

Date: September 12, 2011

To: Pacific Gas and Electric Company

From: 

Michelle Cooke, Interim Director, Consumer Protection and Safety Division

Re: Consumer Protection and Safety Division Review of Pacific Gas and Electric Company Request to Restore MAOP of Pipeline Facilities at Topock Compressor Station

On September 7, 2011, Pacific Gas and Electric Company (PG&E) provided the Consumer Protection and Safety Division (CPSD) with documentation to support its request to restore Maximum Allowable Operating Pressure (MAOP) on various pipeline facilities upstream, and on the suction-side of, the compressors at Topock Compressor Station (hereafter referred to as Request). PG&E reduced the MAOP of the subject facilities, in compliance with a February 2, 2011 directive from the Commission's Executive Director, due to a pressure upset condition that had resulted in these facilities experiencing a pressure which exceeded, by 1 pound per square inch gage (psig), the allowable range for abnormal conditions permitted under Commission General Order 112-E (GO 112-E).

Decision D.11-09-006, adopted on September 8, 2011, requires PG&E to provide, as part of its filing, an indication of CPSD's concurrence with the Request. CPSD has reviewed the Request and makes the following findings:

- PG&E has provided documentation to support that all personnel involved with the test subject to the Request, were operator qualified pursuant to 49 CFR, Part 192, Subpart N;
- In creating the continuous chart which records pressures throughout a pressure test, PG&E's Standard A-37, Hydrostatic Testing Procedure, requires that the pressure chart accuracy be +/- 0.5%. While performing the pressure tests subject to the Request, and in the creation of the charts which recorded these tests, PG&E's contractors and/or sub-contractors did not utilize pressure chart equipment which complies with PG&E's Standard A-37. Instead of a +/- 0.5% accuracy, the pressure charts utilized during the tests provided a manufacturer certified accuracy of +/- 1%, and a last calibrated accuracy of -0.67%, slightly less accurate than that required by Standard A-37;
- PG&E Standard A-37 also requires that an electronic pressure recorder or dead weight tester (DWT) be used for testing any segment above 90% Specified Minimum Yield Strength (SMYS).

The standard requires that electronic pressure recorders record pressures every 15 seconds and print the recordings at not greater than 15 minute intervals. None of the facilities tested, subject to the Request, were tested to pressures of 90% of SMYS or above. Also, PG&E's site specific hydro-test procedure clarified that DWT pressures were to be recorded on 30-minute increments. However, there is an inconsistent approach to recording between the DWT and electronic pressure readings.

- PG&E's contractor employed to assure quality control, and confirm that the hydrostatic testing process complied with all PG&E standards and work procedures, was present to witness field testing work performed on the "B Site" but not the "A Site" of the Topock Compressor Station. For the "A Site", the contractor performed only an office review of applicable exhibits "to determine the similarity between the prescribed test procedures implemented at the two sites." Furthermore, PG&E's contractor did not note and/or provide information stating that they had found deficiencies in regard to the accuracy of the pressure chart, as discussed above.
- Contrary to protocols agreed to with CPSD, PG&E did not conduct a 5% spike test above 49 CFR, Part 192, subpart J levels on facilities tested subject to the Request. PG&E stated that the configuration of the tested facilities, testing against operating valves, and other pressure restrictions limited the ability to perform the spike tests. PG&E, through its consultant also provided information stating that spike tests are more appropriate for situations where pipe attributes are unknown, and not desirable where, generally, margins do not permit the test to be performed without exceeding maximum test pressures and thermal expansion considerations of the test fluid.
- CPSD found that, despite PG&E's assertions, not every test conducted by PG&E had insufficient margin limits above the spike test pressure so as to preclude the use of a spike test.
- Despite the deficiencies noted, as described below, the hydrostatic tests conducted by PG&E, on pipeline facilities subject to the Request, provide adequate assurance of the fitness for operation of these facilities at the restored MAOP.

In addition to reviewing the documentation provided on September 7, 2011 and additional follow up documentation, and contacting PG&E's independent hydrostatic testing expert from Kiefner Associates, CPSD reviewed a July 2004 report, prepared for the U.S. Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety, which provides information on the subject of spike hydrostatic testing.

The 2004 report, TTO Number 6, Integrity Management Program Delivery Order DTRS56-02-D-70036, *Spike Hydrostatic Test Evaluation*, notes: *"The most important consideration is attaining the highest possible test pressure even if for only a few minutes..."* In reference to the ration of the hydrostatic test pressure (HTP) to the maximum operating pressure (MOP), the report also notes: *"The inescapable conclusion is that the higher the HTP/MOP ratio, the more effective a hydrostatic test is as a demonstration of fitness for service."* In regard to pressure reversals, the report notes: *"...pressure reversals one to a few percent were not that uncommon in hydrostatic tests where tens of dozens of test failures take place...Given that a 20 percent pressure reversal would be needed to cause a defect that survived a 90 percent-of-SMYS test to fail at 72 percent of SMYS upon being subjected to service pressure, they concluded that the chance of a pressure reversal causing a service failure...to be one in ten million."*

CPSD's review confirmed that all tests subject to the Request were performed in conformance with 49 CFR, Part 192, Subpart J. The use of chart equipment which did not provide the accuracy specified by Standard A-37 constitutes a violation by PG&E to follow its own standards. Nevertheless, the reduced accuracy of the chart equipment, even at a level of 1% inaccuracy, would still indicate that test pressures met the minimum levels required by regulations. In addition to the pressure levels recorded by the charts, test pressure readings are supported by pressure readings obtained, and recorded, from the DWT.

As noted earlier, CPSD's review found that PG&E performed no spike hydrostatic tests, to a level of 5% above the minimum Subpart J requirements, for any of the pipeline facilities subject to the Request. Not every test conducted by PG&E had insufficient margin limits above the spike test pressure so as to exclude the application of the use of this test in order to avoid damaging, or exceeding the pressure rating of, components being tested. However, considering that all tested lines will operate at less than 50% of SMYS, the HTP/MOP ratios exceeding 1.5xMAOP, the fact that no test failures occurred during the tests subject to the Request, and pressure reversal levels exceeding 30% of the test pressure all indicate, based on guidance provided by the 2004 report discussed above, that failure due to pressure reversal has significantly less than a one in 10 million chance of occurrence, CPSD believes the hydrostatic tests conducted by PG&E, on pipeline facilities subject to the Request, provide adequate assurance of the fitness for operation of these facilities.

The deficiencies noted raise issues for PG&E's ongoing hydrostatic testing program that must be remedied promptly. Based on this review, PG&E's hydrostatic testing program must:

- Perform a spike test to a range of 5-10% above that required to establish MAOP, on all operating pipeline segments which are pressure tested to confirm MAOPs. This includes all instances of pressure testing performed on transmission lines where testing is performed in preparation for future requests to restore MAOP. For any applicable pressure tests where a spike hydro-test will not be performed, PG&E's MAOP restoration request must provide advance notice regarding the specific pipeline facility, or component, which PG&E believes would preclude the spike hydro-test from being performed to a minimum level of 5%.
- Revise Standard A-37 to require that DWT readings, as for electronic pressure readings, be recorded on not greater than 15 minute intervals.
- Ensure that **all** PG&E standards and work practices are complied with. The significance of any failures on the part of any contractor or sub-contractor to comply with this requirement must be assessed by PG&E and not the contractor or sub-contractor who failed to comply. CPSD expects that PG&E will have the contractor or sub-contractor rectify the non-compliance, and not simply offer reasons for why the contractor's or sub-contractor's failure to follow the standard should be considered by PG&E as being insignificant, before the work product is accepted as complete.
- Determine why its contractor tasked with assuring quality control, and confirming that the hydrostatic testing process complied with all PG&E standards and work procedures, did not identify the deficiencies, noted above, in their Certificate of Compliance issued to PG&E for tested pipelines facilities subject to the Request. Going forward, CPSD expects PG&E's independent quality assurance process for its hydro-testing program to identify **all** non-compliances by PG&E, or its contractors and sub-contractors, with **all** applicable PG&E standards and work procedures, as well as testing protocols agreed to between PG&E and CPSD.

This review was performed by Sunil Shori, Utilities Engineer.