Transmission Patrols and Enhanced Inspection Frequency Guidelines

SUMMARY
This utility procedure provides the following guidelines for inspecting overhead transmission lines:

- Baseline frequencies for enhanced inspections, patrols, and risk-based driven inspections
- Annual asset selection process for inspections
- Methods for conducting aerial inspections, including drone technology and high-definition helicopter inspections
- Aerial patrols

Level of Use: Informational Use

TARGET AUDIENCE
This procedure applies to the following electric transmission personnel involved in the maintenance of transmission line facilities:

- Asset strategy
- Standards
- Maintenance and construction (M&C)
- Work management
- System inspections (SIs)
- Centralized Inspection Review Team (CIRT)
- Quality control/compliance

SAFETY
This procedure describes administrative tasks that do not expose personnel or the public to any specific hazards.

BEFORE YOU START
NA
Transmission Patrols and Enhanced Inspection Frequency Guidelines

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PROCEDURE STEPS

1 Background Information

1.1 Before 2019, inspections were performed by electric transmission line (ETL), with frequencies based on the structure type (wood or steel). Inspection methodology involved aerial patrols and detailed ground and climbing inspections.

1.2 In 2019, findings from the Wildfire Safety Inspection Program (WSIP) resulted in inspections that generated more data, enabling a better understanding of the health of asset components. This led to the creation of an enhanced inspection methodology using multiple inspection types: aerial patrol, detailed ground, detailed aerial (drone/helicopter), and climbing.

1.3 In 2020 and 2021, enhanced inspection baseline frequencies were primarily based on geographic boundaries in the high fire threat districts (HFTDs) / high fire risk areas (HFRAs).

1.4 Starting in 2022, with the increased availability of risk data, inspections are a part of a risk-based plan. Inspection frequencies guidelines will continue to evolve with improved risk data.

2 Enhanced Inspection Frequency and Schedule

2.1 High Fire Threat District (HFTD)/High Fire Risk Area (HFRA) Structures

1. Starting in 2022, INSPECT HFTD and HFRA structures according to the baseline inspection cycles described in Table 1 on Page 4. In addition to the baseline inspection cycles, structures are added to the inspection scope annually, based on the following criteria:

a. Wildfire risk, which is based on the annualized probability of failure multiplied by the Multi-Attribute Value Function (MAVF) wildfire consequence. The MAVF is calculated based on the results of Technosylva wildfire modeling.

b. Wildfire consequence, which is considered independently, in addition to the wildfire risk, to account for high-consequence, low-probability events.
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2.1 (continued)

c. Other factors involving data not currently integrated into the wildfire risk and consequence models (inspection result trends, terrain/fire suppression difficulty, etc.).

2. The list of additional HFTD/HFRA structures is determined each year from a snapshot of the risk (probability and consequence) data.

   a. The criteria or thresholds used to define the additional structures may vary each year, as the risk models mature and the overall risk of the transmission system evolves. These criteria are specified when the inspection plan is finalized.

2.2 Areas of Concern (AOC) Structures

1. Asset strategy personnel COMPILE a list of AOCs annually, with input from SI personnel, M&C personnel, and other organizations.

2. For non-HFTD areas, INSPECT AOC structures outside the baseline inspection cycle outlined in Table 1 on Page 4. Examples of AOCs include the following:

   • Known encroachments
   • Interaction with public (e.g., structures that cross rivers, highways, and railroads; structures in locations with high population density)
   • Asset health trends (e.g., failure history; wind, corrosion, and snow loading threats; potential access issues)
   • External regulator queries

2.3 Diablo Canyon Power Plant (DCPP), Morro Bay Power Plant, and Western Electricity Coordinating Council (WECC) Lines

1. Circuits supporting the DCPP, Morro Bay Power Plant, and tie lines for the WECC require more frequent inspections. SEE the last column of Table 1 on Page 4.

2.4 New Structures and Removed Structures

1. DO NOT INSPECT structures in the year they are installed.

2. DO NOT INSPECT structures in the year they are to be removed.

2.5 Due Dates and Exemptions

1. Detailed ground, climbing, and aerial inspections are due by July 31st in HFTDs and HFRA, and by December 31st in non-HFTD areas.
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2.5 (continued)

2. In “Can't Get In” (CGI) locations, external factors prevent scheduled inspections.

a. CGIs for ground and climbing inspections receive a “B” tag to address access issues. The “B” tag due date OR the original inspection due date – whichever is later – becomes the new inspection due date.

b. CGIs for aerial inspections are tracked through an internal AIR+ process. Aerial CGIs have a due date of **90 days** after the CGI OR the original inspection due date, whichever is later.

### Table 1. Overhead Enhanced Inspection and Patrol Baseline Frequencies

<table>
<thead>
<tr>
<th>Voltage (kV)</th>
<th>Inspection Type</th>
<th>Structure Type</th>
<th>Non-HFTD (Years)</th>
<th>HFTD Tier 3, Tier 2</th>
<th>DCPP/Morro Bay WECC Lines (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>Detailed ground and aerial</td>
<td>Steel</td>
<td>3</td>
<td>3</td>
<td>Annually</td>
</tr>
<tr>
<td></td>
<td>Climbing</td>
<td>Steel (critical)</td>
<td>3 (and as triggered)</td>
<td>3</td>
<td>Annually</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steel (non-critical)</td>
<td>12 (and as triggered)</td>
<td>3</td>
<td>Annually</td>
</tr>
<tr>
<td></td>
<td>High Water Table Inspection</td>
<td>Steel</td>
<td>5</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>(Bay Waters Foundation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Infrared</td>
<td>Steel</td>
<td>5 (and as triggered)</td>
<td>Tier 3 – Annual Tier 2 &amp; Zone 1 – 3</td>
<td>Annually</td>
</tr>
<tr>
<td>230 115 70 60</td>
<td>Detailed ground and aerial</td>
<td>Steel or wood</td>
<td>5</td>
<td>3</td>
<td>Annually</td>
</tr>
<tr>
<td></td>
<td>Climbing or aerial lift</td>
<td>Steel or wood</td>
<td>As triggered</td>
<td>As triggered</td>
<td>As triggered</td>
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<tr>
<td></td>
<td>High Water Table Inspection</td>
<td>Steel</td>
<td>5</td>
<td>NA</td>
<td>NA</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>Infrared</td>
<td>Steel or wood</td>
<td>5 (and as triggered)</td>
<td>Tier 3 – Annual Tier 2 &amp; Zone 1 – 3</td>
<td>Annually</td>
</tr>
<tr>
<td>All voltages</td>
<td>Patrol</td>
<td></td>
<td></td>
<td></td>
<td>Patrons are performed by ETL. Each structure requires a patrol per calendar year. A detailed inspection within the calendar year counts toward a patrol for that structure. Any line not detailed-inspected end-to-end that calendar year requires a patrol. A non-routine patrol, if the entire circuit is patrolled, may satisfy the routine patrol requirement.</td>
</tr>
</tbody>
</table>

1 Critical 500-kV structures are defined as the top 2% of structures by “Importance Factor” in the 1993 report, “500 kV Emergency Restoration Project.”

2 Non-500 kV steel structures: No prescribed climbing frequency.

Wood poles: Typically, climbing is not a part of routine inspections. PERFORM climbing of wood poles as triggered, in accordance with Utility Standard TD-2325S, “Inspecting, Testing, and Maintaining Wood Poles.”

3 Enhanced Inspection Methodology

3.1 Inspections identify abnormalities or circumstances that negatively impact safety, reliability, or asset life. Inspections include the following:

- Visual observations of individual structures, components, and equipment
- Component testing (hammer test).

3.2 Inspection results have shown that different inspection methods are effective for identifying different conditions.

1. Detailed ground and aerial (drone or helicopter) inspections: PERFORM on each asset scheduled for an inspection.

2. Climbing inspections: PERFORM in addition to detailed ground and aerial inspections, either on a prescribed schedule for 500-kV structures OR as-triggered for other structures.

   **NOTE**

   There is no requirement to conduct inspections at the same time.

3.3 COMPLETE all inspection types in the same year, preferably close to the same time.

1. Performing all inspection types close to the same time on a line reduces repeated clearances associated with the execution of any identified “A” or “B” tags.

3.4 The inspection is complete only when all inspection methods have been completed.

4 Patrol Methodology

4.1 Patrols include visual observations to identify abnormalities (i.e., obvious structural problems or hazards) or circumstances that negatively impact safety or reliability.

4.2 Patrons can be either aerial or ground (applicable to no-fly zones).

4.3 DO NOT SUBSTITUTE patrols for any of the inspection methods. SEE Table 1 on Page 4.

   **NOTE**

   A detailed ground inspection may be considered a patrol.

4.4 Personnel may PERFORM patrols by walking, driving, or flying (helicopter only).
CONDUCT all patrols to identify the typical electric overhead transmission problems listed in TD-1001M, Electric Transmission Preventative Maintenance Manual, Section 2.3.3.3, “Patrols.”

DEFINITIONS

NA

IMPLEMENTATION RESPONSIBILITIES

NA

GOVERNING DOCUMENT


COMPLIANCE REQUIREMENT / REGULATORY COMMITMENT

Records and Information Management:

Information or records generated by this procedure must be managed in accordance with the Enterprise Records and Information Management (ERIM) program policy, standards, and Enterprise Records Retention Schedule (ERRS). Refer to GOV-7101S, “Enterprise Records and Information Management Standard,” and related standards. Management of records includes, but is not limited to:

- Integrity
- Storage
- Retention and Disposition
- Classification and Protection

REFERENCE DOCUMENTS

Developmental References:

- Utility Standard TD-1464S, Attachment 3, “Relationship Between Fire Index Areas, High Fire Threat District, and High Fire Risk Area”
REFERENCE DOCUMENT (continued)

Supplemental References:


APPENDICES
NA

ATTACHMENTS
NA

DOCUMENT REVISION

DOCUMENT APPROVER
Electric Transmission Asset Strategy – Substation and Transmission

DOCUMENT OWNER
Senior Manager, Transmission Line Asset Strategy

DOCUMENT CONTACT
Specialist, Electric Transmission Asset Strategy

REVISION NOTES

<table>
<thead>
<tr>
<th>Where?</th>
<th>What Changed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>This is a new utility procedure.</td>
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</table>