and made operational with a minimum amount of effort.
- ☐ Bottom of equipment or 25% of surface area is not accessible and corrosion is likely to occur (that is, wet structure and equipment does not have marine coating).

Figure 5–7: Moderate Corrosion — Example 1 of 3

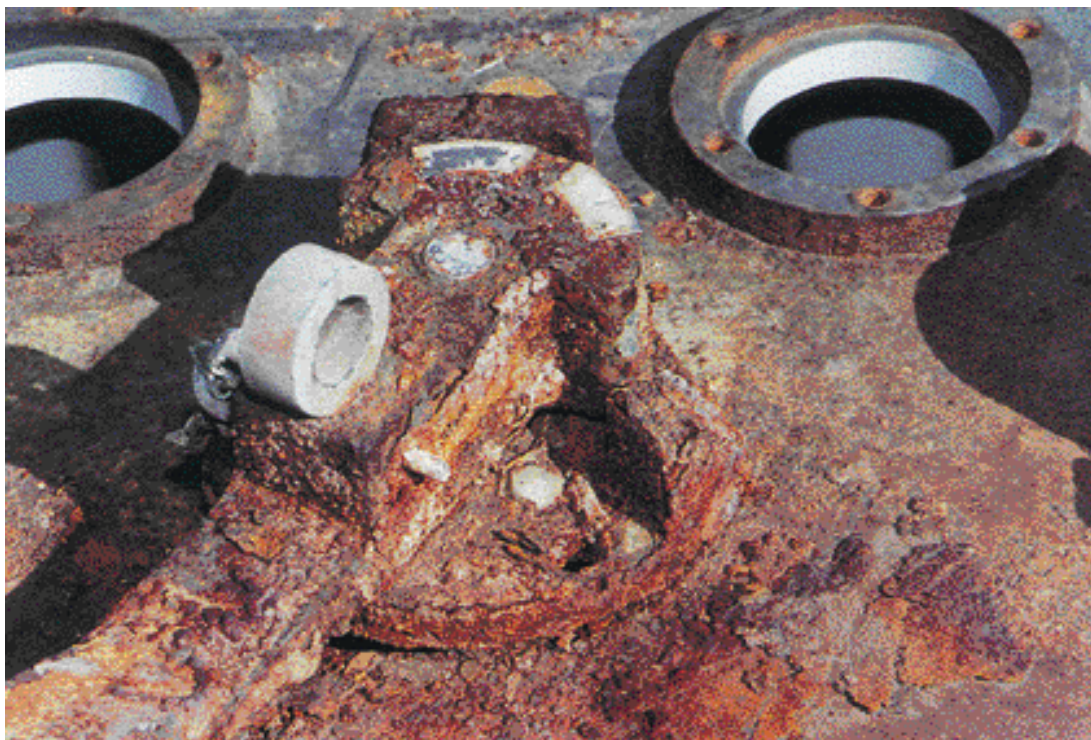


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Figure 5–8: Moderate Corrosion — Example 2 of 3



Figure 5–9: Moderate Corrosion — Example 3 of 3



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2.5 Light Corrosion

- ☐ There is some discoloration and disruption to painted surfaces, but no serious pitting or scaling is present over 75% of the equipment's surface.
- ☐ Switch operators work freely.
- ☐ No signs of oil leaks.

Figure 5–10: Light Corrosion — Example 1 of 3



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Figure 5–11: Light Corrosion — Example 2 of 3

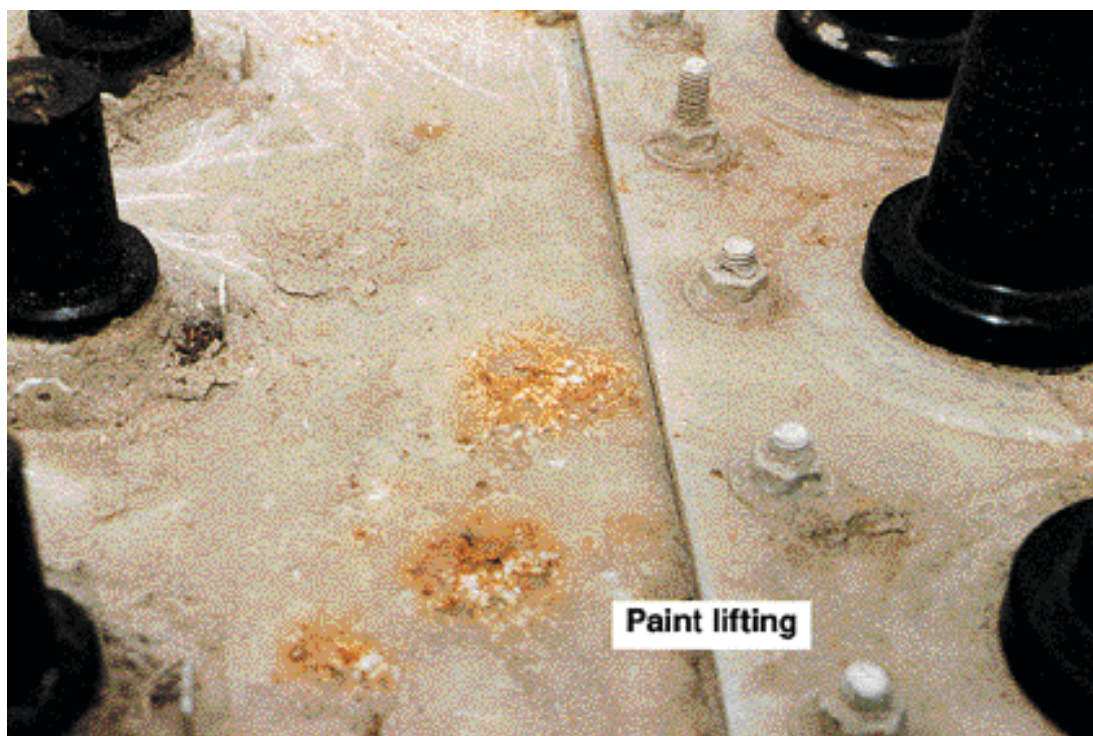


Figure 5–12: Light Corrosion — Example 3 of 3

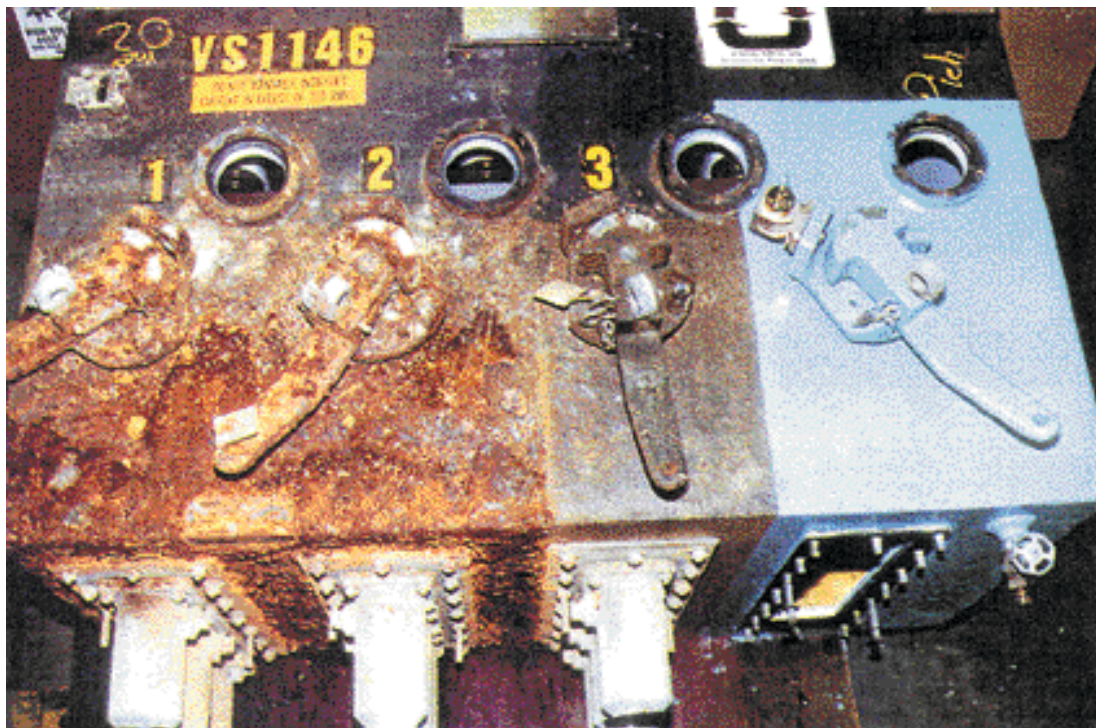


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2.6 Maintenance and Refurbishing

- ☐ Any “moderate” or “light” corrosion equipment should have the following repairs performed:
- ☐ The operating mechanism should be cleaned, greased (if required), and operate freely.
- ☐ The equipment tank, except for the back and/or bottom, should be cleaned of corrosion and coated with an approved material.
- ☐ The equipment tank, except for the back and/or bottom, should be cleaned of corrosion and coated with an approved material.
- ☐ To determine the level of corrosion and, in particular, the depth of pitting, the corroded material must be removed.
- ☐ To extend the life of equipment and ensure the operating mechanism functions properly.
- ☐ To inspire confidence in crew members when working in a vault or enclosure where the equipment has obviously been maintained.

Figure 5–13: Maintenance and Refurbishing — Example 1 of 4



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Figure 5–14: Maintenance and Refurbishing — Example 2 of 4



Figure 5–15: Maintenance and Refurbishing — Example 3 of 4



Figure 5–16: Maintenance and Refurbishing — Example 4 of 4



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2.7 Typical Problems

- A. This is an example of a switch oil drain valve assembly where the drain plug and nipple have corroded to the point that the assembly is inoperative.

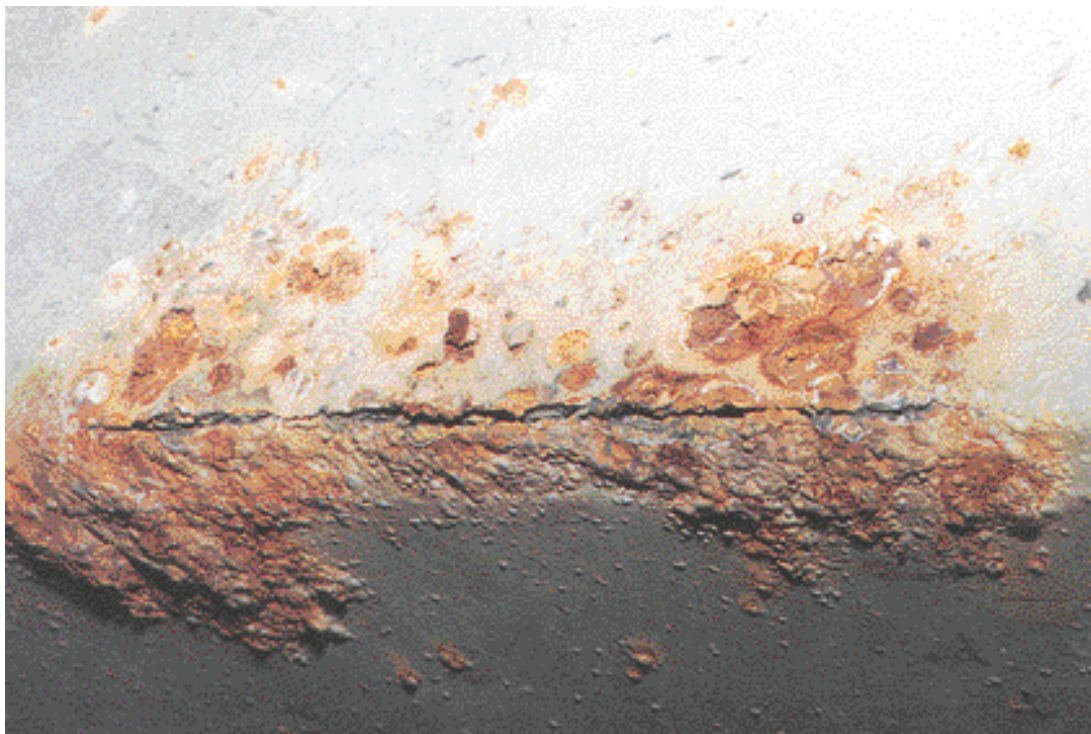
Figure 5-17: Typical Problems — Example 1 of 4



- B. This picture illustrates a weld seam that has possibly corroded to the extent that an oil leak may be imminent.

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Figure 5–18: Typical Problems — Example 2 of 4



- C. In some cases, there are aluminum-bodied terminators installed in areas where moisture is present. These terminators will normally be classified as “very heavy” or “heavy” corrosion, depending upon degree of corrosion.

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Figure 5–19: Typical Problems — Example 3 of 4



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Figure 5–20: Typical Problems — Example 4 of 4



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1.0 Corrosion Levels of Pad Mounts, Switch Enclosures, Transformers and Capacitors

1.1 Purpose

Listed below are guidelines to assessing corrosion guidelines. Utilize the Risk Assessment Matrix to determine reasonable time frame for any required action needed.

This procedure provides the requirements for establishing external and internal corrosion levels and the criteria for making necessary field repairs or replacements of padmounted (PMH/PME) switch enclosures, transformers, and capacitors.

1.2 Inspection

The following are the measures for detection and inspection of corrosive and deteriorating conditions of padmounted switch enclosures, transformers, and capacitors:

A. External Inspection

- ☐ Check paint for blistering, cracking, flaking, peeling, and any significant color changes.
- ☐ Check for evidence of corrosion at specific locations. These locations include but are not limited to weld seams, edges, corners, and around enclosure base.
- ☐ Open switch operating mechanism compartments in switch enclosures and check for hidden areas of corrosion.

B. Internal Inspection

- ☐ Check around door edges (including hinges), at areas where the door comes in contact with the enclosure, at base of door openings, and on component structural support members for evidence of corrosion.
- ☐ Check for evidence of standing water in structure below switch enclosure, transformer, or capacitor, and note in inspection report.
- ☐ Check for evidence of moisture condensation on internal surfaces.

1.3 Designating External and Internal Corrosion Evaluation

To evaluate the external corrosion evaluation of PMH/PME switch enclosures, transformers, or capacitors, scrape and wire brush the areas on the enclosure, operating mechanisms, and other metal components where corrosion is suspected so that the depth and extent of corrosion can be determined. Ensure proper safety measures are being taken. After scraping and cleaning, each enclosure shall have the corrosion level rated and maintenance priority established as described in the following:



Once a corrosion evaluation has been established, that evaluation should not be changed as a result of cleaning, repairing, or painting. This policy is established since pitting cannot be repaired and the interior of the enclosure usually will not be repaired or repainted.

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A. Severe Corrosion (Priority 1)

- ☐ Severe corrosion or pitting has eroded 100% of the wall thickness.
- ☐ Cable termination hold down bolts have corroded where they no longer support the cable.
- ☐ Equipment oil leakage is severe where routine repairs will not stop leakage.
- ☐ Any condition that would indicate that a severe hazard exists.

B. Very Heavy Corrosion (Priority 2)

- ☐ There is very heavy corrosion over most of the equipment, or the equipment enclosure has pits that are "near through" the wall thickness.
- ☐ There are openings completely through the enclosure wall.
- ☐ There is oil leakage that cannot be repaired.
- ☐ Any other condition exists that would indicate a hazard.

C. Heavy Corrosion (Priority 2)

- ☐ There is distinct corrosion, heavy loss of paint, and deep pitting over half of the equipment surface.
- ☐ There is pitting that exceeds one quarter of the original wall thickness.
- ☐ Metal is flaking away in nonhazardous locations.
- ☐ There is minor oil leakage, but it is repairable.

D. Moderate Corrosion

No action required; monitor during next inspection cycle.

- ☐ There is distinct discoloration and significant loss of paint and/or moderate pitting (pencil point-sized pits no deeper than one quarter of the original wall thickness).
- ☐ There is no sign of oil leakage.

E. Light Corrosion

No action required; monitor during next inspection cycle.

- ☐ There is some discoloration and disruption to painted surfaces, but no serious pitting or scaling are present.
- ☐ Switch handles and mechanism are operational.
- ☐ There is no sign of oil leakage.
- ☐ There are only minor touch-up repairs required.

2.0 Corrosion Examples

2.1 Severe Corrosion

- ☐ Severe corrosion or pitting has eroded 100% of the wall thickness.
- ☐ Cable termination hold down bolts have corroded where they no longer support the cable.
- ☐ Equipment oil leakage is severe where routine repairs will not stop leakage.
- ☐ Any condition that would indicate that a severe hazard exists.

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NOTE

Severe corrosion is described above. There are no pictures of severe corrosion in this manual revision. Corrosion conditions exceeding the conditions identified in “Very Heavy” images are considered Severe.



WARNING

When a severe corrosion condition exists, the structure shall be closed and a sign shall be posted stating “DO NOT ENTER WHILE EQUIPMENT IS ENERGIZED.” The situation shall be made safe and the equipment shall be replaced as soon as possible.

2.2 Very Heavy Corrosion

- ☐ There is very heavy corrosion over most of the equipment, or the equipment enclosure has pits that are “near through” the wall thickness.
- ☐ There are openings completely through the enclosure wall.
- ☐ There is severe oil leakage that cannot be repaired.
- ☐ Any other conditions exist that would indicate a hazard.



WARNING

When a very heavy corrosion condition exists, the structure shall be closed and a sign shall be posted stating “DO NOT ENTER WHILE EQUIPMENT IS ENERGIZED.” The situation shall be made safe and the equipment shall be replaced as soon as possible.

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Figure 6–1: Opening Completely Through the Enclosure Wall

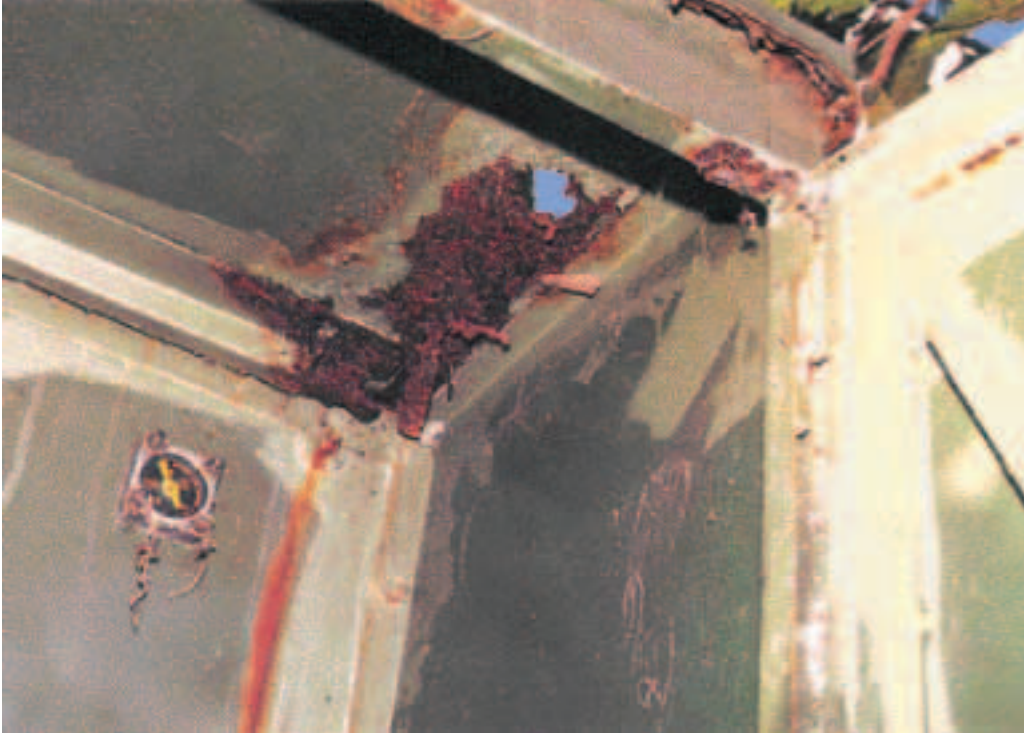


Figure 6–2: Very Heavy Corrosion of Locking Assembly



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Figure 6–3: Another Example of Metal Flaking Away at Nonhazardous Locations



2.3 Heavy Corrosion

- ☐ There is distinct corrosion, heavy loss of paint, and/or deep pitting over half of the equipment's surface.
- ☐ There is pitting that exceeds one quarter of the original wall thickness.
- ☐ Metal is flaking away in nonhazardous locations.
- ☐ There is minor oil leakage, but it is repairable.

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Figure 6-4: Wall Corrosion at Top of Compartment Door, Covered when Other Door Closed



Figure 6-5: Wall Corrosion at Bottom of Compartment Door, Covered when Other Door Closed

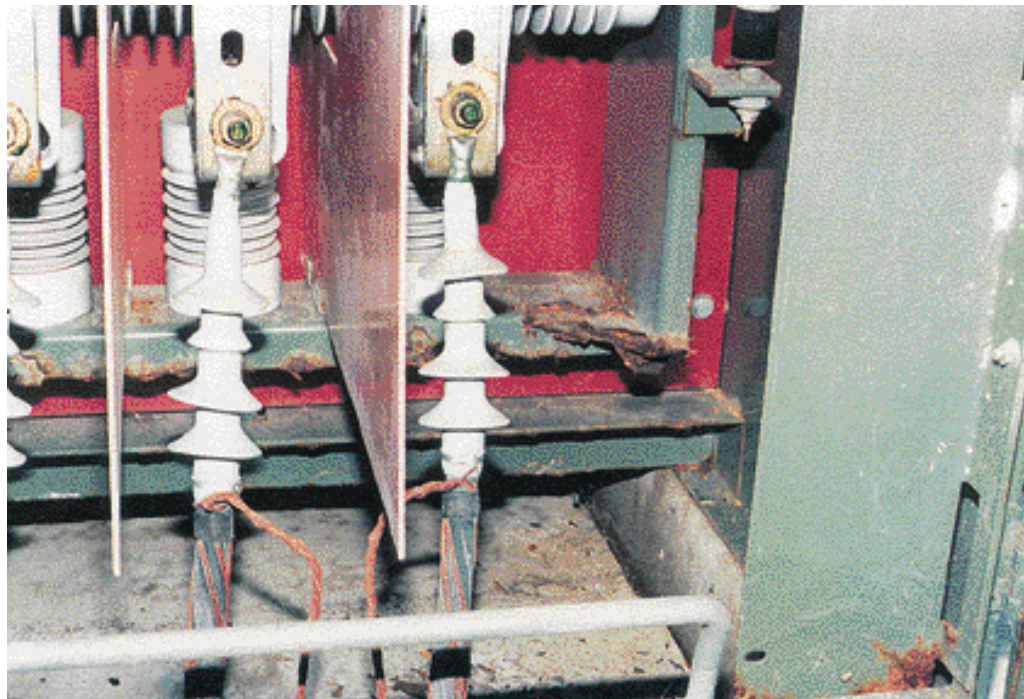


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Figure 6–6: Pitting Exceeding One-Quarter Depth of Wall Thickness



Figure 6–7: Distinct Corrosion of Component Structural Support Members

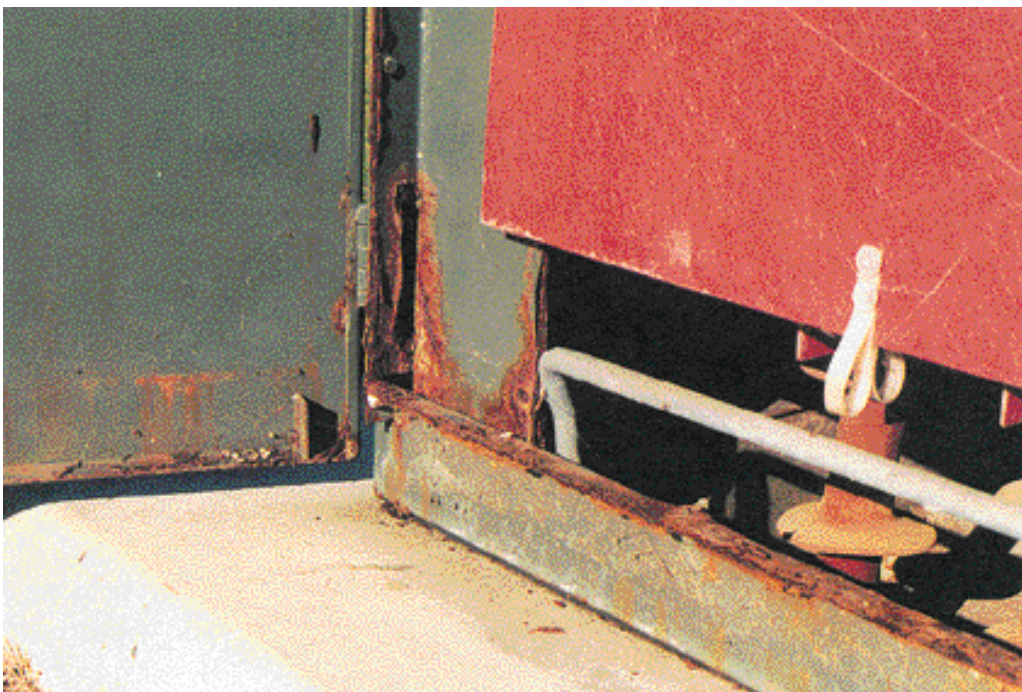


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Figure 6–8: Metal Flaking Away at Nonhazardous Locations



Figure 6–9: Another Example of Metal Flaking Away at Nonhazardous Locations



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**Figure 6–10: Heavy Corrosion with Deep Pitting,
Exceeding One-Quarter of Original Wall Thickness**



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**Figure 6–11: Another Example of Heavy Corrosion with Deep Pitting,
Exceeding One-Quarter of Original Wall Thickness**



2.4 Moderate Corrosion

- ☐ There is distinct discoloration and significant loss of paint and/or moderate pitting (pencil point-sized pits no deeper than one quarter of the original wall thickness).
- ☐ There is no sign of oil leakage.

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Figure 6–12: Ineffective Prior Repairs



Figure 6–13: Significant Blistering of Paint



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Figure 6–14: Moderate Corrosion with Pitting on Edge of Enclosure Top



Figure 6–15: Loss of Metal



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Figure 6–16: Moderate Corrosion with Blistering, Pitting, and Discoloration in and around Vents



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Figure 6–17: Moderate Corrosion with Pitting and Significant Loss of Paint



Figure 6–18: Moderate Corrosion with Significant Loss of Paint at Base



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Figure 6–19: Interior Blistering, Flaking, Corrosion, and Discoloration

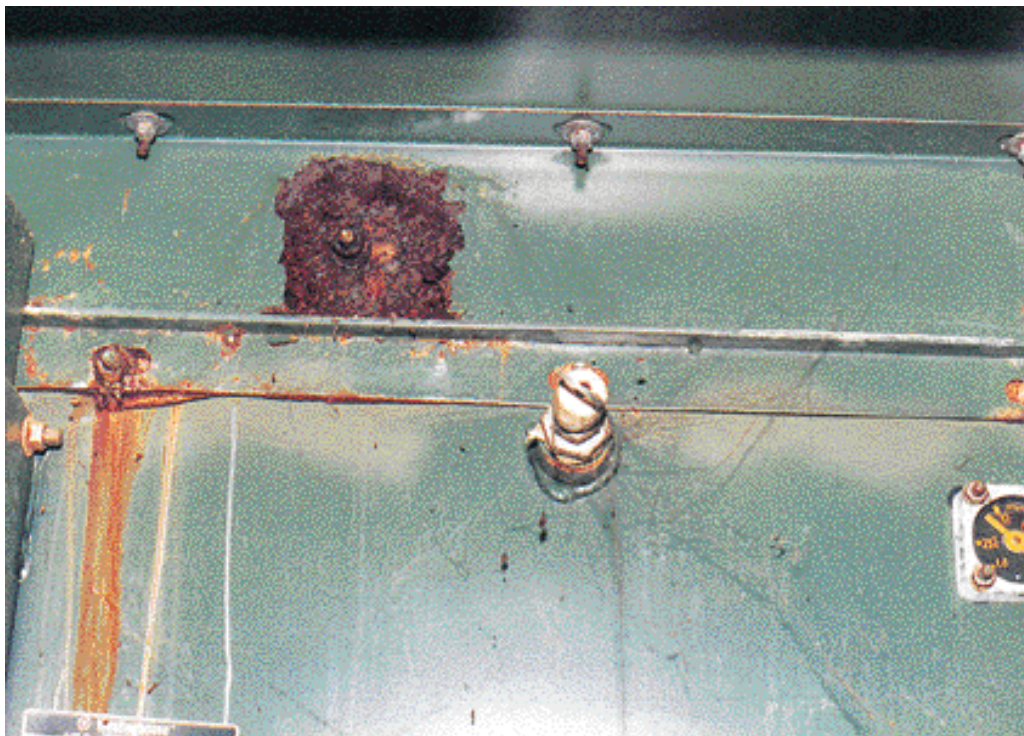


Figure 6–20: Peeling of Paint with Moderate Pitting



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Figure 6–21: Moderate Corrosion of Interior with Significant Pitting



2.5 Light Corrosion

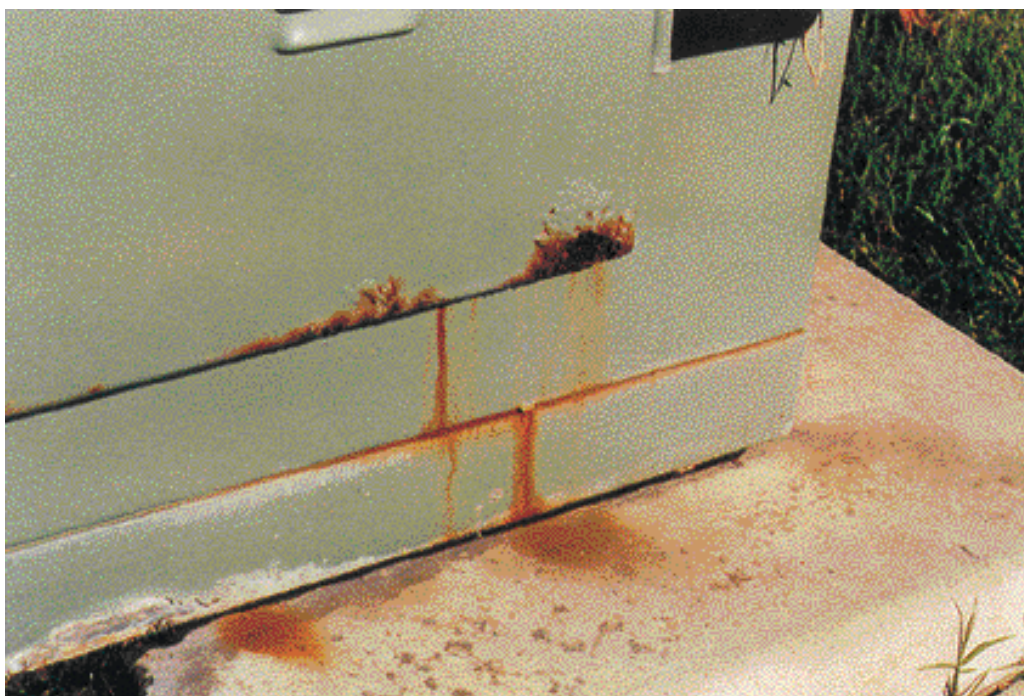
- ☐ There is some discoloration and disruption of painted surfaces but no serious pitting or scaling are present.
- ☐ Switch handles and mechanisms are operational.
- ☐ There is no sign of oil leakage.
- ☐ There are only minor touch-up repairs required.

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Figure 6–22: Light Corrosion on Bottom of Door (No Serious Pitting)



Figure 6–23: Close-Up of Light Corrosion on Bottom of Door (No Serious Pitting)



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Figure 6–24: Light Corrosion within Manual Switch Operating Mechanism Compartment (No Serious Pitting)

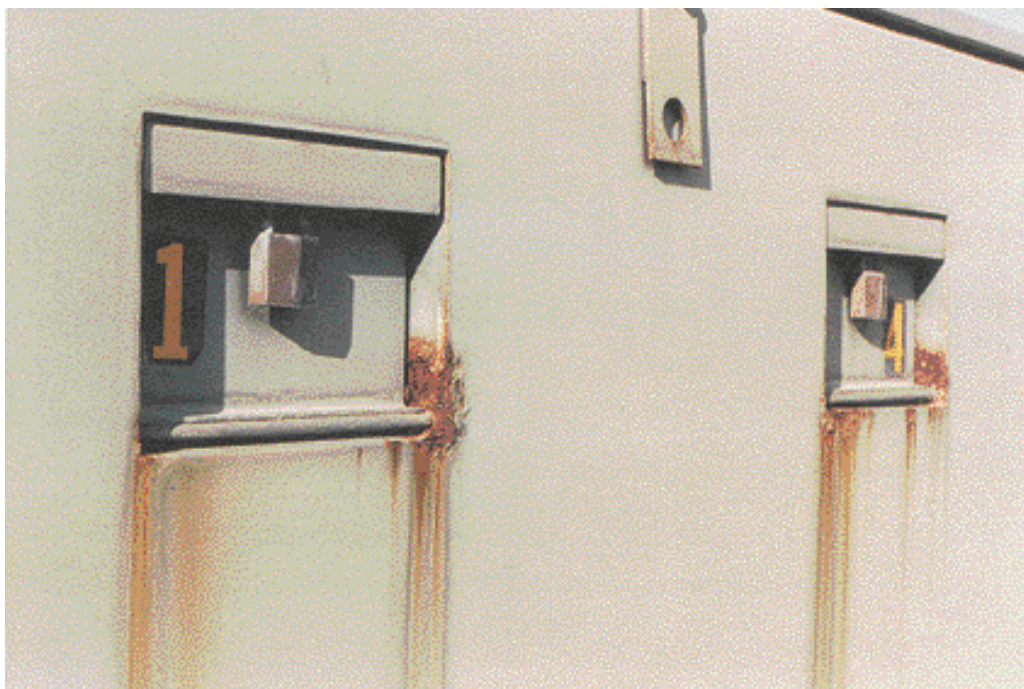


Figure 6–25: Light Corrosion at Louver Openings and at Base of Cabinet (No Serious Pitting)



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Figure 6–26: Limited Peeling of Paint



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**Figure 6–27: Light Corrosion of Adapter Cover Plate
(No Serious Pitting)**



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**Figure 6–28: Light Corrosion at Lower Edge of Top Cover and Brackets
(No Serious Pitting)**



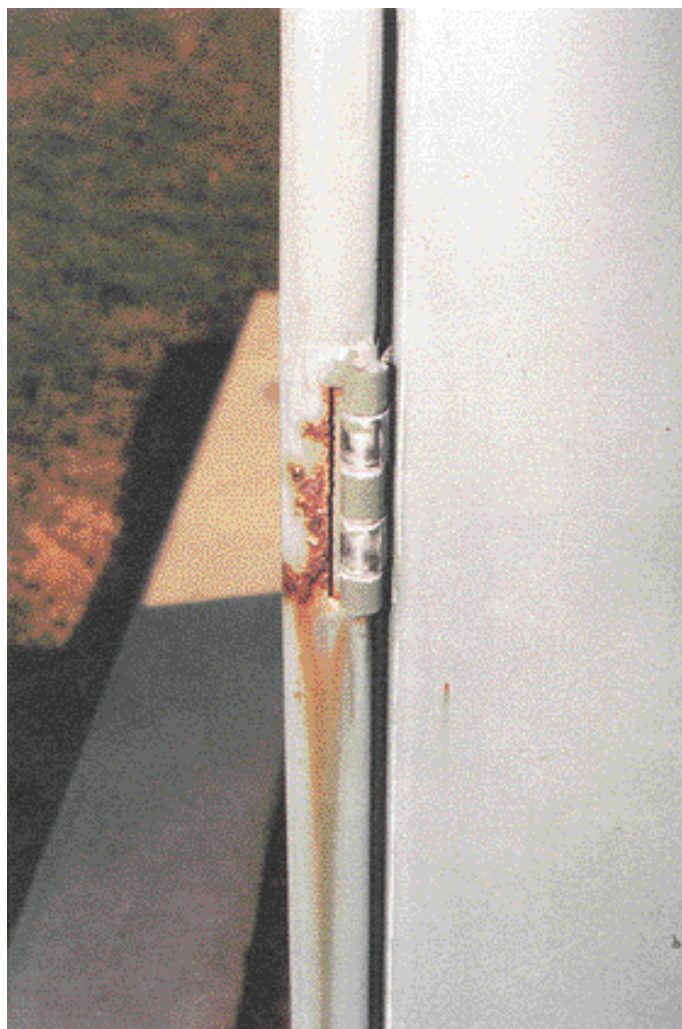
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**Figure 6–29: Light Corrosion at Weld Seam
(No Serious Pitting)**



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Figure 6–30: Light Corrosion at Hinges



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CG-7: Field Painting of Pad-Mounted Equipment

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CG-7: Field Painting of Pad-Mounted Equipment

1.0 Moderate Corrosion

Perform routine maintenance within three years. Touch up exterior of equipment rated as Corrosion Level 4 as necessary using the following material coded items:

- Paint Thinner, SCE Item 303
- Valspar Chromox Primer, SCE Item 105 (Manufacturer's No. 13-R-50)
- Paint, SCE Item 214, Bell Telephone Green



NOTE

Refer to Corrosion Prevention maintenance instructions (CP-2, 1.0) for field repainting of padmounted equipment.

2.0 Light Corrosion

Opportunity maintenance is identified (but not required) prior to the next inspection cycle.

3.0 Surface Preparation

The following photographs illustrate three stages of surface preparation recommended for repainting of PMH/PME switch enclosures, transformers, and capacitors.

- Stage **A** — Condition as found before scraping or cleaning.
- Stage **B** — Condition after scraping and cleaning.
- Stage **C** — Finished condition with primer undercoat.

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Figure 7–1: Field Painting of Pad-Mounted Equipment (1 of 12)



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Figure 7-2: Field Painting of Pad-Mounted Equipment (2 of 12)

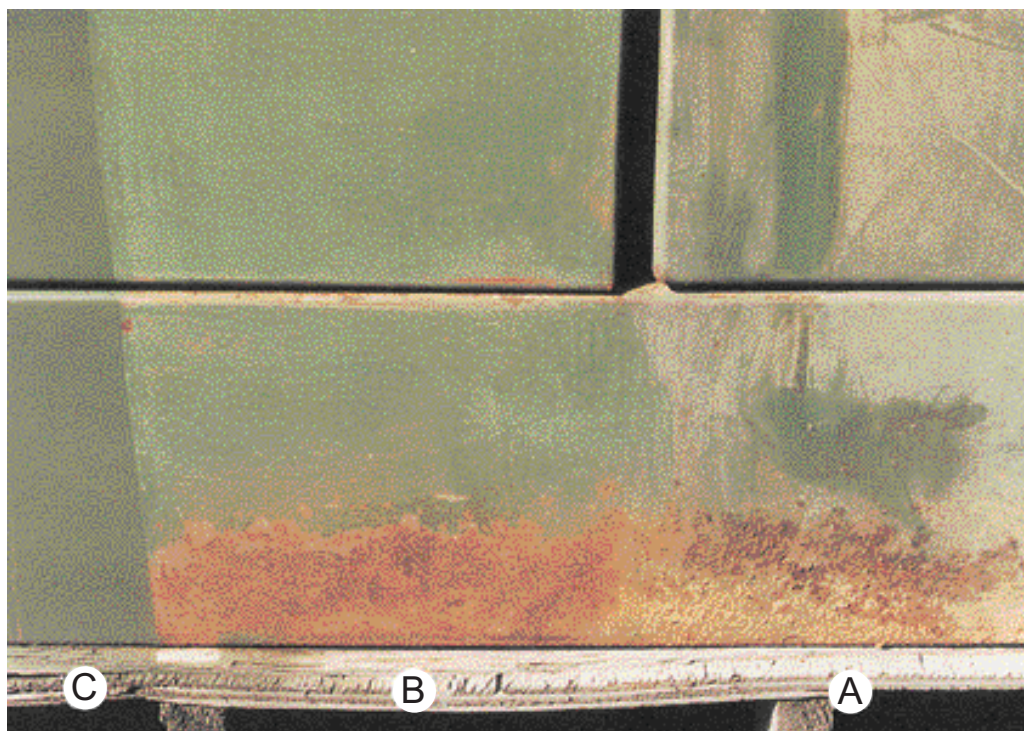
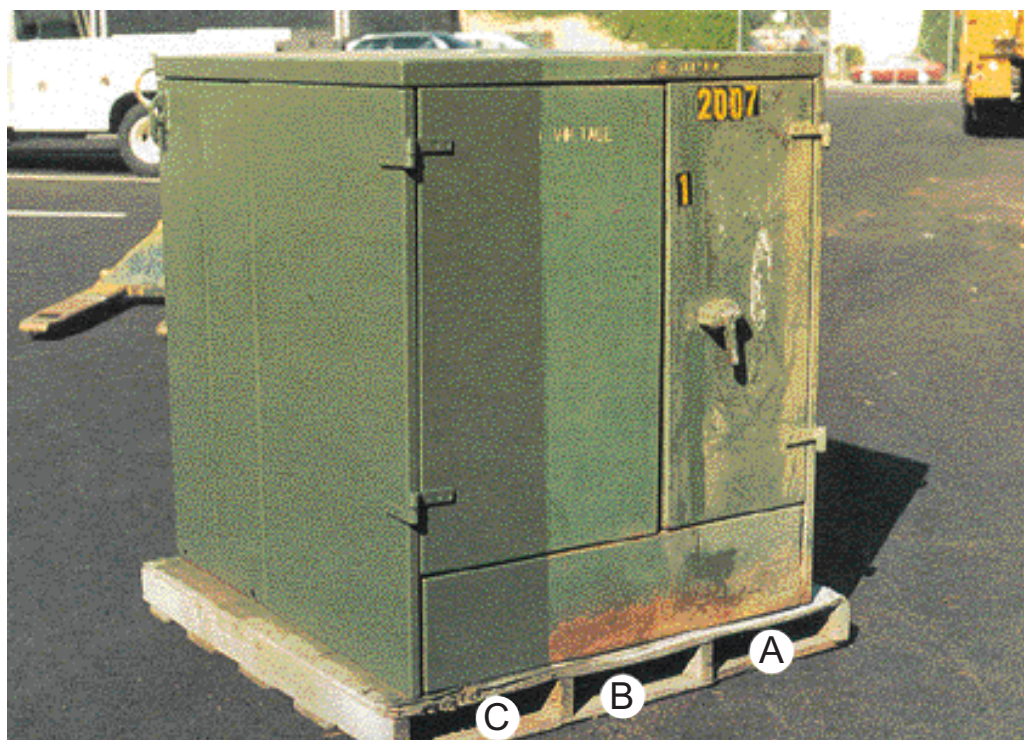
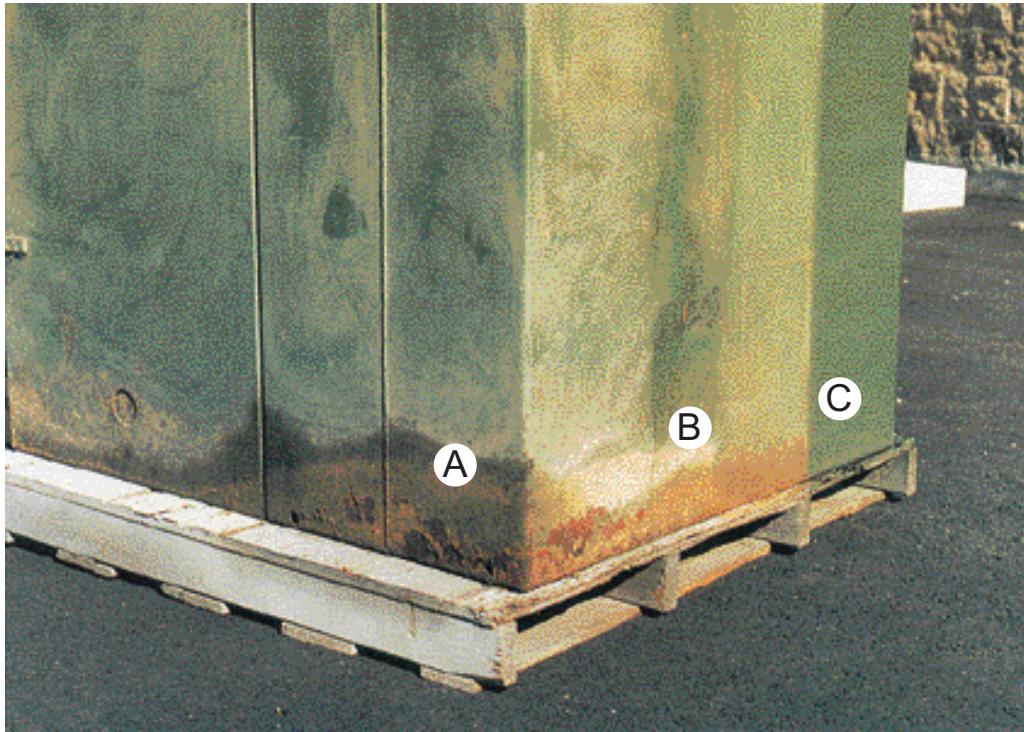


Figure 7-3: Field Painting of Pad-Mounted Equipment (3 of 12)



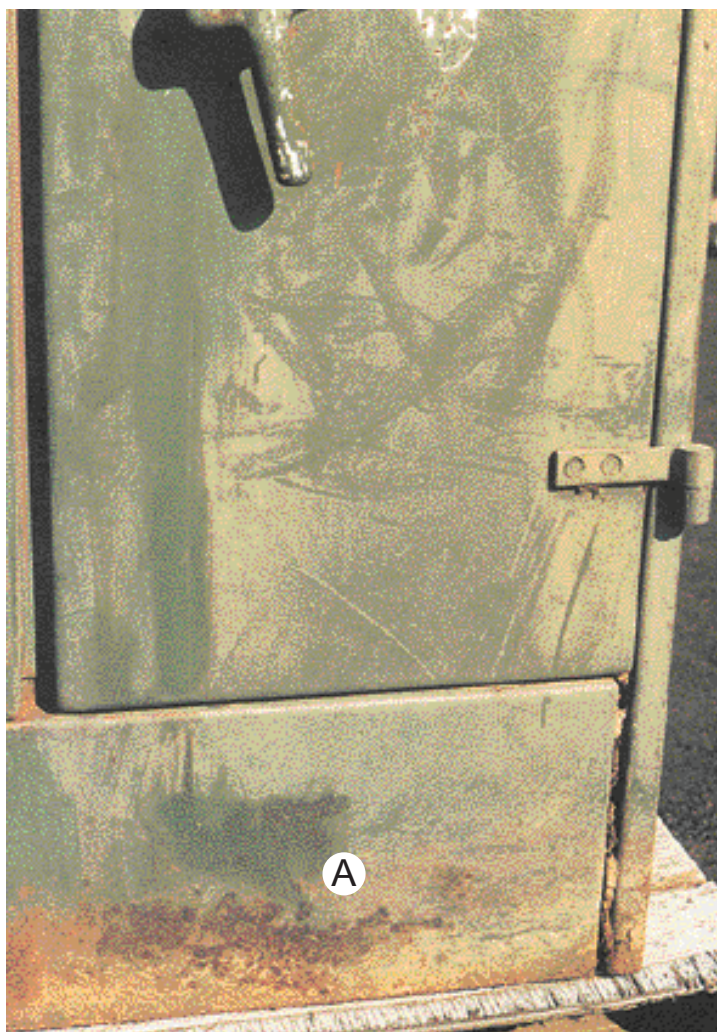
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Figure 7–4: Field Painting of Pad-Mounted Equipment (4 of 12)



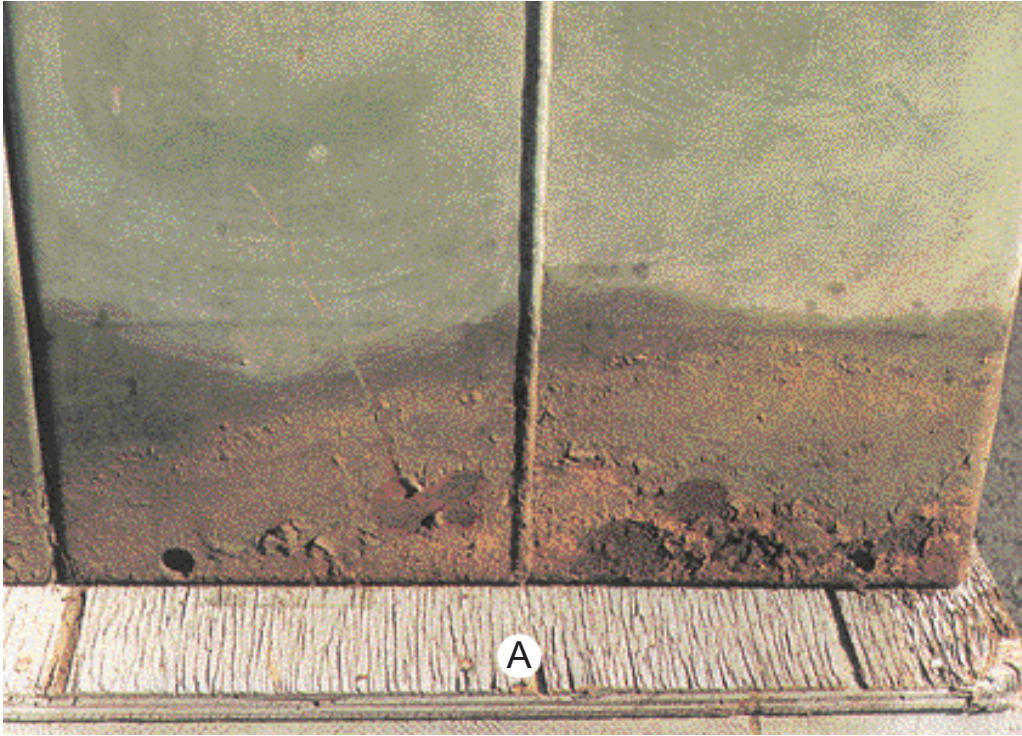
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Figure 7–5: Field Painting of Pad-Mounted Equipment (5 of 12)



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Figure 7–6: Field Painting of Pad-Mounted Equipment (6 of 12)



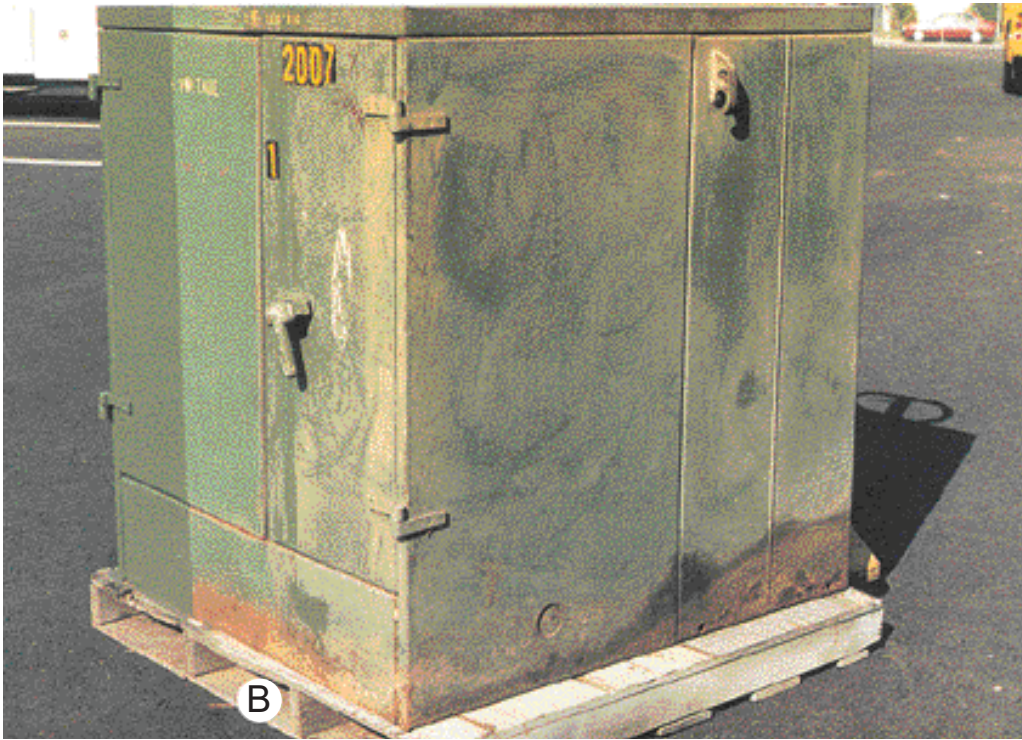
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Figure 7–7: Field Painting of Pad-Mounted Equipment (7 of 12)



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Figure 7-8: Field Painting of Pad-Mounted Equipment (8 of 12)



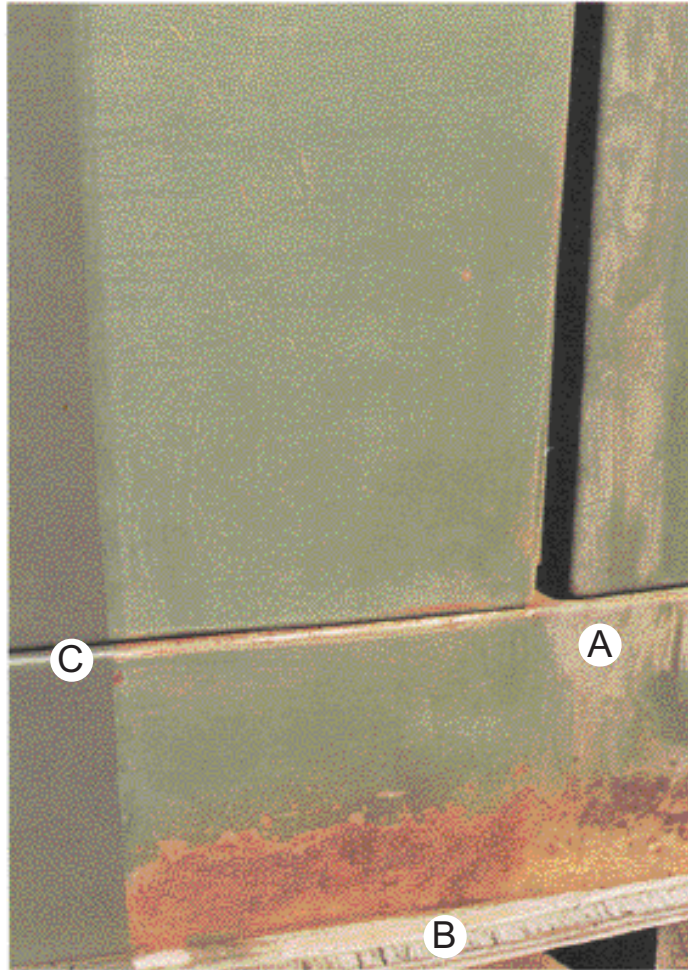
CG-7	Field Painting of Pad-Mounted Equipment	EFFECTIVE DATE 10-23-2015
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Figure 7-9: Field Painting of Pad-Mounted Equipment (9 of 12)



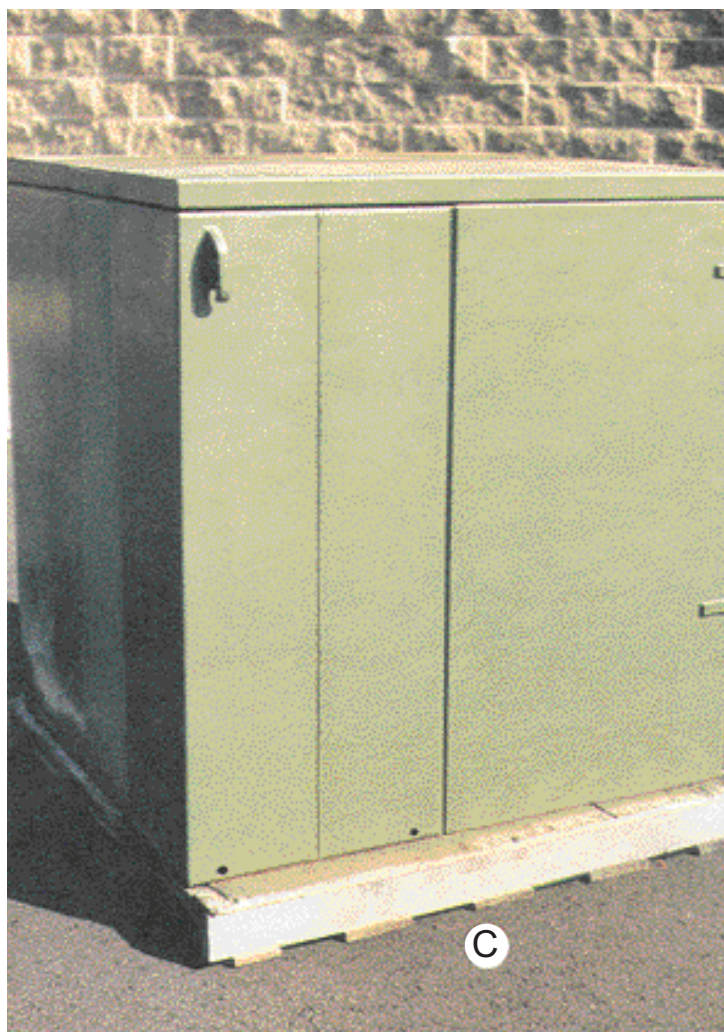
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Figure 7–10: Field Painting of Pad-Mounted Equipment (10 of 12)



CG-7	Field Painting of Pad-Mounted Equipment	EFFECTIVE DATE 10-23-2015
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Figure 7–11: Field Painting of Pad-Mounted Equipment (11 of 12)



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Figure 7–12: Field Painting of Pad-Mounted Equipment (12 of 12)



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