Test Procedure for Existing Pipelines

Summary

This procedure describes the process for conducting, evaluating, recording and reporting of the spike hydrostatic testing of Company's existing pipelines, in accordance with the California Public Utilities Commission (CPUC) Consumer Protection and Safety Division's (CPSD) directive dated September 12, 2011.

Data search and checks are required for existing pipelines to ensure correctness of pipeline features. Where existing data are incomplete, the data must be field verified and reviewed by a Company-approved independent consultant.

The requirements of this utility procedure apply to all Company-owned or Company-operated existing gas gathering, transmission and distribution pipelines and station facilities.

Level of Use: Informational Use

Target Audience

Gas operations and maintenance personnel responsible for the design, construction, testing and maintenance of Company's existing gas gathering, transmission, distribution pipelines and station facilities.

Safety

Potential hazards impacting the requirements governed by this standard include, but are not limited to, the following conditions:

- High energy level of nitrogen and water contained in pumping equipment, pipes, and hoses at high pressure.
- Nitrogen used as a super dry vapor requires adequate ventilation at the exhaust and sampling point.
- Hazardous substances or materials remaining in the pipeline interior wall such as PCBs, arsenic, mercury and chlorinated semi-volatile organic compounds that may be present in the natural gas.
- Heavy pigs saturated with water and contaminants.

Before You Start

Field personnel following this procedure must wear the following personnel protective equipment (PPE) at a minimum, in addition to any other PPE as specified in the *Code of Safe Practices*:

- Hard hat (must be available)
- Traffic vest
- Proper footwear, no sneakers allowed

- Long sleeve shirt
- Long pants
- Gloves (must be available)
- Safety glasses (must be available)

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Procedure Steps

1 General

1.1 Company's supervisor-in-charge of the test program, the project manager of record, is responsible for safety and successful completion of the hydrostatic testing program.

1.2 Before work being performed, the project manager must develop a list of covered tasks included within the project scope and must check operator qualifications (OQ) for all covered tasks to ensure assigned personnel are qualified to perform the work.

1.3 All Company and contractor personnel involved with the hydrostatic test must be familiar with the test procedure and safety instructions and follow them during the testing.

1.4 For any applicable pressure test where a spike hydrostatic test will not be performed, Company must provide advance notice in writing to CPUC's Consumer Protection and Safety Division (CPSD) regarding the specific pipeline facility, or component, that Company believes would preclude the spike hydrostatic test from being performed to a minimum level of 5% above that required to establish the maximum allowable operating pressure (MAOP).

2 Safety Considerations

2.1 Company supervisor in charge of the test must protect personnel and the general public during testing by taking necessary precautions as follows:

1. Schedule the test at a time that minimizes public exposure in highly populated areas.

2 (Continued)

2. Notify public agencies of the scheduled test, as necessary.

3. Notify parties located in the general vicinity of the test section to avoid the area during the test.

4. Place barriers along the test section, where needed to prevent public access.

5. Keep personnel at a safe distance from all pressurized pipelines and water discharge locations. Keep away the public and personnel not working on the test operation by patrolling.

6. Locate test equipment and instrumentation at a minimum safe distance of 50 feet from the test section.

7. Special consideration must be given to bridge crossings and spans to prevent excessive stress levels caused by the weight of water. As necessary, anchor or support the pipe.

8. Restrain all water discharge lines such that they are secure in the event of failure of pipeline or connections.

9. Continuously monitor the pipeline pressure and inlet pressure during the test medium pressurization, testing period, and discharge process.

10. Visually inspect temporary piping, closures, and other equipment used in conjunction with the test to verify that they are in safe working order and are used within the manufacturer's approved limits. Perform a periodic visual inspection of this equipment from a safe distance during the test.

11. Do not remove caps, plugs, or valves from the test head, or any other test equipment, until a positive determination is made from two independent taps that the test section is depressurized.

12. During the preparation for a test or retest of a section of pipeline that is isolated from an existing pipeline by isolation valving, consider the potential for gas leakage into the test section from an adjacent section of pipeline that remains in service, or from the release of gas from residual liquid that may remain in the line. Take special precautions to verify that a combustible mixture is not present in the section to be tested before performing cutting, welding, or any operation generating a source of ignition on the section.

13. Develop contingency plans for handling flooding or other damage in the event of a test failure.

14. Keep personnel safe from hazardous material which might be present in the pipeline interior wall.

3 Notifications to the California Public Utilities Commission (CPUC)

Notifications to the CPUC are required for new construction, any failures occurring during spike hydrostatic testing and applicable pressure tests where a spike test was not practical as follows:

1. Piping projects costing more than $2,500,000 and designed to operate at more than 20% of specified minimum yield strength (SMYS) must be reported to the CPUC in writing 30 days before construction. Pipeline engineering personnel must initiate the report. The spike hydrostatic test may be witnessed by a member of the CPUC staff accompanied by Company pipeline engineering personnel.

2. In case of a pipe failure when conducting the strength test, make sure that the failure is properly and fully reported as follows:

   a. Any failure when strength testing a pipeline to be operated at a hoop stress of 20% or more of SMYS must be reported to gas control personnel at **800-811-4111** within 1 hour of the failure if media are on site; and within 2 hours if media are not present. Provide as much information as available to gas control personnel as required by Utility Standard TD-4413S, "Gas Event Reporting Requirements." Complete Form TD-4137P-01-F01, "CPUC Pressure Test Failure Report" and send it to regulatory compliance personnel for submission to the CPUC.

   b. For all test failures, a detailed follow-up report is required that describes the nature of the fault that caused the failure (for example, failed girth weld, failed pipe seam, loss of metal due to corrosion, mechanical damage, etc.). Also provide details of actions taken to resolve the faults and enable re-testing of the pipeline. When the failed length of pipe and/or its appurtenances are replaced, the failed pipe and its appurtenances must be saved for further investigation by the pipeline engineering personnel for supplementary reporting to regulatory agencies. It is recommended that photos of the failure be taken, and sketches made to complement the write-up for a traceable, verifiable, and complete record as required by the regulatory agencies.

   c. The supplementary report of the failure must be sent to regulatory compliance personnel for submission to the CPUC.

   d. Save all strength test pressure reports (STPRs) related to the test failure as part of a permanent record.

   e. Use Company chain-of-custody procedures for handling all failed pipe testing. Refer to Utility Procedure TD-4100P-14, "Removing, Documenting, and Preserving Gas Transmission Pipe and Components."

3 (Continued)

3. For any applicable pressure tests where a spike hydrostatic test is not practical, the project manager must prepare, or work with Regulatory Compliance & Support to prepare, a letter notice setting forththe reasons such tests will not be performed. The letter notice shall be sent to CPUC's Consumer Protection and Safety Division (CPSD) at least 1 week in advance of the test. The advance notice must describe the specific pipeline facility, or component, that PG&E believes would preclude the spike test from being performed to a minimum level of 5% above that required to establish MAOP.

4 Spike Hydrostatic Test Plan

Engineering must develop the spike hydrostatic test plan for each pipeline segment. The engineering deliverables are as follows:

- Hydrostatic test procedure
- Test equipment
- Test instruments
- Water supply, filling, and removal
- Test section pressurization
- Pipeline drying

4.1 Hydrostatic Test Procedure

Establish a plan for the spike hydrostatic test. The plan must include the following:

1. A sketch of the test section showing the stationing of the test section and points of maximum and minimum elevation (see Drawing N0.3805231, "Sample of Hydrostatic Test Section").

2. Issue for construction (IFC) engineering drawings, including:

   - Material of record
   - Bill of materials with verified pipeline features

3. A copy of the completed Form 62-4921, "Gas Pipeline Facilities Strength Test Pressure Report."

4. Written instructions for the testing, which include identification of potential problem areas for the specific test involved. The written plan must be developed by a Company test supervisor in conjunction with the responsible engineer. It must cover the following:

   - Copy of the Form 62-4921, "Gas Pipeline Facilities Strength Test Pressure Report" and schematic sketch of the test section at the test location.
   - The elevation differences to ensure that the SMYS of the pipeline is not exceeded.

4.1 (Continued)

- The safety of Company personnel and the general public. The requirements to safely fill and dewater the pipeline. The pipeline is completely filled and pig speed is controlled.
- The type of pig to be used (foam, cup, poly, bi-directional, etc.).
- Contingency plan for handling flooding or other damages in the event of test failure.

  For details see Form 62-4921, "Gas Pipeline Facilities Strength Test Pressure Report."

4.2 Test Equipment

1. Test Heads

There are two approved styles of test heads for hydrostatic testing: permanent test heads and temporary test heads:

- **Permanent test heads** are re-used and shipped out of a central location when needed.
- **Temporary test heads** are designed to be constructed in the field for a specific hydro test and then destroyed.

a. Permanent Test Heads

Gas general construction (GC) personnel are responsible for the construction and maintenance of all test heads. The Chart-1 on Drawing No.386527, "Piping-Details Pipeline Test Head, Sheet 2 of 2," lists all the test heads that are authorized for use to date. Test heads that are not on this list must not be used until they have been inspected and issued serial numbers by GC personnel.

(1) Permanent test heads are to be constructed and tested in accordance with Drawing No. 386527, "Pipeline Test Head." All test heads must be:

- Visually inspected
- Magnetic-particle examined
- X-rayed
- Hydrostatically tested
- Properly tagged for maximum test pressure
- Issued serial numbers before they are authorized for use

(2) The necessary paperwork to verify the inspection and testing and to verify the wall thickness (WT), size, and grade of the pipe, valves, flanges and fittings used to make each test head must be on file in a central location.

4.2.1 (Continued)

(3) Test heads must be stored, maintained, requested from storage, and returned to storage per Utility Procedure # WP4100-08. In some instances, when a new test head must be fabricated, the lead time may be as long as 6 to 8 months. Expenses for newly fabricated test heads, and their shipment to and from the requesting location, will be charged to the project requesting the test head.

(4) If the proper size test heads are not available for a test, substitute test heads may be used. Due to the unequal outside diameter (OD) and wall thickness (WT) of the pipe to be tested and the substitute test heads, approval, material specifications, and welding procedures must be obtained from pipeline engineering personnel.

CAUTION

Improper mounting could result
in injury or damage to the test head.

(5) For the safety of personnel, the protection of the test head, and ease of shipment, special steel skids have been made for each test head. Care must be taken in placing the test head on the skid. For most test heads, there is only one mounting position that allows for proper placement of the tie-down chains.

(6) Modification, welding, or cutting must not be made in the field (except welding the test head to the pipe being tested). If modifications are required, the modification must be made under the direction of pipeline engineering personnel responsible for maintaining the test heads in accordance with Drawing No. 386527, "Pipeline Test Head." When the test head is removed from the pipeline after the hydrostatic test, all pipe attached to the test head in the field must be removed (by cutting the transition can just beyond the weld). If a pup of tested pipe is left on the test head, it must be removed by GC personnel responsible for maintaining the test heads upon receipt back in the central yard.

b. Temporary Test Heads and Test Caps

4.2.1 (Continued)

(1) Temporary test heads and test caps are constructed in the field in accordance with Drawing No.3805227, "Temporary Pipeline Test Head and Test Cap." The specific design of the temporary test head or test cap must be approved by the responsible pipeline engineer. Temporary test heads and test caps must be visually inspected, X-rayed, hydrostatically tested, and properly tagged with the maximum allowable test pressure. Documentation (including a note stating the date the test head was destroyed) must be forwarded with the as-built drawings to Mapping.

(2) Upon completion of the hydrostatic test(s) on a specific project, the temporary test heads must be destroyed by cutting the cap in half.

(3) Temporary test heads and test caps may only be used a maximum of three times on a single project if the test pressure exceeds 72% SMYS of the test head or test cap. On completion of three tests where test pressure had exceeded 72% SMYS of the test head or test cap, destroy the test head by cutting the cap in half.

(4) A temporary test head and test cap may be used on a second project as an exception, with the approval of the responsible pipeline engineer, if the following conditions are met:

a. Temporary test head or test cap was not subjected to a test pressure that had exceeded 72% SMYS of the test head or test cap.

b. Visual inspection did not reveal any gouges, dents, or defects which could impair the integrity of the test head or test cap.

c. Documentation of the temporary test head and test cap is complete and accurate.

(5) The 6-inch manifolds, which can be used in conjunction with temporary test heads, are available for watering and dewatering the pipeline. The manifolds have been constructed in accordance with Drawing No. 3805228, "Hydrotest Manifolds" and can be requested per Utility Procedure WP4100-08.

(6) **Isolation Caps**—Multiple permanent isolation caps are available in sizes 10" through 42", for use on existing pipelines. These isolation caps are stored in a central location for use and return. See Drawing No. 3805229, Sheets 1 to 11, "Piping Arrangement 10.75" to 42" Isolation Caps," for details.

4.3 Test Instruments

1. Pressure records are required on all hydrostatic tests. A chart or digital printout with appropriate intervals and pressure ranges is required. All pressure recording equipment, whether primary (official record) or secondary (backup) must be calibrated. Pressure recording devices must be calibrated within 1% accuracy every 6 months. Dead weight testers must be calibrated within 0.5% accuracy every 12 months.

2. An electronic pressure recorder or dead weight tester is required when testing any segment of the test section over 90% SMYS. Electronic pressure recorders must record the pressure a minimum of every 15 seconds and print out the pressure recordings at no longer than15 minute intervals. A log of dead-weight tester reading must be made every 15 minutes.

3. Any time an electronic pressure recorder or dead weight tester is used, the pressure records must be attached to the Strength Test Pressure Report and submitted to mapping through pipeline engineering personnel, as part of the permanent records.

4. Indicating pressure gauges should be available for possible installation at the remote end of the test section or at maximum or minimum elevations of the test section. These gauges are for information purposes only.

5. Pressurizing equipment, hoses, and other associated equipment must be visually inspected and determined to be in good working condition before the test. Make sure the equipment is properly sized and rated for the maximum test pressure.

4.4 Water Supply, Filling, and Removal

1. Water Supply

   a. The water source selection, testing of water for contaminants before and after the hydrostatic test, and the hydrostatic test water discharge permits must be coordinated through the environmental compliance personnel before construction begins. In general, the water used for hydrostatic testing must be reasonably clean. Contaminated water or salt water must not be used. Water must be obtained from the most readily available clean source, subject to authorization by the appropriate local, county, state, or federal regulating agency or agencies.

   b. Potable water is preferred; however, other water from other sources such as wells, lakes, rivers, and non-potable distribution systems can be used as hydrostatic test water.

   c. If wells must be used as the water source and the quantity of water needed for the test is substantial, a draw-down test must be performed. If the wells prove to be inadequate, find an alternate source. Transporting water by truck must be used only as a last resort when the quantity of water needed is substantial.

4.4.1 (Continued)

d. If non-potable water is to be used as the water source for a hydrostatic test, the water must be tested for the presence of microbes and contamination before placing the water into the pipeline. Microbes can cause internal corrosion. Contamination, such as the presence of hydrocarbons and heavy metals (17 car metals), is an environmental concern. The microbe test is called a "MIC kit III" (BTI Products) test and should be performed by corrosion engineering personnel or ATS Corrosion personnel. Contamination tests should be determined and performed by the environmental compliance personnel.

e. If non-potable water with a microbe concentration more than 1,000 bacteria count per ml or any contaminant concentrations above the allowable limits is to be used as source water for a hydrostatic test, the corrosion or environmental compliance personnel, respectively, must be consulted to determine the best mitigation strategy. A few potential alternatives are:

(1) Find another source of water.

(2) Use the water for the hydrostatic test and then, after water removal, dry the pipeline to a dew point temperature of -20°F to -40°F to minimize the amount of water left in the pipeline before putting the pipeline in service. Refer to Utility Procedure TD-4137P-03, "Drying Procedure for Pipelines."

(3) Treat the water to kill the microbes and remove contamination before placing it into the pipeline.

(4) Use the water for the hydrostatic test and then treat the water for contaminants upon discharge per Utility Procedure TD-9500P-16, "Deactivation and /or Retirement of Underground Gas Facilities."

2. Water Filling (See Drawing No. 3805231, "Sample of Hydrostatic Test Sketch.")

a. Consider the following points in the water-filling operation:

(1) The test section must be completely filled with water. A pig must be run ahead of the water to force as much air as possible out of the test section. For test sections where a pig cannot be used, the air must be vented at the high points.

(2) Fill the test section from only one direction, preferably from the low end.

(3) If necessary, anchor or support the pipe to prevent excessive stress levels caused by the weight of the water. Give special consideration to bridge crossings and spans.

4.4.2 (Continued)

(4) Slowly open and close fill and drain valves to prevent pressure surges resulting from rapid changes in water velocity.

b. Water Filling Equipment

(1) Size the fill pumps considering static head due to elevation difference in the test section and the fill time desired.

(2) Install filters or other necessary treatment equipment on the suction line of the pumps if necessary to prevent fish and other foreign matter from entering the test section.

(3) The exhaust of the pump engine must have spark arrestors and be positioned to minimize fire hazards.

(4) Water may be transferred from one test section to another by use of a fabricated connecting U-bend hairpin. The hairpin must not be left in place during the test.

c. Test Pressure Relief and Water Testing

(1) Use extreme caution when releasing water at the test pressure. The test pressure should be relieved by partially opening a small tap valve before initiating the testing or water removal process.

(2) The hydrostatic test water must always be tested for contaminates and pH level before it is discharged, even if the water supply is potable. Existing pipelines can introduce contamination into the hydrostatic test water. The discharge water testing determines the appropriate treatment (if necessary) and ultimately documents that the discharge water is clean. Follow Utility Procedure TD-9500P-16, "Deactivation and/or Retirement of Underground Gas Facilities," to mitigate any environmental impacts of discharge water.

(3) Remove hydrostatic test water from the pipeline as soon as practical after the hydrostatic test. Hydrostatic test water should never to be left in the pipeline more than 2 weeks. Storage tanks such as Baker tanks can be used to store water on site before discharge.

3. Water Removal from the Pipeline

Removal of water from the pipeline must be included in the written hydrostatic test plan. For safe operation, personnel must have required training.

a. Pre-Approved Typical Dewatering Plans:

4.4.3 (Continued)

(1) Drawing No. 3805232, "Typical Hydro Test Discharge Plan for the Test Sections Less Than 300' Long" and Drawing No. 3805230, "Typical Hydro Test Discharge Plan for the Test Sections More Than 300' Long" are approved written plans for typical short (300 feet long test sections) and long (greater than 300 feet long) test sections. Both typical drawings have less than 100 feet elevation change. Location-specific plans that include all the aspects of the approved typical plans are approved for use. Any deviation from the typical plan must be approved by the responsible pipeline engineering personnel.

(2) Less than 300 feet long test section dewatering plan (Drawing No. 3805232, "Typical Hydro Test Discharge Plan for the Test Sections Less Than 300' Long"): The plan includes safety zone, steel discharge piping between the test head and the 2 inch or 3 inch flexible hoses, coupling connections, valves, pressure gauge, and anchor points.

(3) More than 300 feet long test section dewatering plan (Drawing No. 3805230, "Typical Hydro Test Discharge Plan for the Test Sections More Than 300' Long"): The plan includes safety zone, continuously welded 4 inch or 6 inch steel discharge piping, valves, pressure gauge, and anchor points.

b. Location-Specific Dewatering Plan

Consider the following guidelines when developing a dewatering plan:

(1) Study the piping system and surrounding environments.

(2) During the initial planning stage of a dewatering operation, an analysis of the existing and temporary piping system must be performed to identify the pressure associated with fluids and other forces that could adversely affect the integrity of the pipeline or the stability of the drainage and its components, such as dewatering outlet pressure, inlet pressure, elevation difference, water hammer, pig velocity, discharge rate, force on elbows, etc. Be sure that adequate valving is planned to safely throttle down the pressure to ensure control of the operation at all times. Investigate possible sites for water disposal.

c. Anchor the dewatering lines.

Establish effective anchoring systems based on expected forces and ensure that the systems are used during dewatering projects.

4.4.3 (Continued)

Anchoring includes:

- Placing heavy equipment on top of dewatering lines to prevent uncontrolled whipping
- Restraining dewatering line supports
- Using standard anchoring and restraining devices

d. Ensure condition of couplings and parts:

When flexible hoses are used, all couplings and parts of the dewatering system must be properly selected for their application. The associated piping that connects the couplings is a significant variable in the entire mechanical piping system. The couplings are manufactured in a controlled environment, and variations in the quality of the couplings should be limited. Ensure that couplings are within manufacturer's tolerances and free of damage that may result in connection failure. A chain is only as strong as its weakest link. In dewatering piping systems, the weakest link frequently is the temporary dewatering pipe connections. Use a fail-safe link between mechanical couplings (these are similar to safety chains on air hoses and prevent connections from whipping if disconnected under pressure).

e. Establish safety zone:

During the dewatering process, there may be hazards that have not been completely controlled. Unexpected high pressure or high discharge rate may exceed the designed capacities of the temporary discharge piping system or the anchorages. Therefore, access to the safety zone must be limited to only those persons who are necessary to perform the dewatering work. The safety zone is typically a circle area centered at the connection of temporary system to the main pipeline.

f. Provide adequate personnel training:

Instruct personnel on dewatering installation designs and techniques, including proper coupling and anchoring methods, and the procedures they should implement to protect themselves and others working around them.

g. Discharge considerations

Consider all discharge options, including the following:

4.4.3 (Continued)

- Drainage to a body of water
- Drainage to a sewer system
- Drainage onto the surface of adjacent land
- Returning the discharged water to the original source
- Hauling the water to an approved dump site
- Taking precautions to minimize erosion or other hazards when discharging water from the pipeline

4. Dewatering Procedure

Ensure the written dewatering plan is followed on the jobsite.

a. Install the temporary dewatering piping per the written plan.

b. Company supervisor-in-charge must inspect the dewatering piping and the anchoring system before dewatering.

c. Clear the safety zone, except for personnel necessary to perform the dewatering work.

d. Relieve the pressure by partially opening a small tap valve before opening the main dewatering valve.

e. When removing the water from long test sections with a pig, maintain the pig speed between 1 to 5 miles per hour.

f. Control the discharge valve and monitor the discharge rate. Ensure that the discharge rate complies with the written plan and discharge permit (if applicable).

g. Dispose of the water in a manner that prevents damage to the environment and complies with prevailing water disposal regulations.

4.5 Test Section Pressurization

1. Before conducting the test, verify the Strength Test Pressure Report (STPR). If Part I of the STPR does not show the latest design changes on the design drawings and the actual pipe to be tested, or the test pressure exceeds any component within the test section, return the STPR to the responsible pipeline engineering personnel.

2. After verification of the STPR, proceed with the test section as follows:

4.5 (Continued)

a. Once the test medium has filled the test section, pressurize the test section slowly while continuously monitoring the test section pressure, and then maintain the test pressure within the upper and lower bounds of the test as specified by the Strength Test Pressure Report for spike test.

b. A spike test requires the minimum test pressure at maximum elevation to be increased by approximately 10% and held for 30 minutes. A spike factor of 1.1 (10% above the minimum test pressure) is preferable. However, if the resulting spike pressure at minimum elevation exceeds the maximum test pressure at minimum elevation, then the spike factor should be lowered until the spike pressure at minimum elevation does not exceed the maximum test pressure at minimum elevation.

NOTE

If the spike pressure is reduced such that the difference between the minimum test pressure at maximum elevation and the maximum post-spike pressure at minimum elevation is less than 30 psig, a spike test may not be feasible.

If after allowing for elevation differences and an acceptable pressure range between maximum and minimum pressures, a spike test is not possible, provide an explanation and notify Gas Transmission's Regulatory Compliance and the CPUC's CPSD. Refer to Section 3.

c. Spike Pressure at Maximum Elevation

Determine this value by multiplying the value of Minimum Test Pressure at Maximum Elevation by the value of the Spike Factor.

d. Spike Pressure at Minimum Elevation

Adjust for elevation differences by calculating the spike pressure at minimum elevation, as follows:

Spike Pressure at Maximum Elevation + Static head due to elevation difference between the maximum and minimum elevation in the test section

4.5 (Continued)

NOTE

The resulting value cannot exceed the value in the Maximum Test Pressure at Minimum Elevation field. If this occurs, lower the value in the Spike Factor field accordingly.

e. Maximum Post-Spike Pressure at Minimum Elevation

After the spike test, the spike pressure at minimum elevation must be reduced by at least 5% to the desired test pressure for the remainder of the required test duration. Determine this value by multiplying the value of Spike Pressure at Minimum Elevation by 0.95. This value then becomes the new maximum, or pressure ceiling, which cannot be exceeded for the duration of the test. A desired test pressure for the remainder of the test must be between the minimum pressure at maximum elevation and the maximum post-spike pressure at minimum elevation.

f. Water to be used as Test Medium

g. Minimum Test Duration

Facilities being tested that are designed to operate at pressures under 30% of SMYS must be tested for a minimum of 1 hour. If they are to operate at pressures over 30% of SMYS, they must be tested for a minimum of 8 hours. The duration of the spike test is included in this minimum test duration; it is not added to the minimum test duration. For example, an 8-hour test with a spike test includes a 30-minute spike with at least a 7.5-hour test. Refer to all notes in Numbered Document A-34,"Piping Design and Test Requirements."

h. Pressurize short test sections slowly and cautiously because the pressure can build up quickly. If necessary, nitrogen can be used to pressurize the test sections once the test section has been filled with water.

i. Follow all safety considerations identified in Section 2, "Safety Considerations" of this procedure.

4.6 Drying the Pipeline

1. Pipeline must be dried to a dew point temperature of -20°F to -40°F as per Utility Procedure TD-4137P-03,"Drying Procedure for Pipelines."

2. Short sections of the pipeline and fabricated assemblies may be inclined to drain them and then swabbed dry by hand.

4.6 (Continued)

CAUTION

Although drying removes most of the free water from the test section, hydrates may form from moisture in the pipeline when it is returned to service.

3. Take precautionary measures at the downstream regulator stations to prevent the possibility of freezing. These precautions may include the following:

   - Monitoring the dew point of the gas until it has dropped below the level where freezing can occur
   - Injecting methanol into the gas stream ahead of the regulators
   - Using heaters to heat the gas stream and the regulators

5 Reports and Records

5.1 Records of test data:

Records of test data are vital for the Company in meeting the regulatory obligations. The test record must be accurate, traceable, verifiable, complete, and maintained for the useful life of pipeline facilities. STPRs must be signed in non-erasable ink by personnel responsible for the test. Maintain the original chart, log, drawings, and STPR with the job packet to be delivered to the gas job closeout desk.

5.2 CPUC Notification of Construction and Pressure Test failures:

Notifications are required to CPUC as stated in Section 3 of this procedure.

END of Instructions

Test Procedure for Existing Pipelines

Definitions

Spike Test: A test used at the beginning of a pressure test on existing pipelines (uprates, confirming MAOP's, etc.) to verify the structural integrity of the pipelines with potential time-dependent anomalies. The spike test involves subjecting the piping system to a maximum pressure level that is held for a short duration at the beginning of the test followed by a longer duration hold period at a reduced pressure.

Spike Hydrostatic Pressure Factor: A factor for computing spike hydrostatic test pressure. The spike hydrostatic pressure factor is multiplied by the required minimum test pressure at maximum elevation used to establish MAOP of a pipeline in order to determine the minimum required spike hydrostatic test pressure. The range of spike hydrostatic test pressure factor is: 1.05 (min) to 1.1 (max).

Spike Hydrostatic Pressure Duration: The desirable target duration for the spike portion of a hydrostatic pressure test is 30 minutes with a minimum acceptable duration of 15 minutes.

Refer to gas standard Utility Standard TD-4137S, "Pipeline Test Requirements" for complete list.

Implementation Responsibilities

The Company supervisor in charge of the test is responsible for overseeing the implementation of this procedure.

The Subject Matter Expert (SME), the gas transmission maintenance and construction (GT M&C) supervisor, the distribution transmission and regulation (T&R) supervisor responsible for testing pipelines, gas engineering personnel; and gas mapping personnel must facilitate implementation of this procedure.

Governing Document

Utility Standard TD-4137S, "Pipeline Test Requirements" governs this document.

Compliance Requirement/ Regulatory Commitment

Consumer Protection and Safety Division (CPSD) Directive dated September 12, 2011.

Code of Federal Regulations (CFR) Title 49: Transportation, Part 191—Transportation of Natural and Other Gas By Pipeline; Annual Reports, Incident Reports, and Safety-related Condition Reports, Section (§) 191.3, "Definitions."

49 CFR § 192.3, "Definitions."

49 CFR § 192.503, "General requirements."

49 CFR Subpart J-Test Requirements §192.505 "Strength test requirements for steel pipeline to operate at a hoop stress of 30 percent or more of SMYS."

49 CFR Subpart J-Test Requirements §192.507 "Test requirements for pipelines to operate at a hoop stress less than 30 percent of SMYS and at or above 100 p.s.i. gage."

49 CFR Subpart K-Uprating §192.555 "Uprating to a pressure that will produce a hoop stress of 30 percent or more of SMYS in steel pipelines."

CFR Title 49, Subpart L- Operations §192.619 "Maximum allowable operating pressure: Steel or plastic pipelines."

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," Sections 125 and 126.

Reference Documents

Developmental References:

Engineering Drawing Number 3805229, Sheet 1 of 11, "Piping Arrangement 10.750" ISOLATION CAP Gas Standard."

Engineering Drawing Number 3805229, Sheet 2 of 11, "Piping Arrangement 12.750" ISOLATION CAP Gas Standard."

Engineering Drawing Number 3805229, Sheet 3 of 11, "Piping Arrangement 16.000" ISOLATION CAP Gas Standard."

Engineering Drawing Number 3805229, Sheet 4 of 11, "Piping Arrangement 20.000" ISOLATION CAP Gas Standard."

Engineering Drawing Number 3805229, Sheet 5 of 11, "Piping Arrangement 22.000" ISOLATION CAP Gas Standard."

Engineering Drawing Number 3805229, Sheet 6 of 11, "Piping Arrangement

24.000" ISOLATION CAP Gas Standard."

Engineering Drawing Number 3805229, Sheet 7 of 11, "Piping Arrangement 26.000" ISOLATION CAP Gas Standard."

Engineering Drawing Number 3805229, Sheet 8 of 11, "Piping Arrangement 30.000" ISOLATION CAP Gas Standard."

Engineering Drawing Number 33805229, Sheet 9 of 11, "Piping Arrangement 34.000" ISOLATION CAP Gas Standard."

Engineering Drawing Number 3805229, Sheet 10 of 11, "Piping Arrangement 36.000" ISOLATION CAP Gas Standard."

Engineering Drawing Number 3805229, Sheet 11 of 11, "Piping Arrangement 42.000" ISOLATION CAP Gas Standard."

Utility Procedure, TD-4137P-03, "Pipeline Drying Procedure"

Numbered Document A-34, "Piping Design and Test Requirements"

Supplemental References:

Utility Guideline G14362, "Maintenance and Operation of Water Dew Point Instruments for Natural Gas Pipelines"

Appendices	None
Attachments	NA
Document Recision	This document supersedes and cancels Numbered Document A-37 "Hydrostatic Testing Procedures," Revision 0, issued on November 22, 2004. This procedure includes procedural steps previously included in Numbered Document A-37.
Approved By	William Mojica, Manager
Document Owner	Redacted Principal Gas Engineer

Test Procedure for Existing Pipelines

Document Contact Redacted Gas Standards Engineer

Revision Notes

Where?	What Changed?
NA	First issue; new procedure.