Gas Transmission Stations Inspection, Testing, and Maintenance Procedures

Summary

This procedure provides direction for inspecting, testing, and maintaining equipment in Pacific Gas and Electric Company (Company) gas transmission stations, which include major gas facilities and regulator stations.

This procedure also applies to all work conducted on main gas processing equipment normally found in gas station facilities. It does not apply to special and/or complex equipment (such as gas compressors, standby electric generators, glycol reboilers, etc.) that are covered by detailed manufacturer's instructions and/or specific station operation and maintenance instructions.

Target Audience

The primary audiences for this procedure are gas transmission maintenance and construction employees, their supervisors, and local district superintendents.

Safety

Improper inspection and maintenance of any gas station facility equipment could jeopardize public and employee safety.

Perform all work in compliance with Utility Standard Practice (USP) 22, "Safety and Health Program," and *Code of Safe Practices*.

Before Starting this Procedure

Personal Protective Equipment (PPE): Employees performing these procedures must use Company-approved PPE such as hard hats and flame-resistant (FR) traffic vests, as well as proper work attire (e.g., footwear, long-sleeved shirts, eye and face protection, and gloves), as described in the *Code of Safe Practices*.

Additional PPE, such as respirators or safety harnesses, may be required to perform specific tasks identified in this procedure. Employees and supervisors must identify and discuss the proper use of such equipment during tailboards before starting the work.

Employee Qualifications: Employees who perform inspections or maintenance in accordance with this procedure must be properly trained and qualified under the applicable Operator Qualification (OQ) tasks identified under the Operator Qualification Program.

Tools, Materials, and Equipment: Use only Company-approved tools and equipment. Equipment includes but is not limited to calibrated test gauges, calibrated pressure recorders, air monitoring instruments, and leak test soap solution. Refer to the manufacturer's instructions for specialized tools required for the maintenance of unique equipment and transmission facilities.

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Procedural Steps

1. General Procedures

The following paragraphs summarize general procedures for all inspection, testing, and maintenance of gas transmission facilities:

1. Where applicable, follow the requirements in Utility Work Procedure WP4100-10, "Gas Clearance Procedures for Facilities Operating Over 60 PSIG," to obtain a clearance to perform any inspection, testing, or maintenance that requires a clearance on gas transmission equipment, facilities, or pipelines.
2. Before entering any gas transmission and distribution (GT&D) facility, employees must be familiar with Utility Standard S4050, "Security Measures for Gas Transmission Facilities." Employees must obtain the proper approvals from the district or division responsible for maintaining the facility. Any person entering a gas transmission facility must be knowledgeable about the operations of that facility or be accompanied by a local gas transmission employee.
3. Before entering any pit or vault, observe the necessary precautions regarding barricading and sources of ignition and check for combustible gases in accordance with Utility Standard S4414, "CGT Confined Space Entry Program," and the *Code of Safe Practices*.
4. If the facility gate or door alarm is activated, contact Brentwood Gas Control to inform them of your presence.
5. Check the piping for any obvious gas leaks. All station equipment must be free of leakage, in good mechanical condition (i.e., free of atmospheric corrosion), and capable of being operated by authorized persons at any time.
    a. Survey station piping annually for gas leakage using a portable combustible gas indicator (CGI) or a hydrogen flame ionization unit. Leak-check any aboveground fittings/connections using a CGI or soapy water. Tighten any loose connections and repair any component that may be contributing to a leak. If the gas leak is considered hazardous, immediately conduct repairs or make the condition safe.
    b. If gas is found in a vault, inspect the equipment in the vault for leaks. Repair any leaks immediately.
6. Perform station housekeeping to ensure a safe working environment. Station housekeeping includes the following activities:
    - Sweep all buildings and remove trash, debris, spider webs, weeds and water (in either pits or yards).
    - Perform upkeep of painted surfaces on mechanical and piping structures.

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- Maintain security fences, vaults, and enclosures.
- Store supplies of flammable or combustible materials not required for everyday use or other than those normally used in compressor buildings a safe distance from compressor buildings.

7. If possible, complete any scheduled inspection on the same day it is started. If system diagnosis, scheduling, or other needs prohibit performing a full inspection, document the partial inspection for the work performed. The work performed at that time does not need to be repeated at the next scheduled inspection as long as it complies with the inspection frequency requirements.
8. At the completion of every inspection, ensure that all valves and equipment are returned to their normal operating positions and are functioning correctly. Notify Brentwood Gas Control and the people named in the clearance procedure that the work is complete and the station is back in operation.

2. Inspection Schedule

The following paragraphs summarize high-level inspection schedule information:

1. Perform and document maintenance annually on all major components at gas transmission regulator stations.
2. Inspect unmanned major gas facilities at least once a month. Attachment 3, "Station Monthly Routine – Sample Log," identifies and describes the items to inspect.
3. The maximum duration between complete inspections of individual components is identified in Attachment 2, "Station Inspection Schedule," which provides a summary of inspection frequencies for equipment typically found in GT&D facilities (refer to the "Transmission Maintenance Roadmap" for additional information and guidance). In gas facilities where there are unusually severe service conditions or extremely heavy equipment usage, inspection frequencies may need to be increased. For detailed inspection requirements for a particular component, refer to the reference documents listed in Attachment 2 for each component.
4. Update schedules and track station maintenance with the Pipeline Maintenance (PLM) (to be replaced by Systems Applications and Products/Work Management (SAP/WM) program).
5. Check the proximity of aboveground gasoline and oil storage tanks at compressor stations to any new structures annually. If the distance between the storage tanks and structures is not at least 50 feet, contact station engineering.
6. Inspect gas piping for atmospheric corrosion in accordance with Attachment 7, "Inspection of Piping for Atmospheric Corrosion at Transmission Gas Station Facilities."

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3. Records and Forms

Employees must keep records on the appropriate forms for all inspections, testing, and maintenance performed on transmission facilities.

1. All work activities required in this procedure are tracked in Pipeline Maintenance (PLM) *(to be replaced by SAP/WM)*. Document supplemental information or work activities performed on equipment not tracked by PLM on Form TD-4430P-02-F01, "Technical Maintenance Equipment Card" (Attachment 1). File the equipment card in the local operating office.
2. Record non-boot and non-diaphragm regulator inspection and maintenance on Form TD-4430P-02-F02, "Gas Facilities Station Maintenance Report" (Attachment 4) or other appropriate forms identified in the reference documents. (Attachment 5 presents an example of a completed "Gas Facilities Station Maintenance Report.") File the form(s) in the local operating office. Retain continuous maintenance records for 10 years or for the life of the facility, whichever is less.
3. Use Form TD-4430P-02-F02 to document the time and location of each partial or full inspection . For partial inspection data, on the day an inspection is completed, transfer all applicable information to Form TD-4430P-02-F02. It is permissible to use component-specific forms in conjunction with a Station Log Book in lieu of Form TD-4430P-02-F02 for all devices as defined in this document.
4. Create a Station Monthly Routine log to document the monthly or weekly inspection and maintenance of unmanned major gas facilities. Use Attachment 3 as an example to develop a station monthly routine log for each facility.
5. Whenever there is an equipment problem, submit a "Material Problem Report" (Company Form 62-0113) and a work request. The MPR tracks equipment problems and trends, which assists in evaluating vendors' hardware. Do not report normal wear of consumable goods (e.g., filter elements or pilot seats). See Utility Standard S2333, "Material Problem Reporting (MPR)," for further information.

4. Inspecting and Testing Station Components

4.1 Actuators, Valves

4.1.1 Manual Gear Operators

When performing annual valve(s) servicing, inspect the gear housings for damage and wear. Inspect weather seals and replace them, if necessary. Inspect for any oil leakage. There is no need to periodically open and inspect enclosed gear housings.

Note: If roughness and/or a grinding noise is detected when operating a manual gear-operated valve, open and inspect the enclosed gearbox operator. Inspect for damaged parts and lubricate the gears.

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4.1.2 Power Actuators

Use Attachment 8, Form TD-4430P-02-F03, "Valve Actuator Maintenance Record," to document inspection and maintenance work on power actuators.

1) Diaphragm/Chamber Actuators

Inspect the diaphragm assembly annually for leakage by applying gas pressure through the static or pilot connections. The amount of pressure applied must not exceed the normal diaphragm operating pressure.

If pressure loss occurs, perform the following steps:

1. Soap test the diaphragm flange before disassembling the diaphragm.
2. Visually examine diaphragm(s) for pliability, abrasion, rupture, or separation.
3. Replace diaphragm(s) as needed.

2) Pneumatic Piston Actuators

Stroke the valve and check for smooth operation annually. Record the open-to-closed and closed-to-open travel time. If operation is rough or jerky, investigate for internal wear or damage. Check for excessive wear or binding of linkages.

If low torque output is suspected, check the gas supply pressure and/or conduct a cylinder bypass leak test to evaluate the condition of the cylinder and seals.

If the manual override is hydraulic, drain and replace the hydraulic fluid with Marinus biodegradable fluid every 10 years. Test manual operation.

Grove Arcron ball valve packages use a pneumatic piston actuator and a pneumatic valve seat loading/unloading system. Check the seat loading/unloading switch annually to ensure that the following conditions exist:

- When the valve is in the closed position, the valve seats are loaded with upstream pressure.
- When the valve is off the closed stop, the valve seats are loaded with downstream pressure.

3) Pneumatic Gas Motor-Driven Actuators

Check to ensure that the motor lubricator is filled with oil and working properly monthly (or more frequently if required). Periodically, depending on oil usage, drain the oil sump located in the exhaust vent stack. Stroke the valve and check for smooth operation annually. If operation is rough or jerky, investigate for internal wear or damage. Check for excessive wear or binding of the gears.

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4) Vane-Type Actuators

Stroke the valve and check for smooth operation annually. If operation is rough or jerky, investigate for internal wear or damage.

Check for low hydraulic fluid in the operator.

Every 10 years, drain and replace the hydraulic fluid in the operator with Marinus biodegradable fluid to remove any accumulation of condensate, slag, and mill scale. Refer to the manufacturer's literature for instructions.

5) Electric Motor-Driven Actuators

Stroke the valve and check for smooth operation annually. If operation is harsh or jerky, investigate for internal wear or damage. Check for excessive wear or binding of the gears.

6) Electro-Hydraulic Actuators

Stroke the valve and check for smooth operation annually. If operation is harsh or jerky, investigate for internal wear or damage.

Check for low hydraulic fluid in the operator.

Every 10 years, drain and replace the hydraulic fluid in the operator with Marinus biodegradable fluid to remove any accumulation of condensate, slag, and mill scale. Refer to the manufacturer's literature for instructions.

Note: Valve actuators can develop oil or hydraulic fluid leaks. If oil or hydraulic fluid is found on the ground adjacent to the operator, determine and remedy the cause. For minor spills and leaks, clean up the area and properly dispose of the contaminants. For significant leaks, contact the local environmental monitor for instructions.

4.2 Batteries

Maintain batteries in accordance with UO Guideline G14293, "CGT Station Battery Maintenance and Testing."

4.3 Chromatographs, Gas

Maintain chromatographs in accordance with Utility Work Procedure WP4300-17, "Gas Chromatographs – Calibration Gas."

4.4 Compressors and Drivers for Gas Compression

Perform periodic maintenance on compressors and drivers according to the manufacturer's literature.

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4.5 Compressors, Air

Perform periodic maintenance on compressors and drivers according to the manufacturer's literature.

4.6 Control Equipment, Miscellaneous

This category includes any electrical, electronic, or pneumatic control equipment not already identified separately in this procedure, such as volume boosters and electric and pneumatic trip switches. Maintain all such equipment according to the manufacturer's literature.

4.7 Control Philosophies

Many stations with complex controls have a "Control Philosophy," which is an excellent reference document. Check the DocuTrak listing for the station under maintenance.

4.8 Controllers

4.8.1 Pneumatic Controllers (Including Becker Pilots)

Conduct a 3-point check annually: full-scale, mid-travel, and zero (0). If the readings are inaccurate, follow the manufacturer's instructions to recalibrate.

Review the controlling process (pressure/flow) chart annually. Tune the controller if there is evidence of instability or sluggishness in the control process. Use the ¼-amplitude dampening method to receive a preferred system response.

Perform a Class A inspection on Becker Pilots annually (see Becker training manual). Perform a Class B inspection once every 5 years from the previous B inspection or for cause.

4.8.2 Electronic Controllers

Follow the calibration and tuning diagnostics described in Section 4.8.1, "Pneumatic Controllers" above. In addition, visually inspect each controller annually for the following problems:

- Abnormalities, such as loose, broken, or stressed ribbon cable.
- Damaged circuitry.
- Heat-stressed parts.
- Excessive dirt or dust buildup that could impede air flow and inhibit proper heat dissipation.

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4.9 Dehydrators

Refer to Utility Work Procedure WP4330-02, "Removal and Control of Liquids from Pipelines and Maintenance and Operation of Associated Gas Conditioning Equipment," for dehydrator maintenance instructions.

4.10 Drips, Pipeline

Check the offset and drop-leg drips, bottom-tapped drains, and siphon drips equipped with manually controlled dump valves annually. Periodically drain pipeline drips to prevent excessive liquid accumulation in the pipeline. Determine the frequency for draining by the historical liquid volume experienced at each location and corrosivity of the liquids.

Periodically inspect offset and drop-leg drips equipped with automatically controlled liquid dump valves and liquid storage tanks for proper operation according to the inspection requirements specified in the environmental and safety plan for the facility. Refer to WP4330-02 to determine the recommended intervals for checking drips.

4.11 Electrical Power Equipment

This category includes the following equipment that requires periodic maintenance (including inspection and testing). Perform maintenance according to the manufacturer's literature.

- Switchgear and switchboards.
- Panel boards.
- Motor control centers (MCCs) and starters.
- Power cables.
- Variable frequency drives.
- Uninterruptible power supplies.
- Direct current (DC) power equipment.
- Standby generators, including P units.
- Transformers.

4.12 Emergency Shutdown Systems (ESDs)

Emergency shutdown systems are mandated by CFR 49, 192.167, "Compressor stations: Emergency shutdown," for some compression facilities. Annual testing is mandatory. See the manufacturer's literature.

4.13 Fire Detectors and Fire Suppression Equipment

Perform periodic inspection, testing, and maintenance in accordance with Attachment 6, "Station Fire Protection Systems/Equipment Routine."

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4.14 Gas Coolers

Perform periodic maintenance in accordance with the manufacturer's literature.

4.15 Gas Detectors

Maintain and performance-test gas detectors annually per CFR 49, 192.736,"Compressor stations: Gas detection." See the manufacturer's literature.

4.16 Gas Filters, Strainers, and Scrubbers

Check filter drains for dirt, liquids, or other debris annually. Perform a differential pressure test on each filter/strainer/scrubber with an indicating gauge or manometer at the inlet and outlet. Based on the known or estimated flow rate, compare the differential pressure with published specifications. Replace the filter element or clean the strainer if the measured differential exceeds specifications. These instructions also apply to combination filter/separator units. For complete instructions, refer to TD-4540P-04, "Pilot-Operated Regulator Station Maintenance (Outlet Pressures > 60 psig)."

Note: "Scrubber" is a term for a device used at compressor stations that most closely approximates a strainer.

4.17 Gas Saver Circuits (GSCs)

Verify that the GSCs on monitor valves and standby regulators are functioning properly. Perform the following steps annually to evaluate GSCs:

1. Under normal (standby) conditions, verify that the valve positioner is not venting supply gas, the output port(s) of the valve positioner is zero (0), and the pneumatic end-of-travel limit switch is tripped.
2. Shut off the gas supply to the GSC by closing the hand valve at the monitor/standby regulator. Partially stroke the monitor/standby regulator valve by manually overriding the valve actuator (using a handwheel or hydraulic pump override) until the valve paddle just disengages the pneumatic end-of-travel limit switch. Open the hand valve to resupply the power gas to the GSC. The GSC then supplies gas to the valve positioner, which in turn moves the valve to the original position and trips the limit switch.
3. Use the controller to partially stroke the valve. The GSC supplies gas to the valve positioner whenever the controller output is between 3 and 15 pounds per square inch gauge (psig). This test may be performed in conjunction with a Class A diagnostic valve check.

If the result of any of these steps is negative, troubleshoot the problem and calibrate the GSC. Refer to CGT Standard 4271, "Gas Saver Circuitry for Pneumatic Valve Actuators," for further information.

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4.18 Gas Supply Racks

Perform the following tasks annually:

- Perform a Class A inspection on the pressure regulators (including monitors) and relief valves.
- Check and service (as required) filters, dehydrators, and filter/separator combinations. If liquid is found when checking the filter or dehydrator drains, replace the desiccant in the dehydrator.

  Note: Perform a Class B inspection of the regulators, monitors, and relief valves for cause only. See Section 5, "Main Gas Regulator, Monitor, and Relief Inspection Procedures" on Page 13 for details.

4.19 Meters, Operation and Fiscal

Refer to Utility Standard S4300, "Gas Measurement Requirements," for information about maintaining these meters.

4.20 Odorizers

At a minimum, inspect all odorizers except farm tap odorizers monthly. Check, test, and service farm tap odorizers at least annually. Refer to Utility Standard S4350, "Odorization of Natural Gas," for further information.

4.21 Pilots

Internally inspect any pilots used with regulators, monitors, and relief valves every 5 years.

Filter the gas supply to each pilot. If a pilot filter exhibits an unusually heavy buildup of debris, increase the inspection frequency for the filter.

Conduct annual Class A diagnostic inspections and checks of pilots whenever maintenance is performed on the main gas regulator/monitor/relief upstream of the pilot and downstream of the filter.

4.22 Positioners, Valve

Check each valve positioner annually when conducting a valve/actuator test.

1. Using the valve controller, transmit controller output signals equivalent to full open, 50% open, and fully closed positions to the positioner.
2. Check the position of the valve against the full open, 50% open, and fully closed controller output signals.
3. Calibrate the valve positioner as needed.
4. Check linkages between the positioner and valve for smoothness of operation and excessive wear.

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4.23 Pressure Recorders

Conduct a 3-point calibration check annually: full scale, mid-travel, and zero (0) pressure. If the readings are inaccurate (±1% for mechanical recorders and ±0.5% for electronic recorders), follow the manufacturer's instructions to recalibrate.

4.24 Pressure and Differential Pressure Transducers and Transmitters

Conduct a 3-point calibration check annually: full scale, mid-travel or normal operating pressure, and zero (0) pressure. If the readings are inaccurate, follow the manufacturer's instructions to recalibrate.

4.25 Regulator/Monitor, Main Gas

Inspect, test, and maintain boot- and diaphragm-type regulators in compliance with TD-4540P-04.

Inspect and test main gas regulators and monitors (non-boot- or non-diaphragm-type regulators) annually. The work performed on main gas regulators and monitors is specified in Section 5, "Main Gas Regulator, Monitor, and Relief Inspection Procedures" on Page 13. Inspect and partially operate controller-operated standby regulators and monitor valves monthly (for ¼-turn valves) or semiannually (for globe-style regulators).

4.26 Relief Devices, Main Gas

Inspect and test relief devices annually to confirm that the following conditions exist:

- They are in good operating condition.
- They are set to function at the correct pressure.

  Note: Verify the set point by physically testing to ensure that the relief valve begins to operate and reseats or reseals at the proper pressure settings.

Properly install and protect relief devices from dirt, liquids, and other conditions that could prevent proper operation.

- Boot/diaphragm relief valves require a Class B internal inspection once in the first calendar year after initially placing the station in operation and for cause thereafter. Follow the requirements described in TD-4540P-04.
- For all other types of relief valves, Class B internal inspections are not required except for cause.

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Verify relief capacities annually. In addition, immediately verify the capacity when changes are made that could affect the ability of a relief device to protect the connected system. Notify the appropriate pipeline or facilities engineer to conduct a capacity verification. For further information, refer to CGT Standard S4433, "Gas Pressure Relief Devices – Responsibility for Annual Inspection and Verification of Capacity."

4.27 SCADA Equipment

Visually inspect the remote terminal unit (RTU) annually (or more often if operating in severe environmental conditions) for the following problems:

- Abnormalities such as loose, broken, or stressed ribbon cable.
- Damaged circuitry.
- Heat-stressed parts.
- Excessive dirt or dust buildup that could impede air flow and inhibit proper heat dissipation. Clean (or replace) the dust filter and interior as required.

Test the backup power supply annually. Verify that the power to the RTU can automatically transfer and operate off the backup power.

4.28 Security Systems

Maintain and test security systems according to the manufacturer's literature to ensure proper performance.

4.29 Separators

Monitor all separators, including filter separators, at least monthly to ensure proper operation. Perform maintenance of gas separators according to WP4330-02 and the equipment manufacturer's recommendations.

4.30 Valves, Block

Check and operate all station block valves annually, including valves required to isolate the station in an emergency.

Power-actuated plug, ball, and gate valves require a more frequent inspection/maintenance schedule. Refer to Utility Work Procedure WP4430-04, "Gas Valve Maintenance Requirements and Procedures," for further information.

4.31 Vaults

Inspect all vaults that house pressure-regulating and pressure-limiting equipment and are over 200 cubic feet (cu ft) in internal volume annually. Refer to Utility Standard S4446, "Vault Inspection Procedure," for instructions.

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5. Main Gas Regulator, Monitor, and Relief Inspection Procedures

5.1 General Information

The procedures in this section apply to the inspection, testing, and preventive maintenance work required for non-boot or non-diaphragm regulators, monitors, and reliefs. Examples of non-boot and non-diaphragm valves are ¼-turn ball or plug valve regulators, linear globe-style control valves, and pilot-operated pressure loading regulators (such as Fisher 1098 and Rockwell 441).

Note: Inspection, testing, and maintenance of boot and diaphragm regulators, monitors, and reliefs must comply with TD-4540P-04. Boot and diaphragm regulators and monitors with set points greater than 66 psig require a Class B inspection every 5 years.

At any stage of inspection, take steps to correct deviations from proper operation.

A main gas regulator or monitor is considered to be operating properly when the following conditions exist:

- The regulator or monitor controls the set pressure in a stable manner throughout the normal range of flows and during normal inlet pressure variations.
- All components are adequate from the standpoint of reliability, capacity, and safety.

A main gas relief is considered to be operating properly when the following conditions exist:

- The relief starts to operate at the set pressure.
- The relief keeps the pressure at or below the maximum pressure allowed in the pipeline.
- The relief shuts off completely at the prescribed "reseat" pressure.
- All components are adequate from the standpoint of reliability, capacity, and safety.

If any equipment does not meet the requirements listed above, determine and correct the problem immediately. Retest to ensure proper operation.

Document inspection and maintenance activities using the following applicable forms, or as specified:

- Attachment 9, Form TD-4430P-02-F04, "Self-Contained Regulator Valve Maintenance Record"
- Attachment 10, Form TD-4430P-02-F05, "Self-Contained Monitor Valve Maintenance Record"
- Attachment 11, Form TD-4430P-02-F06, "Self-Contained Relief Valve Maintenance Record"
- Attachment 12, Form TD-4430P-02-F07, "Package Regulator/Relief Valve Maintenance Record"

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5.2 Class A Inspections – External Diagnostics

The following are instructions for main gas working regulator, standby regulator, monitor, and relief operating tests.

5.2.1 Working Regulators

Check regulating devices for pressure settings and control. Test working and standby regulators or control valves for lockup and the ability to control minimum flow. If lockup is not achievable, evaluate the station and system's dynamics and operations to determine whether lockup is necessary or achievable.

5.2.2 Standby Regulators

Cause the standby regulator, if present, to operate and take over pressure control at its set point. Lower the set point of the lead regulator to cause the standby regulator to control. Ensure that the standby regulator controls pressure properly.

5.2.3 Monitors

1) Monitor Set Point

CGT Standard 4125.2, "Establishing Setpoints on Overpressure Protection Devices" describes the procedure for establishing a monitor valve set point.

Set the maximum monitor set point 5 psig over the maximum allowable operating pressure (MAOP) for systems operating less than 250 psig. For systems operating equal to or greater than 250 psig, the maximum monitor set point must be 10 psig over the MAOP.

Note: Based on experience, the monitor set points established in CGT Standard 4125.2 ensure that the monitor valve operates and controls the pressure below the maximum overpressure value of MAOP +10% or pressure generating pipe stress of 75% specified minimum yield strength (SMYS), whichever is less.

The maximum main gas monitor valve set points for all major GT&D facilities are listed in Engineering Drawing #183018, "CGT Overpressure Protection Device Settings."

2) Monitor Testing

Test each monitor valve annually by raising the set point of the associated regulator valve until the monitor valve comes into control. This enables a transmission technician to check the monitor set point and observe the operation of the monitor under actual field conditions. Evaluate the monitor valve control tuning for adequate controllability. After satisfactorily controlling pressure

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through the monitor valve, reset the regulator set point to the original setting. This is the preferred method for testing the monitor valve.

Note: Normally, the Company does not purposely operate over the pipeline's MAOP. When testing monitor valves, it is acceptable to temporarily exceed the MAOP; however, the pressure must be reset to the MAOP (or lower) after the test.

When there is not enough inlet pressure available to adequately test the monitor at its set point, lower the monitor set point until the monitor takes over control to observe the monitor controllability. After satisfactorily controlling pressure through the monitor valve, return the monitor set point to the original setting. Then check the monitor set point by simulating a pneumatic signal to the controller sensing line.

Document the use of a false pneumatic signal to test the monitor in the "Comments" section of the appropriate form (SAP/WM may be modified to incorporate this information field during the annual testing of individual monitors). This allows GT&D engineering personnel to track which monitor valves have not been tested and observed under full line pressure. For the next year's annual monitor testing, give consideration to rescheduling the testing for a time when the inlet pressure is normally available. However, the maximum 15-month interval (to the date) between tests must be met.

Caution: During the testing of a monitor valve, carefully observe the outlet pressure to ensure that the downstream pressure does not exceed acceptable limits.

Typically, control valves do not prevent pressure from increasing past the set point, especially when the valve begins to take over control. **Under no circumstances must the downstream pipeline ever exceed MAOP plus 10% or a pressure that produces 75% SMYS, whichever is lower. If this operating error occurs, an abnormal operating condition results and district or division personnel must complete CGT Safety Form 11, "Gas system Maintenance & Technical Support Incident Report."**

Based on experience, each monitor set point established by CGT Standard 4125.2 ensures that the monitor valve operates and controls so that the pressure never exceeds the maximum overpressure limit. However, if the monitor is improperly tuned, the monitor may control erratically, causing the pressure to spike over the allowable overpressure limit.

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3) Gas Control Notification

Gas control procedures require that GT&D districts have an authorization clearance in place for testing monitor valves. Notify gas control personnel 10 days before conducting a test on the monitor valve. Gas control personnel may need to modify the gas system's flow to accommodate the required pressures for the monitor testing. District personnel work with the maintenance planner to ensure a 10-day notification.

For GT&D monitor valves maintained by a division, division personnel must call the appropriate gas control personnel just before conducting work on a monitor. Occasionally, local transmission pipeline pressure may not be adequate to test the monitor set point with actual line pressure. In these instances, the testing of the monitors is still granted. Division personnel must notify gas control personnel 10 days before the next year's testing for these particular monitor valves so that there is a high probability that the valves can be tested at actual line pressure.

5.2.4 Reliefs

- CGT Standard 4125.2 describes how to establish a relief valve set point.
- Engineering Drawing #183018 lists the maximum relief valve set points for all major gas transmission facilities.
  - If a relief is present, raise the regulator set point to cause the release to just start to open.
  - Check that the relief set point is correct and that the relief "reseats" properly.
  - An alternate method is to close the valve just upstream of the relief and externally load in a pressure upstream of the relief to test the relief set point.
  - Be sure the upstream valve is reopened after testing is completed.
  - Clear (blow out) and inspect all control vent lines and check vent screens.
- Main gas regulator/monitor/relief maintenance:
  - For plug- or ball-type valves, refer to WP4430-04 for required lubrication and maintenance.
  - For all other valve types, refer to the manufacturer's literature for recommended lubrication and maintenance.

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5.3 Class B Inspections – Internal

Class B internal inspections of main gas regulators, monitors, and reliefs are required only for cause. Cause may include the following problems:

- Inability to fully stroke the valve.
- Excessive mechanical noise or vibration.
- Rough operation.
- Inability to maintain the set point.
- Inability to reasonably shut off the flow of gas.

Follow the manufacturer's procedures for conducting an internal inspection. The manufacturer's recommended spare parts must be on-hand before regulating device teardown, unless the device can be taken out of service for an extended period.

After the regulating device is reassembled, conduct the operating tests specified in the Class A diagnostics.

Implementation Responsibilities

District superintendents are responsible for ensuring that gas station facilities are inspected, tested, and maintained in accordance with this procedure.

Governing Authority

This procedure is governed by Utility Standard TD-4550S, "Gas Transmission Facilities" (not yet issued).

Reference Documents

CFR Title 49, Part 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards," Subpart M, "Maintenance"

CFR 49, 192.167, "Compressor stations: Emergency shutdown."

CFR 49, 192.736,"Compressor stations: Gas detection."

CGT Clearance Manual

CGT Safety Form 11, "Gas System Maintenance & Technical Support Incident Report"

Code of Safe Practices

Company Form 62-0113, "Material Problem Report"

CPUC General Order No. 112-E, "State of California Rules Governing Design, Construction, Testing, Operation, and Maintenance of Gas Gathering, Transmission, and Distribution Piping Systems"

Engineering Drawing #183018, "CGT Overpressure Protection Device Settings"

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Transmission Maintenance Roadmap

UO Guideline G14293, "CGT Station Battery Maintenance and Testing"

Gas Numbered Documents:

H-70, "Pressure Relief Devices"

O-16, "Corrosion Control of Gas Facilities"

Utility Standards:

4125.2, "Establishing Setpoints On Overpressure Protection Devices" –,

4271, "Gas Saver Circuitry for Pneumatic Valve Actuators"

S4414, "CGT Confined Space Entry Program"

D-S0213, "Work Procedures in Confined Spaces"

D-S0456, "Recording Pressures in Distribution Systems"

S2333, "Material Problem Reporting (MPR)"

S4050, "Security Measures for Gas Transmission Facilities"

S4110, "Leak Survey and Repair of Gas Transmission and Distribution Facilities"

S4300, "Gas Measurement Requirements"

S4306, "Gas Transmission Measurement Quality Assurance"

S4350, "Odorization of Natural Gas"

S4431, "Operation and Maintenance Instructions Requirements for Major Gas Facilities"

S4433, "Gas Pressure Relief Devices – Responsibility for Annual Inspection and Verification of Capacity"

S4446, "Vault Inspection Procedure"

S4540, "Gas Pressure Regulation Maintenance Requirements"

Utility Standard Practice (USP) 22, "Safety and Health Program"

Utility Work Procedures:

TD-4540P-04, "Pilot-Operated Regulator Station Maintenance (Outlet Pressures > 60 psig)"

WP4050-01, "Entry, Inspections, Response to Threats, and Security Maintenance Requirements for Gas Transmission Facilities"

WP4050-02, "Obtaining and Controlling Access to Gas Transmission Facilities"

WP4100-10, "Gas Clearance Procedures For Facilities Operating Over 60 PSIG"

WP4300-17, "Gas Chromatographs – Calibration Gas"

WP4330-02, "Removal and Control of Liquids from Pipelines and Maintenance and Operation of Associated Gas Conditioning Equipment"

WP4430-04, "Gas Valve Maintenance Requirements and Procedures"

Attachments

Attachment 1, Form TD-4430P-02-F01, "Technical Maintenance Equipment Card"

Attachment 2, "Station Inspection Schedule"

Attachment 3, "Station Monthly Routine – Sample Log"

Attachment 4, Form TD-4430P-02-F02, "Gas Facilities Station Maintenance Report"

Attachment 5, "Sample Gas Facilities Station Maintenance Report (Form TD-4430P-02-F02)"

Attachment 6, "Station Fire Protection Systems/Equipment Routine"

Attachment 7, "Inspection of Piping for Atmospheric and External Corrosion at Transmission Station Facilities"

Attachment 8, Form TD-4430P-02-F03, "Valve Actuator Maintenance Record"

Attachment 9, Form TD-4430P-02-F04, "Self-Contained Regulator Valve Maintenance Record"

Attachment 10, Form TD-4430P-02-F05, "Self-Contained Monitor Valve Maintenance Record"

Attachment 11, Form TD-4430P-02-F06, "Self-Contained Relief Valve Maintenance Record"

Attachment 12, Form TD-4430P-02-F07, "Package Regulator/Relief Valve Maintenance Record"

Document Recision

This revision supersedes Utility Work Procedure WP4430-02, "Gas Station Facilities Inspection, Testing, and Maintenance Procedures."

Definitions

Annually: At intervals not exceeding 15 months to the date, but at least once each calendar year.

Boot or diaphragm regulator: Pilot-operated regulator that uses a pressure-loaded, elastomeric flow element in the valve. The elastomeric element, commonly called a boot, tube, sleeve, or diaphragm, serves as both the actuator and flow shutoff device. This type of equipment includes Mooney Flowgrid, Fisher Model 399, Grove Flexflo, and American Meter Axial Flow regulators.

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Main gas regulator/monitor/relief: Pressure regulating devices that control gas pressure for delivery into transmission or distribution feeder main (DFM) lines. The main gas regulator is the primary pressure regulating device controlling the downstream pressure. The main gas monitor, or relief, is a backup pressure regulating device that takes over pressure control if the main gas regulator fails to limit the delivery pressure. A controller or pilot may control a main gas regulator/monitor/relief, or a main gas regulator /monitor/relief may be self-contained (not require a controller or pilot).

Major gas facilities: Facilities that modulate gas pressure and flow or process the gas within the gas transmission system. These facilities may be unmanned, manned part- or full-time, or remotely operated.

Major gas facilities include the following:

- Gas terminals.
- Gas load centers.
- Compressor stations.
- Pressure limiting stations (PLSs).
- Gas processing facilities.
- Line rupture control valves (LRCVs).
- Gas metering and regulating facilities serving electric generating plants.
- Underground gas storage field facilities.
- High-pressure underground gas holders.
- Other facilities handling large volumes of gas and containing one or more of the following items:
    - Controller-operated equipmen.
    - 10-inch or larger control valves.
    - Ultrasonic metering.

Regulator stations: Facilities, other than those listed as major gas facilities that contain pressure control devices, including monitors and reliefs and their appurtenances, which limit and control pressures in transmission lines or DFMs. Appurtenances, in this case, are any subordinate devices necessary for the pressure regulator, monitor, or relief to function properly (e.g., pilots, controllers, valve positioners, pressure transducers).

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