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Sent:	4/22/2013 9:11:39 AM
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Subject:	FW: P&GJ - PG&E's Pipeline System: From Hell And Back

FYI

From: owner-Newsflash-Real-Time@pge.com [mailto:owner-Newsflash-Real-Time@pge.com] **On Behalf Of** News Flash
Sent: Monday, April 22, 2013 9:03 AM
To: Newsflash-Real-Time
Subject: P&GJ - PG&E's Pipeline System: From Hell And Back

Pipeline & Gas Journal reported on the reorganization of PG&E Gas Operations following the San Bruno accident. PG&E's Executive Vice President of Gas Operations Nick Stavropoulos, Senior Vice President of Gas Transmission Operations Jesus Soto and Senior Director of Gas Systems Operations Mel Christopher were quoted.

PG&E's Pipeline System: From Hell And Back

By Richard Nemec

Pipeline & Gas Journal, April 2013

http://www.pipelineandgasjournal.com/pge%E2%80%99s-pipeline-system-hell-and-back?page=show

In less than three years, the San Francisco-based combination utility **Pacific Gas and Electric Co. (PG&E)** has had to reconstitute its vast natural gas transmission and distribution system on a scale that is unprecedented for the U.S. pipeline sector.

With PG&E as the focal point, the U.S. industry has been touched by the fallout from the September 2010 failure of the company's high-pressure, 30-inch transmission line in San Bruno, CA. From the charred ruins and loss of life resulting from that pipeline rupture and explosion, PG&E not only had to rebuild its physical gas components, it had to rebuild its work force, its spirit as a multibillion-dollar energy-providing organization and its trustworthiness among regulators, elected officials, customers and the general public.

Less than a year into San Bruno's aftermath, the California utility giant reached out nationally to snag gas industry veteran **Nick Stavropoulos**, then with National Grid, to run its natural gas system, consisting of 5,800 miles of transmission pipelines, 42,000 miles of distribution mains and numerous underground storage facilities, all spread over 70,000 miles of service territory. A salient fact for the rebuilding effort is that 2,088 miles of its transmission pipelines traverse high consequence areas (HCA) that include some of America's most seismically active and diverse topography.

At the midway point, **Stavropoulos** and PG&E seem to be up to the challenge in a four-year full-court press to complete a $4 billion pipeline upgrade plan and revamping of the company's pipeline integrity management program. Along the way, there also has been an attempt to change PG&E's culture and the previous negative perceptions of many of its stakeholders.

When asked to give himself a grade, **Stavropoulos** declined to do so, but allowed that what the company has accomplished so far is precedent-setting. He added, when it comes to operating a safe, reliable pipeline system, "You're never finished. The job is never done."

Stavropoulos has brought in other experienced pipeline industry veterans, such as **Jesus Soto, senior vice president for gas transmission operations**, who has more than 20 years of senior executive experience at El Paso Natural Gas – some of that during the company's recovery following the Carlsbad, NM rupture of a 30-inch interstate transmission pipeline that killed a dozen people in 2000. Internal corrosion was eventually cited as the cause and **Soto** has never forgotten it.

PG&E also recruited **Mel Christopher as senior director of gas systems**

operations to lead its completely revamped gas control center operations. **Christopher**, who has been on board about 18 months, came with 30 years of industry experience, 27 of which were with the PNM Resources utility operations in Albuquerque, NM. Both **Soto** and **Christopher** bring strong philosophies with them.

Both underscore the extraordinary nature of PG&E's challenge so far, dissecting vast amounts of high-pressure transmission pipeline segments in Class 3, 4 and HCA areas. "The concentration for this effort is unprecedented," said **Soto**, while reciting what he calls the "intricacies" of working in limited spaces, while dealing with issues of noise, traffic control, limited work hours and operating heavy equipment in populated areas. "That's very different than doing hydrostatic testing in rural areas," he said.

In consolidating and totally reorganizing PG&E's gas control for both its transmission and distribution pipeline systems, **Christopher** said he is not "simply rebuilding," and if that were the case his mission would be a failure. "We're building what is the front line in public and employee safety at PG&E," he said.

Under mandates from federal and state regulators, particularly the California Public Utilities Commission (CPUC), PG&E has embraced advanced technology and extensive new training for its thousands of gas system employees, from top to bottom, including experienced contract workers. Nevertheless, some oil and pipeline industry associations have urged Congress and the Pipeline and Hazardous Materials Safety Administration (PHMSA) not rush to endorse technology that has not proved reliable or cost-effective in the field.

Technology, however, is an undisputable key to PG&E's massive undertaking, and **Christopher** highlights that in describing what the company is trying to do with its gas control center. He thinks the technology is a "first-of-its-kind," the place "where the industry has to go." The center's interlacing is a combination of advanced software and the deployment of a lot of smart communications technology and devices.

Noting that the company has not come to this epiphany on its own, **Christopher** said a lot of benchmarking of "best-in-class" operations in the industry has helped PG&E paint a whole new vision of its gas control operations and what they should be.

The gas control center will have to be the traditional "control, monitor and respond" operation with co-located transmission, distribution and gas dispatch functions. However, it must also expand its "philosophy," **Christopher** said, to be more real-time "proactive and predictive." That means it must have a preventive core, turning the myriad of pipeline data from the field into "intelligence."

And to do that, he said, technological innovations are needed.

"Response is still critical, but to the extent we can prevent something, that's all the better," **Christopher** said, noting it won't all come together when PG&E opens its new consolidated gas control center in the East San Francisco Bay suburbs later this year; it will take up to five years to be fully operational under the new philosophy and organization.

PG&E asked what technologies it could apply to make emergency response in the field more effective, and the answer was interconnected iPads for all field personnel and a "smartboard" in the control center. "We can put critical information on the smartboard at the same time technicians are viewing it in the field," **Christopher** said.

Ultimately, PG&E's pipeline safety and enhancement plan (PSEP) implementation needs the control center as its focal point.

"The heart of any integrity management system – transmission and distribution – is to understand the risks of your system," said **Christopher**, adding that what counts is what is known about an entire system – the network, pipe and valves – and what is needed to protect its integrity.

"We are connected directly to the integrity management programs in the control center," he said. "In real time, to maintain the integrity, the control center needs to know the condition of the entire system, its regulators, and we're gathering all that data real time and monitoring it and modeling it against performance models that we have on the network."

As an extension of earlier work covering several years, PG&E and a Silicon Valley maker of measurement instruments, Picarro Inc., announced last fall it was expanding its collaboration on a technology for more accurate detection of natural gas pipeline leaks. PG&E decided to deploy six of the vehicle-mounted, super-sensitive gas leak detectors throughout its service territory. PG&E has billed itself as the first utility in the nation to use this new technology. Picarro and PG&E contend that the leak-detection equipment is 1,000 times more sensitive than traditional leak-detection equipment with capability to detect leaks down to one part-per-billion in ambient air, while reducing false positives from naturally occurring methane.

At one point near the end of 2012, the pair conducted a "road show" to demonstrate the equipment in different communities around the utility service territory in the northern and central parts of the state as part of PG&E's trust-building and transparency initiatives.

PG&E is also developing new tools to help analyze pipeline data so the maximum allowable operating pressure (MAOP) can be calculated more efficiently and effectively. PG&E has licensed that technology.

"We're making it available to the transmission operators throughout the country as well," **Stavropoulos** said. "It's a really good application in which we are investing heavily in improving the technical training required." He said this is part of PG&E's efforts to provide better tools and technology to its workforce across the board.

Soto said this was developed by PG&E specifically from its efforts to claw out of the ashes of San Bruno. What they have come up with is commercial and now patented. It is referred to simply as an MAOP Validation Calculator. In developing the device, PG&E has worked with Coler & Colantonio Inc. (C&C), a privately held consulting and engineering firm, specializing in pipeline software and services among other things.

The technology incorporates data into a Geospatial Information System (GIS), so that it can be made available to other potential pipeline operators. Data from the MAOP Validation Calculator is stored within C&C's Intrepid™ GIS. The software performs calculations to validate the MAOP for each pipeline component, contributing to a more

reliable pipeline information system, according to PG&E's experts working with the device.

"Many operators are very interested in seeing how this geospatial technology has been beneficial to PG&E in providing answers to auditors through building and maintaining a traceable, verifiable and complete asset management system," said Jeff Allen, a C&C vice president.

"We're trying to leverage technology from every corner of the industry," said Soto, noting that another promising system involves the use of lasers in manned aerial patrolling of pipeline rights-of-way to detect leaks and third-party activity in the corridors.

"Right now, the technology being used is all manned," he said. "But there are efforts under way to develop drone-based aircraft that not only detect leaks, but also detect potential third-party activity." Soto noted that PG&E as a member of the industry organization Pipeline Research Council International (PRCI) is studying this potential advancement. PRCI hopes to have a breakthrough soon.

Another focus post-San Bruno has been an unprecedented heavy concentration of expensive, time-consuming hydrostatic testing. Embraced now by the CPUC, hydrostatic testing has long been a staple in the industry, particularly for testing strings of pipe prior to putting them into service. But some industry experts always raise cautions about the limitations of the tool for pipeline operators.

While not a panacea for every aspect of a pipeline's safety characteristics, hydrostatic testing – filling a pipe segment with water and cranking up the pressure beyond its identified MAOP – can identify a number of pipe flaws, including:

- Existing material flaws
- Stress corrosion cracking and pipe mechanical properties
- Corrosion cells that are active
- Localized hard spots that could cause failure in the presence of hydrogen

At the end of last year, PG&E had completed hydrostatic testing on 409 miles of its vast transmission system. Through the end of 2014, it intends to have validated 783 miles, replacing 185 miles of pipe; that's part of the $4 billion PSEP.

For most of the industry, this testing technique is used to address changes in the class locations of pipelines that may require changes and verification of MAOPs. But for PG&E, the tests have been a much larger undertaking, directly related to mandates the utility is under from the CPUC and federal regulators since San Bruno.

"Just the sheer numbers of miles to date is more than 400 miles of hydrostatic-tested pipe segments, all in heavily populated areas," **Soto** said. "The shear logistics is unprecedented. Work space, water management and the blow downs, along with keeping all the customers in service – there all first of its kind."

In 2012, at the seaside college town of Santa Cruz, about 50 miles southwest of San Francisco, PG&E maintained gas service to 20,000 customers for a two-week period of segment hydrostatic testing. The utility's solution was liquefied natural gas (LNG), something it has repeated in communities across its service territory in the past two years.

PG&E maintains a fleet of LNG truck-tankers for these remote, field-fueling operations, providing up to 20,000 gallons daily of LNG in the Santa Cruz hydrostatic testing project. The giant combination utility has been using portable gas fueling systems – LNG and compressed natural gas (CNG) – since 1998, but it has really ramped up its capabilities in recent years with its massive effort to test and verify MAOPs.

For the Santa Cruz pipe strength testing, eight 48-foot tankers filled with LNG were delivered from Yuba City, CA, in the north-central valley, about 150 miles away to a vacant lot in Santa Cruz County. Then the real work began – getting the liquefied gas from the tankers to customers, and PG&E has other mobile equipment to make that happen.

It's a multi-step process, a kind of "automated assembly line," according to PG&E's

field technicians. Each tanker, filled with about 10,000 gallons of LNG, is like a large Thermos. The advantage of using LNG is that more of it can be transported because of its temperature (1 cubic foot of the liquid converts to 600 cubic feet of natural gas).

The liquid is then pumped into a vaporizer, which converts it into a gas that is heated to 70 degrees. During this stage, the odorless LNG is injected with mercaptan to give the gaseous fuel its distinct odor. From there, a compressor boosts the pressure of the natural gas from 140 pounds per square inch (psi) to 275 psi. The gas is then discharged into a natural gas pipeline.

At Santa Cruz, this operation lasted around the clock for two weeks. Twelve employees and contractors were dedicated to the mobile fueling site, constantly monitoring the temperature of the natural gas and the flow rate while checking for leaks. The team communicates with the hydro-test operators daily, and two refilled tanker-trucks returned daily.

This sort of effort is being replicated daily throughout 70,000 square miles of service territory. It involves not only pipe-strength testing and replacement, but also the installation of what will be 220 automatic and remote control valves, and the intensive training of thousands of utility and contract field workers. Soto estimates up to 85% of the work crews are contractors, because the bulk of the work is concentrated in a five-month period of June through October.

More valves are being installed in seismically active areas. The work of outfitting the pipes with the new devices is one thing, but the real time-consuming process is developing the communications links between the valves and the emerging new gas control center, Soto said. There is an electrical support system that is absolutely critical, he added.

Overall, the more accelerated use of tests and installation of the valves are designed to lower the overall risk profile of the PG&E system, **Soto** said.

"That is why so much of the work is focused on populated Class 3, 4 and HCA areas," he said. "It is all aimed at reducing risk, and that is the new culture we are aiming for at

PG&E. It is a culture that puts people first. We're doing everything we can to lower the risk and enhance the integrity of the system."

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