

# PG&E's 2014 Gas Operations Improvement Report



Pacific Gas and Electric Company's (PG&E) 2014 Gas Operations Improvement Report contains information about organizational and operational milestones PG&E has achieved since 2011. The Improvement Report is updated on a semi-annual basis and all content is subject to change.

If you any have questions about information contained within, please contact your local PG&E representative or call PG&E's media line at [1-415-973-5930](tel:1-415-973-5930).



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**We've earned two prestigious international certifications:** In May 2014, PG&E became one of the first utilities in the world to achieve PAS 55-1:2008 and ISO 55001:2014 certifications for best-in-class asset management. These certifications were awarded by an internationally recognized independent auditor and demonstrate the growing strength of our safety culture, our rigorous approach to asset management and our unwavering commitment to gas safety excellence.

**We're responding to gas odor calls faster than ever:** In 2014, the average response time was 19.9 minutes, improving the yearly average response time by nearly 14 minutes compared to response time in 2010. PG&E now ranks in the top decile for gas utilities nationally.

**We've decommissioned all known cast-iron pipe:** In 2014, through its Gas Pipeline Replacement Program, PG&E decommissioned more than 835 miles of remaining cast-iron pipe in its system, replacing it with modern plastic pipe, which is more flexible and reliable during earthquakes, and newer steel pipe.

**We've made significant progress on our Pipeline Safety Enhancement Plan\*:** Since the program began in 2011, we have validated the maximum allowable operating pressure of our entire transmission pipeline system; verified pipeline strength for 847 miles of transmission pipeline via hydrostatic strength testing and records verification; replaced 127 miles of transmission pipeline; automated 208 valves; and collected and digitized more than 3.8 million pipeline records. *\*PSEP data valid as of December 31, 2014*

**We've closed out nine of twelve NTSB recommendations:** Of the twelve safety actions recommended by the NTSB following the San Bruno accident, PG&E has completed nine. Work on the remaining three recommendations is already well underway.

**We're opening a state-of-the-art training facility:** In 2014, PG&E announced its proposal to construct a new training facility just outside of Sacramento. This facility will provide teams with a best in-class training environment, teach enhanced safety protocols and use the latest technologies. It will also have a significant positive economic impact on the community and region.

**We're improving the quality of, and access to, our gas distribution records:** We've created a Geographical Information System tool to map, reconcile and analyze the data and events that take place on PG&E assets and are training employees to use this centralized system.

**We've launched a system to track issues from identification through resolution:** The Gas Operations Corrective Action Program (CAP) provides employees and contractors with a system that offers multiple platforms for reporting potential and existing issues, and tracks the corrective actions taken. In 2014, we added a CAP App for smart phones, allowing users to initiate corrective action from virtually any location.

**We're using new tools and technology:** PG&E deployed more than 30 new, innovative gas safety tools in 2014. Examples include our leak detection technology pioneered with NASA's Jet Propulsion Lab and a miniature pipeline casing robot inspector that allows visual inspection of pipelines without the need for costly construction digs. Other technological upgrades include providing gas construction crews with real-time access to detailed maps of our underground gas system and becoming the first utility to use Picarro's car-mounted natural gas leak detection device—the world's most advanced leak detection tool.

# Gas Safety Excellence

## Background

PG&E is on a mission to become the safest, most reliable gas company in the United States, and to do so, we created a safety management system—Gas Safety Excellence (GSE)—as a framework to guide all aspects of the business. GSE has three key elements:

**Asset Management**, knowing the condition of our assets and having a robust plan to manage those assets based on accurate information, and understanding and managing risks to those assets.

**Process Safety**, which entails developing and deploying a comprehensive series of processes and procedures that serve as controls, preventing large-scale operational failures and associated risks.

**Safety Culture**, which entails embracing and encouraging open and honest communication among employees and leaders, and the alignment of human performance with the organizational strategy.



### Goals of GSE:

Effectively manage risk and provide continuous improvement in accordance with the international certifications PG&E has achieved (asset management)

Embed safety into the design and maintenance of all of our assets by identifying and analyzing hazards (process safety)

Encourage employees to report safety issues through an integrated corrective action program designed to identify and track issues (safety culture)

Meet and exceed the standards for optimized physical asset management

### Achievements:

In May 2014, PG&E became one of the only companies in the world to achieve both PAS 55-1:2008 and ISO 55001:2014 certifications, which are globally-recognized specifications for best-in-class operational standards for asset management from an independent, international auditor, Lloyd's Register

- Maintained both certifications during Lloyd's Register's six month visit in November 2014 and closed two minor non-conformances related to asset management and system documentation. Three non-conformances remain in records, management of change and information management.
- Conducted over 500 field assessments to identify strengths and weaknesses in field processes, tool/instrument calibrations, records, training, employee engagement and other areas

### Continuing Work:

Working to improve upon PG&E's three minor non-conformances as well as other recommended areas for improvement for the next Lloyd's visit scheduled for first quarter of 2015

Continuing to conduct field observations to ensure adherence to standards and identify further ways to improve

Working with asset family owners to continuously improve asset management



To become the safest, most reliable gas company in the United States, PG&E must have accurate, detailed information about our physical assets. Efforts underway relating to Asset Management and Maintenance include:

## Asset Management Policy

Created a 14-point asset management policy that clearly states how we manage our business and our assets

- The policy provides the framework of our asset management plans, which detail how we will reduce risk across our eight asset families

Identified eight asset families and designated owners and risk champions to oversee the physical assets for each of these families

1. Transmission Pipelines
2. Distribution Mains
3. Distribution Services
4. Customer-Connected Equipment
5. Compression and Processing
6. Gas Storage
7. Measurement and Control
8. Compressed Natural Gas (refueling stations)/Liquefied Natural Gas (portable supply)

## Risk Management

Completed a benchmarking study that identified best practices for risk management in the utility, finance, and energy industries

- In 2012, worked with leading industry consultants to develop a roadmap to achieve best-in-class risk management practices

Continuing to identify the top operational risks and communicate them to employees

- Uploaded risk data to the Enterprise Compliance and Risk Tracking System (ECTS-Risk), the database used as a central repository of risk information across all Lines of Business for reporting and tracking purposes.
- Developed Risk Register reports from ECTS-Risk, which are easily accessible to all employees through the Gas Operations Risk Management website.
- Increased subject-matter expert(SME) participation, quantification and analysis in risk identification and evaluation through the review of a vast array of data files and reports, including:
  - Corrective Action Program (CAP) issues [See page 17 for further details on CAP]
  - Process Hazard Analysis (PHA) and Quantitative Risk Assessment (QRA) data
  - Quality Assessment / Quality Control reports and findings
  - Material Problem Reports (MPRs)
  - Industry data
  - Root Cause Analysis results
  - Asset health condition-based assessments
- Utilized external industry expertise to review and validate methodologies and findings

Updated fact sheets specific to each asset family, including specific risks and mitigation strategies to educate employees



Identified risk managers and SMEs for each asset family to ensure rigorous and thoughtful risk analyses as well as to provide information during risk assessments

Coordinated an Enterprise and Operational Risk Management-led training for Gas Operations SMEs on Risk Assessment

Developed an intra-company website on Risk Management

Integrated Risk with the CAP program

- Takes issues reported through CAP and associates them with known threats to help identify trends that could lead to new risk identification
- Developed CAP-Risk dashboard reports for asset families that provide a consolidated view of the relationship between CAP issues and current risks

Established a Risk Charter and a Risk Compliance Committee in 2012, to oversee risk management activities, compliance programs, audit procedures and safety-related matters

Expanded the Gas Operations Risk Management team to better support an integrated risk management process within Gas Operations

Published the Asset Risk Management Standards and Procedures in October 2014

Held several risk assessment workshops in 2012, 2013, and 2014 to identify and evaluate operational and compliance risks

Developed a new, more granular risk scoring system, integrated with Investment Planning, to determine likelihood and consequence of failures in Gas Operations

- Adopted the standard enterprise Risk Evaluation Tool (RET) for risk scoring
- Established key performance indicators (KPIs) to measure the effectiveness of the mitigations and programs
- Developing metrics for some risks to monitor progress in risk reduction
- Linked risks in the next phases of the strategic planning process for investment prioritization and resource allocation

Began working with other Lines of Business to evaluate shared risks, such as Cybersecurity and Employee Qualification

## Records and Information Management

Created a Gas Operations Records and Information Management (RIM) organization in 2012 to define, implement and manage standard recordkeeping practices

- Gas Operations RIM is responsible for:
  - Developing and managing the governance structure for Gas Operations records management, working with the companywide RIM organization
  - Implementing a multi-year roadmap to achieve records management maturity level three as defined by ARMA International, a nonprofit association and authority on managing records and information
  - Developing the process for managing, storing and disposing of paper and electronic records, including processes to ensure appropriate controls are employed
  - Providing employees with training and tools to ensure they are aware of and knowledgeable in records management
  - Building, training and managing a network of Gas Operations RIM Coordinators throughout the service area to standardize processes and promote best practices

- Enhancements and activities underway include:
  - Developed and trained 112 RIM Coordinators across the gas service area
  - Completed paper records assessments and cleanup for 52 field offices located in the Northern California area
  - Inventoried paper records and linked them to an updated records retention schedule
  - Transferred inactive records from field locations to a centralized storage facility with a fully searchable database
  - Continuing assessments and cleanup of paper records in 98 other field offices
  - Hosting learning events at field locations to provide a deeper understanding of records requirements
  - Deploying storage receptacles to secure and protect legal hold documents

Conducts assessments at PG&E field offices to catalog and standardize all records and ensure office teams are utilizing the system properly

- Completed phase one of taking inventory of records by identifying the location of critical paper and electronic records

Continuing the transition from reliance on paper records to offer electronic forms and automated, optimized scheduling functions on mobile devices:

Migrated all leak data into one enterprise core system (SAP)

- Implemented the fully electronic capture and recording of new leaks found by Leak Surveyors

Completed the delivery of data analysis tools that will improve pipeline safety and integrity management processes by automating manual data processing tasks.

- This allows our engineers to spend less time processing data and more time analyzing potential threats to our pipeline system.

Introduced a mobile technology that captures leak repairs, preventative maintenance, and other gas corrective work.

- This technology increases the traceability and accessibility of our gas assets as well as ensures improved quality and timeliness of asset data, storing all asset information in a single, enterprise system (SAP)

Is deploying a Gas Distribution Geographical Information System (GIS) tool to map, reconcile and analyze the data and events that take place during work on PG&E distribution assets

- Converted data on 27,000 miles of main and 2.3 million services into GIS
- Successfully deployed gas distribution GIS to eleven divisions in 2013 and 2014, and expect to complete six more by the end of 2015
- Expanded the pilot of the one-way push of Gas asset data from GIS to SAP beyond the Peninsula Division to East Bay Division in August 2014 and San Francisco and Sacramento Divisions in November 2014
- Scanned all distribution Gas Service Records and collected the critical attributes to be put into GIS - approximately 5 million Gas Service Records consisting of over 12 million pages of information were scanned
- Adding new functionalities to the GIS such as a search capability for gas service records
- Continuing the integration of the GIS-SAP integration across divisions, which:
  - Automates the synchronization of asset data between GIS and the SAP Asset Registry
  - Creates notifications within SAP to support the as-built process and pushes info to users
  - Improves data quality

Completed the Pipeline Open Data Standards (PODS) Certification process, to support the development of PG&E's Gas Transmission GIS

- PODS is an industry standard that provides pipeline operators a database architecture to integrate critical records and analysis data with geospatial location for each component of your pipeline system
- Completed the Alignment Certification process which aligned the PODS asset data to Pipeline Centerline surveys for Gas Transmission pipelines

## Data Accessibility

Supplied 400 ruggedized laptops to gas construction crews giving them real-time access to digital transmission and distribution pipeline maps, current standards and work procedures, email, and PG&E's intranet

- Converted paper leak repair and corrective work forms to electronic format to improve data collection and efficiency

Deployed more than 300 tablet computers to leak survey and compliance field employees making real-time data, pipeline maps, and email from remote locations instantly accessible

## Mapping

Has decreased the length of its map cycle, defined as the time it takes for new or changed asset data to be updated in records after completion of construction

- For 2013, averaged 34-day average map cycle
- As of December 31, 2014, PG&E achieved an average of a 29-day map cycle

Focused on reducing the overall cycle time between construction completion in the field and updating maps in the system

- Implemented training of the mapping system for operating and clerical personnel
  - Created a standardized checklist for job packages from the field
  - Trained hundreds of employees on how to use the new process
  - Conducted quality checks in the field to ensure that necessary documents are entered into the system
  - Created standards and procedures for the creation of maps completed in the field for the Transmission and Distribution asset families

## Class Location Verification Program

Conducts an annual system-wide review of transmission pipeline class location designations, analyzing approximately 5,800 miles of pipeline to identify potential changes in class designation. *In 2015, PG&E's definition of transmission pipeline will change to include approximately 900 additional miles that will be analyzed for class location designation.*

- Informs the CPUC's Safety and Enforcement Division of system-wide review findings
- Takes action if any pipeline segments are determined to be operating out of class and mitigates issues according to regulation

Designated the Manager of Integrity Management Data Delivery & Analysis as the person with ownership and accountability for keeping class locations current



Revised the standards and procedures for pipeline patrolling and continuous surveillance of class locations, and implemented new guidelines for aerial patrols and reporting

Revised the standards and procedures for class location determination to be implemented beginning January 1, 2015

Enhanced employee training on all class location procedures and reporting methods

## Infrastructure Upgrades

PG&E completed an initial assessment of the documents for every critical gas transmission (GT) facility, including more than 5,700 drawings and manuals

PG&E began three long-term projects in 2013 to improve the asset information of the approximate 500 facilities belonging to the Measurement and Control, and Compression and Processing asset families. The three programs include:

- Condition Assessment
  - Phase 1, completed in 2014:
    - Assess condition of station-specific assets and determine inputs for station asset integrity
    - Prepare an assessment report that includes recommended corrective action plans and cost estimates for future activities
  - Phase 2, to be completed by 2017:
    - Integrate assessment report findings and algorithms with real time data obtained in SAP, following the conversion of the PLM database to SAP
- Critical Documents
  - Phase 1, completed in 2014:
    - Modernized or updated four documents determined by PG&E to be critical importance to field personnel operating station assets
  - Phase 2, to be completed by 2017:
    - Ensure critical documents are created and maintained in accordance with PG&E Standard TD-4551S requirements to improve the safety, reliability and accuracy of information for GT facilities
- Stations MAOP Reconfirmation
  - Strength Test Pressure Report Correlation and Record Retrieval, completed in 2014
    - Collected and reviewed station strength-test documentation and primary records containing engineering specifications to achieve traceable, verifiable, and complete records for facilities
  - Engineering Critical Analysis (ECA), ongoing:
    - Review and identify potential issues that may compromise station asset integrity, mitigate using lower risk ECA solutions, coupled with strength testing when required

All three projects include the development or review of records and information, including the generation of facility assessment reports, the gathering of station component data, including historical strength test records and material specifications, and ensuring that station drawings meet or exceed modern regulatory

## Pipeline Safety Enhancement Plan

Rigorously verifies and upgrades our gas transmission system to enhance pipeline integrity. As of December 31, 2014, PG&E has:

- Verified pipeline strength of 847 miles of pipeline
  - 673 miles verified through hydrostatic strength testing
  - 174 miles validated through previous records
- Automated 208 valves
  - Installed 14 automatic shutoff valves in areas where transmission pipelines cross major fault lines
- Replaced 127 miles of transmission pipeline
- Upgraded 201 miles of transmission pipeline to accommodate in-line inspection tools
  - Since 2000, 215 miles have been in-line inspected under PSEP and more than another 1,100 miles have been in-line inspected under base integrity management

Continues to improve its process and schedule performance

- Pipe replacement, valve automation, in-line inspection and strength-test schedulers were combined into one team in 2013 to increase efficiency and promote consistency
- Delivered earlier completion of design and engineering of 2014's project portfolio, as compared to 2013, having reached at least the 90 percent engineering completion milestone on approximately 90 percent of projects, compared to 75 percent at this same date in 2013.

Continues to improve its safety performance

- Reduced safety incidents by approximately 5 percent in the fourth quarter of 2014 as compared to the same period in 2013

## Transmission Integrity Management

Completed MAOP validation on all of its 6,750 miles of transmission pipeline in July 2013

Implementing integrity management principles beyond pipelines located in high consequence areas (HCAs), including:

- Monitoring localized, slow-moving land masses and their interactions with pipelines
- Surveying soil movement and land mass changes
- Supplementing and refining existing internal corrosion control program by implementing industry best-practices
- Improving existing external corrosion direct assessment (ECDA) program with support of industry-leading consultants
- Implemented an improved risk analysis model using integrated software that provides real-time risk analysis across the transmission pipeline system
- Developing a shallow-pipe program to collect data on pipeline depth during normal patrols
  
- Completed centerline surveys via the Pipeline Pathways program
- Implementing fault-crossing study, monitoring and remediation program
- Implemented a fracture-control plan to identify any changes in longitudinal seam stability
- Continues to work with industry-leading consultants to enhance integrity management processes

Conducted industry benchmarking assessment and upgraded procedures to reflect industry best practices

Increased aerial patrols of all HCA pipeline segments to twice a month

- Conducts monthly aerial “reliability” patrols of its intrastate pipeline system that carries gas supplies into California from the Oregon and Arizona borders

Since 2000, PG&E has retrofitted 1,510 miles of pipeline to accommodate in-line inspection tools

- Inspected more than 1,350 miles of pipeline using in-line inspection tools, approximately 26% of PG&E’s gas transmission system

Developed, in conjunction with German firm 3P, an in-line inspection tool to be used with low-flow, low-pressure pipelines, which was used for the first time in the world to assess L-101

Completed a “centerline” mapping survey of its entire 6,750-mile gas transmission pipeline system in 2013, using highly precise mapping tools

- Survey areas above transmission pipelines, called utility rights-of-way (ROW), which are located along residential, commercial, industrial and agricultural properties
- Locate, mark and map the center of all transmission pipelines and check the area above them for structures or vegetation that could interfere with PG&E’s ability to maintain, inspect and safely operate the pipeline
  - Provides easier access for maintenance, testing and monitoring of the pipelines, and enables PG&E to work more effectively and efficiently with first responders
- Having precise GPS locations of the center of a pipeline will enable PG&E to use high-tech tools to better maintain its pipeline system
  - This will be important whether someone is checking on a pipeline in a computer system, doing a leak survey or patrolling in the field, either on foot or from the air using a helicopter or airplane

## Distribution Integrity Management

Analyzing and replacing Aldyl-A plastic pipelines throughout the system:

- Replaced 65 miles of Aldyl-A pipeline in 2012 and 2013, and 30 miles of Aldyl-A pipeline in 2014. PG&E has approximately 5,440 miles of Aldyl-A main in its distribution system.
- Targeting approximately 52 miles of Aldyl-A for replacement in 2015

Video inspected more than 35,000 sewer laterals in 2014 to confirm that previous gas replacement work did not damage adjacent sewer lines. PG&E has video inspected more than 61,500 sewer laterals since 2012.

- Between 2012 and 2014, inspection crews identified 428 locations where cross bores have occurred. Of those, 416 cross bores have been repaired
- For 2015, PG&E is planning 24,000 inspections

The DIMP Field Review process implemented in 2012 solicits feedback from PG&E field crews regarding the condition of the gas distribution system

- As of December 2014, 12 divisions have had a field review and another five are planned for 2015

Piloted a new proactive approach to addressing facilities with a high potential leak rate by identifying and replacing T-Caps with a higher risk for cracks or leaks

- In 2014, over 480 T-Cap locations were identified and replaced
- For 2015, PG&E is targeting 1,000 T-Cap replacements

### Gas Pipeline Replacement Program

Continues to replace aging cast iron, steel and copper distribution lines with modern plastic pipe, which is more flexible and reliable during earthquakes, and newer steel pipe through the Gas Pipeline Replacement Program (GPRP):

- In December 2014, PG&E completed the decommissioning of the 835 miles of known cast iron pipe in its system
- A total of 2,270 miles of cast iron and pre-1940 distribution main have been replaced since the program was launched in 1985
- In 2014, replaced more than 26 miles of steel and cast iron main
- In 2015, plans in progress to replace approximately 20 miles of steel distribution main, including 2,500 associated services

### Distribution Leak Repairs

Reduced the gradable leak workload:

- Repaired nearly 41,000 leaks of all grades in 2013
- Repaired nearly 41,000 leaks of all grades in 2014
- Reduced the number of all workable Grade 2 and 2+ leaks to an all-time low of approximately 120 leaks as of December 31, 2014

Exceeds the regulatory requirements by repairing non-gradable, very minor trace leaks at customer gas meters

- Repaired nearly 108,000 trace leaks at customer gas meters by the end of 2013, with more than 57,000 more completed in 2014



PG&E is taking a systematic approach to safety incident investigations, integrating corrective action programs and implementing non-punitive reporting of safety issues. Efforts underway relating to Process Safety:

## Gas Control Center

In 2013, opened a 42,000-square-foot Gas Control Center located at Bishop Ranch in San Ramon where gas system operators and dispatchers work side by side with state-of-the-art technology to improve coordination and handling of incoming emergency calls and efficiency in dispatching response crews

Installed new tools and technology to provide improved situational awareness and intelligence of potential risks

Is adding remote pressure-monitoring technology at approximately 3,000 locations within the gas distribution system and is expanding gas transmission system monitoring and control over a five-year period

This will increase Gas Control Center visibility of nearly all of PG&E's distribution system, allowing for early detection of abnormal conditions and the ability to take a proactive approach to reducing emergency events.

Created instructions on automated pipeline segment shutdowns, linking them to SCADA screens so they are readily available during emergencies

Engaged with industry experts to analyze and improve operator workflows, processes and tools to enhance situational awareness

Begun developing and implementing Gas Distribution and Transmission Control operator best practices, in addition to updated clearance processes and training

## Gas Dispatch Center

Improved the handling process for incoming emergency calls to efficiently dispatch Gas Maintenance and Construction personnel, Gas Service Representatives (GSRs), and other first responders to the scene of a natural gas emergency

Completed dispatch system upgrades, improving arrival times of GSRs responding to service calls

- The average GSR response time in 2014 was 19.9 minutes, improving the average response time by 1.4 minutes since 2013 (21.3 minutes) and nearly 14 minutes since 2010 (33.3 minutes)
- In December 2014, GSRs continued to excel in response time, achieving arrival on-site within 60 minutes 99 percent of the time
- Begun installing "smart board" technology allowing interactive emergency response planning with field crews and remote technical staff

## Quality Assurance and Quality Control

Implemented new programs to assess the quality of, and adherence to, company standards and procedures

- New or improved programs in 2014 included:
  - Side-by-side quality assessments of regular station maintenance, valve maintenance, rotary meter maintenance and corrosion control monitoring
  - Comprehensive assessments for most distribution construction work, including short and long duration work performed by division construction crews, general construction crews and contractors
    - These assessments reinforce standards and procedures, communicate best practices, respond to field workers' technical questions on procedures and provide information to improve the procedures and training associated with this work
    - Quality Specialists act as mentors to communicate and reinforce technical requirements with field employees
  - Completing assessments of work performed by newly qualified operator employees or employees who have failed an earlier leak survey, locate and mark, or other assessments
    - Provides field employees with continued training and feedback on performance and ensures leak detection and locate and mark work is examined for quality
- Executed Records Quality Assurance programs including data quality management for:
  - Regulator Station Maintenance; Leak Survey and Repair; Valve Maintenance; Pipeline Patrol; Corrosion Control; Instrument Calibration; and As-Built Records – Distribution and Transmission
- Continued quality assessments for field work in:
  - Distribution re-dig
  - Transmission construction
  - Field services
  - Locate and Mark field work
    - Failures are immediately addressed with retraining, standards review and corrective actions
    - Dig-ins to PG&E facilities that are the result of Locator mis-marking were reduced by more than 50 percent in 2014. This was accomplished through rigorous investigation of incidents and consistent leadership at the supervisor level
    - Locate and Mark assessments are based on a variety of factors, including timeliness and accuracy of mark, correct marking designation and proper instrument calibration
- Created and issued a first edition of The Damage Prevention Handbook in January 2014 to all Locators in the field. This handbook compiles all applicable standards and regulatory requirements for performance of Locate & Mark duties. The handbook contains:
  - Easy to follow step-by-step instructions
  - Supportive job aids
  - Helpful color pictures
  - User friendly references

Engaged two professors with academic expertise and valuable industry experience to conduct a comprehensive study of PG&E's Gas Operations Quality Management System and recommend improvement actions. The study was completed in July 2014 with specific recommendations for PG&E

- In progress improvements include the creation of balanced scorecards for each key process, including "Quality" in Gas Operations Line of Sight Goals for 2015 and performance metrics
- Establishing a Gas Operations Quality and Process Improvement Council comprised of Senior Leadership to oversee quality and process improvement activities and implementation of recommendations from the academic study.



## Technology and Innovation

Has put 90 new gas crew trucks into service, designed with input from hundreds of employees

- New upgrades include roll-up side compartments giving crews safer access to tools while parked on busy streets and a loading device to assist with heavy equipment
- Over the next three years an additional 40 trucks are expected to be deployed

Became world's first utility to use Picarro's car-mounted natural gas leak detection device, which is much more sensitive than traditional instruments

Increased use of high-definition cameras and high-tech devices called "smart pigs" to inspect the internal condition of many pipelines with 360 degrees of visibility

- In 2014, introduced new technology called the "3D Toolbox" to inspect for the same dents, cracks and corrosion on the outside of pipelines. The tool provides traceable, repeatable measurements faster than manual assessments.

Increased use of aerial technology on helicopters to survey our pipeline system, especially in more remote and rugged areas

Rolled out an advanced leak-detection instrument called Detecto Pak-Infrared (DP-IR) that uses infrared technology to pinpoint methane gas leaks without false alarms caused by other gases; this technology can detect and grade leaks at the same time

In 2014 began using a new software, NYSEARCH, to inspect residential appliances for optimal performance given the changing composition of gas

In 2014 began testing on several technologies, including:

- A miniature robot that will allow the visual inspection of natural gas pipelines for signs of corrosion without the need for costly construction digs
- A highly sensitive tool 1,000 times more sensitive to methane than traditional tools to help gas-leak detection. This technology is being designed in conjunction with NASA's Jet Propulsion Laboratory.

## Emergency Planning and Response

Contacted ~25 other utilities and first responder agencies to identify best practices and industry standards, and benchmarked against other leading utilities in 2011

- The Emergency Management Advancement Program (EMAP) conducted a benchmarking study with eight major utilities and three governmental agencies in order to formulate recommendations for integrating and standardizing PG&E's various Emergency Plans
- Continues to benchmark against other emergency preparedness programs and enhance the Gas Emergency Response Plan (GERP)

Established a Gas Operations Emergency Preparedness and Public Awareness (EP&PA) department in 2012, which focused on three areas: (1) Field Delivery, (2) Emergency Planning, and (3) Performance and Compliance. In 2014, the Damage Prevention group was added to EP&PA.

- This team revised and published its fourth annual GERP in 2014—the first integrated transmission and distribution response plan of its kind

Annually upgrades PG&E's Emergency Preparedness Mobile Application (EPMA) to the most recent version of the GERP. This mobile application—available on iTunes—allows first responders to access the GERP from any location.

Dedicated a team to oversee gas emergency planning, support, and training which:

- Provides free, regionally-based emergency response training to fire departments and agencies within PG&E's service area
  - In 2014, EP&PA's Field Delivery group held 500 first responder trainings
- Designs and manages internally-focused emergency response and public-safety programs and training
  - In the first quarter of 2014, the team completed 26 GERP trainings with over 400 gas employees
- Meets regularly with local governments and agencies
  - In 2014, EP&PA's Field Delivery group met with more than 500 distinct agencies
- Continuously evaluates PG&E's emergency response and public safety efforts

Participates in, and occasionally presents at, safety-related conferences, including:

- The Firehouse World Expo held in San Diego in February 2014
- The Southern Gas Association (SGA) 2014 Mutual Assistance & Emergency Management Workshop in May 2014, in New Orleans, with 35 gas utilities, agencies, and others
- The FBI National Academy Conference held in Sacramento in 2014
- The California Fire Chiefs Association Conference held in Long Beach in September 2014
- The California Hazmat Continuing Challenge held in Sacramento in October 2014
- The COPSWEST Training & Expo held in Long Beach in October 2014, where EP&PA's Field Delivery group partnered with SEMPRA Energy in a presentation

Completed two full-scale mock emergency scenario exercises in 2012, eight in 2013 and seven in 2014

- Represented PG&E Gas Operations Emergency Preparedness in the GridEx II Exercise in November 2013. GridEx II, conducted by the North American Electric Reliability Corporation (NERC), exercised the sector's ability to respond to a major disruption stemming from coordinated physical and cyber-attacks. The exercise featured a geographically distributed environment in which over 100 organizations (utilities, system operators, coordinating councils, federal and state authorities) participated.
- Participated in AGA/NGA/SGA/WEI/MEA (gas utility organizations) Mock Mutual Assistance Drill for 72 hours in January 2014
- Conducted two full-scale Company Exercises, in May and November 2014. These 2-day enterprise-level emergency preparedness exercises tested the Emergency Management Advancement Program (EMAP) concepts and processes developed, tested new catastrophic response processes, assessed Emergency Center procedures, and identified and adopted best practices.
- Adding new emphasis on partnering with first responder organizations, such as, but not limited to, Law Enforcement, Fire (career and volunteer), Emergency Management Systems, Caltrans, City and County Office of Emergency Services, Public Works Agencies, American Red Cross and federal agencies, such as Homeland Security

Provided pipeline maps, GIS data, and other critical information to first responders through our first responder online portal, which had 1,186 users through the end of 2014.

Implemented new 911 notification procedures in 2012 to ensure that PG&E promptly calls the appropriate local emergency agency (e.g., 911) during any incident that may affect public safety, public property or the environment

## Damage Prevention (Public Awareness)

Addressing the “dig-in prevention” effort by developing dig-in reduction programs and enhancing public awareness and partnerships

In 2014, hosted 42 “811 Workshops” about safe digging, reaching 1,815 excavators and industry leaders representing 482 companies

Participated in two Senator Jerry Hill “Damage Prevention Workshops” focused on strengthening damage prevention efforts in California

- Completed a “Call Before You Dig” video shoot in partnership with the US Department of Transportation Pipeline and Hazardous Materials Safety Administration
- Partnered with 25 Home Depots during Safe Digging Month (April 2014) in high dig-in areas targeting homeowners, do-it-yourselfers and contractors to promote Call 811 Before You Dig

Established PG&E’s Gold Shovel Standards, a requisite set of conditions a contractor must maintain to do excavation-related work for PG&E

- In August 2014, launched the program within PG&E, which promotes the programs of legislators and government executives, enhances public safety, and protects the environment

Working to identify commercial excavating entities which have “dug-in” or otherwise damaged—or threatened to damage—PG&E underground assets and/or which have repeatedly demonstrated poor excavating habits, in an effort to reduce dig-ins

- Employ a decision matrix for identified entities, based on defensible criteria. Possible sanctions, balanced with educational opportunities, would be implemented to correct the culture or behavior of “habitual offenders.”

Working with Homeowner Associations to encourage compliance with One Call Law, which requires compliance with Government Code 4216, where individuals are required to call 811.

811 Ambassador Program

- Educating employees on One Call Law to engage them as promoters of the Damage Prevention and Public Awareness efforts

Partnering with the Contractors State License Board to enforce One Call Law

- PG&E’s dig-in reduction task force (pilot from August to December 2014 in select high dig-in areas) issued notices of unsafe excavation practices, which resulted in filing reports with the Contractors State License Board (CSLB)
- Filed 154 reports in 2014 about contracting companies that did not call before digging.

## Safety-Enhancing Emergency Response Technology

Maintains a fleet of six Mobile Command Vehicles, packed with the tools crews need to address emergencies from the field, including:

- On-board generators for 48 to 96 hours of run time
- Multiple workstations equipped with laptops and desktops, plotters, printers, and conference tables
- Satellite phones, radios, and a radio controller that allows PG&E to communicate with other first responder agencies, such as police, fire and highway patrol, and interoperable with agencies such as CAL FIRE and Cal OES
- Four Emergency Communications Trailers (ECTs) to enhance radio communications in the event of poor radio coverage

Continue to update and enhance an online portal for first responders, giving them secure access to transmission pipeline maps, valve locations and attribute data

In 2012, created online training classes for first responders accessible via PG&E's public website: [www.pge.com/firstresponder](http://www.pge.com/firstresponder)

- Created "Teaming Up for a Safe Response" videos demonstrating how agencies respond to gas emergencies in urban and suburban areas
  - Videos are being distributed to external first responders by PG&E's Public Safety Specialists

In 2012, created five gas-specific on-call teams that respond to the Emergency Operations Center (EOC) and Gas Emergency Center (GEC) for high-level emergencies. These rotating teams of technical experts are available around the clock all year in the event of a high-level gas-related emergency. The teams train and practice roles and responsibilities to engrain emergency preparedness throughout Gas Operations and to ensure successful collaboration in the event of a combined gas and electric emergency.



PG&E encourages employees and contractors to report and act on safety concerns. This includes fostering an environment where essential behavioral changes can occur at all levels. We are setting clearly defined goals and expectations, structuring incentives to align with those goals, measuring progress using industry benchmarks, and effectively communicating with customers, employees, regulators and the communities we serve.

## Management Focus

For 2015, PG&E's public- and employee-safety metrics account for 50 percent of the company's short-term incentive plan

Clear procedures and guidelines have been set to ensure work is conducted in a safe manner

Internal escalation processes were revised to ensure that customer concerns are addressed quickly and effectively

Best practices and protocols were developed through participation in the industry-wide American Gas Association Pipeline System Safety Initiative

## Corrective Action Program (CAP)

CAP tracks reported issues and the corrective actions taken to prevent future occurrence or recurrence. It features a risk assessment tool to evaluate the significance and probability of the recurrence of issues

CAP has multiple reporting channels to allow employees and contractors real-time, on-site issue reporting and analysis. Platforms include a secure internal website, a hotline accessible from any location, a paper notification form, and SAP Cap.

- Launched a new Corrective Action Program mobile application (CAP App), which has new features, such as the ability to capture/upload photos from smartphones, auto-detection for geo-location of issues, and a quick-dial button to connect with the CAP Held Desk

Implemented a CAP program communications strategy and training plan for users across the service area, including providing CAP Coaches for each department.

Formed a Notification Review Team (NRT) consisting of representatives from gas operations lines of business to review issues submitted through CAP daily and ensure each issue is assigned for resolution.

- The NRT is supported by the newly created Corrective Action Review Board (CARB), a team of Gas Operations directors who provide counsel and support as well as review causal evaluations.

Is performing bi-weekly analysis on metrics to assess the effectiveness of CAP, including:

- Number of issues submitted and closed
- Risk of Issues
- Source of Issues Submitted
- Overdue Notifications/Overdue Tasks
- Issue Submission Methods

## Training the Workforce

PG&E's commitment to providing safe, reliable gas service begins with its employees. Coupled with a safety-first culture, ongoing training and development opportunities ensure that employees are highly skilled and empowered to stop any job if safety is a concern.

- The PG&E Gas Operator Qualification Plan requires all individuals who operate and maintain pipeline facilities meet specific safety requirements (including meeting 49 CFR Part 192 Subpart N)
- Employees must be qualified, and able to recognize and react appropriately to abnormal operating conditions that may indicate a dangerous situation or a condition exceeding design limits

Much like full-time PG&E employees, contractors are also a cornerstone in ensuring PG&E's workforce consists of highly skilled, competent, and experienced technical personnel.

- Prior to starting a job, PG&E confirms that contractors, and subcontractors, are qualified to complete the contracted work.

PG&E is also addressing the critical shortage of skilled workers and trained professionals that PG&E and utilities across the country are facing due to our nation's aging workforce

Created the PowerPathway™ program, partnering with education and workforce investment, labor unions and industry employers to prepare individuals for high demand positions at PG&E and throughout the energy industry

- Initiatives include faculty "train-the-trainer" programs; co-delivery of classroom instruction; student field visits; program funding and in-kind donations of equipment

## Improved Staffing and Organizational Clarity

Separated its gas and electric businesses to create a new Gas Operations organization with the authority, resources and mandate to improve all gas operations

Aligned gas operations teams into three functional organizations to work more efficiently and effectively:

- Asset and Risk Management: responsible for identifying the right work to complete
- Financial and Resource Management: responsible for prioritizing and planning the work
- Engineering, Construction and Operations: responsible for doing the work right

Hired executive leaders who are accountable for the following areas:

- Transmission Engineering and Design, Contract Management, Gas System Planning, Distribution Integrity Management, Process Excellence, Enterprise Corrective Action Program (CAP), Enterprise Information Management, and Standards, Procedures & Training

Hired more than 1,700 new employees and leaders in all levels of the Gas Operations organization since January 2011 through November 2014

- Developed programs to improve recruitment efforts by identifying the most appealing aspects of the company's value proposition, including: surveys, focus groups, and quarterly roundtables of new hires to obtain feedback on the recruitment process



## Public Outreach and Communication

Partners with first responders, community leaders and public safety officials to host practice drills, training programs and educational resources

Launched a pipeline safety campaign directed at all schools within our gas service area

- Sent information and/or held in-person meetings with school administrators to discuss pipeline locations, safety awareness and gas emergency preparedness
- Conducts community outreach activities including community events and school classroom safety board presentations through Employee Ambassador program

Directly mails, every three years, gas safety brochures and letters to more than two million homes and businesses located within 2,000 feet of a PG&E-owned gas transmission pipelines and other gas system facilities. The last mailing effort took place in 2014.

Three times a year delivers gas pipeline safety messages to more than 4.3 million customers through bill inserts in customer energy statements; these messages are also delivered to approximately 2.1 million residential and 84 thousand business customers through an email campaign

Prominently displays 811 messaging in PG&E customer communications

Seeks opportunities for multi-cultural outreach to customers by providing in-language materials

- In February 2014, over 5,000 red envelopes containing gas safety and 811 messages were distributed to customers at San Francisco's Lunar New Year Parade
- During Fall 2014, PG&E hosted community workshops within the Bay Area and Sacramento with day labor and social service organizations to promote 811 on Spanish, Chinese and Vietnamese radio

Mails safe digging and gas pipeline safety mailers to contractors, fencing, landscapers, master meter customers and Homeowner Associations in PG&E's service territory

Includes safety messages in customer newsletters and other mass media outreach

- Ran 811 ads within local publications in the Bay Area throughout the year

Conducts extensive community outreach to notify and educate customers about field activities that may affect them, and answer any questions or concerns they may have

- Conducts public outreach through door-to-door canvassing, door hangers, open houses, automated calls, letters, news releases, PGE.com website, social media, 24-hour dedicated phone line, and public service announcements

Informs public and local government officials of schedule and progress of field work

Conducts customer research and incorporates insights to improve customer communications

Facilitated more than 1,400 first responder workshops since 2011

- In 2014, PG&E facilitated 500 external first responder trainings

Completed 11 tabletop exercises in 2012, 16 in 2013, and 10 in 2014 with an additional three functional exercises also completed in 2014

Continues to develop and deploy training simulation tools to prepare employees for potential pipeline-rupture scenarios

- PG&E's training curriculum received Peace Officer Standards & Training (POST) certification from the State of California in August 2013
- Developed a comprehensive contact list in 2012 for all local first responders to improve communication during an emergency

Continues to complete ongoing, improved Incident Command System (ICS) training, including a Planning & Intelligence Section course

Launching a Salesforce.com solution to track interactions with first responder agencies

- The cloud-based program will allow the Emergency Preparedness and Public Awareness Field Delivery team to document message delivery and outreach to first responder agencies as well as ensure compliance with various regulatory requirements

# NTSB Recommendations

## PG&E is achieving this goal:

Completed nine of the 12 safety actions recommended by the NTSB thus far.

The nine completed recommendations include:

- **Integrity Management (IM):** PG&E has revised its IM program to include an updated risk model and assessment methodology, consideration of defect and leak data for the life of each pipeline, and an improved self-assessment process. In addition, in 2013, PG&E updated 11 risk management procedures and added four new procedures
- **Threat Assessments:** PG&E completed the threat assessments using the revised risk analysis methodology from its IM program, finalized the associated 2012 high consequence area assessment plan, and submitted the results of the assessments to the California Public Utilities Commission and the Pipeline and Hazardous Materials Safety Administration
- **Emergency procedure:** PG&E established a comprehensive response procedure to large-scale emergencies on gas transmission pipelines. The procedure identifies a single person to assume command and specifies duties for all others involved; includes development and use of trouble-shooting protocols and checklists; and requires periodic tests or drills to show that the procedures are effective
- **911 notification:** PG&E's gas control room operators, who keep 24-hour watch of the utility's transmission pipeline network, are now required to immediately notify the 911 call centers of affected communities when a possible pipeline rupture is detected
- **Toxicological tests:** PG&E has revised its post-accident toxicological testing to ensure timely testing and inclusion of all employees potentially involved in an incident
- **Records:** PG&E conducted an intensive records search including retrieving, scanning, and uploading more than 3.8 million paper documents to meet the NTSB's threshold for traceable, verifiable and complete records.
- **Work clearance procedures:** PG&E's work clearance procedures now include the development of contingency plans for planned work on the natural gas transmission system. These new procedures will ensure accuracy and completion of clearance forms, and will require that specific personnel have necessary knowledge of the intended work and related clearance procedures.
  - PG&E's work clearance procedures define the planning and controls that must be in place before work is performed on the gas system.
- **MAOP validation:** PG&E first completed MAOP validation for gas transmission pipelines running through high-consequence, populated areas, and now also has completed MAOP validation for all of its transmission pipelines using traceable, verifiable and complete records.
- **Public Awareness Plan:** PG&E developed and incorporated written performance measurements and guidelines into its Public Awareness Plan to ensure that customers and communities receive important gas safety information

PG&E is working diligently on the remaining recommendations

- Of the three remaining safety recommendations, the NTSB considers PG&E's progress "open—acceptable pending completion"