

Leak Abatement Best Practices Workshop: Implementing Best Practices

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Overview

■ Best Practices Currently in Place

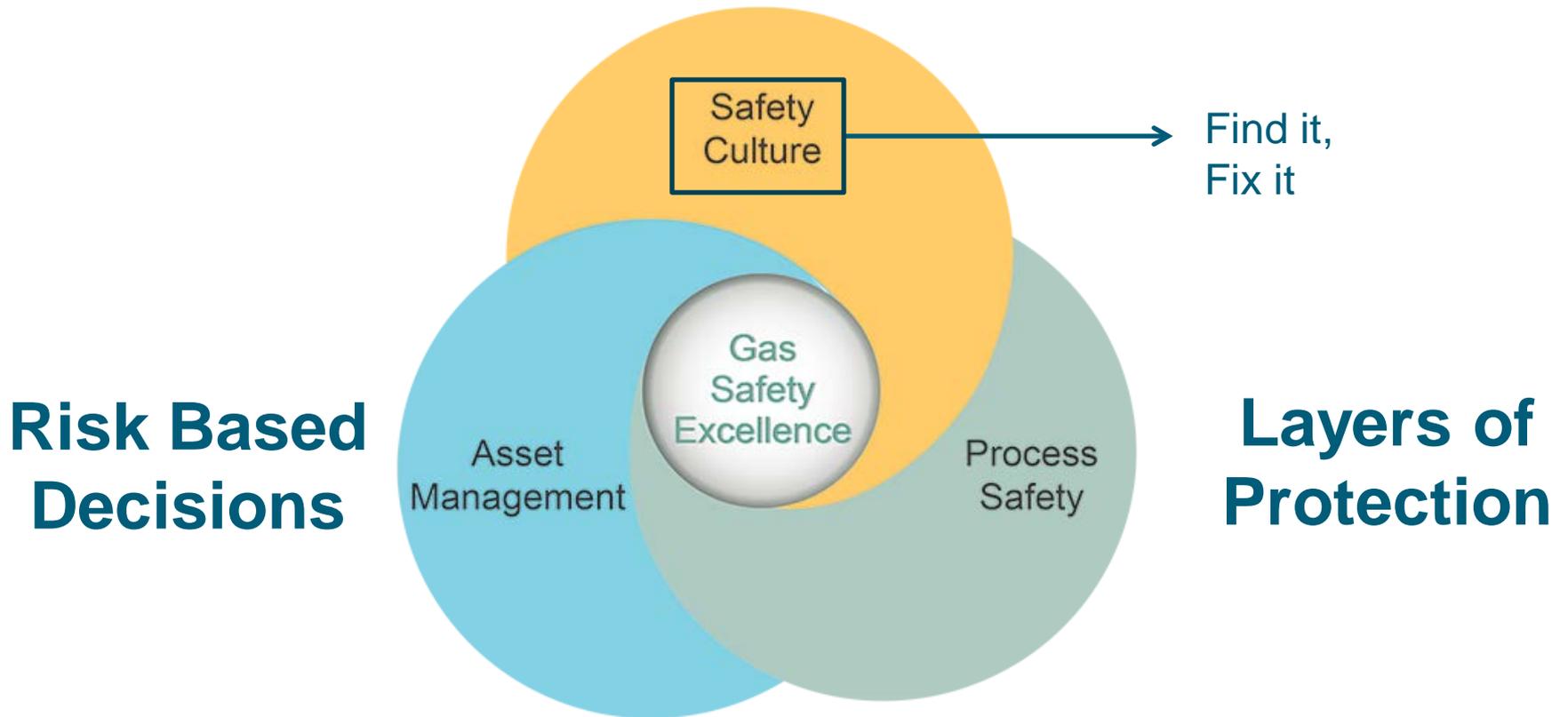
- Mandated
- Continuous Improvement – Gas Safety Excellence

■ Ongoing Research & Development Projects



Culture Change

The way we do safety



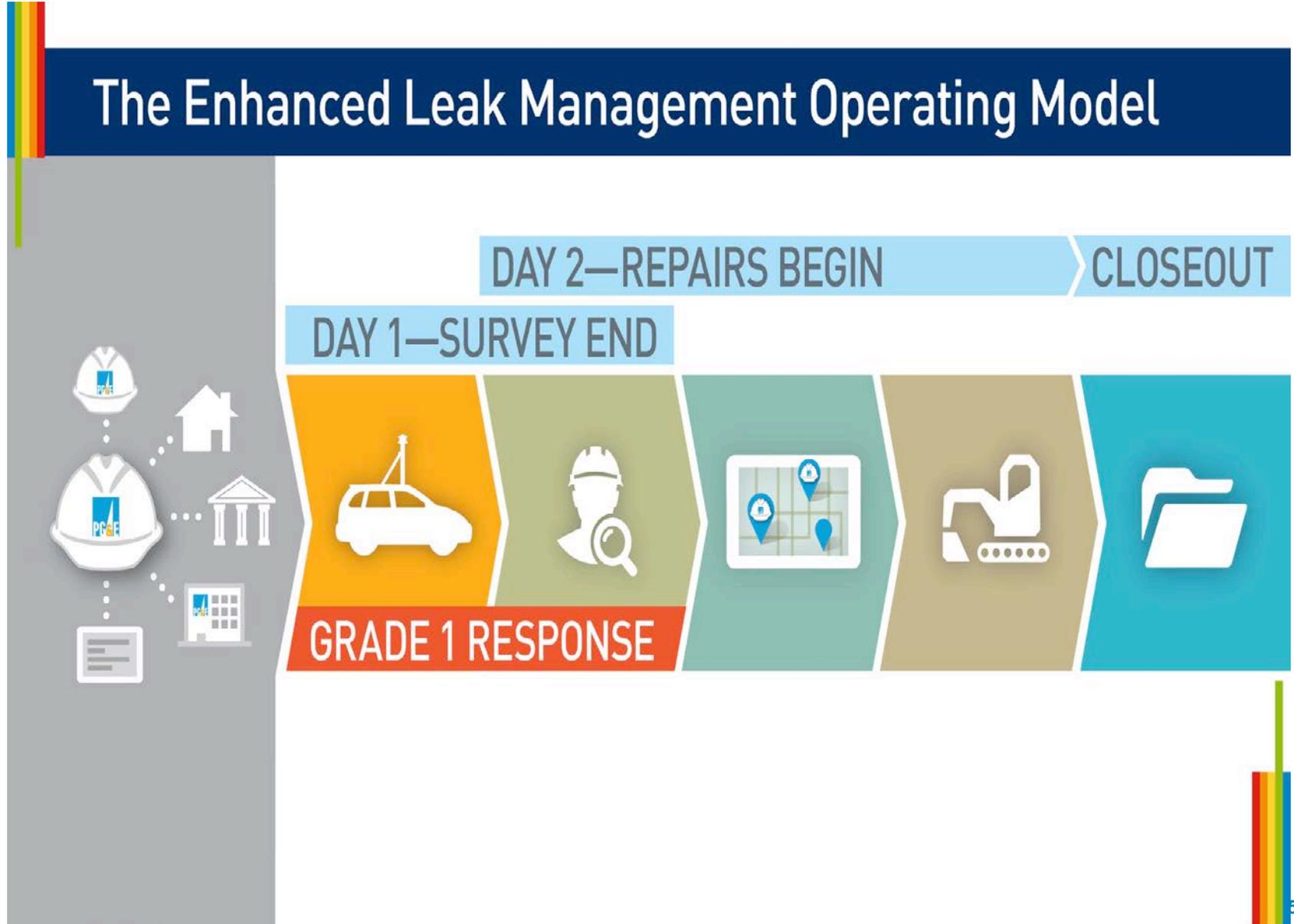


Best Practices

Activity	Best Practice
Leak Identification	Picarro Surveyor™
Leak Reduction	Replace vs Repair, Super Crew
Dig-Ins	Gold Shovel, Habitual Offender
Compressors	Reductions through operational configuration
Customer Meters	Evaluate existing data to develop more precise emission estimates
Transmission Pipeline Blowdowns	Cross Compression

Leak Management

The Enhanced Leak Management Operating Model





Leak Management

- **The Super Crew/Picarro Surveyor™ method: identifies up to 80 percent more leaks than traditional leak survey methods and repairs leaks in about 40 percent of the time that normal crews do.**
 - 35,000 premises surveyed >2,200 leaks repaired.

17 days vs 4 months



Leak Management

Year	Average Days to Repair	Average Open Hours	Estimated emissions from Steel Mains (factor = 3.79)	Estimated emissions from Plastic Mains (factor = 1.04)	Estimated emissions from Plastic Services (factor = 0.4)
2009	181	4344	16,464	4,518	1,738
2010	335	8040	30,472	8,362	3,216
2011	204	4896	18,556	5,092	1,958
2012	179	4296	16,282	4,468	1,718
2013	116	2784	10,551	2,895	1,114
2014	67	1608	6,094	1,672	643

57.7% emissions reduction from leaks identified and repaired 2013 to 2014



Damage Prevention

- **California is one of only nine states that does not have any government-enforced damage prevention program.**
- **PG&E must rely largely on public awareness and education efforts and voluntary compliance by third-party contractors to improve damage prevention performance.**
 - Gold Shovel Standard Damage Prevention Program
 - Updated Habitual Offender Damage Prevention Program



Damage Prevention

- **PG&E launched the Gold Shovel Standard, a first-of-its kind excavation safety program designed to reduce dig-ins**
- **Beginning January 1, 2016, contractors who wish to excavate or subcontract out excavation work for PG&E must obtain Gold Shovel Standard Certification**
- **The program requires that contractors have two or fewer at-fault dig-ins in the previous 12 months, and that they possess and maintain valid Gold Shovel Standard certification in order to perform excavation work for PG&E.**



Damage Prevention

- **The Habitual Offender Damage Prevention Program identifies contractors and other third parties who are more likely than others to dig into PG&E facilities.**
- Recommends appropriate follow-up actions:
 - working with the contractor to reduce the likelihood of future incidents
 - settle PG&E's outstanding damage claims
 - agree to become public advocates for the One Call Program
- Follow-up actions may also include referring the matter to the Contractor State License Board, Cal/OSHA, and/or the District Attorney.



Compressor Stations

- There is an ongoing effort to consolidate work at compressor stations to reduce the number of station blowdowns.
- Extend the pressurized hold on compressors, when possible, to reduce/eliminate compressor unit blowdowns.
- ARB required the installation of metering devices on high-bleed pneumatic devices using a threshold of 6 scfh by January 1, 2015. As a result, PG&E removed 46 high-bleed devices from service and replacing 12 with low-bleed devices at one of its underground storage facilities.

	High-Bleed	Low-Bleed	Intermittent Bleed
McDonald Island UGS	0	79	29
Los Medanos UGS ¹	16	0	20
Pleasant Creek UGS ¹	20	0	30
Transmission Compressor Stations ²	10	1	207

¹ Facilities are not subject to the GHG Mandatory Reporting Rule.

² Emissions from high bleed pneumatic devices in the northern facilities are de minimis and were not subject to the metering requirement per ARB guidance.



Customer Meters and Transmission Pipeline Blowdowns

- **Reviewing customer meter set leak data and refining emissions calculations to enable PG&E to better track emissions reductions over time from customer meters.**
- **Developing a standardized policy to expand the use of cross compression to further reduce transmission pipeline blowdowns.**

Leak Abatement Best Practices Workshop: Ongoing R&D projects

Gerry Bong
October 27th, 2015





Ongoing R&D projects

Overview

- PG&E R&D and Innovation collaborates with national and international research consortiums (e.g. PRCI, NYSEARCH, GTI – OTD) to leverage external expertise and resources in detecting, qualifying new technologies.



- Ongoing projects related to emission quantification:

Number	Project title	Lead group
1	Quantifying methane emissions from non-hazardous leaks	NYSEARCH
2	Stationary methane detector	PRCI
3	Schlieren-based flow Imaging	NYSEARCH

Quantifying methane emissions from non-hazardous leaks

- To develop a mobile and remote technology for quantifying methane emissions in urban environment.
- More than 10 technology providers submitted proposals for consideration. 3 teams were selected:
 - Washington State University and Conestoga & Rovers Associates (Brian Lamb)
 - Colorado State University
 - PSI and Heath Consultants
- First controlled release test is completed. Another controlled test is planned for Winter 2016 to assist providers in refining their technologies.



Controlled release test at PSEG Training facility in Edison, NJ in May 2015

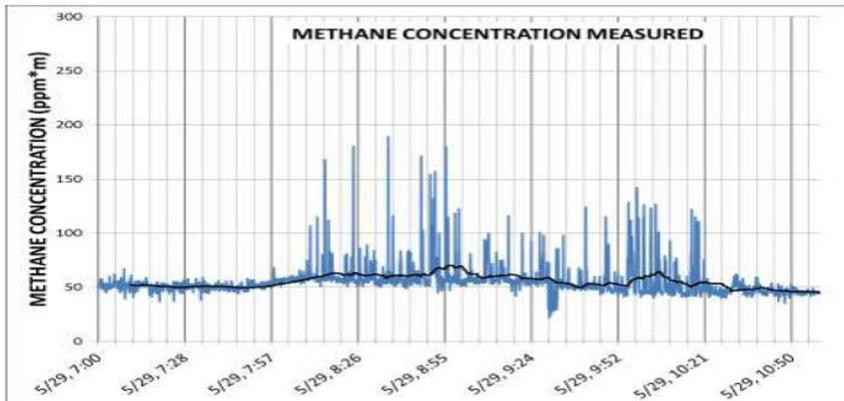
Stationary methane laser detector



Laser used is similar to Remote Methane Leak Detector (RMLD)

- Detector shoots a laser beam that continuously monitors its line of sight for methane (5 ppm sensitivity).
- System was tested at PG&E in 2013 with support from California Energy Commission (CEC).
- Project idea is to install detectors downwind of facilities (compressor and regulation stations) for two purposes:
 1. To study how operational activities correlate with emissions
 2. To obtain duration and frequency of emissions

Installed Remote Methane Leak Detector at PG&E Livermore Training Center (February 2013)



Schlieren-based flow imaging

- Contracted to SRI International (SRI) and FloViz.
- Objective: to demonstrate feasibility of a portable, standoff Schlieren system that can detect and quantify natural gas leaks in the field.
- Methane has a different refractive index from air which causes light rays to pass through these gases differently.
- Schlieren camera measures vector properties (velocity) which can be fed into fluid dynamic analysis for flow quantification.



Schlieren image of Helium flow (courtesy of Floviz)



Schlieren optical imaging for propane flow