BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

Order Instituting Investigation on the Commission's Own Motion into the Operations and Practices of Pacific Gas and Electric Company with Respect to Facilities Records for its Natural Gas Transmission System Pipelines.	**I.11-02-016** **(Filed February 24, 2011)**

PREPARED DIRECT TESTIMONY OF MARSHALL WORLAND ON BEHALF OF THE UNITED ASSOCIATION OF PLUMBERS, PIPE FITTERS AND STEAMFITTERS LOCAL UNION NOS. 246 AND 342, AND THEIR INDIVIDUAL MEMBERS

(from R. 11-02-019)

Phillip Moskal
PO Box 371414
San Diego, CA 92137
thnxvm@gmail.com

April 30, 2012

TESTIMONY OF MARSHALL WORLAND

1. My name is Marshall Worland. I am a pipeline inspector. I became a journeyman weldor[1] and pipe fitter in 1964. Since then I have spent my entire career working on gas and oil pipelines. I have served as a welding inspector, senior welding inspector, piping superintendent and weldor foreman. I am a member of the United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the United States and Canada, AFL-CIO, the Plumbers and Steamfitters Union ("U.A." for short). I have been a member of U.A. Local 342 and other U.A. Local Unions in various places where I have worked.

2. I have worked on every phase of gas and oil pipelines: fabrication, construction, repair, and the supervision and inspection of that work on pipelines throughout California and in Texas, Oklahoma, Louisiana, Alabama, Florida, Indiana, North Dakota, Wyoming, Colorado, New Mexico, Michigan, Minnesota, Wisconsin, Pennsylvania, Oman, Thailand and Egypt.

3. Since 2005 I have served as a welding inspector and senior (*i.e.*, supervising) welding inspector on a number of gas and oil pipeline projects for major pipeline operators.

4. A pipeline inspector's duties are to closely observe the welding work being performed, make sure that governing welding requirements are followed, and require that the welders do their work in a way that ensures the pipeline's integrity. I take these obligations very seriously.

5. On May 23, 2011, I was hired by CANUS Corporation to work as a welding inspector on hydrostatic pressure testing ("hydro-testing") being performed on PG&E gas-pipelines in the San Francisco Bay Area. CANUS did not have senior welding inspectors, which in my experience was unusual. I worked for CANUS until early September 2011.

6. Shortly after I was hired, I attended a one-day CANUS training program in Modesto. As far as I know, the one-day class is the only inspector training that CANUS provides. During that program, we were told emphatically that we were not to inspect – or even observe – any welding done by PG&E's employees. On the job, it turned out that no one was inspecting the PG&E employees' welds. In my experience, this is unprecedented.

---

[1] The spelling "weldor" refers to a person who performs welding work. "Welder" refers to a welding machine.

7. During the time I was employed by CANUS, I inspected hydro-testing work at three locations on one PG&E gas pipeline in southern Alameda County. The pipeline contractor PG&E used was ARB, Inc. ARB is a prominent pipeline contractor that is widely used in gas-pipeline work.

8. The hydro-tests on which I worked for CANUS were on pipeline sections 3 to 3½ miles long. The work process proceeded as follows. First the ends of the section to be tested would be uncovered with dirt-moving equipment. Then ARB weldors would cut a pipe segment (or "joint") approximately 30 feet long out of the pipeline. The joint would be moved away. Then ARB weldors would weld a plug, or cap, onto the end of the pipeline that was not going to be tested. ARB weldors would then weld a manifold onto the end of the pipe section that was going to be tested.[1] Onto the manifold the ARB weldors would weld pipe that would carry water into or (at the other end) out of the section being tested. Once the hydro-test piping was welded into place and the test equipment was attached, a third party would conduct and monitor the hydro-test.

9. After the 30-foot pipe joints had been cut out, I had the opportunity to look inside the old piping, which I understand was originally installed in 1949. The quality of the welds inside was truly terrible. If the San Bruno pipeline was like the one I inspected, I'm not surprised it failed. Some examples of the poor weld quality inside the old pipeline include:

- Defective root passes. When two abutting sections of pipeline are welded together, usually they are joined with "butt" welds. The weldor makes multiple welding passes, each of which goes completely around the pipe. The first pass, on the inside of the pipe, is called the "root" pass. On the old pipeline, I observed that the root passes were extraordinarily defective, so much so that I never saw a 12-inch portion of any root pass that could meet current welding standards. Among other defects, there were gaps in the root passes which are known as "inadequate penetrations".
- "Burn-throughs." Burn-throughs are divots that have been burned in the pipe weld during the welding process. I saw burn-throughs that had not been filled in by the weldor, leaving as much as one-third of the pipe's thickness burned away inside the pipe.

[1] A manifold is a fitting that connects the existing pipeline to the pipe that carries the hydro-test water into or out of the pipeline.

- "Internal undercuts." Internal undercuts are welds where the welding metal does not flow smoothly onto the metal of the pipe. This makes the weld weaker than it's required to be.

All of the welds I saw on the old pipeline were extremely poor. In my opinion, they are dangerous.

10. After a hydro-test had been done, the 30-foot cut-out pipe joint would be replaced. That work is referred to as the "tie-in". PG&E assigned the tie-in work to weldors who were its own employees. In my experience, the tie-in work is always done by employees of the same contractor that does the other welding work. I don't know why PG&E used its own weldors to do the tie-ins.

11. Even though CANUS had instructed its inspectors to stay away from the PG&E employees while they were welding, and not to even look at it, I nevertheless looked at it from a short distance away. On numerous occasions I observed substandard welding work performed by PG&E employees doing tie-ins. That work may well have jeopardized the integrity of PG&E's gas transmission pipelines.

12. The PG&E weldors' main shortcoming was that they were too slow. PG&E's own welding procedures require that each root pass be welded in 6 to 8 minutes if it's being welded with a welding rod (as opposed to using welding wire). But the PG&E weldors were not skilled enough to work that quickly. They usually took an hour or more to weld a root pass with welding rods. The problem with slow welding is not just in the lack of productivity. It also causes substandard welds due to the pipe's loss of pre-heat during welding.

13. Pre-heating is absolutely necessary to proper pipeline welding. It is required by proper welding procedures, including PG&E's. Before welding, the pipe must be heated to a specified temperature, which varies with the material and thickness of the pipe, as well as the ambient temperature. If the pipe is not preheated, or if it does not stay at the specified temperature during welding, then the weld may develop horizontal hydrogen cracks across the weld after it has cooled, and the cooling process can cause longitudinal stress cracks in the weld. Hydrogen cracks can cause the weld to fail and the pipeline to rupture. If a root pass is made in the 6 to 8 minutes prescribed by the welding procedures, the heat from the welder will keep the pipe hot enough to prevent hydrogen cracking. But when the weldor makes his or her welding pass as slowly as PG&E's weldors did, the pipe cools below the proper temperature. The cooling of the pipe allows hydrogen cracks to form after

the weld has cooled and set for a while. Welds are usually X-rayed, but hydrogen cracks do not form until a day or more after the weld has been made. If the weld is not X-rayed after it has completely cooled, cracks may not be discovered until the weld fails and causes an explosion.

14. The heat of the pipe being joined should be checked while the pass is being welded, especially where welding is done as slowly as PG&E's welders worked. If the heat falls below the specifications' temperature, the pipe should be reheated. On the tie-ins I observed, PG&E did not do this.

15. Another problem I observed was in the CANUS inspectors' failure to independently monitor the amperages and voltages on the welding machines being used. Such monitoring is important because there are a number of factors (preheat temperature, amperage and voltage of the welder, and other factors) that affect the integrity of a weld. At the beginning of a pipeline welding job, test welds are made in order to determine the factors that will produce welds with the required strength and integrity. Amperage and voltage are among those factors. Once determined, the values of those factors should be maintained throughout the job. Proper practice is for the inspector to check amperage and voltage with separate measuring instruments on each and every welding pass, not simply rely on the settings shown on the weldors' welding machines. But PG&E and CANUS did not require independent measurement of amperages and voltages.

16. I was also troubled by the cozy relationship between CANUS and PG&E. Inspectors can only protect pipeline integrity if they strictly enforce welding procedures and the USDOT's regulations. But many CANUS executives, supervisors and inspectors are former PG&E employees. This led to deficient enforcement of welding standards. For example, by forbidding its inspectors to observe PG&E's employees' tie-ins and enforce proper welding standards, CANUS gave PG&E a "free pass" at the expense of public safety.

17. The quality-control hazards created by CANUS' tight relationship with PG&E are compounded by the fact that CANUS' pipeline inspectors are required to be members of International Brotherhood of Electrical Workers Local 1245, the same Union that represents most of PG&E's employees, including PG&E's weldors. This overlap of relationships undermines CANUS' independence as an inspector. It encourages corner-cutting and the failure to enforce pipeline-integrity

standards. As a CANUS employee, I was required to join IBEW Local 1245. On other jobs where I have been an inspector, I have never been required to join the Union that represented the operator's employees.

18. On every pipeline inspection job I have had, other than at CANUS, the pipeline inspection company and its employees were independent of the company that owned and operated the pipeline. I have never seen an inspection company where so many executives and inspectors were former employees of and retirees from the operator, or where the inspectors were required to join the same union that represented the operator's employees. Frankly, I think the relationship between CANUS and PG&E undermines pipeline integrity.

19. As the foregoing reflects, my relationship with CANUS was not a good one. Just before Labor Day 2011, I was fired for not having taken photographs of the meters measuring the water going into and out of the pipe being hydro-tested, as CANUS required. The reason I didn't take the photos was that another CANUS inspector had already taken them, and there was no reason to do it over again. I thought CANUS' reason was a pretext, but I was glad to leave. I had a new job 20 minutes later.

MARSHALL WORLAND