

An Analysis of PG&E's Gas Pipeline Safety Performance

Purpose

In 2017 PG&E updated their [Gas Safety Plan](#), and included the following statement on page 1:

“While more remains to be done, PG&E has made great progress in achieving Gas Safety Excellence over the last six years.”

The purpose of this paper is to compare PG&E's recent gas pipeline safety results versus other large U.S. gas pipeline operators, based on publicly available information on safety incidents, in a way that provides an objective, independent assessment of PG&E's rate of safety improvement and current overall safety results relative to its industry peers.

The Authors

This analysis was prepared by Save Lafayette Trees, a nonprofit association located in Lafayette, California. Save Lafayette Trees has a twofold mission: preserve Lafayette's rural California character by identifying and preventing unnecessary tree destruction; and improve the safety of the natural gas pipelines in our area by focusing safety improvement attention on the primary safety risks. For more information, go to savelafayettetrees.org.

Introduction

In September 2010, a devastating explosion traced to a defective section of PG&E's San Bruno gas transmission pipeline destroyed 38 homes and damaged 120 more. Eight people died and 58 were injured. In the aftermath, PG&E committed to the CPUC to implement multiple safety improvements for the utility's gas pipeline network. In 2014, PG&E published their now annual Gas Safety Plan that said, “PG&E remains steadfast in its vision and commitment to *becoming the safest, most reliable gas company in the nation*.” The first strategic action listed in this plan is “*eliminating public safety-related incidents*.” The commitment to become the safest gas company in the nation has been repeated in each of PG&E's annual Gas Safety Plans since 2014, including their safety plan for 2017.

There is no doubt that, following the 2010 San Bruno incident, PG&E has committed significant attention and resources intended to improve the safety of their gas pipeline operations, including steps intended to reduce public safety-related incidents. For example, their 2017 Gas Safety Plan shows substantial improvements in the time required to respond to reports of gas odor and progress in modernizing their transmission pipeline control systems. However, the annual safety reports that PG&E makes available to the public provide little data on changes in the company's rate of gas pipeline safety-related incidents. Save Lafayette Trees views that as an unfortunate omission, especially given PG&E's #1 strategic action: eliminating public safety-related incidents.

During the period September 2017 – January 2018, Save Lafayette Trees conducted a comprehensive analysis of safety-related statistics for PG&E's 6,530 miles of gas transmission pipelines and 77,573 miles of gas distribution pipelines. We compared PG&E's safety results to the safety results of their industry peers (PG&E is one of the largest natural gas pipeline operators in the United States). We also compared PG&E's recent safety results to their results in the years prior to the San Bruno incident.

The details of our analysis are provided in the pages that follow. **In summary, our conclusions are:**

1. PG&E's gas transmission safety results in every category tracked by the federal government (total incidents, serious incidents, fatalities, injuries, and property damage) have deteriorated alarmingly in the period following San Bruno, when compared to the four-year period immediately preceding San Bruno.

2. PG&E's gas transmission overall safety results over the past 12 years for its gas transmission pipeline network are the worst in the United States among the 40 largest gas transmission pipeline operators, based on PHMSA statistics.
3. PG&E's gas distribution safety results are somewhat better, but still disappointing. For significant safety incidents, PG&E ranks 4th-worst among the largest gas distribution operators in our study over the past 10 years, and 2nd-worst over the past 5 years. However, for serious safety incidents, PG&E ranks roughly in the middle among the largest gas distribution operators in our study.
4. With respect to gas pipeline incidents caused by excavation damage (one of the most frequent sources of gas pipeline safety incidents), PG&E has by far the worst incident rate (per mile of pipeline) in the U.S. among large gas pipeline operators, and our analysis concludes that their performance on this dimension has been deteriorating in recent years, in contrast to an overall improvement trend among PG&E's peers.

Terminology and Data Source

The gas pipeline industry and pipeline regulatory agencies use the term *gas transmission system* to refer to large pipelines (typically 6-48 inches in diameter) that move gas longer distances, at relatively high pressure (typically 200-1500 psi). The term *gas distribution system* refers to a system of smaller mains and service lines that deliver natural gas to individual homes and businesses, operating at relatively low pressure.

The federal Pipeline and Hazardous Materials Safety Administration (PHMSA), an agency of the U.S. Department of Transportation, sets policy, writes regulations, conducts inspections, and enforces standards for all U.S. gas pipeline operators. PHMSA's mission is to ensure the safe, reliable, and environmentally sound operation of our nation's pipeline transportation system. They maintain an extensive database on pipeline operator safety performance, including information about safety incidents for each pipeline operator.

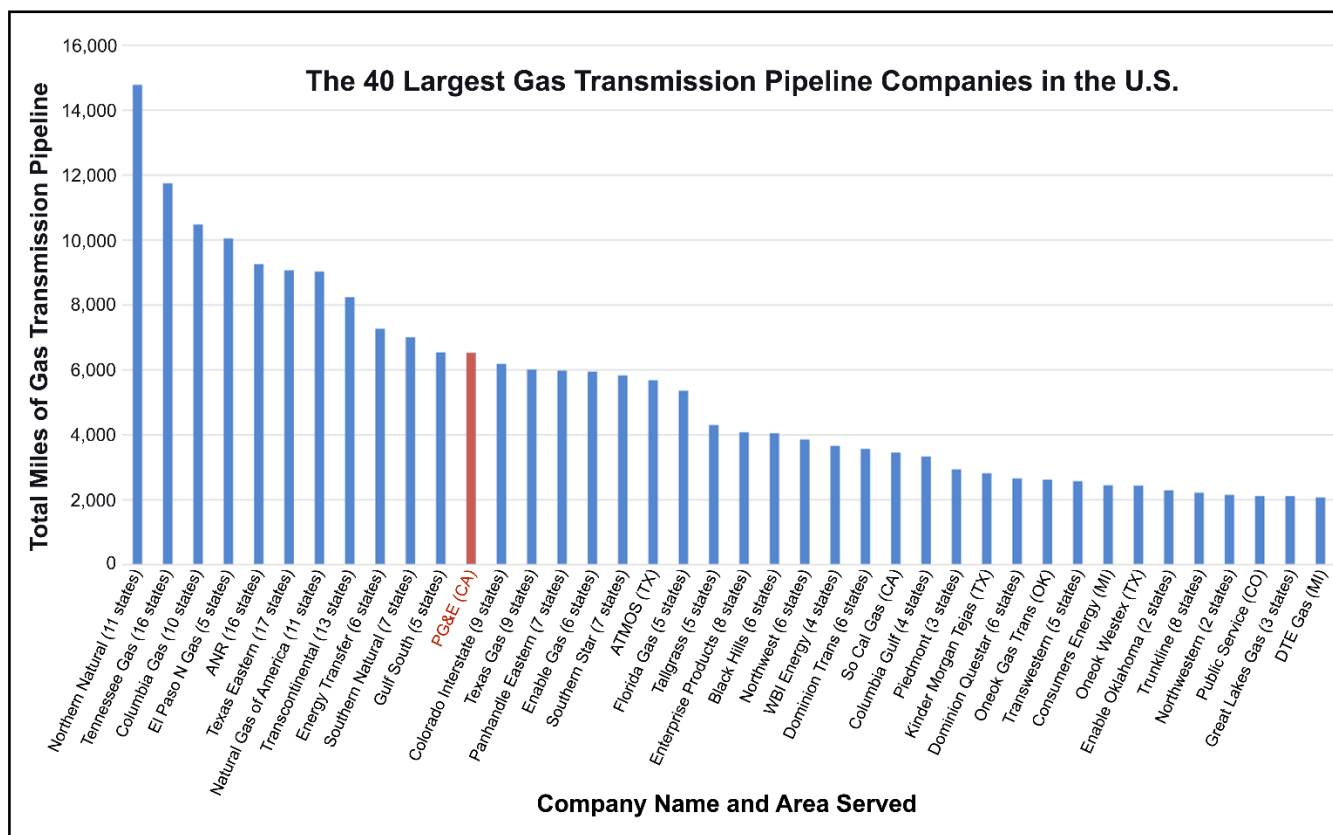
PHMSA reports safety performance data separately for gas transmission and distribution systems. This is due to differences in system design, operating characteristics, nature of hazard, and integrity management practices, among other factors. Gas transmission systems are regarded as having a higher inherent hazard and are subject to more regulatory scrutiny. For example, transmission pipeline operators are required to physically inspect their pipelines, but this is not required for distribution pipelines. This is due in part to distribution pipelines not being subject to the same pressures as transmission pipelines and thus distribution pipelines tend to leak rather than rupture.

PG&E's pipeline network consists of both transmission and distribution pipelines. It provides gas service to homes and businesses in Northern and Central California. Every year, both types of pipeline systems are a source of safety incidents. In this report our goal is to present objective performance information on PG&E's overall gas safety results, including:

- Where does PG&E stand relative to their industry peers in gas pipeline safety?
- How much progress has PG&E made since the 2010 San Bruno incident towards their goal of becoming the safest gas pipeline operator in the U.S.?

PHMSA's gas transmission operator safety performance database is available at this location:

<https://primis.phmsa.dot.gov/comm/reports/operator/Operatorlist.html?#> This database covers more than 1,300 gas transmission operators, with history going back to 2006. The length of transmission pipelines for the individual companies ranges from 1 mile to 14,782 miles. To make our comparison analysis manageable, we limited our consideration to the 40 largest gas transmission operators, which are listed in the chart on the next page. The chart shows relative size in terms of pipeline miles for the largest 40 GT (gas transmission) operators. In terms of miles of transmission pipeline, PG&E ranks #12 within this group of the 40 largest.



PG&E GT Pipeline Safety Results – Before and After the 2010 San Bruno Incident

As shown in the chart above, PG&E operates one of the largest gas transmission (GT) pipeline systems in the U.S. PHMSA makes detailed annual safety results statistics easily accessible for each GT operator dating back to 2006. We examined all five categories of data that PHMSA provides in their [detailed GT operator report](#):

1. Total Safety-Related Incidents

Definition: an event involving release of gas with one or more of these consequences:

- A death or personal injury requiring hospitalization
- Property damage exceeding \$50,000
- Unintentional estimated gas loss of three million cubic feet or more

2. Serious Incidents

Definition: an event involving a fatality or an injury requiring hospitalization

3. Fatalities

4. Injuries

5. Property Damage

As shown in the table at the top of the next page, PG&E's safety performance over the past four years (2014-2017) deteriorated dramatically in all five of the above categories as compared to the four years preceding the San Bruno explosion (2006-2009). For example, their average for total incidents increased to 8.0 from 2.8 (+186%), and their average annual property damage from transmission pipeline incidents increased by an astounding 1,055%.

PG&E System-Wide GT Incident Statistics 2006-2017¹

(6530 miles of gas transmission pipeline)

Year	Total Incidents	Serious Incidents	Fatalities	Injuries	Property Damage
2006	1				\$358,000
2007	3				\$667,500
2008	2				\$114,300
2009	5				\$1,847,000
2010	4	1	8	51	\$558,590,512
2011	5				\$5,569,000
2012	4				\$1,050,710
2013	4				\$1,045,457
2014	9				\$9,550,814
2015	8	2	2	13	\$5,574,404
2016	6				\$2,052,778
2017 (thru Nov)	9	1		1	\$17,321,844
12 Yr Totals	60	4	10	65	\$603,742,319

PG&E Yearly Averages '06-'09

Avg Total Incidents: 2.8
 Serious Incidents: 0
 Fatalities: 0
 Injuries: 0
 Prop Damage: \$746,700

← San Bruno pipeline explosion

PG&E Yearly Averages '14-'17

Avg Total Incidents: 8.0
 Serious Incidents: 0.8
 Fatalities: 0.5
 Injuries: 3.5
 Prop Damage: \$8,624,960

¹ 2017 Data is through Nov; all data for this analysis was extracted from PHMSA website on 1/8/18
<https://primis.phmsa.dot.gov/comm/reports/operator/Operatorlist.html?#>

PG&E System-Wide GT Significant Incidents—Long-Term Trend

PHMSA defines a gas pipeline *significant incident* as any incident where one of the following occurs:

- A fatality or injury requiring in-patient hospitalization
- \$50,000 or more in total costs, measured in 1984 dollars

Operator history for significant incidents is available in a PHMSA database called Pipeline Incident Flagged Files:
https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/data_statistics/pipeline/PHMSA_Pipeline_Safety_Flagged_Incidents_20180531.zip

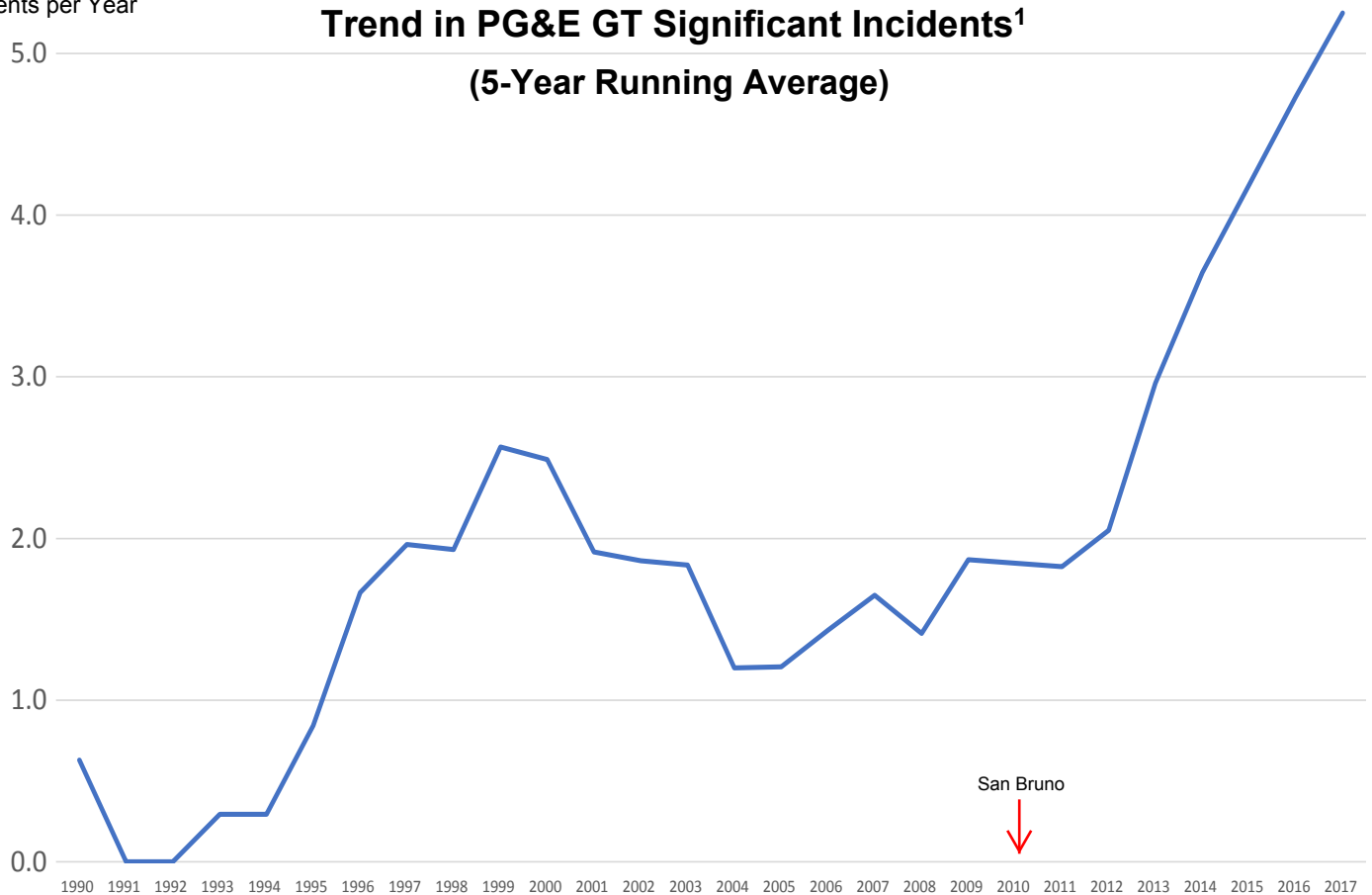
On the next page is a chart of PG&E's system-wide significant incidents over the past 28 years. The chart is a plot of the 5-year running average (simple moving average) of PG&E's annual gas transmission significant incidents. For example, the value of 5.3 average incidents plotted on the chart for 2017 represents the average number of incidents in the 5-year period 2013-2017. See [Appendix 5](#) (p 17) for the data used in this chart.

Strangely, PG&E's yearly significant incidents didn't start turning sharply higher until 2012, two years after San Bruno (easiest to see by looking at Appendix 5). Prior to 2012 they had gone 12 years in a row where yearly significant incidents were in the range of 0-2. Their significant incident average for the 26-year period 1986-2011 was 1.2. This compares to an average of 4.7 in the period 2012-2017 (a 400% increase).

Our analysis of PG&E's significant incidents leads us to the same conclusion we reached in the section above where we looked at the categories of total incidents, serious incidents, and property damage: something appears to have changed since San Bruno, and the GT safety incidents have gotten much worse. Could this be due to PG&E focusing on the wrong safety priorities? Whatever the reason for their sharp deterioration in safety performance, it demands further investigation and corrective action. We are asking both PG&E and CPUC to address this.

Average
Incidents per Year

Trend in PG&E GT Significant Incidents¹ (5-Year Running Average)



¹ Gas Transmission significant incidents are those involving a fatality, in-patient hospitalization or > \$50K total costs. Data for this chart have been normalized to adjust for increasing transmission mileage over the period covered. Without the normalizing adjustment, the worsening trend in the past six years would look even more alarming. See [Appendix 5](#) (p 17) for chart data.
For more about the causes of PG&E GT incidents, go here: https://docs.wixstatic.com/ugd/de4240_c263a60d3e834fd0848dd9ce7c4e725e.pdf

PG&E GT Pipeline Safety Results Versus Peers

Equally troubling is PG&E's rank on key metrics for the nearly 12-year period 2006-2017 YTD within its peer group of the 40 largest U.S. gas transmission operators (those with at least 2,000 miles of gas transmission pipeline). The data for this analysis (see Appendix, [page 12 below](#)) came from the same PHMSA database cited at top of p 4.

Here is what we found:

Safety Attribute	PG&E Rank Among the 40 Largest U.S. Gas Transmission Operators for 2006-2017 YTD
Total Incidents	35 th out of 40
Incidents per pipeline mile	37 th out of 40
Total Serious Incidents	40 th out of 40
Serious Incidents per pipeline mile	40 th out of 40
Total Fatalities	40 th out of 40
Fatalities per pipeline mile	40 th out of 40
Total Injuries	40 th out of 40
Injuries per pipeline mile	40 th out of 40
Total Property Damage	40 th out of 40
Property Damage per pipeline mile	40 th out of 40

PG&E GD Pipeline Safety Results vs Peers

There are more than 1600 gas distribution (GD) pipeline operators in the U.S. As it does for the 1300+ GT pipeline operators, PHMSA makes safety incident statistics available for the GD operators. However, the level of detail and timeframe of this database are not as comprehensive as what PHMSA provides for GT operators. In terms of total GD pipeline mileage, PG&E ranks #2 in the U.S. among the 1600+ GD operators. PG&E has 77,573 miles of pipeline in its GD system. Southern California Gas ranks #1 in the U.S., with 99,872 miles of pipeline in its GD system.

For comparison of GD operator safety results, the PHMSA database shows only these categories:

- 5-year average incidents per million pipeline miles
- 10-year average incidents per million pipeline miles
- 5-year incident count
- 10-year incident count

They provide their GD data in two tables, one for **significant** incidents and one for **serious** incidents. The definitions of significant and serious incidents are the same as for GT operators (see [page 3](#) above).

As we did in our GT operator safety performance comparison, we chose to limit the number of GD operators being compared to the largest in the U.S. For GD operators, our cutoff was 20,000 or more GD pipeline miles, which represents the 30 largest. Below are two tables showing where PG&E stands relative to its GD peers on GD safety results (as of December 2017).

The 30 Largest GD Operators – Significant Incidents per million miles

Operator Name	5 Year Average (incidents per million miles)	10 Year Average (incidents per million miles)	2016 Miles
CONSUMERS ENERGY CO	55.2	37.7	51,040
PACIFIC GAS & ELECTRIC	[2 nd worst] 54.3	[4 th worst] 45.3	77,573
OKLAHOMA NATURAL GAS	52.3	40.8	26,923
COLUMBIA GAS OF OHIO	48.0	50.6	41,683
DTE GAS COMPANY	45.7	38.7	39,650
ATMOS ENERGY - MID-TEX	38.6	45.8	42,460
BLACK HILLS ENERGY	35.5	33.1	40,452
INDIANA GAS CO	34.9	21.8	23,076
PUBLIC SERVICE ELECTRIC & GAS	34.6	28.9	34,995
PUGET SOUND ENERGY	31.4	27.6	25,801
CENTERPOINT ENERGY RESOURCES	27.5	17.6	30,588
SOUTHERN CALIFORNIA GAS	24.2	23.5	99,872
PUBLIC SERVICE CO OF COLORADO	23.6	46.4	34,444
ATLANTA GAS LIGHT	18.8	27.2	64,369
NORTHWEST NATURAL GAS CO	17.3	17.6	23,415
CENTERPOINT ENERGY RESOURCES	15.9	24.3	25,577
NORTHERN ILLINOIS GAS	15.9	23.7	63,060
SOUTHWEST GAS CORP	15.2	23.2	53,036
WASHINGTON GAS LIGHT CO	15.1	35.9	26,389
AMEREN ILLINOIS COMPANY	13.5	10.2	29,545
DOMINION ENERGY OHIO	12.9	28.6	31,034
CENTERPOINT ENERGY RESOURCES	12.5	18.5	66,113

N. INDIANA PUBLIC SERVICE CO	12.2	16.4	33,618
NIAGARA MOHAWK POWER CORP	9.1	9.2	22,148
MIDAMERICAN ENERGY COMPANY	8.9	13.7	22,717
SPIRE ALABAMA INC.	8.4	12.8	23,814
PIEDMONT NATURAL GAS	4.6	9.7	43,565
DOMINION ENERGY - UT/WY/ID	0.0	23.5	28,356
PUBLIC SERVICE CO OF N CAROLINA	0.0	22.2	20,426

The 30 Largest GD Operators – **Serious** Incidents per million miles

Operator Name	5 Year Average (incidents per million miles)	10 Year Average (incidents per million miles)	2016 Miles
OKLAHOMA NATURAL GAS	34.4	22.3	26,923
DTE GAS COMPANY	30.5	23.2	39,650
PUBLIC SERVICE ELECTRIC & GAS	23.0	11.5	34,995
CENTERPOINT ENERGY RESOURCES	21.0	10.5	30,588
BLACK HILLS ENERGY	20.4	15.3	40,452
CONSUMERS ENERGY CO	19.7	15.9	51,040
ATMOS ENERGY - MID-TEX	19.3	25.6	42,460
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PUBLIC SERVICE CO OF COLORADO	11.7	21.1	34,444
MIDAMERICAN ENERGY COMPANY	8.9	4.4	22,717
INDIANA GAS CO	8.7	8.7	23,076
SPIRE ALABAMA INC.	8.4	4.2	23,814
PUGET SOUND ENERGY	7.9	7.9	25,801
PACIFIC GAS & ELECTRIC	[17 th worst] 7.8	[14 th worst] 10.1	77,573
SOUTHWEST GAS CORP	7.6	7.8	53,036
NORTHERN ILLINOIS GAS	6.3	11.1	63,060
CENTERPOINT ENERGY RESOURCES	3.1	8.6	66,113
ATLANTA GAS LIGHT	3.1	9.6	64,369
SOUTHERN CALIFORNIA GAS	2.0	3.1	99,872
DOMINION ENERGY - UT/WY/ID	0.0	15.6	28,356
PUBLIC SERVICE CO OF N CAROLINA	0.0	10.3	20,426
DOMINION ENERGY OHIO	0.0	6.3	31,034
PIEDMONT NATURAL GAS	0.0	4.9	43,565
CENTERPOINT ENERGY RESOURCES	0.0	4.1	25,577
N. INDIANA PUBLIC SERVICE CO	0.0	0.0	33,618
NIAGARA MOHAWK POWER CORP	0.0	0.0	22,148

As noted earlier in this report, the gas distribution system, because of its significantly lower operating pressure and smaller diameter pipes, represents a somewhat lower risk of a major incident compared to the gas transmission system. But both systems have the potential to cause injuries, fatalities, and significant property damage.

PG&E's GD pipeline safety in the category of serious incidents is "middle of the pack" versus peers, and their serious incident performance has shown improvement over the last five years in an absolute sense and relative to peers. However, on the dimension of significant incidents, PG&E's safety performance has deteriorated in the past five years (absolute incident rate and relative to peers). PG&E's GD significant incident rate over the past five years is second-worst among its peers.

Our conclusion is that the overall safety performance of PG&E's GD system is disappointing, especially considering its status as the second-largest in the U.S. and the company's commitment to become the safest operator in the U.S. The increase in their significant incident rate over the past five years, compared to the 10-year period that includes the San Bruno incident, is especially disheartening. However, we also want to acknowledge that PG&E's GD serious incident rate has improved modestly in the most recent five years.

Additional safety performance details for each of the 30 GD operators in our analysis are shown in the Appendix section of this report ([page 14](#)).

PG&E GT + GD Pipeline Incidents Caused by Excavation Damage

In addition to providing overall safety incident rates for GT and GD pipeline operators, PHMSA provides incident statistics organized by the cause of the incident. With one exception (excavation damage), PHMSA presents their pipeline incident cause data separately for GT and GD operators. This reflects the high priority that PHMSA has placed on reducing pipeline excavation damage, which can result in fatalities, injuries, property damage, unintentional fire or explosions. In August 2017, PHMSA submitted to Congress a report titled [A Study on Improving Damage Prevention Technology](#). This study looks at improving existing damage prevention programs through technological improvements in location, mapping, excavation, and communications practices. From 2012 to 2016, PHMSA awarded over \$1.7 million to state organizations to improve pipeline damage prevention technologies and practices, and over \$3.5 million in R&D and CAAP funding to improve damage prevention. In 2007, "811" was established as the nationwide one-call number, enabling excavators to call from anywhere to help avoid damaging underground utilities.

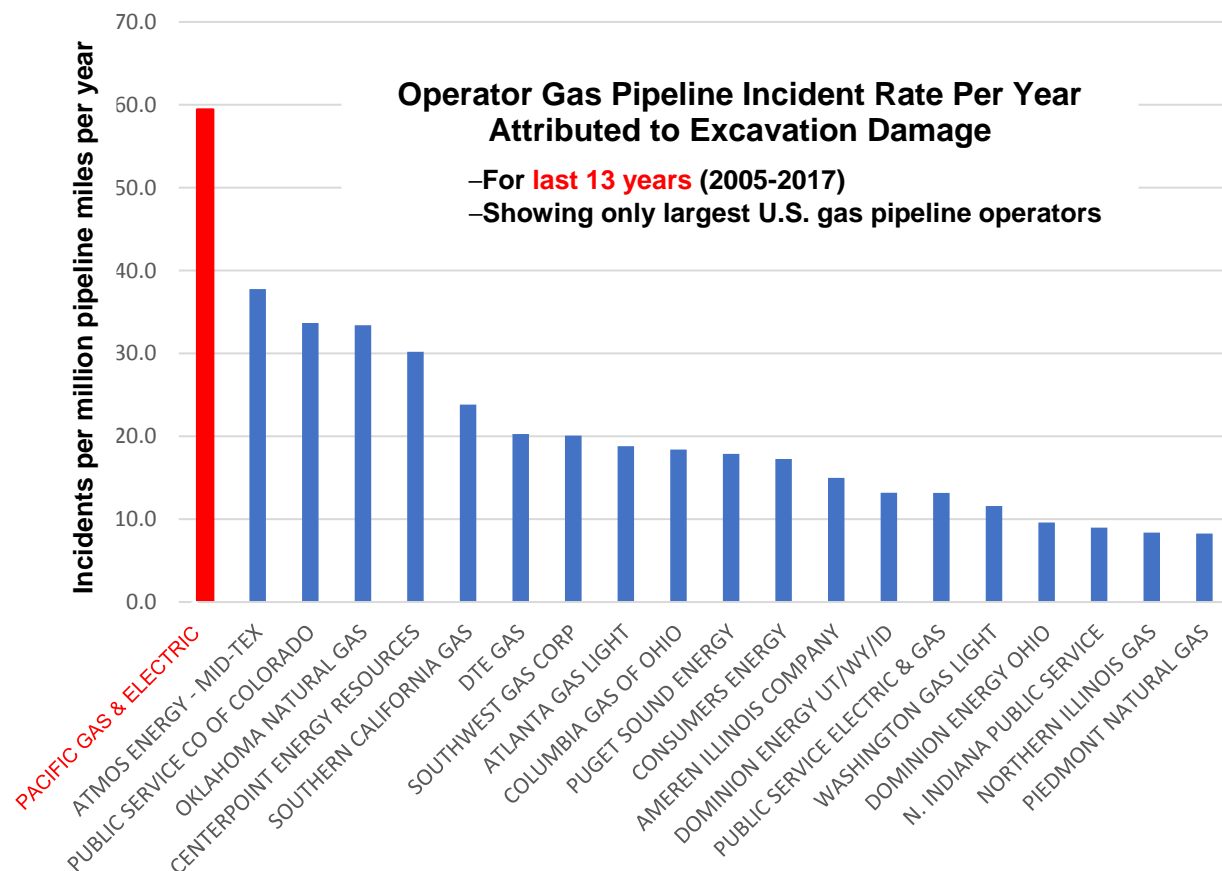
During the past five years, the above and other steps have produced some noticeable reductions in pipeline incidents caused by excavation damage among U.S. gas pipeline operators collectively. But excavation damage remains a leading cause of pipeline accidents resulting in fatalities and injuries. And PHMSA is very clear: excavation damage to pipelines can be prevented. The susceptibility of a pipeline to excavation damage depends on multiple factors, including the extent and type of excavation along the pipeline right-of-way, the effectiveness of the One-Call System in the area, the amount of patrolling of the pipeline by the operator, the placement and quality of right-of-way markers, and the depth of soil cover over the pipeline.

Because excavation damage is one of the greatest challenges to safe pipeline operations nationwide, we looked into PG&E's performance on this dimension. We analyzed the past 13 years of PHMSA data from their table showing GT + GD pipeline incidents caused by excavation damage. For this section of our report, we discuss below only the GT and GD operators whose total pipeline mileage (GT + GD) exceeds 25,000 miles (21 operators). On a national basis, PG&E's GT + GD mileage ranks #2 (84,103 miles) among all gas pipeline operators; Southern California Gas ranks #1 (103,327 miles).

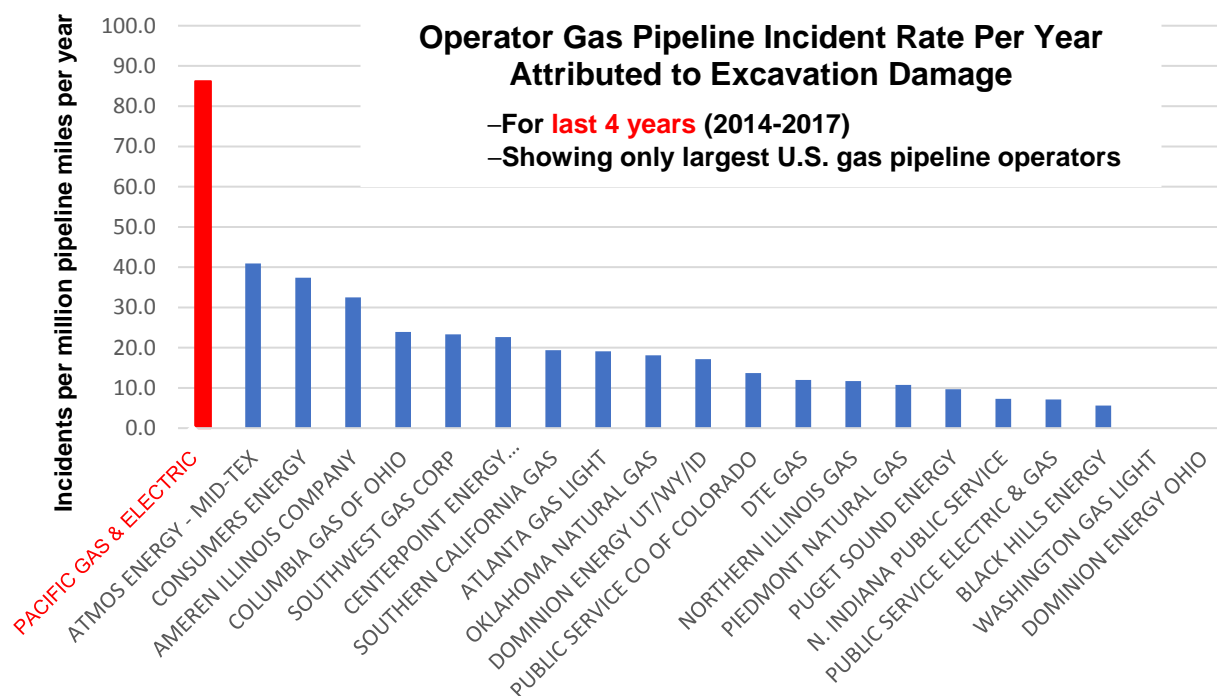
The comparison performance metric we selected is incidents per year caused by excavation damage per million miles of pipeline. The data details are available in the Appendix, [page 16](#). We considered three time intervals for this metric:

- The past 13 years (2005-2017), which is the maximum currently available from PHMSA for this data set
- The past 5 years (2013-2017)
- The past 4 years (2014-2017)

The reason for looking at the shorter intervals was to explore recent trend evidence. The first chart on the next page shows a comparison among the 21 largest operators for average pipeline incidents caused by excavation damage over the past 13 years.



When we looked for PG&E trend information on this performance metric over the past four and five years, we found that PG&E's incident rate increased (got worse) by about the same percentage: +45% over the past four years, and +44% over the past five years. Here is a chart comparing PG&E to their industry peers over the past four years:



Obviously, PG&E's substantial increase in incidents attributable to excavation damage in recent years is a major concern, as is their high incident rate relative to their peers. Not surprisingly, given its large size, PG&E's absolute incidents in this category over the past 13, 5, and 4 years are significantly higher than absolute incidents of their peers. This is shown in the Appendix, [p 16](#) (refer to incident count shown in red in that table).

As a separate issue for follow-up study, we noticed that PG&E's average incident rate per million pipeline miles per year is much higher on their transmission lines compared to their distribution lines. And this pattern is remarkably similar in the Southern California Gas data (both covering the last 13 years for excavation damage):

	GT incident rate/million pipeline miles	GD incident rate/million pipeline miles
PG&E	365	34
Southern Calif Gas	245	16

It is the much higher operating pressures and significantly larger pipe diameters in gas transmission lines that make the order-of-magnitude differences in the middle column versus the right column in the above table worth additional analysis.

Lessons from San Bruno

After nearly a year of investigation, in 2011 the National Transportation Safety Board (an independent U.S. government agency) issued its [final report on the San Bruno pipeline explosion](#). We provide key points from the Executive Summary of that report here because we believe that the San Bruno lessons provide relevant additional context for the conclusions section of our analysis that follows. (Page references below are to NTSB final report.)

According to the NTSB, the probable cause of the San Bruno accident (page xii) was:

- (1) Inadequate quality assurance/quality control during installation of a substandard section of transmission pipe in 1956, in combination with
- (2) An inadequate pipeline integrity management program, which failed to detect and repair or remove the defective pipe section

A contributing factor to the accident (page xii) was the California Public Utilities Commission's failure to detect the inadequacies of PG&E's pipeline integrity management program.

The NTSB pointed out (page 38) that transmission line 132 (involved in the San Bruno accident) had a prior history of pipeline seam defects. Specifically, line 132 experienced a longitudinal seam leak in 1988 (22 years prior to San Bruno) at a point less than nine miles from the San Bruno rupture.

Conclusion

In this report we have looked at multiple dimensions that Save Lafayette Trees believes are highly relevant in assessing PG&E's gas pipeline safety performance. Our data came from the PHMSA website. (PHMSA is the federal agency charged with ensuring the safe operation of the nation's pipelines.) Although there is some minor overlap, our overall assessment approach is quite different from what PG&E used in their 2017 Gas Safety Plan. That plan speaks to many worthwhile initiatives that the company has put in place since the 2010 San Bruno incident. For example, the plan asserts the company's commitment to become the safest, most reliable gas company in the U.S. Key performance metrics in the plan include miles of GT pipeline capable of accepting an inline inspection tool, response time to reports of gas odor, automated valves installed, and becoming the first company in the U.S. to meet the rigor of a new industry standard for pipeline safety management. The 2017 plan says (on page 1) that "While more remains to be done, *PG&E has made great progress* [emphasis added] in achieving Gas Safety Excellence over the past six years [2011-2016]". In support of this, in the same paragraph, we read, "Notably, excavation damage per 1,000 excavation tickets continued its downward trend from 2.11 in 2015 to 2.02 in 2016."

We do not dispute the potential utility of a performance metric for excavation damage that calculates damage per 1,000 excavation tickets. But to quote a 4% performance improvement from the prior year to the current year, with no other data offered, is not persuasive. We think that our multi-year analysis, comparing U.S. pipeline operators of

similar size in areas such as serious incidents/injuries/fatalities/property damage/excavation damage incident rate per pipeline mile provides an essential focus on pipeline safety *outcomes*. Using this as the standard for Gas Safety Excellence, Save Lafayette Trees concludes:

- PG&E has *not* made great progress in achieving Gas Safety Excellence in the period 2011-2016; in fact, there has been remarkably little progress. This is especially the case with the company's gas transmission network and with respect to excavation damage incidents. For both, there is an alarming pattern of safety performance deterioration.
- PG&E ranks among the largest U.S. gas pipeline operators, yet their safety incident rates place them among the worst of the large U.S. gas pipeline operators.
- Seven years post-San Bruno, the combined efforts of PG&E management, CPUC regulatory oversight, and PHMSA regulatory oversight have not produced a much-needed overall improvement in PG&E's unsatisfactory overall safety incident rates.
- PG&E and its customers would benefit from creating a monitoring system that annually publishes PG&E pipeline safety performance data using the metrics in this report.
- A significant change is urgently needed in PG&E's gas safety management practices.

Safety management of a large gas pipeline system is a challenging undertaking, and to be successful the management system must address many facets, including a hierarchy of performance metrics, emergency response, risk assessment, inspection system, maintenance system, and much more. PHMSA calls this an [Integrity Management program](#). It has been required for all GT operators since 2004 and for all GD operators since 2011.

What is the explanation for PG&E's poor, and overall worsening, safety performance, despite the 2010 San Bruno wakeup call? We don't have access to the details needed for a comprehensive analysis. Clearly an effective safety improvement plan needs to start with a small set of key safety outcomes to guide safety planning and decision making. These might be in place at PG&E (perhaps part of their Integrity Management program), but if so the company is keeping this a secret from the public.

PG&E's Integrity Management program is supposed to be grounded in relevant performance metrics and a comprehensive safety risk analysis, which should in turn drive the allocation of resources to improve safety results. Following San Bruno, PG&E has launched multiple programs intended to improve pipeline safety. For example, their Pipeline Pathways program began in 2013 and included precision mapping of GT location, soil cover depth assessment, improved pipeline markers to reduce excavation damage, and the targeting for potential removal of thousands of trees within the pipeline right-of-way. The Pipeline Pathways program was renamed Community Pipeline Safety Initiative in 2015. It has a \$500 million budget, which is part of PG&E's \$3 billion GT pipeline upgrade commitment post-San Bruno. But the deterioration in the company's GT safety performance over the past six years, in contrast to their much better performance in the years preceding San Bruno ([p 4 & 5 above](#)) demands an explanation. Perhaps their deteriorating safety results since San Bruno are due primarily to choosing the wrong improvement priorities. Or ineffective planning and execution of the targeted improvement priorities. It's also quite possible that, following decades of neglect, a much larger commitment than \$3 billion is needed to achieve "Gas Pipeline Excellence," PG&E's stated goal.

In support of our belief that a major part of PG&E's continuing poor safety performance is choosing the wrong improvement priorities, Save Lafayette Trees has a separate analysis available on its website titled "[What Is the Safety Risk of Trees Above PG&E's Transmission Pipelines?](#)" As part of that analysis we examined every significant gas pipeline safety incident that has occurred anywhere in the United States over the past 20 years. This amounted to a total of 2,076 incidents, and each of them was carefully analyzed for cause. Amazingly, *out of 2,076 safety incidents in the past 20 years there were zero in which a tree was found to be the cause of damage to an underground gas transmission pipeline!* Click [here](#) to see PG&E GT incident causes over the past 30 years.

We are also concerned because there are multiple long-standing pipeline safety concerns in Lafayette, unrelated to trees, that PG&E still has not corrected.

The residents of Northern and Central California deserve a gas utility that delivers superior gas pipeline safety results. The available evidence indicates that today we are getting the exact opposite.

Appendix

1. Pipeline Incidents for Large U.S. Gas Transmission Operators – 2006-Nov 2017¹

Operator	Gas Transmission Mileage	Total Incidents	Serious Incidents	Fatalities	Injuries	Property Damage
PG&E (CA)	6530	60	4	10	65	\$603,742,319
So Cal Gas (CA)	3455	15	0	0	0	\$6,455,452
ANR (16 states)	9257	72	1	1	0	\$49,917,467
ATMOS (TX)	5682	15	0	0	0	\$7,060,910
Black Hills (6 states)	4049	0	0	0	0	\$0
Colorado Interstate (9 states)	6187	14	1	1	0	\$8,416,106
Columbia Gas (10 states)	10,480	61	2	0	5	\$43,082,605
Columbia Gulf (4 states)	3331	36	1	1	0	\$94,504,254
Consumers Energy (MI)	2447	21	0	0	0	\$7,419,127
Dominion Questar (6 states)	2659	11	0	0	0	\$707,172
Dominion Trans (6 states)	3568	13	0	0	0	\$2,428,576
DTE Gas (MI)	2071	8	0	0	0	\$872,124
El Paso N Gas (5 states)	10,051	25	1	0	3	\$3,228,461
Enable Gas (6 states)	5948	65	1	0	1	\$13,583,684
Enable Oklahoma (2 states)	2292	18	1	0	1	\$5,218,575
Energy Transfer (6 states)	7270	16	0	0	0	\$7,940,836
Enterprise Products (8 states)	4078	29	1	1	7	\$7,250,225
Florida Gas (5 states)	5361	18	2	0	5	\$9,439,538
Great Lakes Gas (3 states)	2115	5	0	0	0	\$2,148,375
Gulf South (5 states)	6541	54	2	1	1	\$41,553,955

Operator	Gas Transmission Mileage	Total Incidents	Serious Incidents	Fatalities	Injuries	Property Damage
Kinder Morgan Tejas (TX)	2815	8	0	0	0	\$22,743,183
Natural Gas of America (11 states)	9031	26	2	0	3	\$7,154,689
Northern Natural (11 states)	14782	62	1	0	2	\$14,394,417
Northwest (6 states)	3857	19	0	0	0	\$3,641,673
Northwestern (2 states)	2153	0	0	0	0	\$0
Oneok Gas Trans (OK)	2620	11	1	0	1	\$3,703,728
Oneok Westex (TX)	2436	17	0	0	0	\$3,243,815
Panhandle Eastern (7 states)	5979	21	0	0	0	\$9,799,430
Piedmont (3 states)	2936	5	0	0	0	\$1,092,043
Public Service (CO)	2116	8	0	0	0	\$2,168,455
Southern Natural (7 states)	7006	42	0	0	0	\$33,299,826
Southern Star (7 states)	5831	37	2	1	1	\$17,901,655
Tallgrass (5 states)	4304	3	0	0	0	\$808,797
Tennessee Gas (16 states)	11,751	111	2	0	2	\$89,815,380
Texas Eastern (17 states)	9070	39	2	0	2	\$21,734,308
Texas Gas (9 states)	6011	31	1	0	1	\$5,097,163
Transcontinental (13 states)	8241	28	1	4	1	\$44,994,723
Transwestern (5 states)	2573	4	0	0	0	\$909,388
Trunkline (8 states)	2218	11	0	0	0	\$44,691,091
WBI Energy (4 states)	3659	12	2	1	1	\$1,617,010

¹As reported to PHMSA, showing data for all active operators with 2,000 miles or more of gas transmission lines

Data source: <https://primis.phmsa.dot.gov/comm/reports/operator/Operatorlist.html#> (last downloaded 1/8/18)

2. 30 Largest GD Operators – Significant Incidents²

Operator ID	Operator Name	10 Year Average (incidents per million miles)	5 Year Average (incidents per million miles)	10 Year Incident Count	5 Year Incident Count	2016 Miles
2748	CONSUMERS ENERGY CO	37.7	55.2	19	14	51,040
15007	PACIFIC GAS & ELECTRIC	45.3	54.3	36	21	77,573
14210	OKLAHOMA NATURAL GAS	40.8	52.3	9	6	26,923
2596	COLUMBIA GAS OF OHIO	50.6	48.0	19	10	41,683
12408	DTE GAS COMPANY	38.7	45.7	15	9	39,650
31348	ATMOS ENERGY - MID-TEX	45.8	38.6	18	8	42,460
15359	BLACK HILLS ENERGY	33.1	35.5	7	4	40,452
8070	INDIANA GAS CO	21.8	34.9	5	4	23,076
15952	PUBLIC SERVICE ELECTRIC & GAS	28.9	34.6	10	6	34,995
22189	PUGET SOUND ENERGY	27.6	31.4	7	4	25,801
603	CENTERPOINT ENERGY RESOURCES	17.6	27.5	5	4	30,588
18484	SOUTHERN CALIFORNIA GAS	23.5	24.2	23	12	99,872
15931	PUBLIC SERVICE CO OF COLORADO	46.4	23.6	15	4	34,444
792	ATLANTA GAS LIGHT	27.2	18.8	17	6	64,369
13840	NORTHWEST NATURAL GAS CO	17.6	17.3	4	2	23,415
12350	CENTERPOINT ENERGY RESOURCES	24.3	15.9	6	2	25,577
13710	NORTHERN ILLINOIS GAS	23.7	15.9	15	5	63,060
18536	SOUTHWEST GAS CORP	23.2	15.2	12	4	53,036
22182	WASHINGTON GAS LIGHT CO	35.9	15.1	9	2	26,389
32513	AMEREN ILLINOIS COMPANY	10.2	13.5	3	2	29,545
4060	DOMINION ENERGY OHIO	28.6	12.9	9	2	31,034
4499	CENTERPOINT ENERGY RESOURCES	18.5	12.5	11	4	66,113
13730	N. INDIANA PUBLIC SERVICE CO	16.4	12.2	5	2	33,618
13480	NIAGARA MOHAWK POWER CORP	9.2	9.1	2	1	22,148
30750	MIDAMERICAN ENERGY COMPANY	13.7	8.9	3	1	22,717
180	SPIRE ALABAMA INC.	12.8	8.4	3	1	23,814
15518	PIEDMONT NATURAL GAS	9.7	4.6	4	1	43,565
12876	DOMINION ENERGY - UT/WY/ID	23.5	0.0	6	0	28,356
15938	PUBLIC SERVICE CO OF N CAROLINA	22.2	0.0	4	0	20,426

²As reported to PHMSA, showing significant incident data for all active operators with 20,000 miles or more of gas distribution lines

Data source: https://opsweb.phmsa.dot.gov/primis_pdm/significant_inc_trend.asp (last downloaded 1/17/18)

(see next page for GD operator serious incidents data)

3. 30 Largest GD Operators – Serious Incidents³

Operator ID	Operator Name	10 Year Average (incidents per million miles)	5 Year Average (incidents per million miles)	10 Year Incident Count	5 Year Incident Count	2016 Miles
14210	OKLAHOMA NATURAL GAS	22.3	34.4	5	4	26,923
12408	DTE GAS COMPANY	23.2	30.5	9	6	39,650
15952	PUBLIC SERVICE ELECTRIC & GAS	11.5	23.0	4	4	34,995
603	CENTERPOINT ENERGY RESOURCES	10.5	21.0	3	3	30,588
15359	BLACK HILLS ENERGY	15.3	20.4	3	2	40,452
2748	CONSUMERS ENERGY CO	15.9	19.7	8	5	51,040
31348	ATMOS ENERGY - MID-TEX	25.6	19.3	10	4	42,460
13840	NORTHWEST NATURAL GAS CO	8.7	17.3	2	2	23,415
22182	WASHINGTON GAS LIGHT CO	15.8	15.1	4	2	26,389
2596	COLUMBIA GAS OF OHIO	9.6	14.4	4	3	41,683
32513	AMEREN ILLINOIS COMPANY	10.2	13.5	3	2	29,545
15931	PUBLIC SERVICE CO OF COLORADO	21.1	11.7	7	2	34,444
30750	MIDAMERICAN ENERGY COMPANY	4.4	8.9	1	1	22,717
8070	INDIANA GAS CO	8.7	8.7	2	1	23,076
180	SPIRE ALABAMA INC.	4.2	8.4	1	1	23,814
22189	PUGET SOUND ENERGY	7.9	7.9	2	1	25,801
15007	PACIFIC GAS & ELECTRIC	10.1	7.8	8	3	77,573
18536	SOUTHWEST GAS CORP	7.8	7.6	4	2	53,036
13710	NORTHERN ILLINOIS GAS	11.1	6.3	7	2	63,060
4499	CENTERPOINT ENERGY RESOURCES	8.6	3.1	5	1	66,113
792	ATLANTA GAS LIGHT	9.6	3.1	6	1	64,369
18484	SOUTHERN CALIFORNIA GAS	3.1	2.0	3	1	99,872
12876	DOMINION ENERGY - UT/WY/ID	15.6	0.0	4	0	28,356
15938	PUBLIC SERVICE CO OF N CAROLINA	10.3	0.0	2	0	20,426
4060	DOMINION ENERGY OHIO	6.3	0.0	2	0	31,034
15518	PIEDMONT NATURAL GAS	4.9	0.0	2	0	43,565
12350	CENTERPOINT ENERGY RESOURCES	4.1	0.0	1	0	25,577
13730	N. INDIANA PUBLIC SERVICE CO	0.0	0.0	0	0	33,618
13480	NIAGARA MOHAWK POWER CORP	0.0	0.0	0	0	22,148

³As reported to PHMSA, showing serious incident data for all active operators with 20,000 miles or more of gas distribution lines

Data source: https://opsweb.phmsa.dot.gov/primis_pdm/serious_inc_trend.asp (last downloaded 1/15/18)

4. Operator Gas Pipeline Incident Rate Per Year Due to Excavation Damage⁴ (based on last 13, 5, & 4 years for largest GT + GD operators)

Operator ID	Operator Name	Incid last 13	Incid last 5	Incid last 4	GD Miles	GT Miles	Tot GT+GD Miles	Incid per mm/yr last 13	Incid per mm/yr last 5	Incid per mm/yr last 4	% chg 13 v 5	% chg 13 v 4
15007	PACIFIC GAS & ELECTRIC	65	36	29	77,573	6,530	84,103	59.5	85.6	86.2	44.0%	45.0%
31348	ATMOS ENERGY - MID-TEX	21	9	7	42,460	312	42,772	37.8	42.1	40.9	11.4%	8.3%
15931	PUBLIC SERVICE CO OF CO	16	5	2	34,444	2,116	36,560	33.7	27.4	13.7	-18.8%	-59.4%
14210	OKLAHOMA NATURAL GAS	12	4	2	26,923	706	27,629	33.4	29.0	18.1	-13.3%	-45.8%
4499	CENTERPOINT ENERGY RES	26	8	6	66,113	120	66,233	30.2	24.2	22.6	-20.0%	-25.0%
18484	SOUTHERN CALIFORNIA GAS	32	11	8	99,872	3,455	103,327	23.8	21.3	19.4	-10.6%	-18.8%
12408	DTE GAS	11	5	2	39,650	2,071	41,721	20.3	24.0	12.0	18.2%	-40.9%
18536	SOUTHWEST GAS CORP	14	6	5	53,036	596	53,632	20.1	22.4	23.3	11.4%	16.1%
792	ATLANTA GAS LIGHT	16	7	5	64,369	1,067	65,436	18.8	21.4	19.1	13.8%	1.6%
2596	COLUMBIA GAS OF OHIO	10	5	4	41,683	132	41,815	18.4	23.9	23.9	30.0%	30.0%
22189	PUGET SOUND ENERGY	6	1	1	25,801	27	25,828	17.9	7.7	9.7	-56.7%	-45.8%
2748	CONSUMERS ENERGY	12	10	8	51,040	2,447	53,487	17.3	37.4	37.4	116.7%	116.7%
32513	AMEREN ILLINOIS COMPANY	6	4	4	29,545	1,246	30,791	15.0	26.0	32.5	73.3%	116.7%
12876	DOMINION ENERGY UT/WY/ID	5	2	2	28,356	822	29,178	13.2	13.7	17.1	4.0%	30.0%
15952	PUBLIC SVC ELEC & GAS	6	2	1	34,995	62	35,057	13.2	11.4	7.1	-13.3%	-45.8%
22182	WASHINGTON GAS LIGHT	4	0	0	26,389	182	26,571	11.6	0.0	0.0	-100.0%	-100.0%
4060	DOMINION ENERGY OHIO	4	0	0	31,034	1,014	32,048	9.6	0.0	0.0	-100.0%	-100.0%
13730	N. INDIANA PUBLIC SERVICE	4	1	1	33,618	666	34,284	9.0	5.8	7.3	-35.0%	-18.8%
13710	NORTHERN ILLINOIS GAS	7	3	3	63,060	1,158	64,218	8.4	9.3	11.7	11.4%	39.3%
15518	PIEDMONT NATURAL GAS	5	3	2	43,565	2,936	46,501	8.3	12.9	10.8	56.0%	30.0%
15359	BLACK HILLS ENERGY	4	1	1	40,452	4,049	44,501	6.9	4.5	5.6	-35.0%	-18.8%

⁴As reported to PHMSA, showing excavation damage incident data for all active operators with 25,000 miles or more of combined GT + GD lines

Data source: https://opsweb.phmsa.dot.gov/primis_pdm/excavation_damage.asp (last downloaded 1/17/18)

Note that PG&E prefers the metric of excavation damage incidents per 1,000 locate tickets, rather than incidents per million pipeline miles. Incidents per 1,000 tickets is a widely used metric in the pipeline industry, and it is particularly applicable for assessing improvement progress of an individual operator over time. However, PHMSA has pointed out that variations among state laws regarding locate ticket size and scope, along with the length of time a locate ticket is valid, limits the usefulness of this metric when comparing excavation damage incident performance among pipeline operators located in different regions of the country. This is the reason that PHMSA provides operator comparison data for excavation damage using the parameters shown above.

5. PG&E Yearly GT Significant Incidents 1986-2017¹

Year	Signif Incidents	5-yr avg	GT Mileage	Signif Incidents Norrmalized	5-yr avg Normalized
1986	2	NA	4154	3.1	NA
1987	0	NA	4157	0.0	NA
1988	0	NA	4157	0.0	NA
1989	0	NA	4295	0.0	NA
1990	0	0.4	4325	0.0	0.6
1991	0	0	4026	0.0	0.0
1992	0	0	4041	0.0	0.0
1993	1	0.2	4444	1.5	0.3
1994	0	0.2	4436	0.0	0.3
1995	2	0.6	4762	2.7	0.8
1996	3	1.2	4769	4.1	1.7
1997	1	1.4	4401	1.5	2.0
1998	1	1.4	4971	1.3	1.9
1999	3	2	6170	3.2	2.6
2000	2	2	5545	2.4	2.5
2001	1	1.6	5225	1.3	1.9
2002	1	1.6	5397	1.2	1.9
2003	1	1.6	5538	1.2	1.8
2004	0	1	5503	0.0	1.2
2005	2	1	5471	2.4	1.2
2006	2	1.2	5483	2.4	1.4
2007	2	1.4	5711	2.3	1.6
2008	0	1.2	5721	0.0	1.4
2009	2	1.6	5722	2.3	1.9
2010	2	1.6	5727	2.3	1.8
2011	2	1.6	5744	2.3	1.8
2012	3	1.8	5751	3.4	2.1
2013	4	2.6	5737	4.6	3.0
2014	5	3.2	5733	5.7	3.6
2015	5	3.8	6541	5.0	4.2
2016	5	4.4	6530	5.0	4.7
2017	6	5	6535	6.0	5.3

¹ Data source: https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/data_statistics/pipeline/PHMSA_Pipeline_Safety_Flagged_Incidents_20180531.zip

During the period 1986-2017, 67% of the gas transmission incidents that PG&E reported to PHMSA met the criteria for "significant incidents" (definition on p 4 above); 33% did not fall into the significant incident category and are not included in the above tally.