



# Pipeline Inspection and Testing

Pacific Gas and Electric Company has a comprehensive program to enhance the safety of its natural gas transmission pipeline system. We utilize a variety of tools to verify the status, strength and safety of our pipelines. These tools range from a review of records, to in-the-field leak surveys using sensitive detection equipment, to in-line inspections and pressure tests. Because no one tool is ideal for every part of the gas transmission pipeline system, PG&E applies the method or methods that are most appropriate for the specific circumstances.

## Records Review

In some cases, verifying the safe operating pressure for a pipeline and its components can most effectively be done through a thorough review of the records for the equipment used during installation and its maintenance throughout the years. Pipelines installed after 1961 were hydrostatically tested before operation as part of the installation. Records review may not be sufficient to verify the status of a pipe in all circumstances due to gaps in some records. PG&E is conducting an exhaustive and thorough review of all its gas transmission pipeline records.

## Leak Survey

PG&E performs annual leak surveys of transmission pipelines, although after the San Bruno accident PG&E performed additional ground and aerial leak surveys for the entire transmission system. Leak surveys are conducted using combustible gas indicators. Newer leak detection instrumentation employing infrared or laser technology is also being used. In the usual case, a leak surveyor walks along the surface of the ground above the pipeline using leak detection instruments to conduct a leak survey.

## In-line Inspection

There are many internal line inspection, or in-line inspection (ILI), devices available. These devices called “smart pigs” can be equipped with robotic cameras and sensors to check pipe thickness and welds, and can detect flaws and corrosion. The main disadvantage of “smart pigs” is the line has to be designed to accommodate these devices (i.e. “smart pig”

insertion and extraction points, smooth transitions between pipe segments, minimum radius turns, pipeline segments of the same diameter, no plug type valves, etc.). Many of PG&E’s pipelines were designed and constructed before “smart pig” technology was developed. These lines would require significant reconstruction to accommodate in-line inspections.



## Hydrostatic Pressure Testing

A hydrostatic pressure test involves pressurizing a pipe with water to reveal potential weaknesses.

Hydrostatic testing is a proven method for verifying the capability of a natural gas pipeline to operate at a safe level of pressure (referred to as the maximum allowable operating pressure, or MAOP). Hydrostatic testing is also used to test such familiar items as scuba tanks, fire extinguishers and air compressor tanks.

### Performing a hydrostatic test involves the following steps:

- 1) PG&E obtains all required work permits and coordinates activities with local agencies.
- 2) Gas is temporarily provided to customers from an alternate source during the work.

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- 3) The section of pipeline to be tested is temporarily removed from service and safely vented of all natural gas.
- 4) The inside is mechanically cleaned prior to testing.
- 5) The section is sealed on both ends and filled completely with water.
- 6) The pipeline is pressurized to a specified pressure greater than normal operating pressure.
- 7) The test pressure is held and monitored for a set period of time, typically 8 hours.
- 8) If there is no significant loss of pressure, then the section of pipeline is emptied of water, dried thoroughly, and placed back into service.

If a section does not reach or hold the pressure, that means that the pressure from the hydrostatic test has caused the pipe to either leak or rupture. If that occurs, the leak is located, repaired, and the pipe section is tested again. Sections that don't pass the test are replaced.

State standards for hydrostatic testing new pipelines were established in 1961, and federal standards for hydrostatic testing were established in 1970. Pipelines installed after these regulations became effective were hydrostatically tested prior to being put into service.



## Frequently Asked Questions

### What are the benefits of hydrostatic pressure testing?

Hydrostatic testing is safe, reliable, and has been successfully used by the natural gas transmission industry for more than 30 years. It verifies the capability of a pipeline to safely operate at the desired MAOP and can reveal weaknesses that could lead to defects and leaks in the pipe.

### Is hydrostatic pressure testing safe?

Hydrostatic testing is a commonly accepted approach to test pipelines. If a pipeline were to fail during testing with water, you

essentially have a large water leak. That's because water isn't compressible like air or gas; its energy when released dissipates quickly. Although a release of water could cause some flooding or even buckle a roadbed, PG&E will have plans in place and repair teams standing by. PG&E will also inform the local community before testing begins.

### How much of PG&E's natural gas transmission pipeline system will be hydrostatically tested?

In 2011, PG&E will hydrostatically pressure test or replace approximately 150 miles of pipeline segments with characteristics similar to the San Bruno pipeline that have not been pressure tested.

### How long will it take to complete hydrostatic tests on all pipeline segments requiring testing?

We currently estimate conducting the hydrostatic test program could take as long as three years, depending on the final number of pipelines to be tested. Timing will be influenced by such factors as weather and location. For instance, the window to conduct hydrostatic tests will likely be limited to April through October to avoid cold weather periods where customer demand is high.

### How will I know if the pipeline in my neighborhood will be hydrostatic tested?

PG&E will work with state and local government agencies and officials, emergency responders and customers in the areas where PG&E intends to perform these field actions.

### Will my service be disrupted because of hydrostatic testing?

No. In order to perform a hydrostatic test, the pipeline has to be taken out of service for several days. However, during the work we will provide gas to customers from an alternate source, so service will not be interrupted.

### How do you dispose of the test water after the hydrostatic test?

After the hydrostatic test is completed, the water used during the test is filtered of any contaminants while it is being drained from the pipeline. PG&E drains the water into large storage tanks and then performs a lab test on the water to determine the level of contamination. If the water is clean, which for the majority of hydrostatic tests it is, the tanks are emptied per the permits acquired prior to construction. Typically, that means properly disposing it by permit into a sewer pipe or into an open field. If the water is not clean, it will be disposed of at a properly permitted facility.

### Is hydrostatic testing regulated?

Yes. Hydrostatic testing of natural gas pipelines has been required by federal law since 1970. The U.S. Department of Transportation's Pipeline and Hazardous Material Safety Administration, acting through the Office of Pipeline Safety, administers the national regulatory program to assure safe transportation of natural gas. In addition, PG&E is regulated by the California Public Utilities Commission.