Council Priority: Emergency Preparedness

Title: Update on Natural Gas Pipeline Safety

Subject: Information Report on Natural Gas Pipeline Safety

From: City Manager

Lead Department: Utilities

Recommendation
This is an informational report and no action is required.

Background
The purpose of this report is to provide an update to the City Council on Pacific Gas and Electric's (PG&E) activities related to its ongoing safety assessment of its natural gas transmission system and to provide an overview of practices by the City of Palo Alto's Utilities (CPAU) in operating and maintaining the City-owned natural gas distribution system.

Discussion
Staff contacted PG&E’s Government Relations Representative for information regarding PG&E’s activities related to the gas transmission pipelines in the City of Palo Alto (City). In response we received two emails. The first email contained an outline of PG&E’s Pipeline 2020 Program (See Attachment A). The second email contained additional information related to PG&E’s maintenance and operation activities on the pipelines passing through Palo Alto (See Attachment B).

Since receiving the emails, PG&E filed a report with the California Public Utilities Commission (CPUC) and placed a map on its website showing the status of the records of sections of its pipelines. The maps can be found at <http://www.pge.com/myhome/edusafety/systemworks/gas/latestupdates/filingmaps/index.shtml> Map 27, which covers Palo Alto, shows that there are 5 pipeline sections in Palo Alto that PG&E is continuing to investigate for applicable records. These sections are: Line 132 at Page Mill and Alma, Line 132/109 near Page Mill and Foothill Expressway, Line 101 at East Bayshore and Embarcadero, Line 132 on Middlefield near Mitchell Park, and Line 109 at Alma and Charleston. A copy of a section of the map covering Palo Alto is contained in Attachment C.

The maps do not indicate the type of record that PG&E has on each pipeline. It is likely that
many of the pipelines in Palo Alto were constructed prior to the 1961 CPUC requirement to perform pressure testing of the pipelines. Therefore, these pipelines may not have pressure test records. PG&E was able to produce 91% of the testing records for lines installed after 1961 and 30% of the records for the lines installed prior to 1961.

For pipelines installed before 1961 the CPUC established a procedure for determining the maximum allowed operating pressure. This procedure established the maximum operating pressure as the highest documented operating pressure that occurred between July 1, 1965 and June 30, 1970. PG&E has been able to produce 92% of these records establishing the maximum operating pressure.

Within Palo Alto, PG&E has records establishing the maximum allowed operating pressure except in those pipeline sections listed above. It should be noted that the map indicates that Line 132 has been identified for hydrostatic testing or replacement.

Hydrostatic pressure testing is used to verify the quality of the welds and the pipe integrity by taking a portion of pipeline out of service, filling it with water and then increasing the test pressure to approximately 1.5 times the maximum allowed operating pressure. If the system does not leak water under pressure, the system passes the pressure test. For example, if PG&E was to re-establish the maximum allowed operating pressure of the transmission system to 300 pounds per square inch (psi), a pressure test at 450 psi would have to be conducted and documented. It is a requirement to keep these records for the life of the pipeline.

At this time CPAU does not have detailed information on the construction of PG&E pipeline sections located in Palo Alto or access to pressure testing results. Late last year PG&E inserted a camera into Line 109 on East Bayshore Rd. and conducted a visual inspection of the interior of the pipeline. CPAU has not received official results from this inspection.

The next section of this report is an update of information related to CPAU's natural gas distribution system.

Palo Alto Gas Distribution System Operating Pressure
CPAU operates its gas distribution system at a maximum allowed operating pressure of 25 pound per square inch (psi) as compared to PG&E's normal 60 psi maximum allowed operating pressure for its gas distribution system. For its much larger gas transmission system pipes, PG&E operates near 300 psi. CPAU uses a lower pressure, which places less stress on pipeline components. Upon installation of any new or replacement facilities, CPAU requires testing of the facilities at 100 psi. The test must demonstrate zero leakage prior to final connection to the system. The testing at 100 psi exceeds requirements for operating the system at the 25 psi level. For facilities operated at no more than 25 psi, the maximum pressure test requirement is 37.5 psi. The application of the more conservative test condition would permit operating CPAU's gas distribution system at slightly above 60 psi. At the current time there are no plans to increase the operating pressure of CPAU's gas system.
CPAU, similar to most if not all other gas distribution system operators in the United States, does not use hydrostatic pressure testing on distribution gas mains. The approved practice is to conduct air pressure tests.

Energy Released in a Pipeline Failure
If a pipeline failure were to occur on CPAU’s largest pipe operating at 30 psi, the energy contained in the released gas is over 100 times less than what would occur in a failure of a 30 inch pipeline operating at 300 psi.

Excess Flow Valves on Gas Services
CPAU began installing excess flow valves on residential customers’ gas services in 1999 and more recently on commercial customers’ services. These valves stop the flow of gas when the volume increases beyond a pre-set rate, which would occur if a service pipeline is severed during an event such as a dig-in or an earthquake. CPAU adopted this practice well in advance of the Department of Transportation (DOT) mandatory requirement enacted in December of 2009.

Gas Distribution System Valves
Currently, CPAU’s distribution system has approximately 2,500 manually operated valves, which are utilized to stop the flow of gas. The valves are typically located at most intersections to allow the isolation of individual city blocks. Additional valves are located at the sites of high use customers. The number of valves installed in the City is significantly higher than the number installed by other gas utilities over a comparable area.

Automatic and Remote Shutoff Valves
CPAU has not installed automatic or remote shutoff valves in the gas distribution system. Remote shutoff valves are installed at the four receiving stations where CPAU receives gas from PG&E’s high pressure transmission lines.

The city operates a “networked” gas distribution system where the gas can be supplied from either direction in the gas main (as opposed to only one direction) to ensure service reliability for customers. This type of system is significantly different from a radial feed transmission system. The first difference is that the gas distribution system operates at a much lower pressure and gas is transported in smaller pipelines. The lower pressure and smaller pipelines limit the amount of gas that can be released in a break.

Secondly, shutting down a networked gas system is much more complicated on the distribution system because of the network nature of the gas lines and the number and location of valves that would need to be controlled. Most shutdowns of the gas mains result in the loss of service to customers. When this occurs the utility must enter each home and relight the gas pilot lights. If an outage occurs over a large area the process to relight the pilot lights can take several weeks to complete. For this reason, most repairs on the gas distribution system are designed to be performed while the gas system is in operation.
The installation of remotely controlled valves would require a significant amount of work and cost to install, operate, and maintain across the entire City. Each site would require an electronically controlled valve, electric service, and communication infrastructure. The estimated cost per installed valve is between $15,000 and $20,000. If all 2,500 valves in the system were remote operating valves it would cost approximately $50 million. These costs do not include the additional expense of operating, testing, and maintaining these valves on an annual basis.

**Updated City Records**
CPAU has records of all of the materials and types of gas mains installed and the dates of installation. An intensive effort to accurately map all of the distribution system components electronically for easy access by the Operations and Engineering teams has been underway for the past two years. CPAU also retains the original paper documents and scans and files copies in a document management system.

**Leak Surveys in Palo Alto**
Annually, CPAU conducts two types of leak surveys: one by foot, and one using drive-by detection equipment. The driving survey covers the City's mains, and services in all eleven business districts. The foot (walking) survey is conducted on a two year cycle with 1/2 of the City being surveyed every year.

The walking survey includes inspection of all mains and associated service lines up to and including customer meters at residential and commercial buildings.

**System Patrolling and Key Valve Maintenance**
Portions of CPAU's gas distribution system that cross creeks, railroad tracks and freeways are patrolled annually to detect leaks and to maintain signage associated with these crossings. CPAU also maintains and operates 97 key valves within the distribution system on an annual basis. These key valves provide system isolation within the defined business districts and at the receipt gate station where gas is delivered from PG&E.

**Cathodic Protection**
CPAU regularly monitors (at least monthly) 42 testing stations for external cathodic protection levels on metallic portions of the gas distribution system in compliance with DOT regulations. Cathodic protection is a process that uses electricity to minimize the corrosion of steel gas mains. Maintenance of the cathodic protection system includes: replacement of sacrificial anodes, investigation and elimination of electrical shorts, recoating of exposed metallic segments, maintenance of rectifiers which impose protective current, and preparation of regulatory reports. Staff is currently preparing a bid package to provide automated current interruption and wireless remote monitoring of test points including abnormal condition notification.

**Operator Qualification**
CPAU tests and trains its workers within established intervals in accordance with DOT
guidelines for maintaining a qualified work force to operate the gas system. Tests are provided in written format and in field evaluations of necessary skills to operate the gas system in a safe and efficient manner. Continuous staff training is provided to maintain skill levels and to develop the talent pool available.

**Underground Service Alert**

It is the excavator’s/customer’s responsibility to mark the boundaries of excavations and notify the Underground Service Alert One Call Center, a centralized coordination service for underground facility location. This service notifies all utility agencies that they need to mark their facilities. Upon notification from the One Call Center, CPAU has the responsibility to place paint markings on the surface corresponding to the underground locations of our gas facilities. In the past year, staff responded to 2,180 mark-and-locate tags. Third party dig-in damage is the leading cause of incidents associated with gas distribution systems nationwide. CPAU has implemented the use of geo-positional surveys (GPS) on all CIP projects to increase the accuracy of our mapping systems and decrease the incidence of third party damage.

**Public Awareness**

CPAU provides customers with gas safety information at established intervals through our billing process. Information provided covers topics including: what to do if one smells gas, how to locate underground utilities if one is planning any excavation, and how gas leaks can be recognized, to name a few. CPAU also provides safety information to non-customers outside of our service territory, who reside adjacent to our distribution system. To gauge the effectiveness of our public safety outreach efforts, annual telephone surveys are conducted of our customers. Responses are compared with a similarly sized group of people who live outside, but near to, the City. Survey results indicate our customers are informed about gas safety and are, in fact, more educated on these issues than are those in surrounding communities.

**Attachments:**

- Attachment A - PG&E 2020 Program (DOC)
- Attachment B - PG&E Gas Transmission System Activity Update (DOC)
- Attachment C - PG&E Transmission Line Map (PDF)

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Sent: Monday, March 07, 2011 9:46 AM
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Subject: PG&E

Pipeline 2020 Program

Program Background

In October 2010, PG&E announced Pipeline 2020, a program for enhancing natural gas pipeline safety and reliability. The Pipeline 2020 program represents a substantial and long-term commitment of people and resources to ensure the safety and integrity of our gas transmission system. It involves a combination of targeted investments, research and development, improved processes and procedures, and enhanced coordination with public agencies. It has five major areas of focus:

1. Modernizing critical pipeline infrastructure
2. Expanding the use of automatic or remotely operated shut-off valves
3. Spurring the development of next-generation inspection technologies
4. Developing industry-leading best practices
5. Enhancing public safety partnerships

Pipeline 2020 efforts will include collaboration with the following groups to enhance our ongoing efforts to adopt industry best practices:
- State and federal regulators,
- Industry and scientific experts and
- Local agencies

Program Update

- In the weeks following the San Bruno accident, PG&E began working with companies that provide natural gas transmission services to establish immediate and important industry best-practices.
- PG&E is in the process of creating a nonprofit entity that will encourage and fund research and development proposals to spur the development of next-generation inspection technologies. The initial $10 million in funding will be provided by PG&E, not our customers.
- Some of the elements of the program, such as enhancing our emergency response programs with local communities and first responders, can be done immediately. We are currently meeting with first responders to assess their needs, improve coordination and provide pipeline data and other needed information.
- For other aspects of the program, such as pipeline modernization and installation of automatic or remotely operated shut-off valves, PG&E is working with
regulators, independent experts and other stakeholders to determine the right
criteria and timing.
• PG&E plans to make a filing with the CPUC in the first half of 2011 that lays out
the Pipeline 2020 program.
Hi Greg,

Here is additional information:

PG&E performs a number of maintenance activities on our transmission pipeline and distribution facilities throughout our system, including the three transmission pipelines that run through Palo Alto (Lines 101, 109 and 132) as well as the Page Mill distribution feeder main (DFM). For lines 101, 109, 132 and the Page Mill DFM, PG&E has performed the following maintenance activities:

Leak Surveys:

PG&E last performed a leak survey on the transmission pipelines and DFM that run through Palo Alto in September and early October of 2010. No leaks on the pipelines were found. However, two valves required greasing and one fitting required tightening to resolve minor leaking.

Pipeline Patrols:

While PG&E normally performs pipeline patrols on a quarterly basis, the transmission pipelines on the San Francisco Peninsula have been patrolled on a weekly basis since the San Bruno Incident. The transmission pipelines running through Palo Alto were last patrolled the week of January 17, 2011. In addition, an aerial patrol was last performed on these transmission pipelines on December 23, 2010.

Cathodic Protection:

PG&E also performs maintenance activities to ensure the cathodic protection monitoring systems on its transmission pipeline are operating properly. PG&E last checked the cathodic protection on the three transmission pipelines running through Palo Alto in September and December 2010. For the Page Mill DFM, PG&E last checked the cathodic protection in September 2010. These inspections verified that the cathodic protection systems on these pipelines and facilities are operating properly.

Pipeline Integrity Assessments:

An External Corrosion Direct Assessment (ECDA) for Line 101 was performed in 2006-07 and will be performed again in 2011. An ECDA for Line 109 was completed in 2009.
and will be performed again sometime between 2014 and 2016. Likewise, an ECDA for Line 132 was completed in 2009 and will be performed again in 2016.
PG&E Gas Transmission Pipeline

- Natural Gas Transmission Pipelines (Pipelines)
- Pipelines in HCAs with Pressure Test Records and or Section 619(c) Documentation
- Pipeline Segments in High Consequence Areas Under Review
- Reduced Pressure Zones
- 2011 Testing and Replacement Plan

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