



Patrolling Pipelines and Mains

Summary This procedure establishes a uniform process for patrolling Pacific Gas and Electric Company (Company) gas facilities.

Level of Use: Informational Use

Target Audience Gas transmission and regulation (T&R) personnel.
Gas maintenance and construction (M&C) personnel.
Gas engineering personnel.
Aerial patrol pilot.

Safety Hazards impacting this work include, but are not limited to, the following conditions:

- Dangerous animals.
 - Tripping and slipping hazards.
 - Traffic conditions.
 - Vegetation including poison oak.
 - Environmental surroundings.
 - Construction sites.
-

Before You Start Field personnel following this procedure must wear the following personal protective equipment (PPE) at a minimum, plus any other applicable PPE, as specified in the [Code of Safe Practices](#):

- Hard hat (must be available).
- Traffic vest.
- Proper footwear, no sneakers allowed.
- Long-sleeved shirt.
- Long pants.
- Gloves (must be available).
- Safety glasses (must be available).

Personnel patrolling pipelines and mains must complete [Operator Qualification](#)



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[08-01 "Patrolling Pipeline."](#)

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Procedure Steps

1 Overview

- 1.1 Patrolling Company gas facilities is the responsibility of the operating department supervisor and the district superintendent who direct the maintenance and operation of these facilities in their areas.
- 1.2 Performance responsibilities include the following tasks:
 - Determining the specific scope of patrols and any special considerations.
 - Scheduling and assigning patrol frequency.
 - Reviewing and maintaining patrol records.
 - Initiating and ensuring the completion of actions to correct conditions found during patrols.
- 1.3 Maintaining patrol records is the responsibility of division maintenance and construction (M&C) personnel and gas transmission district offices.



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1.4 Federal Code Requirements

1. This procedure fully addresses the federal code requirements for [CFR Title 49 §192.481, "Atmospheric corrosion control: Monitoring,"](#) [CFR Title 49 §192.705, "Transmission lines: Patrolling,"](#) and [CFR Title 49 § 192.721, "Distribution systems: Patrolling,"](#) for all transmission and distribution pipelines, with the following exceptions:
 - [Utility Procedure TD-4430P-02 "Gas Transmission Stations Inspection, Testing, and Maintenance Procedures,"](#) addresses piping in transmission stations containing controller-operated equipment.
 - [Utility Procedure WP4430-04, "Gas Valve Maintenance Requirements and Procedures,"](#) addresses atmospheric corrosion on main line valves and associated equipment.
 - Utility Procedure TD-4540P-01 (proposed), currently [WP4540-01, "District Regulator Station Maintenance,"](#) addresses piping at transmission stations containing pilot-operated equipment and district regulator stations.
 - [Utility Procedure TD-4110P-06, "Field Inspections of Gas Facilities,"](#) addresses customer riser pipes and customer meter and regulator sets. This includes curb meters in vaults and high-to-high sets to an individual customer, two small adjacent or adjoining customers, or multiple small customers served through a meter header or manifold (also known as non-district high pressure regulators [HPRs]).
2. This procedure partially addresses the requirements of [CFR Title 49 §192.613 "Continuing Surveillance."](#) It provides for surveillance concerning changes in class location, failures, and other unusual operating and maintenance conditions.

2 Patrol

2.1 Patrol the following facilities when tasked with monitoring pipelines and mains:

1. All gas transmission and gathering lines up to the first valve at compressor stations, district regulator sets, and valve lots.
2. Any gas distribution lines and distribution feeder mains (DFMs) operating at $\leq 20\%$ specified minimum yield strength (SMYS) in places or on structures where anticipated physical movement or external loading could cause leakage or failure.
3. Exposed distribution mains, excluding customer riser pipes and customer meter and regulator sets not included in Item 2 above. This exclusion includes curb meters in vaults and high-to-high sets to an individual customer, two small adjacent or adjoining customers, or multiple small customers served through a meter header or manifold (also known as non-district HPRs).
4. Any other gas pipeline facilities requiring special attention, as conditions warrant.



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3 Conditions to Observe and Report

3.1 Observe and report on the following conditions when tasked with monitoring pipelines and mains:

- Landslides or potential slides.
- Erosion by streams, wave action, rain, or other natural causes.
- Land subsidence, earth slippage, or extensive tree root growth that could affect the pipeline.
- Possible third-party threats, including construction or maintenance work along the pipeline (within 220 yards [660 feet] on either side) or encroachment on the Company's right-of-way.
- Any excavation, grading, demolition, or other construction activity that could result in the following conditions:
 - Damage to the pipe.
 - Loss of support due to settlement or shifting of soil around the pipe.
 - Undermining or damage to pipe supports.
 - Loss of cover.
 - Excess fill.
- Presence of survey parties and/or other indications of possible future work within 220 yards (660 feet [ft]) on either side of the pipeline.
- Evidence of gas leakage as indicated by dead or dying vegetation, bubbles in surface water, odor, readings, etc.
- Signs of severe seismic displacement (fault zones).
- Damage to Company-owned facilities, including casing vents.
- Damage to the supports of Company facilities (including highway structures and other facilities not owned by the Company) for exposed pipe for transmission and distribution pipe. Damage includes, but is not limited to, corrosion and missing, cracked, and/or loose supports.
- Access roads that may not be in a passable condition.
- Pipeline markers and signage, including those inside Company-owned stations.
- Any other factors affecting the operation or safety of the pipeline.

4 Atmospheric Corrosion Conditions to Observe and Report

4.1 Report the following issues using the documents in [Section 10, "Documentation."](#)



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4.2 For pipe conditions, observe and report the following:

1. Coating OK? (Y/N)

- Respond “N” for no if the coating is in poor condition. Six inches beyond the soil surface is desired for air/soil transitions, but if the coating is in good condition respond “Y” for yes and note the lack of coating length (if responding with no, include notes of condition).
- Respond “N” for no if coating is not present on the length of the span (surface rust is not an issue). If responding with no, include notes of condition.

2. Pipe Integrity OK? (Y/N)

- Respond “N” for no if pitting is present (include depth in notes).

3. Paint OK? (Y/N)

- Respond “N” for no if there is chalking, peeling, or cracking (if responding with no, include notes of condition).

4. Structure OK? (Y/N)

- Respond “N” for no if support, cables, or footings are not in good condition (if responding with no, include notes of condition).

4.3 Air/Soil Transition Considerations

1. Evaluate any evidence of pitting corrosion on exposed pipe surfaces. Repair if possible.

2. The pipe condition always dictates whether or not remedial work is required and the priority for the remedial work.

a. The fact that the coating does not extend to a distance of at least 6 inches above the soil level is not sufficient reason to require repairs.

b. The presence of cold-applied plastic tape or other coating systems that are not approved as replacement systems for transitions is not sufficient reason to require repairs.

3. Recoat the pipe to at least 6 inches above the ground when making repairs.



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4.4 Evaluation Strategy and Criteria for Corrosion

1. Determine the maximum corrosion depth and compare it to the nominal thickness in the uncorroded area.
2. IF the corrosion depth cannot be determined,
THEN refer to corrosion engineering.
3. Accept any corrosion that does not exceed 20% of the measured nominal thickness.
4. IF the depth is greater than 20% of the measured nominal thickness,
THEN contact the responsible engineer.
5. The responsible engineer determines if the corrosion is acceptable based on the criteria and strategies provided below in Table 1, "Corrosion Criteria and Evaluation Strategies."

Table 1. Corrosion Criteria and Evaluation Strategies

Strategy	Maximum Corrosion Depth	Evaluation Criteria for Pipe	Comments
1	<= 20% of nominal wall thickness	None. Pipe is acceptable as is.	If Strategy 1 fails, proceed to Strategy 2.
2	> 20% and < 80%	Perform RSTRENG analysis. Per RSTRENG, any length of corrosion < 20% deep is acceptable. Use caution where secondary loads could be present.	If Strategy 2 fails, repair or replace pipe or lower the pressure. Contact the responsible engineer.
3	>= 80%	None. Automatic repair or replacement of pipe is required.	Repair or replace pipe.

5 Patrolling Methods

- 5.1 Conduct patrols to observe surface conditions on and adjacent to the facility right-of-way.
- 5.2 Use patrolling methods in the following order:
 1. Aerial observation (preferred method)
 - a. Coordinate routine aerial patrols of gas transmission lines with the designated Company aerial pipeline patrol program manager.
 - b. Coordinate other special aerial patrols (for example, helicopter patrols) with the gas transmission and distribution (T&D) technical special program manager.



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5.2 (continued)

- c. Supplement aerial patrols with ground patrols whenever any of the conditions listed on Page 4 in [Section 3, "Conditions to Observe and Report,"](#) cannot be adequately observed by aerial patrol.
2. Ground observation (including motorized vehicle)
 - a. Perform ground patrols in conjunction with other work as long as the necessary functions of patrolling, including reporting, are accomplished.
 - b. Patrol by ground if it is not practical to patrol by air (for example, heavy foliage over a pipeline, air space restrictions).
 - c. Supplement aerial patrol with ground patrol if the conditions listed on Page 4 in [Section 3, "Conditions to Observe and Report,"](#) cannot be adequately observed by aerial patrol.

6 Aerial Patrol

6.1 Follow these steps for the frequency of aerial patrols:

1. Fly all pipelines quarterly at a minimum.
2. Fly some areas more frequently depending on the activity around the pipeline.
3. Obtain the schedule defining the frequency of the air patrol from the aerial pipeline patrol program manager.

6.2 Pilot is to adhere to the following when conducting aerial patrol observations:

1. Follow the established flight schedule.
2. Use the Aerial Patrol Report form to document observations from the air.
3. List items needing further ground review on Page 2 of the Aerial Patrol Report form.
4. IF no new hazards are observed,

THEN document this on the Aerial Patrol Report form.
5. IF an observation is made,

THEN perform the following steps:
 - Contact appropriate Company personnel using the contact numbers listed on the Aerial Patrol Report form.
 - Indicate the observation on the Aerial Patrol Report form.



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6.2 (continued)

- Note personnel contacted and the date and time of contact on the Aerial Patrol Report form.
- Document on the Aerial Patrol Report form using the words “BUILDING CONSTRUCTION OBSERVATION” along with specific details for every observation of presence of survey parties, and/or other indications of possible future building construction within 220 yards of the pipeline (660 ft) on either side of the pipeline).
- Report new construction of any buildings intended for human occupancy or small well defined outdoor areas such as a playground, recreation area, outdoor theater or other place of public assembly.

6. IF district supervisors cannot be reached in an emergency,
THEN contact San Francisco Gas Control.

6.3 Gas system maintenance personnel, gas T&R personnel, and local division gas supervisors perform the following steps when aerial patrol requires supplemental ground patrol by M&C crews:

1. Investigate observations listed on the Aerial Patrol Report form.
2. Determine the impact on the pipeline.
3. Create a work request to document the observations.
4. IF the pipeline issues have been resolved,
THEN complete the work request.

6.4 Perform the following steps to document aerial patrols:

1. The pilot completes the following steps for the air patrol company:
 - a. Send the completed Aerial Patrol Report forms to the responsible district or division personnel within 48 hours of the patrol.
 - b. Send copies of the completed Aerial Patrol Report forms to the aerial pipeline patrol program manager at the end of every month.
2. Gas system maintenance personnel, gas T&R personnel, and local gas division supervisors, or their designees, complete the following steps for the field office:
 - a. Review the Aerial Patrol Report form for completeness.



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6.4 (continued)

- b. IF action was required to correct observations found by the aerial patrol,

THEN complete the documentation of the work performed to make the corrections.
- c. Reporting New Construction.
 - (1) Complete [Form TD-4412P-07-F04, "Report of New Construction Along Pipeline, For Pipelines Operating at or over 20% SMYS,"](#) Section II if the Aerial Patrol Report indicates the presence of survey parties, and/or other indications of possible future building construction within 220 yards (660 ft) of the pipeline on either side of the pipeline.
 - (2) Report new construction of any buildings intended for human occupancy or small well defined outdoor areas such as a playground, recreation area, outdoor theater, or other place of public assembly.
 - (3) Send completed [Form TD-4412P-07-F04](#) to gas transmission mapping personnel in Walnut Creek **within 10 days** of the finding.
 - (4) Retain a copy in the aerial patrol binder/file in the local office.
 - (5) Mapping and engineering personnel complete Sections III and IV in compliance with [Utility Standard 4127, "Class Location Determination, Compliance, and Maintenance,"](#) and return the original to the local office.
 - (6) File the original returned from mapping in the aerial patrol binder/file and discard the copy.
- d. File all documentation in a file/binder, sorted by flight route number or date.
- e. Keep the documentation for the life of the pipeline.
- f. Present the documentation as necessary during any audit.

- 6.5 For blowdowns, gas system maintenance personnel, gas T&R personnel, and local division gas supervisors notify the pilot in advance of any scheduled blowdowns due to clearances or other pipeline maintenance activities.



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6.6 Complete the following steps for flight schedule modifications:

1. Gas system maintenance personnel, gas T&R personnel, and local division gas supervisors, or their designees, contact the aerial pipeline patrol program manager to request changes to the flight schedule, or the list of pipelines to be patrolled.
2. The aerial pipeline patrol program manager initiates and coordinates requested changes with the pilot, gas mapping personnel, and any other involved personnel.

7 Annual Review of Facilities to be Patrolled

7.1 Conduct annual reviews of facilities to be patrolled as follows items:

1. For a local office review, review and update the following:
 - The list of pipelines to be patrolled.
 - The patrolling methods for each pipeline.
2. For an aerial patrol review, the aerial pipeline patrol program manager reviews and updates the aerial patrol program.

8 Patrol Frequency

8.1 Refer to [Table 2, "Patrol Frequency Requirements,"](#) below for minimum patrol frequency requirements.



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Table 2. Patrol Frequency Requirements

Facilities	Quarterly	6 Mo.	3 Yr.	Acceptable Methods	Form
Gas transmission lines, gathering lines and/or line segments (exposed or buried).	X			Aerial and/or ground	Aerial Patrol Report (Example Only) Attachment 4 Ground Patrol Report (Form – Use) TD-4412P-07-F01
Atmospheric corrosion inspection of exposed portions of transmission lines, gathering lines.			X	Ground	TD-4412P-07-F02
Distribution lines in places or on structures where anticipated physical movement or external loading could cause failure or leakage and consequent hazards to public safety. (See A and B below)				Aerial and/or ground	Aerial Patrol Report (Example Only) Attachment 4 Landslide Area (Form – Use) TD-4412P-F03
A. In business districts.	X				Aerial Patrol Report (Example Only) Attachment 4 Landslide Area (Form – Use) TD-4412P-F03
B. Outside business districts.		X			Aerial Patrol Report (Example Only) Attachment 4 Landslide Area (Form – Use) TD-4412P-F03
Exposed portions of distribution lines.			X	Ground	TD-4412P-07-F02

8.2 Consult the following bulleted list for the allowable limits to patrol frequencies:

- **Quarterly** – At least four times each calendar year, not to exceed 4½ months to the date.
- **Six months** – At least twice each calendar year, not to exceed 7½ months to the date.
- **Annually** – At least once each calendar year, not to exceed 15 months to the date.



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8.2 (continued)

- **Three years** – Once every 3 years, not to exceed 39 months to the date.

8.3 Conduct additional patrols, as local conditions warrant, based on the following circumstances:

- Earthquakes
- Landslides
- Fires
- Heavy rainstorms or extended rainfall
- Train derailments near a pipeline right-of-way
- Other disasters

9 Corrective Actions

9.1 Be prepared to correct minor conditions found during the patrol, if possible (for example, missing stickers, ensure markers are upright).

9.2 Contact the responsible supervisor or superintendent as soon as possible concerning conditions that require immediate attention but cannot be corrected during the patrol.

9.3 Enter conditions which require follow-up attention and priority work scheduling (but which can be deferred) into a work management database as an SAP notification or pipeline maintenance (PLM) work request.

10 Documentation

10.1 Document ground patrols in the following manner:

1. Complete [Form TD-4412P-07-F01, "Pipeline Patrol Report."](#)
 - a. Complete the form.
 - b. Print the patroller's LAN ID and the date of the patrol.
 - c. Initial the form in the space provided.
 - d. Submit the form to the responsible supervisor.
2. Complete a corrective notification or PLM work request as follows:
 - a. Report conditions that require immediate attention but cannot be corrected by the patrol.



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10.1 (continued)

- b. Submit the form to the responsible supervisor.

10.2 Document aerial patrols in the following manner:

1. The aerial pipeline patrol program manager (the person who administers the aerial patrol program) customizes an aerial patrol report for the pipeline segments patrolled in each area.
2. The pilot completes the customized aerial patrol report for each aerial patrol.
3. Send the completed aerial patrol report to the district or division office for the pipeline segments and/or DFMs patrolled.
4. File the report in the aerial patrol binder.
5. The aerial pipeline patrol program manager retains copies of the aerial patrol reports.
6. The aerial pipeline patrol program manager provides copies of aerial patrol reports upon request.

10.3 Document special inspections in the following manner:

1. For spans, complete [Attachment 2, Form TD-4412P-07-F02, "Exposed Piping and Spans,"](#) to document inspections of exposed piping and spans.
2. For landslides, perform the following steps:
 - a. Patrol slide conditions quarterly, at a minimum.
 - b. Complete [Attachment 3, TD-4412P-07-F03, "Landslide Area,"](#) if slide conditions exist.
3. To maintain form retention, perform the following steps:
 - a. Retain all patrol reports of Company responses at district or division M&C local offices.
 - b. Retain the records describing the Company's response and actions taken as a result of the patrol findings for the life of the patrolled facility.
 - c. Retain completed patrol reports for patrols not requiring corrective action for the following time frames.
 - (1) The life of the facility for numbered transmission pipelines.
 - (2) 3 years for all other facilities.



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END of Instructions

Definitions

Class location: the density of buildings as defined in [CFR Title 49 §192.5, "Class locations."](#)

Distribution feeder main (DFM): a line operating over 60 pound-force per square inch gauge (psig) that is not a numbered transmission line.

Distribution line: a pipeline that serves as a common source of supply for more than two service lines.

Exposed facility: a facility that is normally exposed to the atmosphere. This includes mains and services on the roofs of buildings and equipment in underground vaults. Excluded facilities include those exposed in a temporary excavation, cased piping, and buried valve bodies within a frame and cover that may or may not be in contact with the soil.

Gathering line: a pipeline that transports gas from a current production facility to a transmission line or main. This term includes collection lines taking gas from wells.

High pressure regulator (HPR): a type of pressure regulation device.

Transmission lines: all lines operating over 20% SMYS that are not gathering lines. This term includes gas underground storage field injection and withdrawal lines and lines that transport gas within a storage field.

Implementation Responsibilities

Gas management personnel provide the necessary resources to patrol gas facilities and to correct conditions found.

Gas transmission and M&C personnel perform patrols and report conditions found.

Gas engineering personnel perform analyses of atmospheric corrosion conditions found during patrols to determine necessary actions.

The aerial pipe patrol program manager manages the aerial patrol and maintains the necessary aerial patrol records.

Governing Document

[Utility Standard S4412, "Preventing Damage to Underground Facilities,"](#) governs this document.



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Compliance Requirement/ Regulatory Commitment

[CFR Title 49 § 192.481, "Atmospheric corrosion control: Monitoring."](#)

[CFR Title 49 § 192.613, "Continuing Surveillance."](#)

[CFR Title 49 § 192.705, "Transmission lines: Patrolling."](#)

[CFR Title 49 § 192.721, "Distribution systems: Patrolling."](#)

Reference Documents

Developmental References:

Aerial Patrol Process Instructions.

[CFR Title 49 § 192.481, "Atmospheric corrosion control: Monitoring."](#)

[CFR Title 49 § 192.705, "Transmission lines: Patrolling."](#)

[CFR Title 49 § 192.721, "Distribution systems: Patrolling."](#)

[Code of Safe Practices.](#)

[Operator Qualification 08-01 "Patrolling Pipeline."](#)

[USP 22, "Safety and Health Program."](#)

[Utility Standard 4127, "Class Location Determination, Compliance, and Maintenance."](#)

[Utility Procedure TD-4110P-06, "Field Inspections of Gas Facilities"](#)

[Utility Procedure TD-4430P-02, "Gas Transmission Stations Inspection, Testing, and Maintenance Procedures."](#)

[Utility Procedure WP4430-04, "Gas Valve Maintenance Requirements and Procedures."](#)

[Utility Procedure WP4540-01, "District Regulator Station Maintenance."](#)

Supplemental References:

NA

Appendices

NA



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- Attachments**
- [Attachment 1, Form TD-4412P-07-F01, "Pipeline Patrol Report."](#)
 - [Attachment 2, Form TD-4412P-07-F02, "Exposed Piping and Spans."](#)
 - [Attachment 3, Form TD-4412P-07-F03, "Landslide Area."](#)
 - [Attachment 4, "Aerial Patrol Report Front Side."](#)
 - [Attachment 5, "Aerial Patrol Report Back Side."](#)
 - [Attachment 6, "Aerial Pipeline Patrol Flow Chart."](#)
 - [Attachment 7, "Aerial Patrol Process Instructions."](#)
 - [Attachment 8, Form TD-4412P-07-F04, "Report of New Construction Along Pipeline, For Pipelines Operating at or over 20% SMYS."](#)

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Director, Codes and Standards

Document Owner [Redacted]
Process owner

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Revision Notes

Where?	What Changed?
Step 1.4	Changed reference to 49 CFR 192.613, "Continuing Surveillance."
Compliance Requirement/Regulatory Commitment	Changed reference to 49 CFR 192.613, "Continuing Surveillance."