

DOCKET NO. C-2018-3006116, et al.

Hearing Date: October 14, 2020

SPLP

Ex. JSZ-1

(John Zurcher CV)

SPLP

St. No. 2

(Rebuttal
testimony of
John Zurcher,
with accompanying
exhibits)

ZCR-1 (GAO report)

ZCR-2 (News article) (NOT ADMITTED)

SPLP

GG-1 (Energy Transfer
public awareness
pamphlet, public
version)

SPLP

GG-2 (Energy Transfer
public awareness
pamphlet, emergency
responder version)

Exhibit SPLP JSZ-1

SPLP
JSZ-1

The Blacksmith Group

2368A Rice Blvd, Suite 444
Houston, TX 77005
Phone: 713-494-1052
Email: jsz@blacksmithgroup.com

RESUME' OF JOHN S. ZURCHER

FORMAL EDUCATION

Associate of Arts in Engineering Technology
University of Southern Colorado - 1975

Bachelor of Science in Electrical Engineering
University of Colorado - 1977

Master of Science in Business Administration
University of Northern Colorado - 1981

PROFESSIONAL AFFILIATION

Department of Transportation, Technical Pipeline Safety Standards Committee,
1995 to 2001
(Advisory Committee to DOT, appointed by the Secretary of Transportation)

American Society of Mechanical Engineers, B31.8 Section Committee,
1980 to present

NACE International
1993 to present

Gas Piping Technology Committee,
1980 to 2000
(Chairman of Transmission Division, 1986 to 1994)

American Gas Association, Operations Safety Regulatory Action Committee,
1984 to 2001

Interstate Natural Gas Association of America,
1980 to 2001
(Chairman of Pipeline Safety Committee, 1992 to 2001)

Gas Technology Institute, 1993 to 2001
(Chairman of Integrity Maintenance & Systems Operations, 1993 to 2001)

Pipeline Research Committee, International

1993 to 2001

(Co-Chairman of Design and Integrity Management, 1999 to 2000)

Department of Transportation, Mapping Quality Action Team

1994 to 2000

Department of Transportation, Risk Management Quality Action Team

1994 to 2000

MILITARY BACKGROUND

United States Navy Submarine Service - 1970 to 1974

Engineering Department, Auxiliary Division

CONGRESSIONAL TESTIMONY GIVEN

Testified before the Committee on Transportation and Infrastructure, Congress of the United States in 1999 concerning the Reauthorization of the Natural Gas and Hazardous Liquid Pipeline Safety Program.

Testified before the U.S. House of Representatives Committee on Commerce in 1999 concerning the Reauthorization of the Natural Gas and Hazardous Liquid Pipeline Safety Program.

HONORS AND AWARDS RELATED TO PIPELINE SAFETY

Pipeline Research Council International, Inc., Distinguished Service Award - 2002

Office of Pipeline Safety Certificate of Appreciation, Mapping Quality Action Team – 1998

U. S. Department of Transportation Certificate of Special Achievement, Risk Management – 1997

Appointed by Secretary of State to represent the United States at the Organization for Economic Co-Operation and Development international conference on pipeline safety in Oslo, Norway, 1996

EXPERIENCE

2002 to Present – Principal at P-PIC, Managing Director at The Blacksmith Group

Principal at Process Performance Improvement Consultants, LLC (P-PIC) and Managing Director at The Blacksmith Group. Major areas of emphasis are consulting to natural gas and

hazardous liquid pipeline operators and consulting to various natural gas and hazardous liquid trade associations and research organizations.

As a consultant to pipeline operators, expertise is provided in many areas such as design, construction, pipeline integrity management, risk management, security, emergency response, operations and maintenance procedures and standards, pipeline safety regulations, operations and maintenance work processes, and process auditing.

As a consultant to trade associations and research organizations, expertise is provided in basic research, consensus standards development, pipeline safety regulations, pipeline integrity and risk management research, and communications liaison between these entities.

2001 to 2002 – Vice President, HSB Pipelines

Consultant with Hartford Steam Boiler Inspection and Insurance Company (HSB), in the Pipeline Group. Major areas of emphasis were consulting to natural gas and hazardous liquid pipeline operators. In addition, consulting to various natural gas and hazardous liquid trade associations and research organizations.

As a consultant to pipeline operators, provided expertise in many areas such as pipeline integrity management, risk management and emergency response protocols. Additionally, expertise was provided in the areas of operations and maintenance procedures and standards, pipeline safety regulations, design and construction work processes and operations and maintenance work processes.

As a consultant to trade associations and research organizations I provided expertise for the development of many consensus standards. Additionally, expertise was provided in the areas of pipeline safety regulations, pipeline integrity and risk management research, and communications liaison between these entities and all involved stakeholders. I also was the primary author of the Natural Gas Industries Security Practices Report.

1997 to 2001 - Manager, Pipeline Safety, Columbia Gas Transmission

Responsible for the products of a group of engineers and analysts in the areas of Pipeline Safety Compliance, Risk Management, Capital Maintenance Programs, Emergency Response, and the Engineer Training Program.

The Pipeline Safety Compliance Section is responsible for insuring compliance with applicable industry codes, Company standards, and Federal and State Regulations. This includes maintenance of the Operations and Maintenance Manual, incident reporting, crisis communications, code interpretations, compliance monitoring, responding to rule-makings and Pipeline Safety Re-authorizations.

The Risk Management Team is responsible for developing the Companies Risk Management Program. This includes model development for use in planning rehabilitation and other integrity programs, development of the Risk Management Plan for the Company and for developing the program to enter the Company into the DOT Risk Management Project.

The Capital Maintenance Team is responsible for insuring the integrity of the Companies pipeline facilities. This includes the management of the Companies pipeline integrity assurance program, pipeline replacements, pipeline rehabilitation, pipeline inspection including the smart pigging program, and pipeline efficiency improvement projects. The section is also responsible for setting of standards and developing procedures for pipeline operation and maintenance.

The Emergency Response Team is responsible for insuring the proper procedures are in place and that the proper training has been conducted to effectively handle a pipeline emergency. This includes making facilities safe, notification of regulatory agencies, liaison with local emergency response agencies and public officials and implementation of continuous improvement.

The Engineering Training Program provides for the recruitment of recent college graduates and their initial training and internship. This program provides for a structured two-year education of these individuals in order to provide them with a broad knowledge of company operations.

1993 to 1997 - Director, Pipeline Services, Tenneco Energy

Responsible for the products of a group of engineers, consultants, technicians, analyst, and clerical personnel in the areas of Corrosion Control, Pipeline Engineering, Codes and Standards, Risk Management, Systems Applications, and AM/FM/GIS. Corporate Companies include: Tennessee Gas Pipeline Company, Midwestern Gas Transmission Company, East Tennessee Natural Gas Company, Iroquois Gas Transmission Company, and Channel Industries Gas Company.

The Corrosion Control Section is responsible for insuring the protection of the Companies steel infrastructure. This includes setting of standards and procedures for corrosion control, training of personnel, audits of compliance, quality assurance and quality control of all corrosion control activities and records.

The Pipeline Engineering Section is responsible for insuring the integrity of the Companies pipeline facilities. This includes the management of the Companies pipeline integrity assurance program, pipeline change-outs, pipeline rehabilitation, pipeline inspection including the smart pigging program, and pipeline efficiency improvement projects. The section is also responsible for setting of standards and developing procedures for pipeline operation and maintenance.

The Codes and Standards Section is responsible for insuring compliance with applicable industry codes, Company standards, and Federal and State Regulations. This includes maintenance of the Operations and Maintenance Manual, incident reporting, crisis communications, code interpretations, responding to rule-makings and Pipeline Safety Re-authorizations.

The Risk Management Section is responsible for developing the Companies Risk Management Program. This includes model development for use in planning rehabilitation and other integrity programs, development of the Risk Management Plan for the Company and for developing the program to enter the Company into the DOT Risk Management Project.

The Systems Application Section is responsible for administration of the Companies electronic forms and databases for all as-built activities and operational records. In addition the section maintains the house count database, performs annual relief and regulator valve capacity confirmations, and establishes MAOP's for the pipeline system.

The AM/FM/GIS Section is responsible for the design, development and implementation of the Companies GIS System. This system in conjunction with a Work Management System and a Document Management System will provide the necessary platform to move to an integrated Risk Management Program as well as manage the company's as-built records and operational records. The system will be implemented in 1997.

1988 to 1993 - Manager, Engineering, Panhandle Eastern Corporation

Responsible for the products of a group of engineers, technicians, analysts, and clerical personnel to insure that all facilities are designed, constructed, operated, and maintained in accordance with applicable government regulations, industry codes, and Company standards. Corporate companies included: Algonquin Gas Transmission Company, Centana Energy Company, Panhandle Eastern Pipe Line Company, Texas Eastern Transmission Company, and Trunkline Gas Company

Worked on all Company projects involving facility additions and replacements in order to provide quality assurance. Responsible for insuring regulatory compliance with the Department of Transportation, the States in which the Corporation operates in, as well as other local municipalities. Participate in rule-making activities at the Federal and State levels writing regulations and giving testimonies on behalf of the Company, the industry, and engineering associations. Prepare and adhere to capital and operational budgets for the Company and my department.

Responsible for the Corporations AM/FM/GIS System. This system contains the facility data base and graphics elements, which comprise the Corporations mapping systems. These maps and data base are used to insure compliance with the regulations as well as to provide operating personnel with the necessary documents to perform their work.

Responsible for the As-Built Program for the Corporation. This program takes field mark-ups of construction and operating maintenance activities and as-built's the information into the appropriate permanent records.

Responsible for the Corporations Engineering Records System. These record systems contain all necessary records that document engineering activities. The records maintained include those items necessary to prove regulatory compliance as well as the retention of other business-related documents.

Responsible for the efforts of the Corporations Specialty Mapping Program. These specialty maps are used to present graphical information about the Corporations facilities for use by management and several departments within the Corporation.

1987 to 1988 – Consultant

Responsible for the pipeline safety programs for four intrastate operators. The companies were CITCO Refining and Chemical Company, Clarke Refining Company, AMOCO Gas Transmission Company, and Coastal Crude Gathering Company. These programs insure a proper compliance posture with the Texas Railroad Commission and DOT in the areas of inspections and maintenance of the pipeline systems, records and their systems, and design and construction specifications and standards.

1981 to 1987 - Manager, Engineering, Colorado Interstate Gas Company

Responsible for a group of technical personnel to insure that all facilities were designed, constructed, operated, and maintained in accordance with applicable government regulations, industry codes, and Company standards.

Worked on all Company projects involving facility additions and replacements in order to provide quality assurance. Responsible for insuring regulatory compliance with the Department of Transportation, the States in which operated in, as well as other local municipalities. Participated in rule-making activities at the Federal and State levels writing regulations and giving testimonies on behalf of the Company, the industry, and engineering associations. Prepared and adhered to capital and operational budgets for the Company and my department.

Worked on a collateral basis with the environmental group. Resources and workload was common between the two groups. Worked as an environmental analyst under the direction of the Manager, Environmental Services during periods when significant environmental work was done. Worked in areas such as spill prevention planning; environmental permitting; hazardous material handling, transportation, and disposal, and PSD surveys.

In 1982 given the additional responsibility for insuring regulatory compliance for two other subsidiaries, Wyoming Interstate Gas Company and Cody Gas Company.

In 1986 given the additional responsibility for insuring regulatory compliance for three other Coastal subsidiaries, two in hazardous liquid service, Coastal Pipeline Company and Coastal States Crude Gathering Company, and one in natural gas service, Coastal States Gas Transmission Company.

1979 to 1981 - Senior Engineer, Telecommunications, Colorado Interstate Gas Company.

Responsible for the design, installation, and maintenance of telecommunications equipment for the operational communication of data and information. This included microwave, measurement, supervisory control, telephone, and mobile radio systems. Developed state of the art electronic gas measurement systems and environmental monitoring stations.

1977 to 1979 - Field Engineer, Operations, Colorado Interstate Gas Company

Responsible for the construction of facilities for the transportation of natural gas including pipeline and compressor facilities, gas processing facilities, and auxiliary facilities such as instrumentation, automation and control, electrical, and structural/civil. Also responsible for solving operational problems as they relate to equipment and facilities.

Exhibit SPLP JSZ-2

SPLP
JSZ-2



BUNOCO
PIPELINE L.P.



**PIPELINE
WARNING**



1000 PSI
1000 YARD
1000 PSI

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

MEGHAN FLYNN et al.	:	Docket Nos.	C-2018-3006116 (consolidated)
	:		P-2018-3006117
MELISSA DIBERNARDINO	:	Docket No.	C-2018-3005025 (consolidated)
REBECCA BRITTON	:	Docket No.	C-2019-3006898 (consolidated)
LAURA OBENSKI	:	Docket No.	C-2019-3006905 (consolidated)
ANDOVER HOMEOWNER'S ASSOCIATION, INC.	:	Docket No.	C-2018-3003605 (consolidated)

v.

SUNOCO PIPELINE L.P.

**REBUTTAL TESTIMONY
OF JOHN S. ZURCHER
ON BEHALF OF SUNOCO PIPELINE, L.P.**

Dated: June 15, 2020

**SPLP
N2**

1 **Q. What is your name and current occupation?**

2 A. My name is John Zurcher. I am a principal at Process Performance Improvement
3 Consultants, LLC and Managing Director at the Blacksmith Group.

4
5 **Q. What types of work do you perform with those firms?**

6 A. My major areas of emphasis are consulting to operators of pipelines that transport natural
7 gas and hazardous liquids, as well as consulting to various trade associations and research
8 organizations in those areas.

9
10 **Q. In what specific areas have you provided consulting services and expertise?**

11 A. As a consultant to pipeline operators, I have provided expertise in such diverse areas as
12 pipeline design, construction, integrity management, security, emergency response, operations and
13 maintenance procedures and standards, pipeline safety regulations, process auditing, and work
14 processes for operations and maintenance.

15
16 **Q. And what types of services have you provided to trade associations and research
17 organizations?**

18 A. As a consultant to trade associations and research organizations for natural gas and
19 hazardous liquids pipelines, I have provided expertise in basic research, consensus standards
20 development, pipeline safety regulations, pipeline integrity and risk management. I have also
21 served as a communications liaison.

22

1 **Q. Is SPLP Exhibit No. JSZ-1 a copy of your CV, which generally describes your**
2 **educational background, experience and professional work in the areas of pipeline safety**
3 **and integrity?**

4 A. Yes.

6 **Q. Sunoco Pipeline moves for the admission of SPLP Exhibit No. JSZ-1.**

8 **Q. Please describe your educational background.**

9 A. I started college in 1968. I then entered the military and served in the United States Navy
10 for four years, serving on a submarine in the Mediterranean Sea. I was discharged from the Navy
11 in 1974 and returned to college to complete my degree. I received a Bachelor of Science degree
12 in electrical engineering in 1977 from the University of Colorado. Over the following four years,
13 while working full time, I attended school in the evenings and received in 1981 a Master's of
14 Science degree from the University of Northern Colorado in Business Administration, commonly
15 known as an MBA.

17 **Q. Please describe your relevant work experience.**

18 A. Beginning in 1977, I worked for two years in Amarillo, Texas as a field engineer for
19 Colorado Interstate Gas Company. Within the same company, I then moved to its office in
20 Colorado Springs and worked in telecommunications and supervisory control systems. In that
21 role, I was responsible for the design, installation, and maintenance of telecommunications
22 equipment for the operational communication of data and information.

1 **Q. What was your next position?**

2 A. In 1980, I was promoted to manager of pipeline safety for the same company. In that
3 position, I supervised a group of technical personnel that was responsible for insuring that all
4 facilities were designed, constructed, operated and maintained in compliance with all applicable
5 government regulations, industry codes, and the company's standards. I moved to Houston, Texas
6 in 1985 and continued to work for the same company until 1988. By the time I left Colorado
7 Interstate Gas Company, I was responsible for insuring compliance with a natural gas pipeline and
8 two pipelines that were providing hazardous liquids service.

9

10 **Q. What did you do after you left Colorado Interstate Gas Company.**

11 A. I first worked for a short time in Kansas City, Missouri as an engineer for the pipeline
12 safety programs for two interstate pipelines involving the areas of inspection and maintenance of
13 pipeline systems, records and their systems, and pipeline design and construction specifications
14 and standards. The companies were Panhandle Eastern and Trunkline Gas, both part of Pan
15 Energy Corporation. Pan Energy relocated, so I returned to Houston, Texas in 1988. I worked for
16 about five years for that corporation. During that timeframe, Pan Energy acquired two other
17 pipelines. One of its subsidiaries operated the Texas Eastern Pipeline, which has pipelines in
18 Pennsylvania. The other company was Algonquin Gas. Among other responsibilities, I supervised
19 a group of engineers, technicians and analysts to ensure that all facilities were designed,
20 constructed, operated and maintained in accordance with applicable government regulations,
21 industry codes, and the company's standards. In 1993, I then went to work for Tenneco Energy
22 as Director, Pipeline Services. Among the pipelines for which I had responsibility was the
23 Tennessee Gas pipeline in Pennsylvania. My responsibilities as Director, Pipeline Services for

1 Tenneco Energy are described in more detail in my CV. I worked for Tenneco for about six years,
2 and then went to work for Columbia Gas Transmission in Charleston, West Virginia for
3 approximately four years. Another subsidiary of Columbia Energy was Columbia Gulf
4 Transmission, which also had pipelines in Pennsylvania. When that company went through a
5 merger, I began to work as a consultant, beginning in 2001.

6
7 **Q. In your more than 43 years working with pipelines, in what subject areas have you**
8 **worked?**

9 A. Generally speaking, I have worked in most every aspect of pipelines, whether for natural
10 gas distribution and transmission and with hazardous liquids pipelines. I have done work in
11 pipeline construction, design, inspection, operations, maintenance, and integrity management for
12 both natural gas and hazardous liquids pipelines. As a consultant to pipeline operators, I have
13 provided my experience and knowledge in design, construction, integrity management, risk
14 management, emergency response, operations and maintenance procedures and standards, safety
15 regulations, operations and maintenance work processes, and process auditing.

16
17 **Q. Please describe some of your experience in creating the standards for a pipeline**
18 **operator's public awareness plan and in reviewing the adequacy of a pipeline operator's**
19 **public awareness plan?**

20 A. In the mid-2000s, I was on the original committee that wrote the pipeline industry's
21 standard for public awareness. The pipeline industry and regulators worked together to further
22 improve the process for public awareness. Since that time, I have consulted to pipeline companies
23 and I have developed public awareness programs for them. I have reviewed the public awareness

1 programs for several hundred pipeline companies. I have also audited the public awareness
2 programs of these companies.

3
4 **Q. What other experience have you had with regulatory or industry standards?**

5 A. I have extensive experience with several industry and consensus standards, including the
6 American Petroleum Institute (API) standards. I have worked on the API standards for public
7 awareness, integrity management of hazardous liquids pipelines, and pressure testing of steel
8 pipelines, for which I was the primary author. I have worked on many others.

9
10 **Q. Please explain some of your more noteworthy projects.**

11 A. I was appointed by the Secretary of State to represent the United States at an international
12 conference on pipeline safety. Representatives of 54 other countries participated to discuss
13 methods to improve pipeline safety throughout the world.

14 I consulted to the Department of Energy to do a security and safety audit of the strategic
15 petroleum reserve.

16 After the tragedy of the 9/11 terrorist attack, I wrote the anti-terrorism plan for the natural
17 gas and hazardous liquids pipeline industries.

18 I have been on the Pipeline Research Committee, which includes hazardous liquids pipeline
19 companies, the government and others; I was Chair of the Design and Construction subcommittee
20 for several years. I have been Chair of the Operations and Integrity Management Committee of
21 the Gas Research Institute and I have been the Chair of the Interstate National Gas Association of
22 America, Pipeline Safety Committee.

1 I have spoken on numerous occasions on pipeline safety at the National Association of
2 Regulatory Utility Commissions and the National Association of Pipeline Safety Representatives,
3 particularly when we were developing the integrity management programs.

4 I have also written several standards for the pipeline industry, including the standard on
5 integrity management, corrosion standards and pressure testing for natural gas and hazardous
6 liquids pipelines. I have written the integrity management program for about 60 companies and
7 have audited the integrity management programs, as a consultant, for about another 80 companies.

8 I have testified before Congress on integrity management and pipeline safety on two
9 occasions and have also testified in front of FERC.

10 I have participated in the drafting of federal regulations published at 49 CFR Part 195,
11 regulating the transportation of hazardous liquids by pipeline.

12
13 **Q. Have you given testimony as an expert in court or before a commission?**

14 A. Yes.

15
16 **Q. Please elaborate.**

17 A. Of course. I testified on three occasions before Judge Barnes on behalf of Sunoco Pipeline
18 in the Senator Dinniman proceeding, in an earlier hearing in this proceeding, and in a proceeding
19 brought by Mr. Baker. While I have worked on about fifteen other cases in my career, I have only
20 testified in court on two occasions. I have testified in proceedings like this before other state
21 commissions in New York, Missouri, Texas, California, and Colorado. In each case or proceeding,
22 I was accepted as a qualified expert.

1 **Q. What percentage of your consulting work has been as an expert in court or other**
2 **similar proceeding?**

3 A. Not a large amount. The large majority of my consulting work is assisting companies with
4 these practices and writing procedures, and in auditing companies' procedures and programs. I
5 estimate that over my consulting career less than ten percent of my work has been in what I would
6 describe as legal work.

7
8 **Q. Can you categorize the types of clients for whom you and your company consult?**

9 A. We consult for gas distribution operators, gas transmission operators, and hazardous liquid
10 pipeline operators across the United States. Our total client base is approximately 150 companies,
11 including Energy Transfer and Sunoco Pipeline.

12
13 **Q. What work have you done in Pennsylvania?**

14 A. We have a project for PECO in Pennsylvania. As described earlier, I worked on Texas
15 Eastern's pipeline in Pennsylvania when I worked for Panhandle Eastern Corporation and its
16 subsidiaries. I also worked on the Tennessee Gas pipeline in Pennsylvania when I worked for
17 Tenneco Energy, and I worked in Pennsylvania on the Columbia Gas pipeline. I have also done
18 work for Williams in Pennsylvania and Buckeye as well.

19
20 **Q. Describe the work that you have done for other countries.**

21 A. We wrote regulations for the country of Israel for the transportation and distribution of gas.
22 We also conducted training for the country of India, assisting that country to put together a program
23 for the qualification of operating personnel for pipelines.

1 **Q. Have you done any teaching, and if you have, please describe it briefly?**

2 A. I teach a two-and-one-half day course on pipeline safety for both natural gas and hazardous
3 liquid pipeline operators and others, a two-day course on natural gas and hazardous liquid integrity
4 management, which I have taught on about one hundred separate occasions. I teach engineering
5 companies that design pipelines, construction companies that construct pipelines, and operating
6 companies that operate pipelines.

7

8 **Q. Sunoco Pipeline proffers Mr. Zurcher as an expert in public awareness, integrity**
9 **management, and regulatory compliance for pipelines, including HVL transmission**
10 **pipelines.**

11

12 **Q. Please explain what the different types of pipelines are?**

13 A. Starting in the production field, there are production lines that take gas or liquid from the
14 individual wells to a centralized location where the gas or liquid is gathered. From there are what
15 we called gathering lines that move that gas or liquid for processing or transmission. Transmission
16 lines are typically large-diameter, high-pressure pipelines that move the gas or liquid over long
17 distances. Thereafter, to move natural gas, the transmission lines are connected to distribution
18 lines, which distribute the natural gas to homes and businesses for consumption.

19

20 **Q. Approximately how many miles of the different types of pipelines are there in the**
21 **United States?**

1 A. Based on PHMSA data, there are about 210,000 miles of transmission lines for hazardous
2 liquids and about 300,000 miles of natural gas transmission lines. So there are over 500,000 miles
3 of transmission lines in the United States.

4 There are approximately 1.4 million miles of natural gas distribution lines.

5 There are somewhere in the range of 500,000 to 600,000 miles of gathering and production
6 lines in the United States.

7 So the total for all types of pipelines in the United States, for natural gas and hazardous
8 liquids, is on the order of 2.5 million miles of pipelines.

9
10 **Q. What type of pipelines are the Mariner East pipelines?**

11 A. They are transmission pipelines for hazardous liquids -- propane, butane, and ethane.

12
13 **Q. What percentage of the United States population lives near a pipeline?**

14 A. Approximately 90% of the United States population lives near one of the types of pipelines
15 that I described.

16
17 **Q. How many miles of HVL pipelines in the United States traverse in high consequence
18 area?**

19 A. Approximately one-half of HVL pipelines -- or 35,000 to 40,000 miles of pipeline --
20 traverse a high consequence area.

21
22 **Q. What is a high consequence area?**

1 A. High consequence area is defined by the regulations. According to the regulations, a high
2 consequence area for an HVL pipeline is defined as a high-population area according to United
3 States Census information, as well as areas that are environmentally sensitive. So a high
4 consequence area, as its name implies, is an area in which the release of a product could impact
5 persons or the environment.

6
7 **Q. Describe the goals of a pipeline company's public awareness program.**

8 A. By regulation, there are basically three goals for a public awareness program. First, the
9 pipeline operator provides information for residents and others to know the pipeline's location.
10 Second, the pipeline operator is to provide information to educate the public to recognize a leak.
11 And third, the pipeline operator is to educate the public about how to respond to a pipeline leak.

12
13 **Q. How has Sunoco Pipeline informed the public of the location of the Mariner East**
14 **pipelines?**

15 A. Sunoco Pipeline has provided public information in a variety of ways to inform the public
16 of the location of the Mariner East pipelines. In addition, the pipelines are marked, and the
17 regulations define what the markers must say, the size of the lettering, and where the markers are
18 located. Consistent with the regulations, the markers are placed in a "line of sight" so that if you
19 are standing at a marker, you can look in either direction and the path of the pipeline is identified.
20 In addition, the location of the pipeline is part of a data base, so that persons, including excavators,
21 can call the 811 number to mark the location of the pipeline so that it is not accidentally struck
22 while digging.

1 **Q. Mr. Zurcher, please describe what SPLP Exhibit No. JSZ-2 and JSZ-3 are.**

2 A. Number 2 is a photograph of a pipeline marker, and you can see the lettering and what the
3 marker says. No. 3 is a photograph that shows the markers that mark the location of the pipeline
4 so that you can see the path that it follows. This marking is typical of the markers placed along
5 the route of the Mariner East pipelines.

6

7 **Q. Do you have an opinion within a reasonable degree of professional certainty whether**
8 **Sunoco Pipeline has adequately informed the public of the location of the Mariner East**
9 **pipelines?**

10 A. Yes it has. It has done so through its public awareness program, which includes the
11 distribution of brochures to the public and contractors, other forms of public outreach and
12 education, training of emergency responders, and, of course, markers placed on the pipeline route
13 and inclusion in the 811 one-call system.

14

15 **Q. Has the publicity and controversy associated with Mariner East contributed to the**
16 **public's awareness about the presence of the Mariner East pipelines?**

17 A. Certainly. There has been a tremendous amount of publicity, including on social media,
18 that has informed the public about the location of the Mariner East pipelines. In my opinion, the
19 community is well informed of the pipelines' location.

20

21 **Q. Do you have an opinion within a reasonable degree of professional certainty whether**
22 **Sunoco Pipeline has adequately informed the public about how to recognize a pipeline leak?**

1 A. Yes it has. The brochures advise about using sight, sound and smell. The brochures advise
2 of the ways that you can see if a pipeline has leaked or is leaking, that you may hear it, and that
3 you may smell it. Now as I've described in earlier testimony in this case, unlike natural gas
4 distribution pipelines, there is no odorant added to an HVL transmission pipeline, as mercaptan is
5 added to natural gas distribution lines to give it that "rotten egg" type odor. But HVLs do have a
6 classic petroleum-type odor, and smell is certainly another way to identify a leak or breach of an
7 HVL pipeline. Likewise, natural gas transmission lines do not have an odorant added for the most
8 part, so like HVL transmission lines, there is a petroleum odor, but not the mercaptan odor that
9 most people associate with natural gas that comes into their homes.

10
11 **Q. Please explain how sound can identify if there is a leak in an HVL pipeline.**

12 A. Transmission lines often run at high pressures. When there is a release of product, either
13 through a small leak up to a large breach of the pipeline, there is a lot of noise. A rupture of the
14 pipeline will sound like an explosion. But even for a small leak creates a noticeable sound.
15 Imagine a simple air compressor that you use to fill the tires on your car. If the compressor is at
16 just fifty pounds and you open the valve to bleed that off, it's loud. Pipelines are at a higher
17 pressure, and the higher the pressure, the louder the sound.

18
19 **Q. Please explain how sight can identify if there is a leak in an HVL pipeline?**

20 A. When hazardous liquids are released from a pipeline into the atmosphere, they become
21 gaseous. You will see a vapor cloud, which has been described in other testimony, and you may
22 see dust or other debris blowing. So sight is the third way that you can identify a release from a
23 pipeline. You may also see bubbling if the release occurs in an area that is under water, such as in

1 a swamp or wetland. You may see dead or discolored vegetation, because a release from an HVL
2 pipeline is likely to stay closer to the ground and may kill grass and other vegetation in the
3 immediate area. And you may see ice form around the leak within the right of way because with
4 propane, when released from a pipeline, it gets very cold and can form large pieces of ice that are
5 sometimes visible in the right of way.

6
7 **Q. Do you have an opinion within a reasonable degree of professional certainty whether**
8 **Sunoco Pipeline has adequately informed the public about how to respond if a leak occurs.**

9 A. Yes it has. The first thing one should do is leave the area on foot and warn others to stay
10 away. Second, you should abandon and turn off all equipment so as not to create a spark and do
11 not use an open flame that may ignite the released material. Finally, you should call 911 when
12 you are at a safe distance, which has to be determined by the individual on a case-by-case basis.
13 Those are the only three things that you can do -- and the only three things that a pipeline operator
14 can advise the public to do -- in the event of a release. Turn off ignition sources if you can and
15 don't turn on an ignition source; leave the area on foot, upwind and uphill away from the pipeline;
16 and call 911 from a safe location. The brochures also advise the public of things that they should
17 not do. The public should not attempt to extinguish a fire; the professional responders are trained
18 to address that. And the public should not operate a pipeline valve, because the public is not trained
19 to do that.

20
21 **Q. Have you reviewed the brochures that Sunoco Pipeline now uses as part of its public**
22 **awareness program for the Mariner East pipelines?**

23 A. Yes I have.

1 **Q. Is SPLP Ex. No. JSZ-4 one of the brochures that you reviewed.**

2 A. Yes. This is the brochure that is currently mailed to the general public and excavators, and
3 it is also available on the company's website. Previously, Sunoco Pipeline had mailed one
4 brochure to the general public and others to other audiences.

5

6 **Q. Do you have an opinion within a reasonable degree of professional certainty whether**
7 **Exhibit JSZ-4 and the earlier version of the brochure that you reviewed comply with**
8 **PHMSA regulations and adequately inform the public on pipeline safety?**

9 A. Yes. The current brochure JSZ-4 does and the earlier version of the brochure sent to the
10 public did as well. The brochures comply with pipeline safety regulations, comply with industry
11 practice, and adequately and properly inform the public. The regulations strive for consistency in
12 the information that pipeline operators provide to the public, and Sunoco Pipeline's brochures are
13 remarkably consistent with the brochures of other pipeline companies that operate pipelines in
14 Chester and Delaware Counties. That is by design in the regulations because you want the public
15 to receive a consistent message and have consistent information about how to respond, particularly
16 where, as here, there are several pipelines in the community, and an affected member of the public
17 may not immediately know which pipeline, or which company's pipeline, has experienced a
18 release of product, so the public should be given consistent information by all of the pipeline
19 companies so it can respond to a release in a consistent way.

20

21 **Q. Do you have an opinion within a reasonable degree of professional certain whether**
22 **Exhibit JSZ-4 complies with PHMSA regulations and adequately informs contractors about**
23 **what to do before they dig?**

1 A. Yes it does. This brochure complies with pipeline safety regulations, complies with
2 industry practice, and adequately and properly informs excavators about what to do before digging,
3 including particularly information about the 811 system.

4
5 **Q. Is SPLP Exhibit JSZ-5 a brochure that you reviewed?**

6 A. Yes. This is the brochure that Sunoco Pipeline mails to emergency responders and public
7 officials, and it too is available on Sunoco Pipeline's web site.

8
9 **Q. Do you have an opinion within a reasonable degree of professional certainty whether**
10 **Exhibit JSZ-5 complies with PHMSA regulations and adequately informs emergency**
11 **responders and public officials on pipeline safety?**

12 A. Yes it does. This brochure and the previous version also comply with pipeline safety
13 regulations, comply with industry practice, and provide the same information to emergency
14 responders and government officials about how to identify the location of the pipelines, how to
15 identify a release through sight, sound, and smell, and what to do (and what not to do) in the event
16 of a pipeline release. They also advise of the need for emergency preparedness, the availability of
17 additional information from the company, and the need to plan and practice emergency
18 preparedness and response, including through drills, table-top exercises, and facility tours.

19
20 **Q. Have you reviewed Sunoco Pipeline's public awareness plan as it relates to the**
21 **Mariner East pipelines?**

22 A. Yes I have.

1 **Q. Is SPLP Ex. No. JP-7 a copy of Sunoco Pipeline’s public awareness plan?**

2 A. Yes it is.

3

4 **Q. Do you have an opinion within a reasonable degree of professional certainty whether**
5 **Sunoco Pipeline’s public awareness plan complies with the regulations and is adequate to**
6 **provide information to the public.**

7 A. Yes it does. The public awareness plan defines a program that identifies the audiences that
8 it wants to address, the message content to provide to those audiences, and specifically how and
9 how frequently that message is delivered. The public awareness program provides for Sunoco
10 Pipeline to do mailings, to perform outreach to businesses and excavators. The public awareness
11 plan is very well written, it is consistent with other companies’ plans, which is important for the
12 reasons that I previously described, and it complies with the PHMSA’s regulations and guidance.

13

14 **Q. Have you reviewed the written testimony of Joseph Perez, Joseph McGinn, and**
15 **Gregory Noll, and do you recall the testimony of Messrs. Perez and Noll from the earlier**
16 **hearing in this proceeding?**

17

18 A. Yes, I have read the written testimony of each and was present when Mr. Perez and Mr.
19 Noll previously testified and recall that testimony.

20

21 **Q. Based upon their description of what Sunoco Pipeline has done in terms of public**
22 **awareness, do you have an opinion within a reasonable degree of professional certainty**
23 **whether Sunoco Pipeline has implemented its public awareness plan in a manner that is in**

1 **compliance with the applicable regulations, Sunoco Pipeline's public awareness plan, and**
2 **the appropriate standard for public awareness?**

3
4 A. Yes. That testimony describes a very robust public awareness program that complies with
5 Sunoco Pipeline's public awareness plan, the applicable regulations, industry standards, and any
6 other applicable standards for a public awareness program for a hazardous liquids pipeline. Indeed,
7 Sunoco Pipeline has gone beyond the applicable standards and requirements for public awareness
8 and has demonstrated by its actions a willingness and ability to engage with members of the public,
9 emergency responders, the community, local governments and school districts.

10
11 **Q. Can you explain what is meant by integrity management as it relates to pipelines?**

12 A. Integrity management is a performance-based, process-oriented program to manage the
13 safety and environmental risks associated with hazardous liquids and natural gas pipelines. The
14 simplest way to look at integrity management is to identify the threats that may cause a pipeline to
15 fail. There are nine separate threats to a pipeline's integrity, one example being corrosion. Once
16 the threats to a pipeline are identified, the pipeline company focuses on the likelihood of each
17 threat occurring for a given pipeline. Once we understand the likelihood of each threat to a pipeline
18 occurring, the pipeline is assessed for those threats. This allows a company to better understand
19 its system and to prioritize and manage risk in a systematic way. There is then a focus on high
20 consequence areas, because this is where the potential consequences of a pipeline failure are
21 greatest. The company then performs a risk assessment of its pipelines and develops assessment
22 methods to detect defects or anomalies and repair them as appropriate. Examples of the assessment
23 techniques include hydrostatic testing, in-line inspection of the pipeline with tools that detect

1 anomalies and defects, and direct assessment through survey inspection for anomalies. Sunoco
2 Pipeline has SOPs for these various things; I have reviewed them and they are consistent with the
3 regulations and industry practice for the proper maintenance of the pipelines and to implement the
4 integrity management program.

5 The regulations and standards recognize that with the transportation of hazardous liquids,
6 there is a risk, which is the mathematical product of the consequence of a pipeline failure times
7 the likelihood of a pipeline failure. The risk is very small, and it remains steady irrespective of the
8 population near a pipeline.

9 Risk under the regulations is an important concept to understand and it underlies the
10 management of all pipeline assets. In my view, the Complainants misperceive this, by focusing
11 solely on the consequence of a pipeline failure without considering the likelihood of a pipeline
12 failure. Discussing consequence without also discussing likelihood is meaningless when
13 addressing risk. As the consequence of a pipeline failure increases – as it would here in a high
14 consequence area – the likelihood of that pipeline failing must be reduced to maintain the same
15 risk across the entire pipeline. Therefore, to maintain the same risk across the entire pipeline, the
16 regulations and integrity management program require that additional measures be taken to reduce
17 the likelihood of a pipeline failure in areas of high population.

18 Consequence for pipelines is mainly a function of population. By definition, the larger the
19 population near a pipeline, the greater the consequence of a pipeline failure, and the regulations
20 and integrity management plan expressly recognize and address this. To begin the consequence
21 analysis, the regulations start with four categories called Class Location. A greater safety factor
22 is used in the design of a pipeline as the population near a pipeline increases. In addition, a greater
23 safety factor for the testing of the pipeline is required. And stricter operations requirements and

1 stricter and more frequent maintenance requirements are also required as the population near a
2 pipeline increases.

3 For a high consequence area, as is present here, pipeline operators are required to determine
4 any threats to the integrity of the pipeline and assess the pipeline by one or more means to
5 determine its integrity. Any length of the pipeline that does not meet the acceptance criteria must
6 be repaired or replaced. After repair or replacement and determination that the integrity of the
7 pipeline is acceptable, the operator employs additional measures for prevention and mitigation to
8 manage the integrity into the future.

9 So in sum, the regulations and integrity management require the risk in a high consequence
10 area to be the same as in every other area, so that the risk is uniform across the pipeline. That
11 means that the likelihood of a pipeline failure, by definition, is much, much lower in a high
12 consequence area than in areas where there is low or no population, precisely because the
13 regulations recognize that the potential consequence of a pipeline failure in a high consequence
14 area is much greater. This is why Complainants experts do not focus on the likelihood of a pipeline
15 failure and focus solely on its consequence. They can't focus on likelihood. Necessarily, the
16 likelihood is much, much lower in a high consequence area in order to achieve a uniform risk
17 precisely because the consequence of a pipeline failure is much greater. That is also why it is
18 inappropriate to consider pipeline failures from the PHMSA data base that occurred in areas that
19 were not high consequence areas.

20
21 **Q. Does the PHMSA database contain any record of a rupture of an HVL pipeline in a**
22 **high consequence area?**

23 **A. No.**

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Q. How does the transportation of HVLs by transmission pipeline compare to other modes of transportation in terms of safety?

A. Transmission of HVLs by pipeline is much safer. Transportation by rail is twenty-five times less safe than transportation by pipeline. Transportation by tanker on the highways is seventy-three times less safe than transportation by pipeline.

Q. Based upon available data, how does the risk of death from an HVL pipeline compare to other every-day occurrences?

A. Again, there is much less risk associated with the transportation of HVLs by pipeline. According to the PHMSA database, since 2010 there has been one fatality to the member of the general public associated with a release from an HVL pipeline and that was an individual who walked into a cloud of vapor and was overcome and passed away. In comparison, there have been 45,000 deaths on the highway, 25,000 deaths from a slip and fall, of which 1,200 happened on stairs. You are 900 times more likely to die from a bee sting and 450 times more likely to die from a lightning strike. Those are just examples. You are far more likely to die from drowning, a fall from a ladder or scaffolding, a flood, or from an earthquake. You are far, far more likely to be struck by a car or truck as a pedestrian.

Q. In his prepared testimony, Mr. Marx discusses the projected consequences of a complete rupture of one of the Mariner East pipelines in Chester or Delaware County. In your professional opinion, is that an appropriate evaluation without also considering the risk of such a catastrophic event occurring?

1 A. No it is not.

2

3 **Q. Please explain why not.**

4 A. It is inappropriate to consider the consequence of an event without also considering the
5 likelihood of an event occurring. The whole concept underlying PHMSA's integrity management
6 regulations is that risk is the mathematical product of (1) the consequence of a pipeline failure
7 multiplied by (2) the likelihood of a pipeline failure. Although the risk is very small, PHMSA's
8 regulations require risk to remain constant across the entire pipeline. As the population near a
9 pipeline increases, as it may -- and often does -- in a high consequence area, the consequences of
10 a pipeline failure necessarily increase. The consequences of a pipeline rupture in an unpopulated
11 area is very different than the consequences of a pipeline rupture in a highly-populated area.
12 Therefore, to maintain constant risk in both of those areas, as well as across the entire Mariner East
13 pipelines, the likelihood of a pipeline rupture must be greatly reduced in a high consequence area
14 to make the risk the same as a pipeline rupture with no population present, which is essentially
15 zero. Greater levels of protection in terms of construction, testing, inspection, operation and
16 maintenance are required in a high consequence area to make the risk the same as in a non-high
17 consequence area. Therefore, it is my opinion to a reasonable degree of professional certainty that
18 it is contrary to PHMSA's regulations to consider the consequence of an event only, without also
19 considering the likelihood of that event occurring.

20

21 **Q. Mr. Marx's prepared testimony read from Complainants' Complaint the description**
22 **of three incidents -- one that occurred in November 2007 near Carmichael, Mississippi, one**

1 **that occurred in August 1996 near Lively, Texas, and a third that occurred in December**
2 **1970 in Franklin County, Missouri. Are you familiar with those three incidents?**

3 A. Yes I am.

4
5 **Q. In your professional opinion, is it proper to consider those three incidents to**
6 **determine the risks proposed by the Mariner East pipelines in Chester and Delaware**
7 **Counties?**

8 A. No it is not.

9
10 **Q. Please explain why not.**

11 A. As already stated, consequence without likelihood is meaningless when evaluating risk.
12 Risk is a function of consequence times likelihood. If the consequence of an event is grave but
13 the likelihood of that event occurring is extremely low, then the risk associated with the activity
14 that may produce the event is extremely small as well. That is why we fly in commercial airplanes
15 – the consequence of a crash is grave, but the likelihood of a commercial airline crash is very
16 small. So because of integrity management procedures and in compliance with PHMSA's
17 regulations, the likelihood of the events from those historical accidents occurring in a high
18 consequence area is so remote that it is inappropriate to consider them here. No such event has
19 ever occurred in a high consequence area. As described earlier, there are as many as 40,000 miles
20 of transmission pipelines located in high consequence areas. PHMSA regulations expressly allow
21 it. If that type of analysis were appropriate, then there would be no HVL transmission pipeline
22 located in a highly-populated area, and PHMSA's regulations would not allow for it.

1 **Q. Are there other transmission pipelines located in Chester and Delaware counties and**
2 **how do the consequences of a rupture of those pipelines compare to the consequence of a**
3 **rupture hypothesized by Mr. Marx?**

4 A. Yes there are other transmission pipelines located in Chester and Delaware counties. Those
5 pipelines are similarly located in high consequence areas and would create similar consequences
6 were they to experience the type of catastrophic rupture that Mr. Marx hypothesizes, but has never
7 occurred in a high consequence area.

8
9 **Q. What is your opinion to a reasonable degree of professional certainty about the risks**
10 **presented by locating the Mariner East 2 and 2X pipelines in the same right-of-way as the**
11 **Mariner East 1 pipeline and in the same area as other companies' transmission pipelines?**

12 A. It does not present an additional safety hazard and is in compliance with the applicable
13 regulations. In fact, there are advantages to having transmission pipelines located in the same or
14 similar areas. It allows the pipeline company to focus on operations and maintenance. There is
15 also an advantage in that the community should already be educated about pipelines, and so that
16 consistent message that pipeline companies provide to the public is being reinforced by other
17 pipeline companies.

18
19 **Q. Have you evaluated Sunoco Pipeline's Integrity Management Plan, which is a**
20 **confidential security document?**

21 A. Yes I have.

1 **Q. Do you have an opinion within a reasonable degree of professional certainty whether**
2 **the Integrity Management Plan complies with PHMSA's regulations and is consistent with**
3 **applicable standards for the management of the integrity of pipelines.**

4 A. Yes it is. It is very much in conformance with the standards that I've described and the
5 pipeline safety and integrity management regulations. It properly describes and establishes
6 processes for the management of the integrity of both gas and liquid pipelines.

7
8 **Q. Are pipeline exposures common, and what I mean by that is portions of pipelines**
9 **where the cover may have eroded and the pipeline is exposed or partially exposed?**

10 A. Yes. There are hundreds of thousands of locations across the United States where a
11 pipeline is exposed. In the vast majority of circumstances, an exposed pipeline is not an issue.
12 But a pipeline company is nevertheless required to evaluate an exposure and address it as
13 necessary.

14
15 **Q. Does PHMSA have requirements for a pipeline exposure?**

16 A. No. PHMSA's regulations do not require that pipeline burial be maintained. But if a new
17 pipeline is to be buried, the regulations specify the depth of burial, which is typically thirty to
18 forty-eight inches. There is no requirement in the regulations, however, to maintain a minimum
19 depth of cover or to replace cover where it has eroded or when a section of pipeline is otherwise
20 exposed over the operating life of a pipeline's service.

21
22 **Q. What is the rationale for not requiring a minimum depth of cover over the life of a**
23 **pipeline's service?**

1 A. There is no correlation between depth of cover and the possibility or likelihood of a pipeline
2 event occurring. Depth of cover has no effect on corrosion, cracking, operator error or any other
3 event that may cause a pipeline release. Data show that damage caused by excavation is also
4 unrelated to depth of cover. In addition, if there is a release caused by a pipeline leak or rupture,
5 the additional amount of time for the released product to come to the surface is negligible, whether
6 the pipeline is exposed or at a depth of four feet.

7
8 **Q. Mr. Zurcher, SPLP Ex. No. JP-7 is a copy of Sunoco Pipeline's standard operating**
9 **procedure HLI.24 that addresses pipeline exposures; are you familiar with it?**

10 A. Yes I am.

11
12 **Q. Do you have an opinion to a reasonable degree of professional certainty whether this**
13 **SOP conforms to industry practice, PHMSA's regulations, and pipeline safety dealing with**
14 **pipeline exposures?**

15 A. Yes it does. It provides for a process to inspect the pipeline, where pipeline inspectors
16 literally walk the entire length of the pipeline to identify any area of the pipeline that may be
17 exposed, the exposures are then evaluated to determine whether any present a risk, and the
18 exposures are then ranked so that they are addressed as appropriate. This is typical procedure for
19 identifying, ranking, and addressing pipeline exposures.

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

MEGHAN FLYNN et al.	:	Docket Nos.	C-2018-3006116 (consolidated)
	:		P-2018-3006117
MELISSA DIBERNARDINO	:	Docket No.	C-2018-3005025 (consolidated)
REBECCA BRITTON	:	Docket No.	C-2019-3006898 (consolidated)
LAURA OBENSKI	:	Docket No.	C-2019-3006905 (consolidated)
ANDOVER HOMEOWNER'S ASSOCIATION, INC.	:	Docket No.	C-2018-3003605 (consolidated)
	:		
v.	:		
	:		
SUNOCO PIPELINE L.P.	:		

**REJOINDER TESTIMONY OUTLINE
OF JOHN ZURCHER
ON BEHALF OF SUNOCO PIPELINE, L.P.**

**SPLP
N2-RJ**

1. In his sur-rebuttal testimony, Jeffrey Marx asserts that when you state that 90% of the U.S. population lives near a pipeline, you do not define what it means to live “near” a pipeline. Can you please explain what you mean by “near” when you state that 90% of the U.S. population lives near a pipeline?

- The term “near” is used based on the regulations, which is a distance that is within 660 feet of the centerline of a pipeline. 660 feet equates to one-eighth of a mile.
- Ninety percent of the U.S. population lives within 660 feet of a pipeline.

2. In his sur-rebuttal testimony, Mr. Marx asserts that an area can be characterized as a high-consequence area because of its population or because it is environmentally sensitive, and that only a fraction of the 35,000 to 40,000 miles of pipeline that traverse high-consequence areas are characterized as such because of their population. Is he correct?

- My earlier testimony (page 10 of 25; lines 1-5) does state that an area can be defined as a high-consequence area because of population or because it is environmentally sensitive, so I do identify those criteria from the regulations.
- The integrity management requirements apply to a high-consequence area irrespective of the reason for its characterization.
- Mr. Marx is incorrect when he asserts that a “fraction” of pipelines that traverse high-consequence areas are characterized as such because of population, if he means to imply that it is a small fraction. Of course, if some high-consequence areas are characterized as such because of population and others are characterized as such because they are environmentally sensitive, then there are different “fractions” of the total miles of pipelines that pass through each type of high-consequence area.
- The data show that there are approximately 210,000 miles of pipelines that transport hazardous liquids. Of those, approximately 94,000 miles of pipelines that transport hazardous liquids traverse a high-consequence area. Of those 94,000 miles of pipelines that traverse a high-consequence area, approximately 77,000 miles traverse a high-consequence area that is characterized as such because of population. Therefore, the much larger fraction of pipelines that transport hazardous liquids that traverse a high-consequence area pass through an area characterized as such because of population.
- The PHMSA database does not break out the mileage of HVL pipelines from the pipelines that transport hazardous liquids. The mileage of HVL pipelines that pass through a high-consequence area that is characterized as such because of

population is roughly 28,000 to 33,000 miles, a much larger fraction of the 35,000 to 40,000 total miles of HVL pipelines that traverse all high-consequence areas.

3. In his sur-rebuttal testimony, Mr. Marx asserts that there are no pipelines in Chester and Delaware counties that could create a similar consequence as the Mariner East II pipelines if there were a catastrophic release. Is he correct?

- As previous testimony showed, there are numerous other transmission pipelines located in Chester County, which are shown on maps of Chester County that are publicly available.
- Mr. Marx has not provided any analysis of the hypothetical worst-case scenario of the consequences of a rupture of the other pipelines located in Chester and Delaware counties, so I don't know how he is able to make a comparison.
- The available data do not show that pipeline fatalities are correlated to the diameter of the pipeline.
- The recent incident in Baltimore, Maryland involved a 2-inch diameter natural gas distribution line, causing two fatalities.

4. In his sur-rebuttal testimony, Mr. Marx asserts that it is appropriate to perform a consequence analysis without evaluating the likelihood of the consequence occurring, and that it is simply your opinion that it is inappropriate to evaluate risk without evaluating the likelihood or probability of a consequence occurring. How do you respond to that?

- By definition, risk is a function of the probability or likelihood of an event occurring and the consequence of that event. Mr. Marx concedes that, but he only looks at the potential consequences of a hypothetical worst-case event without any evaluation of the likelihood or probability of that event occurring.
- To evaluate the risk of a fatality or multiple fatalities, it is inappropriate to evaluate the consequence of an event occurring without also evaluating the likelihood or probability of that event occurring.
- Looking at the consequence of a hypothetical worst-case rupture of a pipeline to evaluate the safety of that pipeline in a high-consequence area (by population) is inconsistent with the PHMSA regulations that allow HVL pipelines in high-consequence areas, including those characterized as such by population.
- If the consequence of an unlikely event occurring were sufficient to evaluate risk without also considering the probability of the event occurring, then the regulations would not allow HVL pipelines in high-consequence areas.

- Prohibiting or limiting HVL pipelines in high-consequence areas would lead to greater risks in the transportation of HVLs, because transportation by pipeline is safer than other modes of land transportation.
- I believe that Judge Barnes and the Pennsylvania Public Utility Commission acknowledged that evaluating consequences only is not the proper way to evaluate risk and thus the safety of a pipeline when they denied the petition for emergency relief earlier in this case.

5. In his sur-rebuttal testimony, Mr. Marx asserts that the likelihood of a pipeline failure is not reduced by integrity management and that there is no quantitative proof that integrity management has reduced the risk of a pipeline failure. Is he correct?

- No he is not.
- The foundation of integrity management is to reduce the likelihood of a pipeline failure by, for example, taking steps proactively to identify and address potential problems before they occur.
- The data show that integrity management has reduced pipeline incidents despite the fact that there are more miles of pipeline and more product transported.
- Mr. Marx's views simply disagree with the integrity management programs required by the regulations and the data that show that integrity management reduces risk.

6. In his sur-rebuttal testimony, Mr. Marx refers to a rupture of a natural gas pipeline in San Bruno, California that occurred in 2010. Does that offer any proof that integrity management does not reduce risk?

- No it does not.
- In that instance, the company was found criminally responsible on six counts for failing to follow integrity management requirements.
- Subsequent actions by that company to follow its integrity management program supports that integrity management does work to reduce risk.

7. In his sur-rebuttal testimony, Mr. Marx claims that you state that there has never been an HVL accident in a high-consequence area. Did you say that?

- No.
- He is mischaracterizing my testimony.

8. In his sur-rebuttal testimony, Mr. Marx disagrees with your reading of the PHMSA data relating to ruptures from HVL pipelines. Can you explain?

- Mr. Marx refers to two events characterized as ruptures that reached a high-concentration area characterized by population. I am familiar with them both.
- One involved a Chevron above-ground valve assembly at a refinery in Port Arthur, Texas, which occurred in 2012.
- While characterized as a rupture in the PHMSA database, the narrative description in the PHMSA database describes a leak in a pipeline transporting ethylene used as feedstock. It started as a leak that created a fire, and the fire caused further damage to the pipeline.
- The other involved the Dixie pipeline in Sulfur, Louisiana. It transported liquified petroleum gas, which is a mixture of propane and butane.
- This was characterized as a rupture in the PHMSA database. There were no injuries or fatalities reported.
- Both of the pipelines were located in high-consequence areas.

Exhibit SPLP JSZ-3

SPLP
JSZ-3



Exhibit SPLP JSZ-4

SPLP
JSZ-4



FACTS ABOUT PIPELINE SAFETY IN YOUR COMMUNITY

HECHOS ACERCA DE LAS TUBERÍAS SEGURO EN SU COMUNIDAD

Know

Infórmese

Recognize

Reconozca

Respond

Responda





Energy Transfer Partners, a Texas-based energy company founded in 1995 as a small intrastate natural gas pipeline company, is now one of the largest and most diversified master limited partnerships in the United States. Strategically positioned in all of the major U.S. production basins, the company owns and operates a geographically diverse portfolio of energy assets, including midstream, intrastate and interstate transportation and storage assets. Energy Transfer operates approximately 86,000 miles of natural gas, crude oil, natural gas liquids and refined products pipelines and related facilities, including terminalling, storage, fractionation, blending and various acquisition and marketing assets in 38 states.

Approximately two-thirds of the natural gas and petroleum products we use every day are transported through underground pipelines – making them an essential part of the nation's infrastructure. Studies have confirmed that pipelines are the safest way to transport energy in the United States.

You are receiving this information because Energy Transfer, or one of its affiliates, may operate or maintain a pipeline in your community. We ask that you review the following important safety information, encourage you to share it with others and retain for future reference.



If you would like more information, please visit us at energytransfer.com or call our non-emergency number at 877-795-7271.



We are strongly committed to operating a safe, reliable pipeline system. As part of that commitment, we strive to enhance public safety and environmental protection through increased public awareness and knowledge.

Sunoco Pipeline operates a geographically diverse portfolio of energy assets including, pipelines, terminalling and marketing assets. Crude oil, refined products, natural gas and natural gas liquids are transported through a 12,000-mile pipeline system that traverses 21 states.

24-HOUR EMERGENCY NUMBER:
800-786-7440

PRODUCT: NATURAL GAS LIQUIDS



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KNOW

RECOGNIZE

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RESPONDA

RECONOZCA

INFÓRMESE

COMUNÍQUESE



SUNOCO PIPELINE

An ENERGY TRANSFER Partnership

Estamos muy comprometidos a operar un sistema de tuberías seguro y confiable. Como parte de nuestro compromiso, nos esforzamos por mejorar la seguridad del público y la protección del medio ambiente a través de un aumento del conocimiento y concientización del público.

Sunoco Pipeline opera una cartera de activos energéticos en diversos puntos geográficos que incluyen tuberías, distribución y comercialización. Petróleo crudo, productos refinados, gas natural y líquidos de gas natural son transportados a través de un sistema de tuberías de 12,000 millas que cruza 21 estados.

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LAS 24 HORAS: 800-786-7440

PRODUCTO: LÍQUIDOS DE GAS NATURAL





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National Pipeline Mapping System

Everyone can contribute to safety and security by knowing where pipelines are in their community and recognizing unauthorized activity. To find out who operates transmission pipelines in your area, visit the National Pipeline Mapping System at www.npms.phmsa.dot.gov.

Pipeline Safety

Our pipelines are regularly tested and maintained using cleaning devices, diagnostic tools and cathodic protection. We perform regular patrols, both on the ground and in the air, along our routes to ensure the security and integrity of our lines. For the safety of our system and for the people around it, we monitor pipeline operations 24 hours a day, 365 days a year.

Special Protective Measures

Certain pipelines are designated as being in "High Consequence Areas" (HCA) due to their location in high population or environmentally sensitive areas. In accordance with regulations, we have developed and implemented a written Integrity Management Program that addresses the risks on certain pipeline segments. Baseline and periodic assessments are conducted to identify and evaluate potential threats to our pipelines. Any significant defects discovered are remediated and the company monitors program effectiveness so that modifications can be recognized and implemented.

Along the Right-of-Way

Rights-of-way provide a permanent, limited access to privately owned property to enable us to operate, inspect, repair, maintain and protect our pipeline. Rights-of-way must be kept free of structures and other obstructions. Property owners should not dig, plant, place or build anything on the right-of-way without first calling 811 and having our personnel mark the pipeline, stake the easement and explain our property development guidelines to you.



Sistema Nacional de Mapas de Tuberías

Todos pueden contribuir a la seguridad y protección sabiendo dónde se encuentran las tuberías en sus comunidades y reconociendo si hay actividad no autorizada. Para averiguar quién opera tuberías de transmisión en su zona, visite el Sistema Nacional de Mapas de Tuberías en www.npms.phmsa.dot.gov.

La seguridad de las tuberías

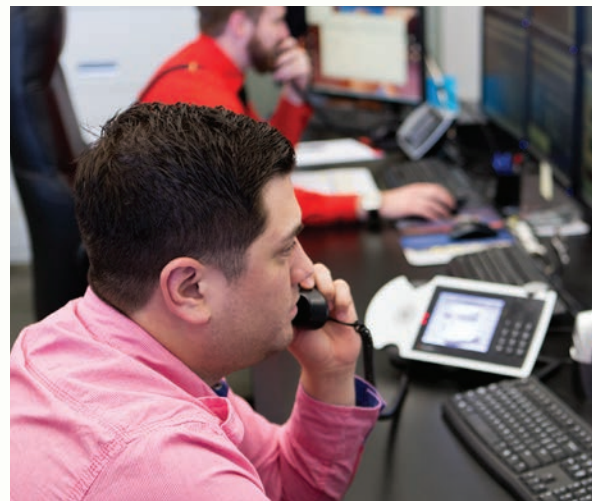
Realizamos pruebas y mantenimiento periódicos a nuestras tuberías usando dispositivos de limpieza, herramientas de diagnóstico y protección catódica. Patrullamos regularmente, tanto por tierra como por aire, nuestras rutas para garantizar la seguridad y la integridad de nuestras líneas. Para conservar la seguridad de nuestro sistema y de las personas a su alrededor, monitoreamos las operaciones de las tuberías las 24 horas del día, los 365 días del año.

Medidas especiales de protección

Ciertas tuberías son designadas como de "Áreas de altas consecuencias" (High Consequence Areas, HCA) debido a su ubicación en áreas de mucha población o con ecosistemas frágiles. En conformidad con las normas, hemos desarrollado e implementado por escrito un Programa de Gestión de Integridad que trata los riesgos de ciertos segmentos de tuberías. Se realizan evaluaciones iniciales y periódicas para identificar y analizar las amenazas potenciales a nuestras tuberías. Se corrigen todos los defectos significativos detectados y la compañía monitorea la eficacia del programa para que se puedan reconocer e implementar las modificaciones.

En el derecho de paso




El derecho de paso provee un acceso limitado y permanente a una propiedad privada para permitirnos operar, inspeccionar, reparar, mantener y proteger nuestra tubería. El derecho de paso se debe mantener libre de estructuras y otras obstrucciones. Los dueños de la propiedad no deben excavar, plantar, colocar o construir nada sobre el derecho de paso sin llamar primero al 811. Nuestro personal tiene que indicar la tubería, colocar estacas en el paso y explicarle a usted nuestras directivas para el desarrollo de la propiedad.





Pipelines are typically made of steel, covered with a protective coating and buried several feet underground. For your safety, markers are used to indicate the approximate location of pipelines. The markers contain the name of the pipeline operator and emergency contact information. Keep in mind that pipelines may not follow a straight line between markers nor do markers indicate the exact location and depth of the pipeline.

Leaks from pipelines are unusual, but we want you to know what to do in the unlikely event one occurs. The table below describes the types of products transported by our pipelines. Refer to the Contact page to find out which products may be transported in your area. You may be able to recognize a leak by the following signs:

	Natural Gas	Natural Gas Liquids (Butane, Ethane, Propane)	Petroleum (Crude Oil, Gasoline, Diesel, Jet Fuel, Kerosene)	Hydrogen Sulfide (H ₂ S)
By Sight 	<ul style="list-style-type: none">• Dust blowing from a hole in the ground.• Continuous bubbling in wet or flooded areas.• Dead or discolored vegetation in a green area.• Flames, if a leak has ignited.	<ul style="list-style-type: none">• Dust blowing from a hole in the ground.• Continuous bubbling in wet or flooded areas.• Dead or discolored vegetation in a green area.• Flames, if a leak has ignited.• Ice around a leak.• Vapor cloud or mist.	<ul style="list-style-type: none">• Pool of liquid on the ground.• Rainbow sheen on the water.• Continuous bubbling in wet or flooded areas.• Ice around a leak.• Vapor cloud or mist.• Flames, if a leak has ignited.• Dead or discolored vegetation in a green area.	<ul style="list-style-type: none">• Dust blowing from a hole in the ground.• Continuous bubbling in wet or flooded areas.• Dead or discolored vegetation in a green area.• Flames, if a leak has ignited.
By Sound 	<ul style="list-style-type: none">• Blowing or hissing sound.	<ul style="list-style-type: none">• Blowing or hissing sound.	<ul style="list-style-type: none">• Blowing or hissing sound.	<ul style="list-style-type: none">• Blowing or hissing sound.
By Smell 	<ul style="list-style-type: none">• An unusual smell or gaseous odor.• Odorless unless mercaptan, a chemical odorant, is added to give it a distinctive smell.	<ul style="list-style-type: none">• An unusual smell or gaseous odor.• Odorless unless mercaptan, a chemical odorant, is added to give it a distinctive smell.	<ul style="list-style-type: none">• An unusual smell or gaseous odor.	<ul style="list-style-type: none">• Foul sulfur odor, similar to rotten eggs.• H₂S exposure may result in asphyxiation (suffocation) and prolonged exposure to low concentrations can deaden the sense of smell.

CONTACT

KNOW




RECOGNIZE

RESPOND



Las tuberías son típicamente de acero, tienen un revestimiento protector y se entierran a varios pies. Para su seguridad, la ubicación aproximada de las tuberías se indica con señales. Las señales contienen el nombre del operador de la tubería e información sobre a quién contactar en caso de emergencia. Recuerde que la tubería quizá no siga una línea recta entre una señal y otra o quizá las señales no indiquen la ubicación y la profundidad exactas de la tubería.

Las fugas de tuberías son poco comunes pero queremos que sepa qué hacer si se produce este evento poco probable. El cuadro de abajo describe los tipos de productos que nuestras tuberías transportan. Consulte la página de Contacto para averiguar cuáles productos pueden ser transportados en su zona. Es posible que reconozca una fuga por las siguientes señales:

	Gas Natural	Líquidos de Gas Natural (Butano, Etano, Propano)	Petróleo (Petróleo crudo, Gasolina, Diesel, Combustible pesado, Kerosén)	Sulfuro de Hidrógeno (H ₂ S)
Por la vista 	<ul style="list-style-type: none"> • Polvo que vuela de un orificio en la tierra. • Burbujeo continuo en áreas húmedas o inundadas. • Vegetación muerta o descolorida en un área verde. • Llamas, si la fuga se encendió. 	<ul style="list-style-type: none"> • Polvo que vuela de un orificio en la tierra. • Burbujeo continuo en áreas húmedas o inundadas. • Vegetación muerta o descolorida en un área verde. • Llamas, si la fuga se encendió. • Hielo alrededor de una fuga. • Una nube de vapor o neblina. 	<ul style="list-style-type: none"> • Charco de líquido en el suelo. • Mancha de brillo policromo en el agua. • Burbujeo continuo en áreas húmedas o inundadas. • Hielo alrededor de una fuga. • Una nube de vapor o neblina. • Llamas, si la fuga se encendió. • Vegetación muerta o descolorida en un área verde. 	<ul style="list-style-type: none"> • Polvo que vuela de un orificio en la tierra. • Burbujeo continuo en áreas húmedas o inundadas. • Vegetación muerta o descolorida en un área verde. • Llamas, si la fuga se encendió.
Por el sonido 	<ul style="list-style-type: none"> • Sonido de soplido o silbido. 	<ul style="list-style-type: none"> • Sonido de soplido o silbido. 	<ul style="list-style-type: none"> • Sonido de soplido o silbido. 	<ul style="list-style-type: none"> • Sonido de soplido o silbido.
Por el olfato 	<ul style="list-style-type: none"> • Un olor inusual u olor a gas. • Es inodoro a menos que se agregue mercaptano, un odorante químico, para darle un olor característico. 	<ul style="list-style-type: none"> • Un olor inusual u olor a gas. • Es inodoro a menos que se agregue mercaptano, un odorante químico, para darle un olor característico. 	<ul style="list-style-type: none"> • Un olor inusual u olor a gas. 	<ul style="list-style-type: none"> • Olor desagradable a azufre, similar a huevos podridos. • La exposición al H₂S puede causar asfixia (sofocación) y la exposición prolongada a bajas concentraciones puede reducir el sentido del olfato.



**Know what's below.
Call before you dig.**

Don't ever assume you know where the underground utilities are located.

One of the greatest single challenges to safe pipeline operations is the accidental damage caused by excavation. In accordance with state and federal guidelines, a damage prevention program has been established to prevent damage to our pipelines from excavation activities, using non-mechanical or mechanical equipment or explosives to move earth, rock or other material below existing grade. Laws vary by state, but most require a call to 811 between 48 to 72 hours before you plan to dig. Your local One-Call Center will let you know if there are any buried utilities in the area, and the utility companies will be notified to identify and clearly mark the location of their lines at no cost to you.



ALWAYS CALL 811 BEFORE YOU DIG.



WAIT THE REQUIRED AMOUNT OF TIME.



RESPECT THE MARKS.



DIG WITH CARE.









If you should happen to strike the pipeline while working in the area, it is important that you phone us immediately. Even seemingly minor damage, such as a dent or chipped pipeline coating, could result in a future leak if not promptly repaired.

What should I do if I suspect a leak?

- Leave the area immediately on foot and warn others to stay away.
- Abandon any equipment being used in or near the area.
- Avoid any open flame or other sources of ignition.
- Call 911 or local law enforcement from a safe location.
- Notify the pipeline company immediately.
- Do not attempt to extinguish a pipeline fire.
- Do not attempt to operate pipeline valves.

Wait for the site to be marked. Marking could be either by paint, flags or stakes.

APWA Color Code

-  Proposed excavation
-  Temporary survey markings
-  Electric power lines, cables, conduit and lighting cables
-  Gas, oil, steam, petroleum or gaseous materials
-  Communication, alarm or signal lines, cables or conduit
-  Potable water
-  Reclaimed water, irrigation and slurry lines
-  Sewers and drain lines

CONTACT

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Determina lo que está **bajo tierra.**
Llama antes de excavar.

Nunca suponga que sabe dónde están los servicios públicos subterráneos.

Uno de los retos más grandes a las operaciones seguras de las tuberías es el daño accidental causado por una excavación. De acuerdo con las pautas estatales y federales, se ha implementado un programa de prevención de daños para prevenir que nuestras tuberías sean dañadas durante actividades de excavaciones, donde se emplean equipos mecánicos y no mecánicos o explosivos para mover tierra, piedra o algún otro tipo de material debajo de la superficie actual. Las leyes varían de estado a estado, pero la mayoría de los estados requieren que haga una llamada al 811 de 48 a 72 horas antes de cuando piensa excavar. Su centro One-Call local le informará si hay algún servicio público enterrado en el área, y se notificará a las compañías de servicios públicos para que identifiquen y señalen claramente la ubicación de sus líneas sin costo para usted.



SIEMPRE LLAME 811 ANTES DE EXCAVAR.



ESPERE LA CANTIDAD DE TIEMPO EXIGIDA.



RESPETE LAS SEÑALES.



EXCAVE CON CUIDADO.

Si llegara a golpear la tubería mientras trabaja en el área, es importante que nos llame por teléfono inmediatamente. Incluso los daños que parecen mínimos, como una abolladura o el raspón del recubrimiento de la tubería, podrían causar una fuga en el futuro si no se reparan rápidamente.

¿Qué debe hacer si sospecha que hay una fuga?

- Retírese inmediatamente del área a pie e indique a otras personas que se mantengan alejadas.
- Abandone cualquier equipo que esté utilizando en el área o cerca de ella.
- Evite llamas abiertas u otras fuentes de ignición.
- Llame al 911 ó a la policía local desde un lugar seguro.
- Notifique inmediatamente a la compañía de la tubería.
- No intente extinguir un incendio de una tubería.
- No intente manipular las válvulas de la tubería.

Aguarde la marcación del sitio. Las marcas pueden ser con pintura, banderas o estacas.

Código de colores de APWA

- Excavación propuesta
- Señales temporales de relevos topográficos
- Líneas de energía eléctrica, cables, conductos y cables de iluminación
- Gas, aceite, vapor, petróleo o materiales gaseosos
- Comunicación, líneas de señales o de alarma, cables o conductos
- Agua potable
- Agua recuperada, líneas de irrigación
- Líneas de drenaje y alcantarillado

Energy Transfer se dedica principalmente al transporte, almacenamiento, colección, procesamiento, compresión y tratamiento de gas natural, y al transporte, fraccionamiento y almacenamiento de líquidos de gas natural (LGN). Energy Transfer, una compañía energética basada en Texas, fundada en 1995 como una pequeña compañía interestatal de tuberías de gas natural, es ahora una de las compañías de transporte de gas natural y líquidos de gas natural de mayor crecimiento en el país. Somos propietarios y operamos un diversificado portafolio de bienes energéticos, que incluyen aproximadamente 86,000 millas de tuberías de gas natural de corriente media, inter e intraestatales y tuberías de LGN.

Aproximadamente dos tercios del gas natural y de los productos del petróleo que usamos a diario se transportan a través de tuberías subterráneas, convirtiéndose en una parte esencial de la infraestructura del país. Los estudios han confirmado que las tuberías son la manera más segura para transportar energía en los Estados Unidos.

Usted está recibiendo esta información porque es posible que Energy Transfer, o uno de sus socios, opere o realice el mantenimiento de una tubería en su comunidad. Le pedimos que repase la siguiente información de seguridad importante, lo alentamos a que la comparta con otros y la conserve para consulta en el futuro.



**Know what's below.
Call before you dig.**

**Please share this important safety
information with others - anyone who
plans to dig.**

**Sírvase compartir esta importante
información de seguridad con los demás
o con cualquiera que tenga planeado
hacer trabajos de excavación.**

Si desea obtener más información, visítenos en energytransfer.com o llame a nuestro número que no es para emergencias al 877-795-7271.



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Exhibit SPLP JSZ-5

SPLP
JSZ-5

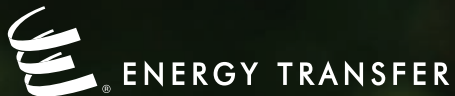
Know, Recognize, Respond

***ARE YOU PREPARED TO RESPOND
TO A **PIPELINE EMERGENCY?*****

IMPORTANT INFORMATION ABOUT PIPELINE SAFETY IN YOUR COMMUNITY.



**Know what's below.
Call before you dig.**



Energy Transfer Partners, a Texas-based energy company founded in 1995 as a small intrastate natural gas pipeline company, is now one of the largest and most diversified master limited partnerships in the United States. Strategically positioned in all of the major U.S. production basins, the company owns and operates a geographically diverse portfolio of energy assets, including midstream, intrastate and interstate transportation and storage assets. Energy Transfer operates approximately 86,000 miles of natural gas, crude oil, natural gas liquids and refined products pipelines and related facilities, including terminalling, storage, fractionation, blending and various acquisition and marketing assets in 38 states.

Approximately two-thirds of the natural gas and petroleum products we use every day are transported through underground pipelines – making them an essential part of the nation's infrastructure. Studies have confirmed that pipelines are the safest way to transport energy in the United States.

You are receiving this information because Energy Transfer, or one of its affiliates, may operate or maintain a pipeline in your community. We ask that you review the following important safety information, encourage you to share it with others and retain for future reference.



If you would like more information, please visit us at energytransfer.com or call our non-emergency number at 877-795-7271.



**Know what's below.
Call before you dig.**

Don't ever assume you know where the underground utilities are located.

One of the greatest single challenges to safe pipeline operations is the accidental damage caused by excavation. In accordance with state and federal guidelines, a damage prevention program has been established to prevent damage to our pipelines from excavation activities, using non-mechanical or mechanical equipment or explosives to move earth, rock or other material below existing grade. Laws vary by state, but most require a call to 811 between 48 to 72 hours before you plan to dig. Your local One-Call Center will let you know if there are any buried utilities in the area, and the utility companies will be notified to identify and clearly mark the location of their lines at no cost to you.



ALWAYS CALL 811 BEFORE YOU DIG.



WAIT THE REQUIRED AMOUNT OF TIME.



RESPECT THE MARKS.



DIG WITH CARE.

If you should happen to strike the pipeline while working in the area, it is important that you phone us immediately. Even seemingly minor damage, such as a dent or chipped pipeline coating, could result in a future leak if not promptly repaired.

National Pipeline Mapping System








Everyone can contribute to safety and security by knowing where pipelines are in their community and recognizing unauthorized activity. To find out who operates transmission pipelines in your area, visit the National Pipeline Mapping System at www.npms.phmsa.dot.gov.

Pipeline Safety

Our pipelines are regularly tested and maintained using cleaning devices, diagnostic tools and cathodic protection. We perform regular patrols, both on the ground and in the air, along our routes to ensure the security and integrity of our lines. For the safety of our system and for the people around it, we monitor pipeline operations 24 hours a day, 365 days a year.

Wait for the site to be marked. Marking could be either by paint, flags or stakes.

APWA Color Code

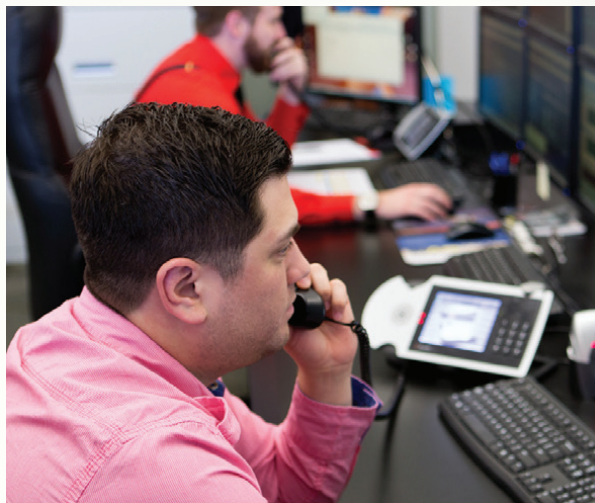
-  Proposed excavation
-  Temporary survey markings
-  Electric power lines, cables, conduit and lighting cables
-  Gas, oil, steam, petroleum or gaseous materials
-  Communication, alarm or signal lines, cables or conduit
-  Potable water
-  Reclaimed water, irrigation and slurry lines
-  Sewers and drain lines

Special Protective Measures

Certain pipelines are designated as being in “High Consequence Areas” (HCA) due to their location in high population or environmentally sensitive areas. In accordance with regulations, we have developed and implemented a written Integrity Management Program that addresses the risks on certain pipeline segments. Baseline and periodic assessments are conducted to identify and evaluate potential threats to our pipelines. Any significant defects discovered are remediated and the company monitors program effectiveness so that modifications can be recognized and implemented.

Along the Right-of-Way

Rights-of-way provide a permanent, limited access to privately owned property to enable us to operate, inspect, repair, maintain and protect our pipeline. Rights-of-way must be kept free of structures and other obstructions. Property owners should not dig, plant, place or build anything on the right-of-way without first calling 811 and having our personnel mark the pipeline, stake the easement and explain our property development guidelines to you.



CONTACT

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RECOGNIZE




RESPOND

Product Characteristics

	Characteristics	Hazards
Natural Gas	<ul style="list-style-type: none"> • Lighter than air. • Dissipates rapidly into air. • Odorless, tasteless and colorless. • May contain hydrogen sulfide (H₂S). 	Natural Gas is flammable and can ignite when it comes into contact with an ignition source. In confined spaces, exposure can cause dizziness or asphyxiation and may be toxic, if inhaled at high concentrations.
Natural Gas Liquids (Butane, Ethane, Propane)	<ul style="list-style-type: none"> • Initially heavier than air and will spread along ground and collect in low or confined areas. • Vapors may travel to source of ignition and flash back. • An unusual smell or gaseous odor. • Odorless unless mercaptan, a chemical odorant, is added to give it a distinctive smell. 	NGL is flammable and can ignite when it comes into contact with an ignition source. Exposure can cause moderate irritation including headaches and dizziness. NGL can also contain H ₂ S.
Petroleum (Crude Oil, Gasoline, Diesel, Jet Fuel, Kerosene)	<ul style="list-style-type: none"> • Initially heavier than air and will spread along ground and collect in low or confined areas. • Vapors may travel to source of ignition and flash back. • An unusual smell or gaseous odor. 	Petroleum is flammable and can ignite when it comes into contact with an ignition source. Exposure can cause skin irritation, dizziness or asphyxiation and may be toxic, if inhaled at high concentrations. Fire may produce irritating and/or toxic gases. Requires use of positive pressure self-contained breathing apparatus (SCBA) or supplied air. Runoff may cause pollution or other hazards.
Hydrogen Sulfide (H ₂ S)	<ul style="list-style-type: none"> • Initially heavier than air and will spread along ground and collect in low or confined areas. • Colorless gas that is an irritant. • Foul sulfur odor, similar to rotten eggs. • Odorless unless mercaptan, a chemical odorant, is added to give it a distinctive smell. 	H ₂ S is flammable and can ignite when it comes into contact with an ignition source. Exposure can effect both oxygen utilization and the central nervous system of the human body. H ₂ S exposure may result in asphyxiation. The severity of health effects can vary depending on the level and duration of exposure however, prolonged exposure to low concentrations can deaden the sense of smell. Requires use of positive pressure SCBA or supplied air.

Pipelines are typically made of steel, covered with a protective coating and buried several feet underground. For your safety, markers are used to indicate the approximate location of pipelines. The markers contain the name of the pipeline operator and emergency contact information. Keep in mind that pipelines may not follow a straight line between markers nor do markers indicate the exact location and depth of the pipeline.

Leaks from pipelines are unusual, but we want you to know what to do in the unlikely event one occurs. The table below describes the types of products transported by our pipelines. Refer to the Contact page to find out which products may be transported in your area. You may be able to recognize a leak by the following signs:

	Natural Gas	Natural Gas Liquids (Butane, Ethane, Propane)	Petroleum (Crude Oil, Gasoline, Diesel, Jet Fuel, Kerosene)	Hydrogen Sulfide (H ₂ S)
By Sight 	<ul style="list-style-type: none"> Dust blowing from a hole in the ground. Continuous bubbling in wet or flooded areas. Dead or discolored vegetation in a green area. Flames, if a leak has ignited. 	<ul style="list-style-type: none"> Dust blowing from a hole in the ground. Continuous bubbling in wet or flooded areas. Dead or discolored vegetation in a green area. Flames, if a leak has ignited. Ice around a leak. Vapor cloud or mist. 	<ul style="list-style-type: none"> Pool of liquid on the ground. Rainbow sheen on the water. Continuous bubbling in wet or flooded areas. Ice around a leak. Vapor cloud or mist. Flames, if a leak has ignited. Dead or discolored vegetation in a green area. 	<ul style="list-style-type: none"> Dust blowing from a hole in the ground. Continuous bubbling in wet or flooded areas. Dead or discolored vegetation in a green area. Flames, if a leak has ignited.
By Sound 	<ul style="list-style-type: none"> Blowing or hissing sound. 	<ul style="list-style-type: none"> Blowing or hissing sound. 	<ul style="list-style-type: none"> Blowing or hissing sound. 	<ul style="list-style-type: none"> Blowing or hissing sound.
By Smell 	<ul style="list-style-type: none"> An unusual smell or gaseous odor. Odorless unless mercaptan, a chemical odorant, is added to give it a distinctive smell. 	<ul style="list-style-type: none"> An unusual smell or gaseous odor. Odorless unless mercaptan, a chemical odorant, is added to give it a distinctive smell. 	<ul style="list-style-type: none"> An unusual smell or gaseous odor. 	<ul style="list-style-type: none"> Foul sulfur odor, similar to rotten eggs. H₂S exposure may result in asphyxiation (suffocation) and prolonged exposure to low concentrations can deaden the sense of smell.



***CONTACT THE PIPELINE COMPANY IMMEDIATELY, USING THE EMERGENCY CONTACT
INFORMATION LOCATED ON THE PIPELINE MARKER.***

Your Response:

Emergency Preparedness

When managing an emergency, protecting lives and the environment requires a concerted team effort. We strive to build partnerships with emergency responders and public officials in order to share resources, establish important lines of communication and provide education needed to safely respond to a pipeline related emergency. Our intent is to exchange information, evaluate potential emergency scenarios and discuss how to coordinate efforts. Emergency responders who are knowledgeable about the hazards and risks of pipeline operations are better able to act quickly to protect life, property and the environment. You will likely be the first on the scene of a pipeline incident – even before the pipeline company personnel.

Responding to an Emergency

- Park vehicles a safe distance from the incident and turn off engines. Approach the incident from upwind, uphill.
- Isolate the area. Restrict entry to trained emergency response and company personnel.
- Call 911 and the pipeline company immediately, using the emergency contact information located on the pipeline marker.
- Eliminate ignition sources. Potential ignition sources include open flames, such as pilot lights or matches. Other sources include sparks from tools, doorbells, electric motors and switches, static electricity, vehicle engines, radios and cell phones.
- Don't attempt to extinguish a pipeline fire with water or other chemicals. Doing so could prolong the emergency. Use spray to protect surrounding exposure. Wet down exposed flammable areas in the vicinity and extinguish perimeter fires.
- Don't attempt to operate valves or equipment. Shutting off the flow of product may actually create an even greater hazard. Rely on pipeline personnel – they are trained in the proper procedures.

Our Response:

In the event that an emergency occurs, company personnel will be dispatched immediately upon notification of a potential emergency. Response times will vary based on time of day, weather conditions, available personnel and incident location. While personnel are en route, please remain in contact with the pipeline company. We will provide information to local public safety officials to aid in their response to the emergency.

CONTINUED ON BACK...

CONTACT

KNOW

RECOGNIZE

RESPOND



Our Response:

Our control center will want to know:

- Caller's name / title / organization
- Caller's phone number(s) and phone number of person to call back (i.e. cell phone at site)
- Emergency information
- Location, include city and state
- What you see
- What you hear
- What you smell

Don't wait for an emergency to contact us. Please notify us anytime you have questions or would like more information concerning:

- Pipeline safety
- Emergency response plans
- Drills, table-top exercises, facility tours



DON'T ATTEMPT TO OPERATE VALVES OR EQUIPMENT. SHUTTING OFF THE FLOW OF PRODUCT MAY CREATE AN EVEN GREATER HAZARD.



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Management of Depth of Cover and Evaluation

Standard Operating Procedures

Applicable to Hazardous Liquids Pipelines and Related Facilities

Code Reference :	Procedure No.: HLI.24	
49 CFR: 195.248, 195.401	Effective Date: 05/01/19	Page 1 of 15

1.0 Procedure Description

This Standard Operating Procedure (SOP) outlines activities directed at the management of depth of cover for the purpose of minimizing the possibility of damage to pipelines as a result of shallow cover or exposure.

2.0 Scope

This SOP establishes depth of cover guidelines with minimum requirements for the inspection, remediation, and monitoring of shallow and exposed pipe conditions, including unintended spans.



NOTE: For additional guidance and inspection requirements of river/waterway approaches and river/waterway crossings requiring Contract Assisted River Crossing Survey (CARCS), refer to SOP [HLI.21 Inspection of ROW – & Crossings Under Navigable Waters](#).

3.0 Applicability

This SOP applies to any regulated pipe segment where shallow cover and pipeline exposures can potentially occur.

4.0 Frequency

As required: Perform depth of cover surveys on regulated pipeline segments to determine pipe segments with existing shallow cover, exposures, or areas suspected of becoming shallow or exposed due to a threat from a weather, natural, or outside force.

As required at least once each calendar year at intervals not to exceed 15 months: Inspect all pipeline segments classified as **exposed**.

As required at least once every two calendar years, not to exceed 27 months: Inspect all pipeline segments classified as **elevated**.

As required at least once every three calendar years, not to exceed 39 months: Inspect pipeline segments classified as **monitored**.

As required: Develop a remediation action plan for pipeline segments classified as **immediate**.

As required: Inspect pipeline segments classified as **remediated**.

Management of Depth of Cover and Evaluation

Code Reference :	Procedure No.: HLI.24	
49 CFR: 195.248, 195.401	Effective Date: 05/01/19	Page 2 of 15

5.0 Governance

The table below identifies responsibility, accountability, and authority for this SOP.

Function	Responsibility	Accountability	Authority
Managing Depth of Cover	Operations Personnel	Operations Manager	Director of Operations
Locating Shallow and Exposed Company Pipelines	Operations Personnel	Operations Manager	Director of Operations
Site Evaluations	Operations Personnel	Operations Manager	Director of Operations
Pipe Inspections	Operations Personnel	Operations Manager	Director of Operations
Develop Remedial Action Plans	Operations Personnel and/or Pipeline Operations Specialist	Operations Manager	Director of Operations
Implement Remedial Action Plan	Operations Personnel and/or Pipeline Operations Specialist	Operations Manager	Director of Operations
Aerial Patrol Observations & Reporting	Operator Performing Patrol	Operations Manager	Director of Operations
Legal Action and Right-of-Way	Right-of-Way Representative	Right-of-Way Representative	Manager Right-of-Way

6.0 Terms & Definitions

Terms associated with this SOP and their definitions follow in the table below. For general terms, refer to SOP [HLA.01 Glossary and Acronyms](#).

Terms	Definitions
Exposed Pipeline	A pipe segment which was designed and constructed according to the pipeline safety regulations in place at the time of construction, with sufficient cover to minimize damage by outside or natural forces, but which has experienced deterioration in the amount of cover originally provided, resulting in exposure of the pipe to the atmosphere.
Shallow Pipeline	A pipe segment which was designed and constructed according to the pipeline safety regulations in place at the time of construction, with sufficient cover to minimize damage by outside or natural forces, but which has experienced

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Terms	Definitions
	deterioration in the amount of cover originally provided.
Unintended Span	A pipe segment classified as Exposed and due to additional loss of surrounding soil has resulted in an unsupported span. (360° exposure)
Immediate Classification	A Shallow or Exposed Pipeline Segment such that without further intervention, damage to the pipeline is likely and remediation is warranted.
Elevated Classification	A Shallow pipeline segment in which an evaluation indicates a threat of becoming Exposed and due to the additional loss of cover, damage from outside or natural forces IS possible. Such a condition requires continued monitoring with no immediate action required.
Monitored Classification	A Shallow Pipeline Segment in which an evaluation indicates that the loss of cover does NOT increase the potential for damage or require remedial action to re-cover the pipe segment. Such a condition requires continued monitoring with no immediate action required.
Remediated	A Shallow or Exposed pipeline segment in which a remediation plan has been completed and the threat of a natural or outside force has been removed by either line lowering, additional soil, or structural protection.
Remediation Plan	A repair or mitigation activity used to reduce the likelihood of failure of the component being examined.

7.0

Management of Depth of Cover and Evaluation

This SOP contains the following sections:

- Depth of Cover Assessment – 7.1
- Location Description with Public Notification – 7.2
- Evaluation of Depth of Cover – 7.3
- Evaluation of Shallow Cover – 7.4
- Evaluation of Cultivated Lands with Shallow Cover – 7.5
- Evaluation of Exposed Pipeline Segments – 7.6
- Evaluation of Unintended Span – 7.7
- Monitored Conditions – 7.8
- Elevated Conditions – 7.9
- Immediate Conditions – 7.10
- Remedial Action Plans – 7.11
- Remediated Conditions – 7.12
- Reporting Requirements – 7.13

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7.1 Operations Personnel uses the following steps to identify pipe segments with shallow cover and exposed conditions.

Depth of Cover Assessment

Step	Activity
1	REVIEW collected depth of cover data. Data sources should include but not limited to the following: <ul style="list-style-type: none"> • 3rd Party Depth of Cover Survey • Construction As-Built • Pipe Inspections • Line locates/probing • Line Crossings • Right-of-Way Reclamation • Encroachments • CARC Survey • River Approach Inspection • Coupling locating
2	DETERMINE areas needing a depth of cover survey performed.
3	IDENTIFY and DOCUMENT pipe segments with shallow cover and exposed conditions from collected data and depth of cover surveys.

7.2 Operations Personnel, upon initial investigation of pipe segments with shallow cover and or exposures will follow the steps below.

Location Description with Public Notification

Step	Activity
1	COLLECT the following data on shallow and exposed pipe segments and document in the electronic Shallow Cover Database <ul style="list-style-type: none"> • Pipeline name • Begin Station and End Station Range • GPS coordinates from Pipeline Mapping System or approved handheld device • Upstream and Downstream Road Crossings • Area Pictures (Facing North, East, South, West) • Land Owner name, address, phone number • If applicable, Farmer/Tenant name, address, phone number • Legal Land Description (e.g. Section/Township/Range/Survey)

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Step	Activity
	<ul style="list-style-type: none"> County
2	WORK with Right-of-Way Department and make NOTIFICATION attempts to the Affected Public concerning shallow and exposed pipe segments. Refer to SOP HLI.40 Public Awareness Plan .
3	RECORD and DOCUMENT on form I.40A Public Awareness Contact Data
4	ATTACH a copy of form I.40A Public Awareness Contact Data to the electronic Shallow Cover Database Record

7.3 Evaluation of Depth of Cover

Operations Personnel, will evaluate pipe segments with depth of cover deficiencies by collecting data on the pipe segments affected and the surrounding area. To evaluate and classify pipe segments, use the steps below.

Step	Activity
1	COLLECT data on shallow and exposed pipe segments to allow for a potential damage evaluation. Data should include the following: <ul style="list-style-type: none"> Land use Potential for third party damage Potential for loading Potential for additional loss of cover/erosion Inadequate pipe support Forces – Outside and Natural Interacting threats (anomalies, low potentials, etc..) Pipe properties (MOP, seam type, SMYS, w.t., O.D., etc..) Water turbidity Coating condition, if applicable Soil Type Slope Angle Within an Identified HCA limit Distance from structures or roadways Extent of inadequate cover



NOTE: UTILIZE information from a variety of sources, including:

- Construction activities
- Landowner notifications
- Depth of cover surveys
- ILI data
- GReporter Database
- O&M Review
- Encroachments

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- Corrosion surveys
- Leakage surveys

Make note of any pipe segments with shallow cover and exposures located on cultivated land, and in addition, follow Section 7.5 – Evaluation of Cultivated Lands with Shallow Cover.

Step	Activity
2	In creeks, rivers, waterways, drainage ditches, wet-lands, and bar ditches associated with shallow or exposed pipe segments DETERMINE the minimum amount of cover between the top of the pipeline and the water to soil interface.



WARNING: If a condition is encountered that results in doubt as to the safety of proceeding with obtaining depths for a creek, river, waterway, drainage ditch, wet-land, or bar ditch, consult the Operations Manager.

Step	Activity
3	DETERMINE the expected maximum depth of the water level. CONSIDER future changes in the waterway bottom or route (migrating head-cut, severe stream bank erosion, reels, etc.), allowing for further erosion and scour.
4	RECORD all information above using the electronic Shallow Cover Database Record
5	COMPLETE an electronic Pipe Inspection Report upon initial discovery of pipeline segments designed for below grade service exposed to the atmosphere. Refer to SOP HLD.35 Pipe Inspections and Evaluations . Exclude pipeline segments under flowing turbid (cloudy, opaque, or thick with suspended matter) water, and where the water cannot be diverted safely.

7.4 Evaluation of Shallow Cover

Operations Personnel, will evaluate Shallow Cover as follows:

Step	Activity
1	USE the data collected in Section 7.3 - Evaluation of Depth of Cover and DETERMINE the classification.
2	If DETERMINED Immediate, DEVELOP a remediation action plan.
3	ATTACH a copy of the remediation plan to the electronic Shallow Cover Database Record.
4	COMPLETE remediation plan promptly.
5	If immediate remediation is NOT necessary, schedule next inspection in Electronic Maintenance System per classification definition.
6	SUBMIT electronic Shallow Cover Database Record for approval.

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7.5 Evaluation of Cultivated Lands with Shallow Cover

Operations Personnel will evaluate cultivated lands with shallow cover as follows.

Step	Activity
1	<p>In cultivated lands INCORPORATE the information below into the evaluation:</p> <ul style="list-style-type: none"> • VERIFY external loading farming equipment does NOT exceed the safe limits. Refer to SOP HLI.27 Abnormal Loading Evaluation for Equipment, Highway & Railroad Crossing Type Loads. • ADVISE the entity responsible for operation and maintenance of the land of the company's damage prevention program. • DISCUSS farming methods and equipment utilized with the landowner/tenant/farmer. • DETERMINE maximum anticipated plow depth.



NOTE: See Appendix B for typical farm data regarding cultivated fields.

Step	Activity
2	PROVIDE a minimum of 12 inches of cover between the maximum planned plow depth and the top of the pipeline in cultivated areas.
3	If DETERMINED the minimum distance between plow depth and the top of the pipeline cannot be provided, Classify as Immediate and DEVELOP a remediation action plan.
4	NOTIFY the Right-of-Way Department to advise them of the condition and involve them as necessary in the remediation plan.
5	ATTACH a copy of the remediation plan to the electronic Shallow Cover Database Record.
6	COMPLETE remediation plan promptly
7	If immediate remediation is NOT necessary, schedule next inspection in Electronic Maintenance System per classification definition.
8	SUBMIT electronic Shallow Cover Database Record for approval.

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7.6

Evaluation of Exposed Pipeline Segments

Operations Personnel, will evaluate exposed pipe segments as follows:

Step	Activity
1	USE the data collected in Section 7.3 - Evaluation of Depth of Cover and DETERMINE the classification.
2	PERFORM an initial Atmospheric Pipe Inspection. Refer to SOP HL.D.44 Atmospheric Pipe Inspection . Reschedule pipeline segments under flowing turbid (cloudy, opaque, or thick with suspended matter) water, and where the water cannot be diverted safely to a time when water levels are lower.
3	If DETERMINED the pipe segment will remain exposed for any length of time, consider and implement one or more of the following: <ul style="list-style-type: none"> • Install a compatible and approved atmospheric coating over the existing underground coating. • Recoat the pipe segment with an approved coating system. Consider the conditions and the need to install both a below ground and above ground system. • Replace the underground coating systems with an atmospheric coating system. Refer to <i>Engineering Standard Volume HL6 – Corrosion Control</i> for the current procedure regarding above and below ground coating systems.
4	If DETERMINED Immediate, DEVELOP a remediation action plan.
5	DOCUMENT and RECORD remediation plan on form D.40.A Corrosion Control Remedial Action Report. Refer to SOP HLD.40 Corrosion Control Remedial Action .
6	ATTACH a copy of D.40.A Corrosion Control Remedial Action Report to the electronic Shallow Cover Database Record.
7	COMPLETE remediation plan promptly
8	If immediate remediation is NOT necessary, schedule next inspection in Electronic Maintenance System per classification definition.
9	SUBMIT electronic Shallow Cover Database Record for approval.



NOTE: In addition to inspections and documentation requirements of this SOP, exposed pipe segments with an atmospheric coating systems are subject to inspection and documentation in accordance with SOP [HLD.44 Atmospheric Pipe Inspections](#)

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7.7

Evaluation of Unintended Span

Operations Personnel, will evaluate Unintended Span pipe segments as follows:

Step	Activity
1	If an exposed pipe segment has become an Unintended Span, DETERMINE if the spanned pipe segment has adequate support upstream and downstream of affected area.
2	CONSULT with the Pipeline Operations Specialist to DETERMINE if pipe segment can remain a span.
3	IF evaluation allows being left a span REFERENCE SOP HLI.25 Aboveground Components / Overhead Crossings for inspection requirements.
4	If DETERMINED Immediate, DEVELOP a remediation action plan.
5	DOCUMENT and RECORD remediation plan on form D.40.A Corrosion Control Remedial Action Report. Refer to SOP HLD.40 Corrosion Control Remedial Action .
6	ATTACH a copy of the D.40.A Corrosion Control Remedial Action Report to the electronic Shallow Cover Database Record.
7	COMPLETE remediation plan promptly
8	SUBMIT electronic Shallow Cover Database Record for approval.

7.8

Monitored Conditions

Operations Personnel, performs the following actions for each monitored condition identified. No remediation is required unless subsequent evaluation determines it to be an immediate condition.

Step	Activity
1	DETERMINE locations for shallow cover or exposed markers based on site specific conditions.
2	VERIFY pipeline identification/location markers are present. MAINTAIN markers and signs until shallow pipeline segment is remediated.
3	CONSIDER installation of warning style pipeline markers at the beginning and end of the shallow or exposed areas on land.
4	INSPECT per Section 4.0 Frequencies or as directed by the Pipeline Operations Specialist or Operations Management to verify the integrity of the segment and evaluate for changes in condition.

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**7.9
Elevated
Conditions** Operations Personnel, performs the following actions for each elevated condition identified. No remediation is required unless subsequent evaluation determines it to be an immediate condition.

Step	Activity
1	DETERMINE locations for shallow cover or exposed markers based on site specific conditions.
2	VERIFY pipeline identification/location markers are present. MAINTAIN markers and signs until shallow pipeline segment is remediated.
3	CONSIDER installation of warning style pipeline markers at the beginning and end of the shallow or exposed areas on land.
4	DETERMINE and form a remedial action plan and SUBMIT into the budget process.
5	ATTACH a copy of the remediation plan to the electronic Shallow Cover Database Record.
6	INSPECT per Section 4.0 Frequencies or as directed by the Pipeline Operations Specialist or Operations Management to verify the integrity of the segment and evaluate for changes in condition until remediate through the budget process.

**7.10
Immediate
Conditions** For each identified Immediate Condition, Operations Personnel, performs the following actions in Section 7.11 Remedial Action Plan. Operations Personnel must consider and implement one or more of the remedial actions described, with the assistance of the Pipeline Operations Specialist or Operations Management. Appropriate remedial measures others than those listed, if required, are subject to company approval.

**7.11
Remedial Action
Plans** Operations Personnel, considers one or more of the remedial actions described in the following sub procedures for each pipeline segment with an Immediate or Elevated condition. Information documented in the remedial plan and in the shallow cover database include:

- Description of the situation
- Inadequate cover evaluation, such as a profile survey
- Remedial Action Plan
- Proposed schedule of submitting into budget
- Inspection interval

**7.11.1
Remediation
Priorities** Operations Personnel, prioritizes plans for remedial action for each shallow or exposed pipeline segment according to the following:

REMEDIAL ACTION PRIORITIZATION

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1. Non-reinforced coupled pipe with unintended spans (360° exposure) with shallow cover extending over over-bends
2. Exposed pipe in cultivated lands
3. Non-reinforced coupled pipe with less than 24 inches of cover extending over over-bends
4. Exposed pipe in bar ditches parallel to roads
5. Pipe with less than 24 inches of cover in cultivated land
6. Pipe with 1 inch to 12 inches of cover in bar ditches parallel to roads (dirt and gravel roads)
7. Exposed pipe in creeks and river crossings
8. Exposed pipe in waterways, drainage ditches and wet-lands
9. Exposed pipe in non-cultivated land
10. Pipe with 1 to 12 inches of cover in creeks, rivers, waterways, drainage ditches and wet-lands.
11. Pipe with less than 24 inches of cover in non-cultivated land
12. Pipe with 12 to 24 inches of cover in creeks, rivers, waterways, drainage ditches, wet-lands, and bar ditches
13. Offshore pipelines with less than 3 feet of cover in water less than 200 feet deep

7.11.1 Negotiation of Plowing Risks

Operations Personnel is responsible for communications of the potential problems associated with plowing.

Step	Activity
1	MEET with the farmer and EXPLAIN the potential problems associated with damage to the pipeline.
2	NEGOTIATE with the farmer to plow at lesser depths.
3	CONTACT Right-of-Way Department and CONSIDER an agreement with the farmer for not cultivating above the pipeline.
4	CONSIDER lowering the pipeline. Refer to SOP HLI.08 Lowering or Raising In-Service Pipelines
5	CONSIDER placing additional cover over the pipelines.



NOTE: If future erosion, other plans to re-contour the field or field drainage is a concern, additional cover may not be a long term solution.

7.11.2 Pipeline Lowering

Operations Personnel is responsible for providing recommendation on lowering the pipeline, if required, to a depth that provides adequate depth of cover, or to a depth that provides sufficient cover in waterways and ditches. Future erosion and scour must be considered. Refer to SOP [HLI.08 Lowering or Raising In-Service Pipelines](#).

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7.11.3 Additional Cover

Operations Personnel, can place additional cover over the pipeline segments. If future erosion, drainage etc. is a concern, additional cover may not be a long term solution.



NOTE: Consider effects of addition weight on certain pipe seams and girth weld types.

7.11.4 Structural Protection

Operations Personnel provides recommendation on installing concrete slabs, mats, or blocks over the pipeline, if required, to achieve a barrier and protection from damage of outside or natural forces.

7.12 Remediated Conditions

Operations Personnel, will evaluate Remediated Conditions as follows:

Step	Activity
1	CONSULT with the Pipeline Operations Specialist to DETERMINE if continued inspections to verify the integrity of the depth of cover and evaluate for changes in condition are needed.
2	INSPECT per Section 4.0 Frequencies or as directed by the Pipeline Operations Specialist.
3	CONSIDER Aerial Patrol to DOCUMENT and RECORD inspections.
4	IF Aerial Patrol is used, ATTACH a copy of the Aerial Patrol report to the electronic Shallow Cover Database Record.

7.13 Reporting Requirements

To fulfill reporting requirements for this SOP, Operations Personnel uses the following steps:

Step	Activity
1	TRACK , at a minimum, the following items in the electronic Shallow Cover database: <ul style="list-style-type: none">• Location Information• Depth of Cover evaluation• Changes from previous inspections• Dates of previous surveys• Who performed the previous surveys• Any problems discovered during previous surveys

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	<ul style="list-style-type: none"> • Remedial actions taken • Remedial actions proposed
2	USE an electronic maintenance system for scheduling and permanently recording each inspection or survey to be done on a uniform recurring basis.
3	RETAIN the results of all surveys and outside consultant investigations for the life of the facility involved.
4	RECORD remediation information in the electronic Shallow Cover database.
5	If applicable, RECORD in electronic Pipe Inspection database.
6	If applicable, RECORD in electronic Corrosion Database

8.0 Documentation Requirements

Record data in electronic database or utilize the following form(s) as applicable:
Electronic maintenance system
Electronic Corrosion Database
Pipeline Inspection Database (GIS Database)
Shallow Cover Database (GIS Database)
I.40A Public Awareness Contact Data Form

9.0 References

[HLA.01 Glossary and Acronyms](#)
[HLD.35 Buried Pipe Inspection](#)
[HLD.40 Corrosion Control Remedial Action](#)
[HLD.44 Atmospheric Pipe Inspections](#)
[HLI.08 Lowering or Raising In-Service Pipelines](#)
[HLI.25 Aboveground Components / Overhead Crossings](#)
[HLI.27 Abnormal Loading Evaluation for Equipment, Highway & Railroad Crossing Type Loads](#)
[HLI.40 Public Awareness Plan](#)
Engineering Standard Volume HL6 – Corrosion Control

Appendix A: OQ Task Requirements

The table below identifies the Operator Qualification (OQ) task requirements.

Function	OQ Task
Underground Pipeline – Locate and Temporary Mark	PLOQ605
Pipeline Patrol	PLOQ701B
Install and Maintain Pipeline Markers	PLOQ703
Visual Inspection for Atmospheric Corrosion	PLOQ417
Visual Inspection of Buried Pipe and Components When Exposed	PLOQ401

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Appendix B: Reference this appendix for typical farm data regarding cultivated fields.
**Cultivated
Fields**

Erosion, leveling, terracing, changes in grade, or changes in land use can reduce the depth of cover above pipelines in cultivated areas where farm equipment could damage the pipeline.

TYPICAL PLOW DEPTHS

The following typical plow depths are based upon discussions with agricultural agencies and farmers and are provided as a general guideline. However, actual depths may vary depending on the type of equipment used, soil conditions, type of crop, and individual farmer preferences. These depths are by no means an absolute limit on plow penetration.

CROP VARIATIONS

Some general differences in plow depth exist based upon the type of crops being planted. For instance, a rice farmer may not want to plow too deep so as to avoid breaking up the impervious soil layer that holds the water in the field; whereas, a cotton farmer may want to plow deep enough to break up a water holding layer. The following list of typical plow depths may be useful:

<u>Crop</u>	<u>Typical Maximum Plow Depth</u>
Cotton	18"
Wheat	12"
Peanuts	12"
Rice	10"
Soybeans	8"
Potatoes	8"
Milo	6"
Corn	6"
Grass	6"

PLOW METHODS

Provided below is a general outline of the frequency of use for various plowing methods and associated plowing depths.

Plow Method	Plow Depth	Frequency
Typical Plowing	< 12"	87%
Subsoiling*	12" – 18"	10%
Deep Subsoiling*	18" – 24"	3%
Custom Equipment*	24" – 30"	< ¼%

*NOTE: Subsoiling equipment typically requires a heavy duty four-wheel-drive tractor,

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which makes it less common due to the investment required. However, this form of “no till” farming is being promoted for better productivity and is on the increase.

LIVE LOADS FROM FARM EQUIPMENT

Farm equipment is designed to exert low ground pressure to minimize soil compaction. As a result, the consideration of the live loads from farm equipment is typically not of concern in cultivated fields since the cover needed to protect the pipe from mechanical damage should also provide protection from the live loads.

However, in areas where the pipeline has less than 24 inches of cover in non-plowed areas that may be crossed by heavy farm equipment, review the current procedure regarding pipeline road and rail crossings for live load considerations.



April 2018

GAS PIPELINE SAFETY

Stakeholders' and Officials' Views on Federal Odorizing Requirements

Accessible Version



GAO Highlights

Highlights of [GAO-18-409](#), a report to congressional committees

Why GAO Did This Study

The nation's gas pipeline network moves about 74 billion cubic feet of combustible gas to homes and businesses daily. To alert the public of a gas leak before an explosion occurs, PHMSA has different requirements for odorizing gas. All gas transported by distribution pipelines throughout communities must be odorized. Gas transported across many miles by transmission pipelines is required to be odorized only in certain populated areas. There are no requirements to odorize gas in gathering pipelines. Congress included a provision in statute for GAO to review odor requirements for all pipelines.

This report presents the views of federal and state pipeline safety officials and industry and safety stakeholders on: (1) the advantages and disadvantages of odorizing combustible gases in pipelines; and (2) whether and how federal requirements for odorizing pipelines should be modified. GAO reviewed relevant regulations and reports; surveyed officials in 48 states and the District of Columbia; and interviewed PHMSA and NTSB officials. GAO also interviewed 34 stakeholders, including 14 experts identified by the National Academies, and 20 other industry and safety stakeholders.

View [GAO-18-409](#). For more information, contact Susan Fleming at (202) 512-2834 or flemings@gao.gov.

April 2018

GAS PIPELINE SAFETY

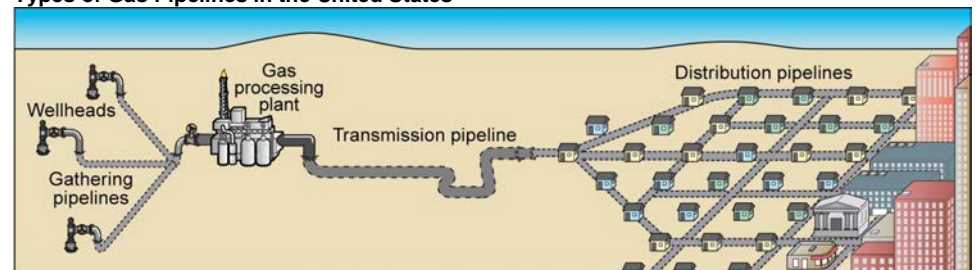
Stakeholders' and Officials' Views on Federal Odorizing Requirements

What GAO Found

Pipeline and Hazardous Materials Safety Administration (PHMSA) and National Transportation Safety Board (NTSB) officials, state officials, and stakeholders GAO contacted cited safety as the main advantage to odorizing combustible gases in pipelines, primarily for distribution pipelines in densely populated areas (see figure). Specifically, adding a chemical with a distinctive odor to gas allows the public to generally detect leaks before an explosion can occur. The most frequently cited disadvantage was that commonly used sulfur-based odorants must be removed—primarily from gas in transmission pipelines—before the gas can be used in certain processes, such as producing fertilizer.

While federal odorization requirements follow a risk-based approach by focusing on pipelines in populated areas, the officials and stakeholders GAO contacted disagreed on the need to modify these requirements for some pipelines. Specifically, because distribution pipelines run through populated areas, everyone GAO contacted generally agreed that these pipelines should be odorized for safety, as currently required. For gathering pipelines, the majority of officials and stakeholders did not see a need to modify regulations because these pipelines would be technically challenging to odorize and are primarily located in rural areas. However, about two-thirds of state officials and about half of stakeholders said that additional transmission pipelines should be odorized for public safety.

Types of Gas Pipelines in the United States



Sources: Pipeline and Hazardous Materials Safety Administration; and GAO. | GAO-18-409

Conversely, officials from PHMSA and NTSB and about half of the stakeholders contacted noted that, because transmission pipelines operate at high pressure and generally rupture rather than leak, it is unlikely that odorant could mitigate risk. Instead, other required safety practices—such as internal pipeline inspections—can provide more preventative, risk-based safety management, according to PHMSA officials. In this regard, PHMSA officials said that they plan to strengthen risk-based safety requirements for transmission and gathering pipelines as part of on-going rulemakings. PHMSA anticipates issuing these rules in 2019.

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Abbreviations

DOT Department of Transportation

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EIA	Energy Information Administration
Manual	2017 American Gas Association Odorization Manual
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
PIPES	Protecting our Infrastructure of Pipelines and Enhancing Safety Act of 2016
Psi	pounds per square inch



April 18, 2018

The Honorable John Thune
Chairman
The Honorable Bill Nelson
Ranking Member
Committee on Commerce, Science and Transportation
United States Senate
The Honorable Greg Walden
Chairman
The Honorable Frank Pallone
Ranking Member
Committee on Energy and Commerce
House of Representatives
The Honorable Bill Shuster
Chairman
The Honorable Peter A. DeFazio
Ranking Member
Committee on Transportation and Infrastructure
House of Representatives

In 2017, the nation's gas pipeline network moved about 73.6 billion cubic feet per day of dry natural gas to homes, schools, and businesses.¹ Pipelines are relatively safe when compared with other modes of transporting hazardous goods. However, a pipeline leak could allow these colorless, odorless gases to seep undetected into areas where people live or work, with potentially devastating results. To alert the public of a dangerous buildup of gas before an explosion can occur, federal pipeline safety regulations—established by the Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA)—require that combustible gases transported by certain pipelines be odorized by adding a chemical with a distinctive odor that can be easily recognizable by a person with a normal sense of smell.² Specifically, all gases in distribution pipelines, which run throughout cities and communities, must be odorized.³ Gases transported by large, high-

¹ Energy Information Administration's (EIA) estimate for 2017. EIA forecasts that natural gas production will reach 80.3 billion cubic feet per day in 2018. Dry gas is natural gas that remains after the liquefiable hydrocarbon portion has been removed from the gas stream; and any volumes of nonhydrocarbon gases have been removed. Dry natural gas is also known as consumer-grade natural gas.

² 49 C.F.R. § 192.625(a).

³ 49 C.F.R. § 192.625(a).

pressure transmission pipelines, which run across the country, are required to be odorized only in certain populated areas.⁴ Gases collected by gathering pipelines from wells in gas drilling areas are not required to be odorized.

The Protecting our Infrastructure of Pipelines and Enhancing Safety (PIPES) Act of 2016 included a provision for us to review the potential impact of requiring that combustible gases transported by all pipelines be odorized.⁵ This report presents the views of federal and state officials and industry and safety stakeholders on:

1. the advantages and disadvantages of odorizing combustible gases transported by pipeline; and
2. whether and how federal pipeline odorization requirements should be modified.

To address both objectives, we reviewed relevant statutes, regulations, and our prior work related to federal and state gas pipeline odorization requirements. We also collected data from PHMSA on pipeline miles by pipeline type, the gases odorized, and the odorant types for fiscal year 2016 through 2018. We assessed the reliability of these data by interviewing PHMSA officials on how it was collected and verified and determined that the data were sufficiently reliable for our purposes. We interviewed PHMSA and National Transportation Safety Board (NTSB) officials on the current federal odorization requirements, as well as whether and how they should be modified.

We also surveyed pipeline safety officials in the contiguous 48 states and the District of Columbia to collect information on both objectives.⁶ We received a 100 percent response rate. To develop the survey questions, we conducted initial interviews with state pipeline safety officials and stakeholders to identify issues regarding pipeline odorization requirements. We also reviewed key literature to ascertain the advantages and disadvantages of odorizing gas transported by pipelines.

⁴ 49 C.F.R. § 192.625(b).

⁵ The provision requested an assessment of the costs and benefits of odorizing all combustible gas in pipeline transportation; however, nationwide data for such an assessment are not available.

⁶ We did not include Alaska and Hawaii in our survey because they do not participate in pipeline safety oversight with PHMSA. Further, Puerto Rico was not included because the survey was conducted during the aftermath of Hurricanes Irma and Maria.

The survey was reviewed by an internal, independent survey expert and pretested with three potential respondents from state pipeline safety agencies. We did this to ensure that:

1. the questions were clear and unambiguous,
2. the terms we used were precise,
3. the survey did not place an undue burden on the agency officials completing it, and
4. the survey was independent and unbiased.

We took steps in survey design, data collection, and analysis to minimize non-sampling errors. Our results are not subject to sampling error because we administered our survey to all 48 lower contiguous state pipeline safety agencies and the District of Columbia.⁷ The survey data were collected from September through November 2017.

In addition, we interviewed 34 stakeholders. We worked with the National Academies of Science to identify 14 experts that we interviewed to discuss their views on both objectives.⁸ These experts were selected based on their expertise in the following areas: chemistry, gas industry, odorant industry, chemical manufacturing industry, and public health and safety, with all areas of expertise balanced to obtain a wide variety of viewpoints. Finally, we interviewed 20 other industry and safety stakeholders including: representatives from chemical manufacturing associations, gas pipeline operators, odorant manufacturers, and pipeline safety groups to discuss both objectives.⁹ These interviews with experts and stakeholders are not generalizable to the entire population of possible experts and stakeholders. For reporting purposes, we developed the following series of indefinite quantifiers to describe the 34 total

⁷ The survey was conducted using self-administered electronic questionnaires posted on the World Wide Web. We sent e-mail notifications to 49 agencies responding to our survey. We also e-mailed each potential respondent a unique password and username to ensure that only members of the target population could participate in the survey. To encourage respondents to complete the survey, we sent an e-mail reminder to each non-respondent about 2 weeks after our initial e-mail message.

⁸ We use the term “interviewed” to include everyone who expressed opinions, whether that was in an interview or through a written response.

⁹ Gas pipeline operators were selected for interviews based on their pipeline system size in miles and region of operation.

stakeholder responses from the 14 experts and 20 other industry and safety stakeholders we interviewed:

- 6 or less of the 34 total is described as “a few”;
- 7 to 13 is described as “some”;
- 14 to 19 is described as “about half”;
- 20 to 26 is described as “many”; and
- 27 or more is described as “most”.

See appendix II for a list of experts and other stakeholders interviewed.

We conducted this performance audit from June 2017 to April 2018 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Roughly two-thirds of domestic energy supplies are transported through over 2.6 million miles of pipelines throughout the United States. These pipelines carry hazardous liquids and natural gas from producing wells to end users (residences and businesses). Natural gas, which is combustible, accounts for 99.8 percent of all gas distributed in the United States. Other combustible gases transported by pipeline include hydrogen, landfill gas, synthetic gas, and propane. Within this nationwide system, three main types of pipelines serve different purposes and users (see fig. 1):¹⁰

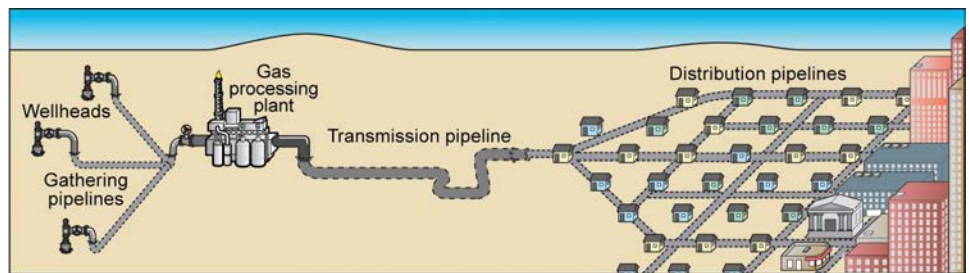
- Gathering pipelines. The estimated 11,500 miles of onshore gas gathering pipelines subject to PHMSA regulation collect natural gas from wells in production areas. These pipelines then typically transport the gas to processing facilities, which in turn refine it and send the gas to transmission pipelines. Gathering pipelines range in diameter from about 2 to 12 inches and operate at pressures that

¹⁰ All pipeline mileage data are as of February, 2018.

range from about 5 to 1,400 pounds per square inch (psi). These pipelines tend to be located in rural areas but can also be located in urban areas. PHMSA estimates that another 230,000 miles of gas gathering pipelines are not subject to federal regulation based on their generally rural location and low operating pressures.

- **Transmission pipelines.** The estimated 298,000 miles of onshore transmission pipelines carry natural gas, sometimes over hundreds of miles, to communities and large-volume users (e.g., factories). Transmission pipelines tend to have the largest diameters and pressures of any type of pipeline, generally ranging from 12 inches to 42 inches in diameter and operating at higher pressures ranging from 400 to 1,440 psi.
- **Distribution pipelines.** The estimated 2,170,000 miles of natural gas distribution and service pipelines transport natural gas from transmission pipelines to residential, commercial, and industrial customers. These pipelines tend to be smaller, sometimes less than 1 inch in diameter, and operate at lower pressures, from 0.25 to 100 psi.

Figure 1: Types of Gas Pipelines in the United States



Sources: Pipeline and Hazardous Materials Safety Administration; and GAO. | GAO-18-409

A specific pipeline only carries one type of gas. These gases may be colorless and odorless, which is why odorizing them may be necessary to safely alert people of a leak.

All odorants used in the United States contain sulfur. According to PHMSA officials, there are nine primary sulfur-based odorants used domestically for transporting combustible gas, all but one contain mercaptan—a type of chemical with a distinctive sulfur smell—which is blended with other chemicals for stability.¹¹ Pipeline operators select the

¹¹ Sulfides are another type of sulfur-based chemical used in the blends. Tetrahydrothiophene (THT or thiophane) is a sulfide used in blends with mercaptan or as a single component odorant that does not contain mercaptan. Sulfides are chemically more stable than mercaptans, but mercaptans possess the highest odor intensity.

odorant blend that works best for their pipeline network. Distribution pipeline operators add the odorant to their gas, usually at the “city gate”, or the place where transmission pipelines connect to a distribution pipeline network. The odorant is transported and stored in a concentrated liquid form that has a strong smell, is flammable, and is toxic. The odorant is injected into the gas stream at the “city gate” odorization station and vaporizes into the gas. In its diluted form, the odorants are nontoxic.

PHMSA, within the Department of Transportation (DOT), administers DOT’s national regulatory program to ensure the safe transportation of natural gas by pipeline. PHMSA oversees and enforces pipeline operators’ compliance with federal odorization requirements for interstate pipelines, which are primarily transmission pipelines. Most states have agreements with PHMSA to oversee and enforce pipeline operators’ compliance with federal requirements—including odorization requirements—for intrastate pipelines, which are primarily distribution pipelines.¹² These states may also impose safety requirements that are more stringent than federal requirements.¹³ Under the current regulatory system, most gathering pipelines are not subject to federal safety requirements, based on their location.¹⁴ Only gathering pipelines close to populated areas or waterways are currently subject to federal requirements.

In March 2012, we reported that land use changes have resulted in development encroaching on existing gathering pipelines and the increased extraction of oil and natural gas from shale deposits has resulted in the development of new gathering pipelines, some of which are larger in diameter and operate at higher pressure than older pipelines. Therefore, we recommended that PHMSA collect data on gathering pipelines to help determine whether to expand regulation of these pipelines.¹⁵ In April, 2016, PHMSA issued the Gas Transmission and Gathering Notice of Proposed Rulemaking that would: 1) require all gas gathering pipeline operators to submit operating and accident data to

¹² Alaska and Hawaii do not have agreements with PHMSA to oversee intrastate pipelines.

¹³ 49 U.S.C. § 60104(c).

¹⁴ 49 U.S.C. § 60101(b).

¹⁵ GAO, *Pipeline Safety: Collecting Data and Sharing Information on Federally Unregulated Gathering Pipelines Could Help Enhance Safety*, [GAO-12-388](#) (Washington D.C.: March 22, 2012).

PHMSA, 2) more clearly define “gathering pipeline” to better identify pipelines subject to PHMSA’s requirements, and 3) increase the number of gathering pipeline miles under PHMSA’s jurisdiction.¹⁶ PHMSA estimates that the new rule would increase the number of gathering pipeline miles with reporting requirements by 344,000 and the number of gathering pipeline miles subject to additional safety measures by almost 70,000.

The overall framework for federal gas pipeline regulations—including odorization requirements—is designed to mitigate risk. All pipelines regulated by PHMSA are required to meet uniform, minimum safety standards. Regarding odorization, these minimum standards prescribe that a combustible gas must be odorized so that at a concentration in air of one-fifth of the lower explosive limit, the gas is readily detectable by a person with a normal sense of smell.¹⁷ The proximity of pipelines to populated areas, where leaks present the greatest risk, determines whether or not the gas needs to be odorized. Since 1970, PHMSA has categorized pipelines into four classes based on their proximity to populated areas to determine the odorization requirements for gas transported by distribution and transmission pipeline. Class 1 locations are in rural areas and Class 4 locations are in densely populated areas (see table 1.). All combustible gases transported by distribution pipelines are required to be odorized because these pipelines are primarily in populated areas. Some transmission pipelines in highly populated—Class 3 and 4—areas are also required to be odorized.¹⁸

¹⁶ 81 Fed. Reg. 20722 (Apr. 8, 2016). In 2018, PHMSA revised this rulemaking to three separate gathering and transmission pipeline rules: Pipeline Safety: Safety of Gas Transmission Pipelines, MAOP Reconfirmation, Expansion of Assessment Requirements and Other Related Amendments; Pipeline Safety - Safety of Gas Transmission Pipelines, Repair Criteria, Integrity Management Improvements, Cathodic Protection, Management of Change, and Other Related Amendments; and Pipeline Safety -Safety of Gas Gathering Pipelines rulemaking. The first two are relevant for transmission and the third is relevant for gathering pipelines. All three rulemakings are due for publication in 2019.

¹⁷ 49 C.F.R. §192.625 (a). The lower explosive limit is the lowest concentration (percentage) of a gas in air capable of producing a flash of fire in presence of an ignition source.

¹⁸ 49 C.F.R. §192.625 (b).

Table 1: Pipeline and Hazardous Material Safety Administration Class Designations for Gas Pipelines

PHMSA Class Level	Location features
Class 1	An offshore area or any location with 10 or fewer buildings intended for human occupancy within 220 yards of the centerline of the pipeline.
Class 2	Any location with more than 10 but fewer than 46 buildings intended for human occupancy within 220 yards of the centerline of the pipeline.
Class 3	Any location with more than 46 buildings intended for human occupancy within 220 yards of a pipeline, or an area where the pipeline lies within 100 yards of either a building or a small, well-defined outside area that is occupied by 20 or more persons at least 5 days a week for 10 weeks in any 12-month period.
Class 4	Any location where unit buildings with four or more stories above ground are prevalent.

Source: 49 C.F.R. § 192.5. | GAO-18-409

In addition, PHMSA has a supplemental risk-based regulatory program termed “integrity management” for pipelines in “high-consequence areas” where an incident would have greater consequences for public safety or the environment. Integrity management has been a part of PHMSA’s risk-based regulatory approach for natural gas transmission pipelines since 2004, and for natural gas distribution pipelines since 2011. The risk-based integrity management programs for natural gas transmission pipelines require operators to systematically identify and mitigate risks to pipeline segments located in high-consequence areas. For example, in these areas operators must monitor their pipelines for signs of corrosion and repair corroded lines within a specified period of time. High-consequence areas for natural gas pipelines include highly populated or frequently used areas, such as parks. These areas may overlap with Class 3 or Class 4 locations. The integrity management program for distribution pipelines applies to all distribution pipelines due to their proximity to populated areas.

Officials and Stakeholders Said That Odorizing Gas in Pipelines Improves Public Safety, but Can Impede Some Industrial Processes

Pipeline Gas Odorization Facilitates Early Detection, Particularly in Populated Areas

Almost all officials and stakeholders we interviewed and the state pipeline safety officials we surveyed told us that the advantage of using sulfur-

based odorants to odorize combustible gas transported by pipeline is public safety.¹⁹ Sulfur-based odorants have a low-odor threshold, so are easily detected at low concentrations. With a smell similar to that of rotten eggs, this odor is particularly advantageous when used in distribution pipelines that are located in areas where people congregate (e.g., homes, businesses and hospitals). If individuals smell an odorant, they can call emergency services and alert those nearby of a potential gas leak, possibly helping to prevent an explosion that could result in the loss of life and property.

According to federal regulations, all local distribution companies must conduct outreach to educate the public and others on what to do when they smell a gas leak.²⁰ To this end, the 2017 American Gas Association Odorization Manual (manual) states that some local distribution companies have gone beyond placing the traditional scratch-and-sniff insert in customers' billing statements—to inform them about gas leaks and odor—to implementing "Smell Gas Act Fast!" campaigns. According to the manual, these campaigns are designed to better educate the public on the smell and nature of natural gas, along with the need to quickly take action if the odor is detected. Responding immediately to the smell of natural gas can help to prevent possible accidents. For example, when authorities were reportedly called to a Rockville, Maryland home in November 2017 to investigate an odor from a natural gas leak, authorities evacuated several nearby homes as a safety precaution in the event of an explosion, until the source of the leak could be identified and addressed.

While nearly all stakeholders we interviewed said that public safety was the key advantage associated with odorizing combustible gases (in particular, combustible gases transported by distribution pipeline), some experts expressed differing opinions on the use of handheld electronic combustible gas detection devices as an alternative to detect gas leaks.

¹⁹ For information on the advantages and disadvantages of non-sulfur based odorants, see appendix I.

²⁰ All pipeline operators (except master meter or petroleum gas system operators) are required to develop and implement a written continuing public education program. 49 C.F.R. § 192.616 Operators' programs must specifically include provisions to educate the public, appropriate government organizations and persons participating in excavation activities about hazards of and safety steps to take in the event of a gas leak. 49 C.F.R. § 192.616(d) In addition, operators' programs and media used must be as comprehensive as necessary to reach all areas in which the operator transports gas. 49 C.F.R. § 192.616(f)

According to one expert, these devices are better suited to detect gas at levels much lower than an individual's sense of smell would allow. This expert also noted that odor does not wake a sleeping individual so a gas leak could go undetected for hours. However, a second expert noted that during his experience with pipeline accident investigations over the past 40 years, he was aware of about 10 cases in which deceased individuals were found after a gas leak accident holding a portable combustible gas detector because (1) the device may not have indicated the presence of gas in one location while a nearby location may have been explosive due to a gas leak; or (2) the user may not have been properly trained on the instrument's limitations to identify a safe area. Accordingly, that expert stated that odorization is the most effective safety method for alerting the public of a possible gas leak. Additionally, a third expert noted that (1) electronic detectors can be difficult to place in certain areas and (2) odorants allow the public to quickly detect gas leaks without acquiring or maintaining external equipment.

The Primary Disadvantages Officials and Stakeholders Cited Are Odor Removal for Some Industries and False Alarms

The most common disadvantage of sulfur-based odorants cited by officials and stakeholders we contacted is the need to remove the odorant for some industrial processes. Officials from both federal safety regulatory agencies we interviewed (PHMSA and NTSB); approximately half of state pipeline safety officials surveyed; and about half of the stakeholders interviewed reported that sulfur-based odorants used in transmission pipelines can cause an adverse chemical reaction during processing for some industries. For example, sulfur in natural gas can be detrimental in the production of electricity, fertilizer, and glass because it interferes with the catalyst used during production.²¹ PHMSA and NTSB officials and about half of the stakeholders said that before these items are produced, operators must remove any added (or naturally occurring) sulfur from their combustible gas, adding another step to production. One expert and three stakeholders told us that removing the odorant also resulted in added cost for some operators. However, because most transmission pipelines are in less populated areas and not odorized, many manufacturers currently receive unodorized gas from transmission

²¹ A catalyst is a substance that increases the rate of a chemical reaction without itself undergoing any permanent chemical change

pipelines and do not need to remove odorant, according to the industry associations we interviewed.

In addition, some stakeholders warned that accidental spills of concentrated odorant, using more odorant than needed, or releasing excessive amounts of odorant during operators' maintenance activities can lead to false alarm calls. One pipeline operator told us that an employee spilled odorant on a glove and the public made several false alarm calls due to the odorant's potent smell as the employee drove through town with the glove on the back of a truck. Officials from PHMSA, an official from a pipeline safety organization and representatives from two pipeline industry associations told us that the public could get accustomed to these types of odorant leaks and begin to ignore them or have a false sense of security when a real gas leak does occur. For example, the official from the pipeline safety organization told us that he has heard of at least one location where odorant leaks frequently occurred, and the public began to ignore the smell.

Additionally, under certain conditions, sulfur-based odorants can be hazardous to human health and the environment. A few stakeholders told us that odorants released in excessive amounts may cause health concerns. For example, during a presentation before the Pipeline Safety Trust, a Los Angeles County public health official stated that it appears a sulfur-based odorant was related to public health complaints made in 2015 after a 4-month long natural gas leak from a natural gas storage facility in California's Aliso Canyon. Many of the reported symptoms matched those made after a 2008 natural gas storage tank leak in Alabama, which included respiratory problems; eye, nose, and throat irritation; headache; nausea; and dizziness. While at least one study has been conducted and another is planned on the long-term effects of sulfur-based odorants on human health, no direct cause and effect relationships have been established.

Finally, a few stakeholders noted potential environmental hazards regarding the use of odorants. For example, one stakeholder told us that odorants can become a hazardous waste depending on the quantity used and the amount of time the chemical remains in one location prior to use; one expert and another stakeholder noted that sulfur-based odorants when spilled may contaminate waterways; and four experts and two stakeholders warned that when combusted, sulfur-based odorants can produce acid rain. Also, according to PHMSA officials, these odorants are both toxic and flammable in their concentrated state. However, none of

the stakeholders provided specific examples of when an odorant caused environmental damage.

Officials and Stakeholders Had Mixed Views on Need to Modify Odorization Requirements

Many Officials and Stakeholders Agreed That Federal Distribution Pipeline Odorization Regulations Do Not Need to be Modified

General consensus exists among those we spoke with (including federal regulatory and safety officials, experts identified by the National Academies, and industry stakeholders) that federal requirements to odorize all gases in distribution pipelines are sufficient as written and do not need to be modified.²² PHMSA and NTSB officials we interviewed and many commenting stakeholders articulated this view. In addition, state pipeline officials we surveyed generally did not indicate a need to change federal regulations for odorizing distribution pipelines. Due to the proximity of distribution pipelines to areas where people live and work, officials, experts, and stakeholders we interviewed emphasized the importance of odorizing gas in distribution pipelines to reduce the safety risk to the public.

As we have previously reported, the operating characteristics of distribution pipelines make odorant a key factor in reducing safety risk. In 2012 we reported that distribution pipelines operate at lower pressures, so pipeline failures are more likely to involve slow leaks rather than explosive ruptures.²³ Leaking gas can accumulate in confined spaces, or migrate away from the pipeline until it finds an ignition source and potentially causes injury, death, and/or property damage. These slow

²² We asked federal officials, state safety officials, experts identified by the National Academies, and stakeholders from the gas industry about the sufficiency of federal gas odorization requirements more generally, as well as whether or not odorization requirements should be expanded to all gathering and transmission pipelines. However, we did not explicitly ask state pipeline officials in our survey about federal distribution pipeline odorization requirements, so their views were not collected on whether these regulations should be modified.

²³ GAO, *Safety Effects of Less Prescriptive Requirements for Low-Stress Natural Gas Transmission Pipelines Are Uncertain*, [GAO-12-389R](#), (Washington D.C.: February 16, 2012).

leaks are difficult to see or hear, so odorants provide a critical warning to call emergency services and inform those nearby of a potential gas leak before it ignites.

Many Officials and Stakeholders Agreed That Odorizing Gathering Pipelines Could Be Technically Challenging with Little Added Safety Benefit

Of those we interviewed or surveyed, about half of stakeholders and a third of state pipeline safety officials did not indicate a need to modify existing regulations for odorizing gas in gathering pipelines.²⁴ Further, a few commenting experts said odorizing those pipelines would be technically challenging. According to the experts, technological challenges stem from the fact that gas contains natural sulfur at many of the wells where gathering pipelines collect the raw gas. The natural sulfur in the raw gas could counteract the added chemical sulfur odorant, masking the smell of each and lowering the effectiveness of the odorant. Further, one stakeholder said that odorizing gathering pipelines would be logistically difficult and expensive given the number of wells that would each need an odorization station. For example, according to this stakeholder, there are roughly 500,000 gas wells nationwide and each odorizer would cost \$2,000 as a capital investment.²⁵ In addition, this stakeholder said that any safety benefit of adding odorant would be limited because most gas wellheads and gathering pipelines are located in sparsely populated rural areas.

While the majority of stakeholders and state survey respondents did not see a need to odorize gas in gathering pipelines, a third of the state safety officials and three other stakeholders said all gathering pipelines should be odorized for additional safety regardless of any technical challenge.²⁶ However, requiring all gathering pipelines to be odorized at the federal level would have to be consistent with federal pipeline safety regulations. According to the safety regulations, a risk assessment,

²⁴ NTSB is currently reviewing an incident in Firestone, Colorado involving gathering pipelines, and therefore could not comment on federal requirements for gathering pipelines at the time of our interview.

²⁵ We were unable to assess the reliability of this estimate.

²⁶ The remaining third of state safety officials either did not have an opinion or did not have any gathering pipeline in their state.

including an assessment of the benefits and costs of proposed regulatory standards, is required to be considered in any decision on whether to impose a new safety standard.²⁷ According to PHMSA officials, they do not have the data to report on any incidents on gathering pipelines where odorant may have made a difference. Moreover, PHMSA officials stated that they do not have the data to formulate an educated opinion or viewpoint as to the need to odorize gathering pipelines. To address this lack of data, the Pipeline Safety -Safety of Gas Gathering Pipelines rulemaking, if approved, will provide PHMSA with more data on gas gathering pipeline infrastructure and incident data. According to PHMSA officials, the data collected will inform PHMSA on the best path forward regarding further regulation of gas gathering pipelines, including the need for odorization. Officials anticipate publishing the final rule in summer 2019.

Officials' and Stakeholders' Views Differed on Need to Odorize Transmission Pipeline Gas

Officials, stakeholders and survey respondents generally disagreed about the need to odorize all transmission pipelines. Officials from NTSB as well as about half of the stakeholders we contacted said the current regulations for odorizing gas in certain transmission pipelines in populated areas were sufficient. Additionally, NTSB officials said they were not aware of incidents where odorants in a transmission pipeline would have alerted the public in time to prevent the incident. These officials and stakeholders generally said that odorizing gas in transmission pipelines is not an effective means of reducing the risk of an incident. For example, one stakeholder said that at the typically high pressure at which most transmission pipelines operate, even a relatively small hole in the pipeline would cause a rupture that would excavate the earth around it so people would hear and see the evidence of the leak. Some experts also said that odorizing gas in all transmission pipelines could have increased costs and other challenges for pipeline operators or gas end users. For example, one expert said that odorizing all gas transported in the transmission pipeline system would require tens of thousands of odorization facilities. This expert also said that if gas is odorized in transmission pipelines, some industries currently receiving unodorized gas will be affected negatively because they either must incur

²⁷ 49 U.S. C. § 60102 (b) (2) (E)

the additional processing and cost of removing the odorant or find new ways to receive gas that is not odorized.

Further, PHMSA officials and representatives from the Interstate Natural Gas Association of America said that the integrity management program for transmission pipelines provides more preventative, risk-based safety management than odorants, which rely on reducing risk through early detection of a leak that has already occurred. The integrity management program requires operators to assess the integrity of their pipelines within high consequence areas—which, by definition, encompass Class 3 and 4 locations—on a regular basis using any of three approved methods: (1) running an in-line inspection tool, or “smart pig”, through the pipeline to detect anomalies, such as corrosion, that can cause leaks (2) conducting a direct assessment using data and direct examination of the pipeline from aboveground to identify problem areas, or (3) hydrostatically testing a portion of the pipeline by removing the gas product, replacing it with water, and increasing the pressure of the water above the maximum allowable operating pressure of the pipeline to test its integrity. These inspection methods are designed to detect issues that could cause a gas leak before the leak occurs. Following the assessments, pipeline operators are required to prioritize and repair anomalies found during assessments.

While odorants could be added in addition to integrity management requirements, PHMSA officials said that integrity management more effectively helps assure an acceptable level of safety for transmission pipelines than an odorant could because the risk assessments focus on the potential causes of leaks and ruptures for these types of pipelines and, therefore, are more preventative than odorizing. In a September 2006 report, we found that PHMSA’s gas pipeline integrity management program benefits public safety by incorporating risk-based management principles into pipeline safety oversight,²⁸ and in June 2013, we reported that transmission pipeline operators were conducting periodic

²⁸ GAO, *Natural Gas Pipeline Safety: Integrity Management Benefits Public Safety, but Consistency of Performance Measures Should Be Improved*, [GAO-06-946](#), (Washington, D.C.: September 8, 2006).

assessments and making repairs to pipelines in high consequence areas.²⁹

Transmission pipeline operators are also required through the integrity management program to proactively take measures to reduce the risk or potential impact of an accident. Based on inspections of interstate transmission operators' integrity management programs, PHMSA officials noted that—while transmission pipeline operators could opt to odorize gas in a transmission pipeline—they are not aware of any operator to date that has concluded that odorizing transmission pipelines was necessary to reduce risk. Instead, operators use tools such as electronic leak detection and remotely-controlled valves to detect potential leaks and shut down the pipeline if needed.

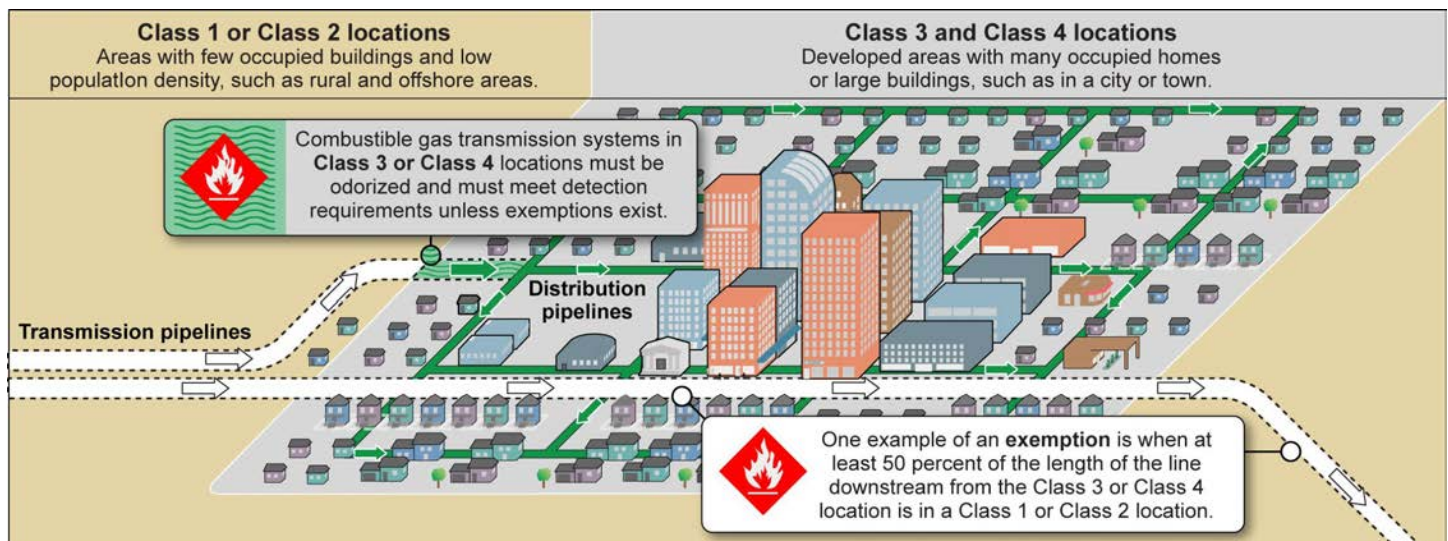
While the preventative safety practices required under the gas transmission pipeline integrity management program are designed to mitigate risk without requiring the use of odorant, officials from two states and one stakeholder questioned the sufficiency of integrity management practices. However, as part of the ongoing two rulemakings: the Pipeline Safety: Safety of Gas Transmission Pipelines, MAOP Reconfirmation, Expansion of Assessment Requirements and Other Related Amendments and the Pipeline Safety - Safety of Gas Transmission Pipelines, Repair Criteria, Integrity Management Improvements, Cathodic Protection, Management of Change, and Other Related Amendments Rulemaking, PHMSA also plans to strengthen and expand requirements for the gas integrity management program for transmission pipelines. For example, PHMSA plans to expand the requirements for periodic assessments and subsequent repairs to additional pipeline mileage beyond that located in high consequence areas. PHMSA plans to publish these rulemaking in March and June, 2019, respectively. The 2016 PIPES Act includes a mandate for GAO to review PHMSA's gas integrity management program as soon as PHMSA publishes the final rule.

In contrast to the opinions expressed above that transmission pipeline odorization requirements are sufficient, 31 of 49 state pipeline safety officials surveyed responded that these requirements are not stringent enough for safety. Of these respondents, several said that exemptions that currently apply to some operators with transmission pipelines in

²⁹ GAO, *Natural Gas Pipeline Safety: Guidance and More Information Needed before Using Risk-Based Reassessment Intervals* [GAO-13-577](#), (Washington, D.C.: June 27, 2013).

Class 3 and Class 4 locations should not be allowed.³⁰ There are several exemptions, determined by the overall class location of the pipeline or end use of the gas. For example, one class location exemption is that when at least 50 percent of the length of the pipeline downstream from the more populated Class 3 or Class 4 location is in a less populated Class 1 or Class 2 location, the gas does not need to be odorized (see fig. 2).³¹

Figure 2: Class Location Odorization Requirements and Exemptions



Source: GAO. | GAO-18-409

Eliminating the current regulatory exemptions for certain transmission pipelines and requiring operators to odorize all gas transported by transmission pipeline through Class 3 or Class 4 locations may not be cost-beneficial under federal regulatory risk assessment principles, which direct the agency to assess the benefits and costs of changes in regulatory standards. For example, while four states cited increased public safety as the reason to remove the existing exemption, PHMSA and NTSB officials could not identify any incidents where odorants in a transmission pipeline would have prevented damage. In addition, as described above, some experts told us that removing the exemptions could have increased costs and other challenges for pipeline operators or gas end users. PHMSA officials also said that the definition of a high-

³⁰ 49 C.F.R. § 192.625(b)(1)-(4).

³¹ 49 C.F.R. § 192.625(b)(1).

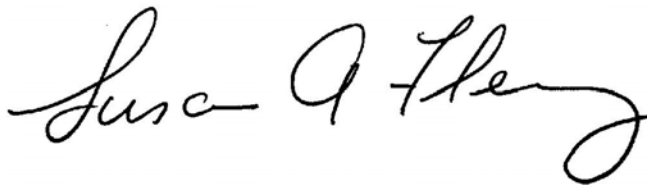
consequence area under the gas integrity management program encompasses all Class 3 and Class 4 locations, so the risk-based preventative measures required under that program apply to the areas exempt from odorization requirements.

Agency Comments

We provided a draft of this product to DOT for review and comment. DOT provided technical comments that were incorporated, as appropriate.

We are sending copies of this report to the appropriate congressional committees, the Secretary of the Department of Transportation, and other interested parties. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-2834 or FlemingS@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix III.

A handwritten signature in black ink, reading "Susan A. Fleming". The signature is written in a cursive, flowing style.

Susan Fleming
Director, Physical Infrastructure

Appendix I: Advantages and Disadvantages of Non-sulfur Based Odorants

While our report focuses on sulfur-based odorants, which are used in the United States, we also asked experts and stakeholders about the advantages and disadvantages of non-sulfur based odorants. According to a German-based manufacturer of non-sulfur odorants, these odorants are used in some European countries, including Germany and Austria. This manufacturer also told us that the German energy industry has embraced using non-sulfur based odorants, in part, to meet German emissions regulations, as these odorants do not produce sulfur dioxide and contribute to acid rain when burned.

Most of the experts and stakeholders that we interviewed were generally unfamiliar with non-sulfur based odorants. Those with some familiarity offered the following advantages and disadvantages.

Advantages:

Three experts and stakeholders reported that non-sulfur based odorants:

- have less adverse impact on the environment; for example, no acid rain effects;
- may cost less for some operators because less product may be needed than sulfur-based odorants; and
- do not adversely impact some operators' processes.

Disadvantages:

Four experts noted that non-sulfur based odorants:

- have a smell that the American public does not associate with a gas leak.

Two experts commented that non-sulfur based odorants:

- may be chemically unstable; and

- can react with other compounds.

Two experts noted that non-sulfur based odorants:

- may have a higher level of toxicity.

Appendix II: Experts and Other Industry and Safety Stakeholders Interviewed by GAO

Table 2: Experts:

Expert Name	Organization
David Bull	ViaData LP
Frankie Wood-Black	Sophic Pursuits
John Bromly	W. Aus. Dept. of Mines
John Jacobus	Jacobus & Associates
John Roberts	Rimkus Consulting
John Zurcher	Blacksmith Group
Karen Crippen	Gas Technology Institute
M. Sam Mannan	Texas A&M University
Matt Stennett	Middle Tennessee Natural Gas Utility District
Melissa Spinelli	National Grid
Richard Kuprewicz	Accufacts Inc.,
Richard Sanders	RES Services, LLC
Rosemarie Halchuck	Xcel Energy
Zac Lowe	Southern Company Gas

Source: GAO. | GAO-18-409

Table 3: Stakeholders:

Gas Associations

- American Gas Association
- Interstate Natural Gas Association of America
- National Association of Pipeline Safety Representatives
- American Public Gas Association
- GPA Midstream Association
- American Petroleum Institute

Safety Organization

- Pipeline Safety Trust
- Los Angeles County Department of Public Health

Operators

- Maine Natural Gas
- Columbia Gas of Ohio
- Iroquois Pipeline Operating Co
- California Gas Transmission
- Dominion Energy Transmission
- Targa Pipeline Partners
- Air Products

Odorant Manufacturers

- Arkema
- Chevron Philips
- Symrise

Chemical Manufacturing Associations

- The Fertilizer Institute
- American Fuel and Petrochemical Manufacturers

Source: GAO. | GAO-18-409

Appendix III: Contact and Staff Acknowledgements

Contact

Susan Fleming, (202) 512-2834 or FlemingS@gao.gov.

Staff Acknowledgements

In addition to the individual named above, other key contributors to this report were Sara Vermillion, Assistant Director; Sarah Jones, Analyst in Charge; Jennifer W. Clayborne; Timothy J. Guinane; David K. Hooper; Delwen A. Jones; Josh Ormond; Rebecca R. Parkhurst; and Kelly L. Rubin.

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FACTS ABOUT PIPELINE SAFETY IN YOUR COMMUNITY

HECHOS ACERCA DE LAS TUBERÍAS SEGURO EN SU COMUNIDAD

Know, Recognize, Respond

Infórmese, Reconozca, Responda



SPLP
GG-1

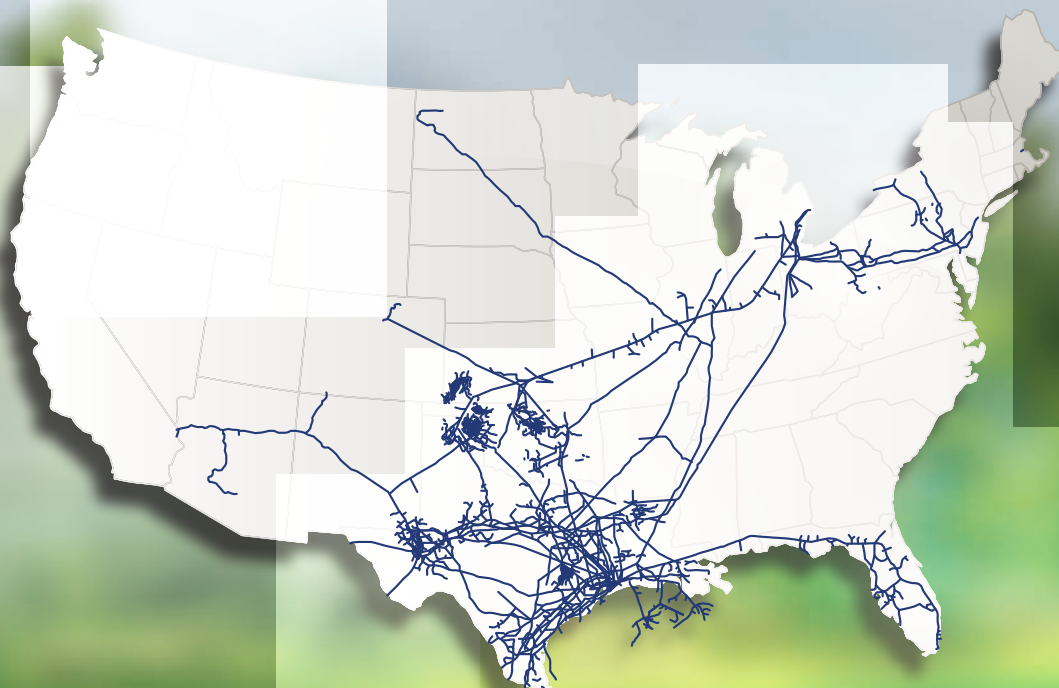




Energy Transfer, a Texas-based energy company founded in 1995 as a small intrastate natural gas pipeline company, is now one of the largest and most diversified master limited partnerships in the United States. Strategically positioned in all of the major U.S. production basins, the company owns and operates a geographically diverse portfolio of energy assets, including midstream, intrastate and interstate transportation and storage assets. Energy Transfer operates more than 90,000 miles of natural gas, crude oil, natural gas liquids and refined products pipelines and related facilities, including terminalling, storage, fractionation, blending and various acquisition and marketing assets in 38 states.

Approximately two-thirds of the natural gas and petroleum products we use every day are transported through underground pipelines – making them an essential part of the nation's critical transportation infrastructure. Studies have confirmed that pipelines are the safest way to transport energy in the United States.

You are receiving this information because Energy Transfer, or one of its affiliates, may operate or maintain a pipeline in your community. We ask that you review the following important safety information, encourage you to share it with others and retain for future reference.





We are strongly committed to operating a safe, reliable pipeline system. As part of that commitment, we strive to enhance public safety and environmental protection through increased public awareness and knowledge.

Sunoco Pipeline operates a geographically diverse portfolio of energy assets including, pipelines, terminalling and marketing assets. Crude oil, refined products, natural gas and natural gas liquids are transported through a 12,000-mile pipeline system that traverses 21 states.

**24-HOUR
EMERGENCY NUMBER:
800-786-7440 or 877-839-7473**

PRODUCT: NATURAL GAS LIQUIDS



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If you would like more information, please visit us at energytransfer.com or call our non-emergency number at 877-795-7271.



RESPONDA

RECONOZCA

INFÓRMESE

COMUNÍQUESE



Estamos muy comprometidos a operar un sistema de tuberías seguro y confiable. Como parte de nuestro compromiso, nos esforzamos por mejorar la seguridad del público y la protección del medio ambiente a través de un aumento del conocimiento y concientización del público.

Sunoco Pipeline opera una cartera de activos energéticos en diversos puntos geográficos que incluyen tuberías, distribución y comercialización. Petróleo crudo, productos refinados, gas natural y líquidos de gas natural son transportados a través de un sistema de tuberías de 12,000 millas que cruza 21 estados.

**TELÉFONO DE EMERGENCIA
LAS 24 HORAS:
800-786-7440 o 877-839-7473**

PRODUCTO: LÍQUIDOS DE GAS NATURAL



Si desea obtener más información, visítenos en energytransfer.com o llame a nuestro número que no es para emergencias al 877-795-7271.



National Pipeline Mapping System

Everyone can contribute to safety and security by knowing where pipelines are in their community and recognizing unauthorized activity. To find out who operates transmission pipelines in your area, visit the National Pipeline Mapping System at www.npms.phmsa.dot.gov. To download the mobile application to your iOS device free of charge, visit the App Store and search for “NPMS Public Viewer.”

Pipeline Safety

Our pipelines are regularly tested and maintained using cleaning devices, diagnostic tools and cathodic protection. We perform regular patrols, both on the ground and in the air, along our routes to ensure the security and integrity of our lines. For the safety of our system and for the people around it, we monitor pipeline operations 24 hours a day, 365 days a year.



Special Protective Measures

Certain pipelines are designated as being in “High Consequence Areas” (HCA) due to their location in high population or environmentally sensitive areas. In accordance with regulations, we have developed and implemented a written Integrity Management Program that addresses the risks on certain pipeline segments. Baseline and periodic assessments are conducted to identify and evaluate potential threats to our pipelines. Any significant defects discovered are remediated and the company monitors program effectiveness so that modifications can be recognized and implemented.

Along the Right-of-Way

Rights-of-way provide a permanent, limited access to privately owned property to enable us to operate, inspect, repair, maintain and protect our pipeline. Rights-of-way must be kept free of structures and other obstructions. Property owners should not dig, plant, place or build anything on the right-of-way without first calling 811 and receiving authorization from our company personnel, who must be present for all excavation.

See Something, Say Something

Neighbors like you can help us maintain a safe, secure and reliable pipeline system and keep your community safe by alerting us to potential problems before they become pipeline emergencies. If you observe any unusual or suspicious persons, vehicles, or activities near our pipeline facilities, such as unauthorized digging, people loitering, recording/monitoring activities, showing unusual interest or tampering with equipment, please call us immediately at the emergency number in this brochure. In the event of an emergency or immediate threat, you should always call 911.

CONTACT

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Sistema Nacional de Mapas de Tuberías

Todos pueden contribuir a la seguridad y protección sabiendo dónde se encuentran las tuberías en sus comunidades y reconociendo si hay actividad no autorizada. Para averiguar quién opera tuberías de transmisión en su zona, visite el Sistema Nacional de Mapas de Tuberías en www.npms.phmsa.dot.gov. Para descargar la aplicación móvil en su dispositivo iOS sin cargo alguno, visite el Apple Store y busque “NPMS Public Viewer.”

La seguridad de las tuberías

Realizamos pruebas y mantenimiento periódicos a nuestras tuberías usando dispositivos de limpieza, herramientas de diagnóstico y protección catódica. Patrullamos regularmente, tanto por tierra como por aire, nuestras rutas para garantizar la seguridad y la integridad de nuestras líneas. Para conservar la seguridad de nuestro sistema y de las personas a su alrededor, monitoreamos las operaciones de las tuberías las 24 horas del día, los 365 días del año.

Medidas especiales de protección

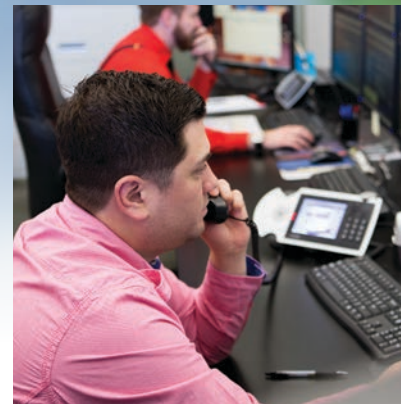
Ciertas tuberías son designadas como de “Áreas de altas consecuencias” (High Consequence Areas, HCA) debido a su ubicación en áreas de mucha población o con ecosistemas frágiles. En conformidad con las normas, hemos desarrollado e implementado por escrito un Programa de Gestión de Integridad que trata los riesgos de ciertos segmentos de tuberías. Se realizan evaluaciones iniciales y periódicas para identificar y analizar las amenazas potenciales a nuestras tuberías. Se corrigen todos los defectos significativos detectados y la compañía monitorea la eficacia del programa para que se puedan reconocer e implementar las modificaciones.

En el derecho de paso

El derecho de paso provee un acceso limitado y permanente a una propiedad privada para permitirnos operar, inspeccionar, reparar, mantener y proteger nuestra tubería. El derecho de paso se debe mantener libre de estructuras y otras obstrucciones. Los dueños de la propiedad no deben excavar, plantar, colocar o construir nada sobre el derecho de paso sin llamar primero al 811 y recibir autorización de los miembros del personal de la compañía, quienes deben estar presentes para toda la excavación.

Si ve algo, diga algo

Vecinos como usted pueden ayudarnos a mantener un sistema de tuberías seguro y confiable, y mantener a nuestra comunidad segura al informarnos acerca de posibles problemas antes de que se conviertan en emergencias de las tuberías. Si observa algo inusual, o personas, vehículos o actividades sospechosos cerca de las instalaciones de nuestras tuberías, como excavaciones no autorizadas, gente merodeando, actividades de grabación/vigilancia, gente que muestra interés inusual o que esté manipulando el equipo, por favor llámenos inmediatamente al número de emergencia que aparece en este folleto. En caso de emergencia o una amenaza inmediata, siempre debe llamar al 911.





Pipelines are typically made of steel, covered with a protective coating and buried several feet underground. For your safety, markers are used to indicate the approximate location of pipelines. The markers contain the name of the pipeline operator, products transported and emergency contact information. Keep in mind that pipelines may not follow a straight line between markers, nor do markers indicate the exact location and depth of the pipeline.

Leaks from pipelines are unusual, but you should know what to do in the unlikely event one occurs. The table below describes the types of products transported by our pipelines. Refer to the Contact page to find out which products may be transported in your area. You may be able to recognize a leak by the following signs:

	Natural Gas	Natural Gas Liquids (Butane, Ethane, Propane, Olefins)	Petroleum (Crude Oil, Gasoline, Diesel, Jet Fuel, Kerosene, Vacuum Oil Gas)	Hydrogen Sulfide (H ₂ S)
Hazards	<ul style="list-style-type: none">Natural gas is flammable and can ignite when it comes into contact with an ignition source. In confined spaces, exposure can cause dizziness or asphyxiation and may be toxic, if inhaled at high concentrations. Natural gas may contain hydrogen sulfide (H₂S).	<ul style="list-style-type: none">NGL is flammable and can ignite when it comes into contact with an ignition source. Exposure can cause moderate irritation including headaches and dizziness. NGL may contain hydrogen sulfide (H₂S).	<ul style="list-style-type: none">Petroleum is a flammable liquid and can ignite when it comes into contact with an ignition source. Exposure can cause skin irritation, dizziness or asphyxiation and may be toxic, if inhaled at high concentrations. Fire may produce irritating and/or toxic gases. Requires use of positive pressure self-contained breathing apparatus (SCBA) or supplied air. Runoff may cause pollution or other hazards.	<ul style="list-style-type: none">H₂S is flammable and can ignite when it comes into contact with an ignition source. Exposure can affect both oxygen utilization and the central nervous system of the human body. H₂S exposure may result in asphyxiation. The severity of health effects can vary depending on the level and duration of exposure however, exposure to low concentrations can deaden the sense of smell. Requires use of positive pressure SCBA or supplied air.
By Sight	<ul style="list-style-type: none">Continuous bubbling in wet or flooded areas.Dead or discolored vegetation in a green area.Dust blowing from a hole in the ground.Flames, if a leak has ignited.	<ul style="list-style-type: none">Continuous bubbling in wet or flooded areas.Dead or discolored vegetation in a green area.Dust blowing from a hole in the ground.Flames, if a leak has ignited.Ice around a leak.Vapor cloud or mist.	<ul style="list-style-type: none">Continuous bubbling in wet or flooded areas.Dead or discolored vegetation in a green area.Flames, if a leak has ignited.Pool of liquid on the ground.Rainbow sheen on the water.Vapor cloud or mist.	<ul style="list-style-type: none">Continuous bubbling in wet or flooded areas.Dead or discolored vegetation in a green area.Dust blowing from a hole in the ground.Flames, if a leak has ignited.
By Sound	<ul style="list-style-type: none">Blowing or hissing sound.	<ul style="list-style-type: none">Blowing or hissing sound.	<ul style="list-style-type: none">Blowing or hissing sound.	<ul style="list-style-type: none">Blowing or hissing sound.
By Smell	<ul style="list-style-type: none">Odorless unless mercaptan, a chemical odorant, is added to give it a distinctive smell.	<ul style="list-style-type: none">Odorless in its natural state, however a faint smell may be present.	<ul style="list-style-type: none">An unusual smell or gaseous odor.	<ul style="list-style-type: none">Foul sulfur odor, similar to rotten eggs.H₂S exposure may result in asphyxiation (suffocation) and exposure to low concentrations can deaden the sense of smell.

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Las tuberías son típicamente de acero, tienen un revestimiento protector y se entierran a varios pies. Para su seguridad, la ubicación aproximada de las tuberías se indica con señales. Las señales contienen el nombre del operador de la tubería, los productos transportados y la información de contacto en caso de emergencia. Recuerde que la tubería quizá no siga una línea recta entre una señal y otra o quizá las señales no indiquen la ubicación y la profundidad exactas de la tubería.

Las fugas de tuberías son poco comunes pero usted debe saber qué hacer si ocurre este evento poco probable. El cuadro de abajo describe los tipos de productos que nuestras tuberías transportan. Consulte la página de Contacto para averiguar cuáles productos pueden ser transportados en su zona. Es posible que reconozca una fuga por las siguientes señales:

	Gas Natural	Líquidos de Gas Natural (Butano, Etano, Propano, Olefinas)	Petróleo (Petróleo crudo, Gasolina, Diesel, Combustible pesado, Kerosén, Gasoil de vacío)	Sulfuro de Hidrógeno (H ₂ S)
Peligros	<ul style="list-style-type: none"> El gas natural es inflamable y puede encenderse cuando entra en contacto con una fuente de ignición. En espacios confinados, la exposición puede causar mareos o asfixia, y puede ser tóxico, si se inhala en altas concentraciones. El gas natural también puede contener sulfuro de hidrógeno (H₂S). 	<ul style="list-style-type: none"> El LGN es inflamable y puede encenderse cuando entra en contacto con una fuente de ignición. La exposición puede causar irritación moderada que incluye dolor de cabeza y mareo. El LGN también puede contener sulfuro de hidrógeno (H₂S). 	<ul style="list-style-type: none"> El petróleo es un líquido inflamable y puede encenderse cuando entra en contacto con una fuente de ignición. La exposición puede causar irritación de la piel, mareos o asfixia y puede ser tóxico si se inhalan en altas concentraciones. El fuego puede producir gases irritantes y/o tóxicos. Exige el uso de un aparato de respiración autónomo de presión positiva (SCBA, por sus siglas en inglés) o aire suministrado. El escurrimiento puede causar contaminación u otros peligros. 	<ul style="list-style-type: none"> El H₂S es inflamable y puede encenderse cuando entra en contacto con una fuente de ignición. Su exposición puede afectar tanto el uso de oxígeno como el sistema nervioso central del cuerpo humano. La exposición al H₂S puede causar asfixia. La gravedad de los efectos en la salud puede variar, dependiendo del nivel y la duración de la exposición. Sin embargo, la exposición a bajas concentraciones puede reducir el sentido del olfato. Exige el uso de un SCBA de presión positiva o aire suministrado.
Por la vista	<ul style="list-style-type: none"> Burbujeo continuo en áreas húmedas o inundadas. Vegetación muerta o descolorida en un área verde. Polvo que vuela de un orificio en la tierra. Llamas, si la fuga se encendió. 	<ul style="list-style-type: none"> Burbujeo continuo en áreas húmedas o inundadas. Vegetación muerta o descolorida en un área verde. Polvo que vuela de un orificio en la tierra. Llamas, si la fuga se encendió. Hielo alrededor de una fuga. Una nube de vapor o neblina. 	<ul style="list-style-type: none"> Burbujeo continuo en áreas húmedas o inundadas. Vegetación muerta o descolorida en un área verde. Polvo que vuela de un orificio en la tierra. Llamas, si la fuga se encendió. Charco de líquido en el suelo. Mancha de brillo policromo en el agua. Una nube de vapor o neblina. 	<ul style="list-style-type: none"> Burbujeo continuo en áreas húmedas o inundadas. Vegetación muerta o descolorida en un área verde. Polvo que vuela de un orificio en la tierra. Llamas, si la fuga se encendió.
Por el sonido	<ul style="list-style-type: none"> Sonido de soplido o silbido. 	<ul style="list-style-type: none"> Sonido de soplido o silbido. 	<ul style="list-style-type: none"> Sonido de soplido o silbido. 	<ul style="list-style-type: none"> Sonido de soplido o silbido.
Por el olfato	<ul style="list-style-type: none"> Es inodoro a menos que se agregue mercaptano, un odorante químico, para darle un olor característico. 	<ul style="list-style-type: none"> Es inoloro en su estado natural, sin embargo, puede haber un leve olor presente. 	<ul style="list-style-type: none"> Un olor inusual u olor a gas. 	<ul style="list-style-type: none"> Olor desagradable a azufre, similar a huevos podridos. La exposición al H₂S puede causar asfixia (sofofación) y la exposición a bajas concentraciones puede reducir el sentido del olfato.



**Know what's below.
Call before you dig.**

Don't ever assume you know where the underground utilities are located.

One of the greatest single challenges to safe pipeline operations is the accidental damage caused by excavation. In accordance with state and federal guidelines, a damage prevention program has been established to prevent damage to our pipelines from excavation activities, including mechanical and non-mechanical equipment, explosives and activities below existing grade. Laws vary by state, but most require a call to 811 between 48 to 72 hours before you plan to dig. Check with your local One-Call Center for specific guidelines in your state. Your local One-Call Center will let you know if there are any buried utilities in the area, and the utility companies will be notified to identify and clearly mark the location of their lines at no cost to you. Company personnel must be present for all excavation near our facilities.



ALWAYS CALL 811 BEFORE YOU DIG.



WAIT THE REQUIRED AMOUNT OF TIME.



RESPECT THE MARKS.



DIG WITH CARE.









If you should happen to strike the pipeline while working in the area, it is important that you call us immediately from a safe location. Even seemingly minor damage, such as a dent or chipped pipeline coating, could result in a future leak if not promptly repaired.

What should I do if I suspect a leak?

- Leave the area immediately, on foot, if possible, in an uphill, upwind direction. Follow direction of local emergency response agencies.
- Abandon any equipment being used in or near the area.
- Avoid any open flame or other sources of ignition.
- Warn others to stay away.
- From a safe location, call 911 or local response agencies, and notify the pipeline company.
- Do not attempt to extinguish a pipeline fire.
- Do not attempt to operate pipeline valves.

Wait for the site to be marked. Marking could be either by paint, flags or stakes.

APWA Color Code

-  Proposed excavation
-  Temporary survey markings
-  Electric power lines, cables, conduit and lighting cables
-  Gas, oil, steam, petroleum or gaseous materials
-  Communication, alarm or signal lines, cables or conduit
-  Potable water
-  Reclaimed water, irrigation and slurry lines
-  Sewers and drain lines

CONTACT

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Determina lo que está **bajo tierra.**
Llama antes de excavar.

Nunca suponga que sabe dónde están los servicios públicos subterráneos.

Uno de los retos más grandes a las operaciones seguras de las tuberías es el daño accidental causado por una excavación. En conformidad con las pautas federales y estatales, se ha establecido un programa de prevención de daños para prevenir daños a nuestras tuberías de actividades de excavación, incluyendo equipo mecánico y no mecánico, explosivos y actividades subterráneas existentes. Las leyes varían de estado a estado, pero la mayoría de los estados requieren que haga una llamada al 811 de 48 a 72 horas antes de cuando piensa excavar. Verifique las directrices específicas para su estado en el centro One-Call de su localidad. Su centro One-Call local le informará si hay algún servicio público enterrado en el área, y se notificará a las compañías de servicios públicos para que identifiquen y señalen claramente la ubicación de sus líneas sin costo para usted. Debe haber personal de la empresa presente en toda excavación cercana a nuestras instalaciones.



SIEMPRE LLAME 811 ANTES DE EXCAVAR.



ESPERE LA CANTIDAD DE TIEMPO EXIGIDA.



RESPETE LAS SEÑALES.



EXCAVE CON CUIDADO.

Si llegara a golpear la tubería mientras trabaja en el área, es importante que nos llame inmediatamente desde un lugar seguro. Incluso los daños que parecen mínimos, como una abolladura o el raspón del recubrimiento de la tubería, podrían causar una fuga en el futuro si no se reparan rápidamente.

¿Qué debe hacer si sospecha que hay una fuga?

- Retírese del área inmediatamente, en lo posible a pie, cuesta arriba y en contra del viento. Siga las instrucciones de las agencias de respuesta a emergencias locales.
- Abandone cualquier equipo que esté utilizando en el área o cerca de ella.
- Evite llamas abiertas u otras fuentes de ignición.
- Advierta a otras personas que se mantengan alejadas.
- Desde un lugar seguro, llame al 911 o a las agencias de respuesta a emergencias locales y notifique a la compañía de la tubería.
- No intente extinguir un incendio de una tubería.
- No intente manipular las válvulas de la tubería.

Aguarde la marcación del sitio. Las marcas pueden ser con pintura, banderas o estacas.

Código de colores de APWA

- Excavación propuesta
- Señales temporales de relevos topográficos
- Líneas de energía eléctrica, cables, conductos y cables de iluminación
- Gas, aceite, vapor, petróleo o materiales gaseosos
- Comunicación, líneas de señales o de alarma, cables o conductos
- Agua potable
- Agua recuperada, líneas de irrigación
- Líneas de drenaje y alcantarillado



Energy Transfer, una compañía energética con sede en Texas, fundada en 1995 como una pequeña compañía interestatal de tuberías de gas natural, es ahora una de las sociedades de responsabilidad limitada más grandes y más diversificadas de los Estados Unidos. Ubicada en una posición estratégica en una de las principales zonas de producción de los EE. UU., la compañía posee y opera una cartera geográficamente diversa de activos de energía, que incluyen activos de transporte y almacenamiento intermedio, intraestatal e interestatal. Energy Transfer tiene operaciones en más de 90,000 millas de tuberías de gas natural, petróleo crudo, líquidos de gas natural y productos refinados, así como instalaciones relacionadas, que incluyen instalaciones de terminales, almacenamiento, fraccionamiento, mezcla y varios activos de adquisición y marketing en 38 estados.

Aproximadamente dos tercios del gas natural y de los productos del petróleo que usamos a diario se transportan a través de tuberías subterráneas, convirtiéndose en una parte esencial de la infraestructura de transporte fundamental del país. Los estudios han confirmado que las tuberías son la manera más segura para transportar energía en los Estados Unidos.

Usted está recibiendo esta información porque es posible que Energy Transfer, o uno de sus socios, opere o realice el mantenimiento de una tubería en su comunidad. Le pedimos que repase la siguiente información de seguridad importante, lo alentamos a que la comparta con otros y la conserve para consulta en el futuro.

**Please share this
important safety
information with others –
anyone who plans to dig.**

**Sírvase compartir esta importante
información de seguridad con los demás o
con cualquiera que tenga planeado hacer
trabajos de excavación.**



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Know, Recognize, Respond

ARE YOU PREPARED TO RESPOND TO A **PIPELINE EMERGENCY?**

IMPORTANT INFORMATION ABOUT PIPELINE SAFETY IN YOUR COMMUNITY



Know what's below.
Call before you dig.

SPLP

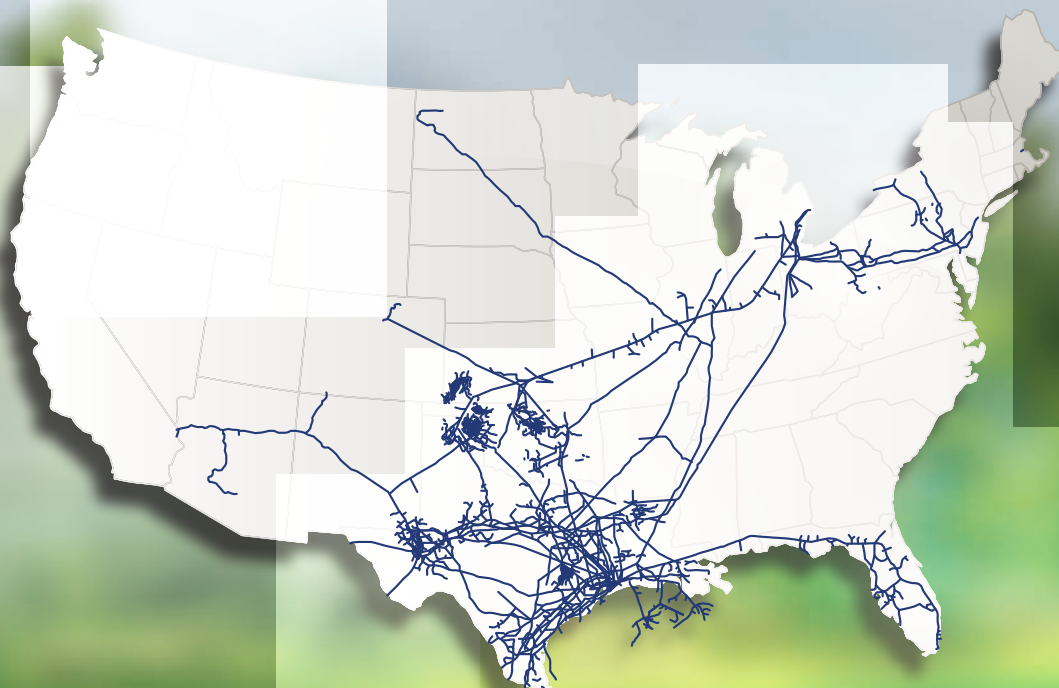
GG-2



Energy Transfer, a Texas-based energy company founded in 1995 as a small intrastate natural gas pipeline company, is now one of the largest and most diversified master limited partnerships in the United States. Strategically positioned in all of the major U.S. production basins, the company owns and operates a geographically diverse portfolio of energy assets, including midstream, intrastate and interstate transportation and storage assets. Energy Transfer operates more than 90,000 miles of natural gas, crude oil, natural gas liquids and refined products pipelines and related facilities, including terminalling, storage, fractionation, blending and various acquisition and marketing assets in 38 states.

Approximately two-thirds of the natural gas and petroleum products we use every day are transported through underground pipelines – making them an essential part of the nation's critical transportation infrastructure. Studies have confirmed that pipelines are the safest way to transport energy in the United States.

You are receiving this information because Energy Transfer, or one of its affiliates, may operate or maintain a pipeline in your community. We ask that you review the following important safety information, encourage you to share it with others and retain for future reference.





We are strongly committed to operating a safe, reliable pipeline system. As part of that commitment, we strive to enhance public safety and environmental protection through increased public awareness and knowledge.

Sunoco Pipeline operates a geographically diverse portfolio of energy assets including, pipelines, terminalling and marketing assets. Crude oil, refined products, natural gas and natural gas liquids are transported through a 12,000-mile pipeline system that traverses 21 states.

**24-HOUR
EMERGENCY NUMBER:
800-786-7440 or 877-839-7473**

PRODUCT: NATURAL GAS LIQUIDS



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If you would like more information, please visit us at energytransfer.com or call our non-emergency number at 877-795-7271.





**Know what's below.
Call before you dig.**

Don't ever assume you know where the underground utilities are located.

One of the greatest single challenges to safe pipeline operations is the accidental damage caused by excavation. In accordance with state and federal guidelines, a damage prevention program has been established to prevent damage to our pipelines from excavation activities, including mechanical and non-mechanical equipment, explosives and activities below existing grade. Laws vary by state, but most require a call to 811 between 48 to 72 hours before you plan to dig. Check with your local One-Call Center for specific guidelines in your state. Your local One-Call Center will let you know if there are any buried utilities in the area, and the utility companies will be notified to identify and clearly mark the location of their lines at no cost to you. Company personnel must be present for all excavation near our facilities.



ALWAYS CALL 811 BEFORE YOU DIG.



WAIT THE REQUIRED AMOUNT OF TIME.



RESPECT THE MARKS.











DIG WITH CARE.

If you should happen to strike the pipeline while working in the area, it is important that you call us immediately from a safe location. Even seemingly minor damage, such as a dent or chipped pipeline coating, could result in a future leak if not promptly repaired.

Wait for the site to be marked. Marking could be either by paint, flags or stakes.

APWA Color Code

-  Proposed excavation
-  Temporary survey markings
-  Electric power lines, cables, conduit and lighting cables
-  Gas, oil, steam, petroleum or gaseous materials
-  Communication, alarm or signal lines, cables or conduit
-  Potable water
-  Reclaimed water, irrigation and slurry lines
-  Sewers and drain lines

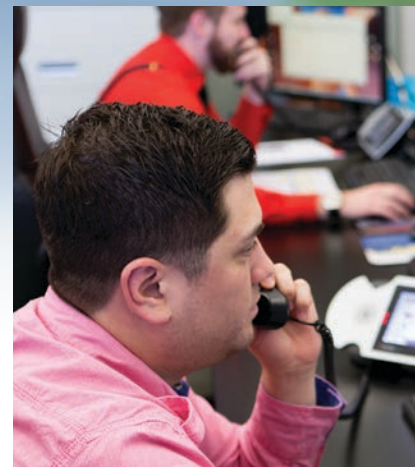


National Pipeline Mapping System

Everyone can contribute to safety and security by knowing where pipelines are in their community and recognizing unauthorized activity. To find out who operates transmission pipelines in your area, visit the National Pipeline Mapping System at www.npms.phmsa.dot.gov. To download the mobile application to your iOS device free of charge, visit the App Store and search for “NPMS Public Viewer.” Pipeline Information Management and Mapping Application (PIMMA) is also available to assist government officials with displaying data in more detail.

Pipeline Safety

Our pipelines are regularly tested and maintained using cleaning devices, diagnostic tools and cathodic protection. We perform regular patrols, both on the ground and in the air, along our routes to ensure the security and integrity of our lines. For the safety of our system and for the people around it, we monitor pipeline operations 24 hours a day, 365 days a year.



Special Protective Measures

Certain pipelines are designated as being in “High Consequence Areas” (HCA) due to their location in high population or environmentally sensitive areas. In accordance with regulations, we have developed and implemented a written Integrity Management Program that addresses the risks on certain pipeline segments. Baseline and periodic assessments are conducted to identify and evaluate potential threats to our pipelines. Any significant defects discovered are remediated and the company monitors program effectiveness so that modifications can be recognized and implemented.

Along the Right-of-Way

Rights-of-way provide a permanent, limited access to privately owned property to enable us to operate, inspect, repair, maintain and protect our pipeline. Rights-of-way must be kept free of structures and other obstructions. Property owners should not dig, plant, place or build anything on the right-of-way without first calling 811 and receiving authorization from our company personnel, who must be present for all excavation.

See Something, Say Something

Neighbors like you can help us maintain a safe, secure and reliable pipeline system and keep your community safe by alerting us to potential problems before they become pipeline emergencies. If you observe any unusual or suspicious persons, vehicles, or activities near our pipeline facilities, such as unauthorized digging, people loitering, recording/monitoring activities, showing unusual interest or tampering with equipment, please call us immediately at the emergency number in this brochure. In the event of an emergency or immediate threat, you should always call 911.

CONTACT

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Product Characteristics

	Characteristics	Hazards
Natural Gas	<ul style="list-style-type: none"> • Lighter than air. • Dissipates rapidly into air. • Tasteless and colorless. • Odorless unless mercaptan, a chemical odorant, is added to give it a distinctive smell. 	Natural gas is flammable and can ignite when it comes into contact with an ignition source. In confined spaces, exposure can cause dizziness or asphyxiation and may be toxic, if inhaled at high concentrations. Natural gas may contain hydrogen sulfide (H ₂ S).
Natural Gas Liquids (Butane, Ethane, Propane, Olefins)	<ul style="list-style-type: none"> • Initially heavier than air and will spread along ground and collect in low or confined areas. • Vapors may travel to source of ignition and flash back. • Tasteless and colorless. • Odorless in its natural state, however a faint smell may be present. 	NGL is flammable and can ignite when it comes into contact with an ignition source. Exposure can cause moderate irritation including headaches and dizziness. NGL may contain hydrogen sulfide (H ₂ S).
Petroleum (Crude Oil, Gasoline, Diesel, Jet Fuel, Kerosene, Vacuum Oil Gas)	<ul style="list-style-type: none"> • Initially heavier than air and will spread along ground and collect in low or confined areas. • Vapors may travel to source of ignition and flash back. • An unusual smell or gaseous odor. 	Petroleum is a flammable liquid and can ignite when it comes into contact with an ignition source. Exposure can cause skin irritation, dizziness or asphyxiation and may be toxic, if inhaled at high concentrations. Fire may produce irritating and/or toxic gases. Requires use of positive pressure self-contained breathing apparatus (SCBA) or supplied air. Runoff may cause pollution or other hazards.
Hydrogen Sulfide (H ₂ S)	<ul style="list-style-type: none"> • Initially heavier than air and will spread along ground and collect in low or confined areas. • Colorless gas that is an irritant. • Foul sulfur odor, similar to rotten eggs. 	H ₂ S is flammable and can ignite when it comes into contact with an ignition source. Exposure can affect both oxygen utilization and the central nervous system of the human body. H ₂ S exposure may result in asphyxiation. The severity of health effects can vary depending on the level and duration of exposure however, exposure to low concentrations can deaden the sense of smell. Requires use of positive pressure SCBA or supplied air.



Pipelines are typically made of steel, covered with a protective coating and buried several feet underground. For your safety, markers are used to indicate the approximate location of pipelines. The markers contain the name of the pipeline operator, products transported and emergency contact information. Keep in mind that pipelines may not follow a straight line between markers, nor do markers indicate the exact location and depth of the pipeline.

Leaks from pipelines are unusual, but you should know what to do in the unlikely event one occurs. The table below describes the types of products transported by our pipelines. Refer to the Contact page to find out which products may be transported in your area. You may be able to recognize a leak by the following signs:

	Natural Gas	Natural Gas Liquids (Butane, Ethane, Propane, Olefins)	Petroleum (Crude Oil, Gasoline, Diesel, Jet Fuel, Kerosene, Vacuum Oil Gas)	Hydrogen Sulfide (H ₂ S)
By Sight	<ul style="list-style-type: none">• Continuous bubbling in wet or flooded areas.• Dead or discolored vegetation in a green area.• Dust blowing from a hole in the ground.• Flames, if a leak has ignited.	<ul style="list-style-type: none">• Continuous bubbling in wet or flooded areas.• Dead or discolored vegetation in a green area.• Dust blowing from a hole in the ground.• Flames, if a leak has ignited.• Ice around a leak.• Vapor cloud or mist.	<ul style="list-style-type: none">• Continuous bubbling in wet or flooded areas.• Dead or discolored vegetation in a green area.• Flames, if a leak has ignited.• Pool of liquid on the ground.• Rainbow sheen on the water.• Vapor cloud or mist.	<ul style="list-style-type: none">• Continuous bubbling in wet or flooded areas.• Dead or discolored vegetation in a green area.• Dust blowing from a hole in the ground.• Flames, if a leak has ignited.
By Sound	<ul style="list-style-type: none">• Blowing or hissing sound.	<ul style="list-style-type: none">• Blowing or hissing sound.	<ul style="list-style-type: none">• Blowing or hissing sound.	<ul style="list-style-type: none">• Blowing or hissing sound.
By Smell	<ul style="list-style-type: none">• Odorless unless mercaptan, a chemical odorant, is added to give it a distinctive smell.	<ul style="list-style-type: none">• Odorless in its natural state, however a faint smell may be present.	<ul style="list-style-type: none">• An unusual smell or gaseous odor.	<ul style="list-style-type: none">• Foul sulfur odor, similar to rotten eggs.• H₂S exposure may result in asphyxiation (suffocation) and exposure to low concentrations can deaden the sense of smell.

CONTACT

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RESPOND



IN AN EMERGENCY, CONTACT THE PIPELINE COMPANY IMMEDIATELY, USING THE EMERGENCY CONTACT INFORMATION LOCATED ON THE PIPELINE MARKER.

Your Response:

Emergency Preparedness

When managing an emergency, protecting lives and the environment requires a concerted team effort. We strive to build partnerships with emergency responders and public officials in order to share resources, establish important lines of communication and provide education needed to safely respond to a pipeline related emergency. Our intent is to exchange information, evaluate potential emergency scenarios and discuss how to coordinate efforts. Emergency responders who are knowledgeable about the hazards and risks of pipeline operations are better able to act quickly to protect life, property and the environment. You will likely be the first on the scene of a pipeline incident – even before the pipeline company personnel.

Responding to an Emergency

- Approach the incident from upwind, uphill. Park vehicles a safe distance from the incident and turn off engines.
- Isolate the area. Restrict entry to trained emergency response and company personnel.
- Call 911 and the pipeline company immediately, using the emergency contact information located on the pipeline marker.
 - Eliminate ignition sources. Potential ignition sources include open flames, such as pilot lights or matches. Other sources include sparks from tools, doorbells, electric motors and switches, static electricity, vehicle engines, radios and cell phones.
 - Don't attempt to extinguish a pipeline fire with water or other chemicals. Doing so could prolong the emergency. Use water spray to protect surrounding exposures. Wet down exposed flammable areas in the vicinity and extinguish perimeter fires.
 - Don't attempt to operate valves or equipment as it may actually create an even greater hazard. Rely on pipeline personnel – they are trained in the proper procedures.

Our Response:

Upon notification of a potential emergency, we will dispatch trained company personnel immediately. Response times will vary based on time of day, weather conditions, available personnel and incident location. While personnel are en route, please remain in contact with the pipeline company. We will provide information to local public safety officials to aid in their response to the emergency.

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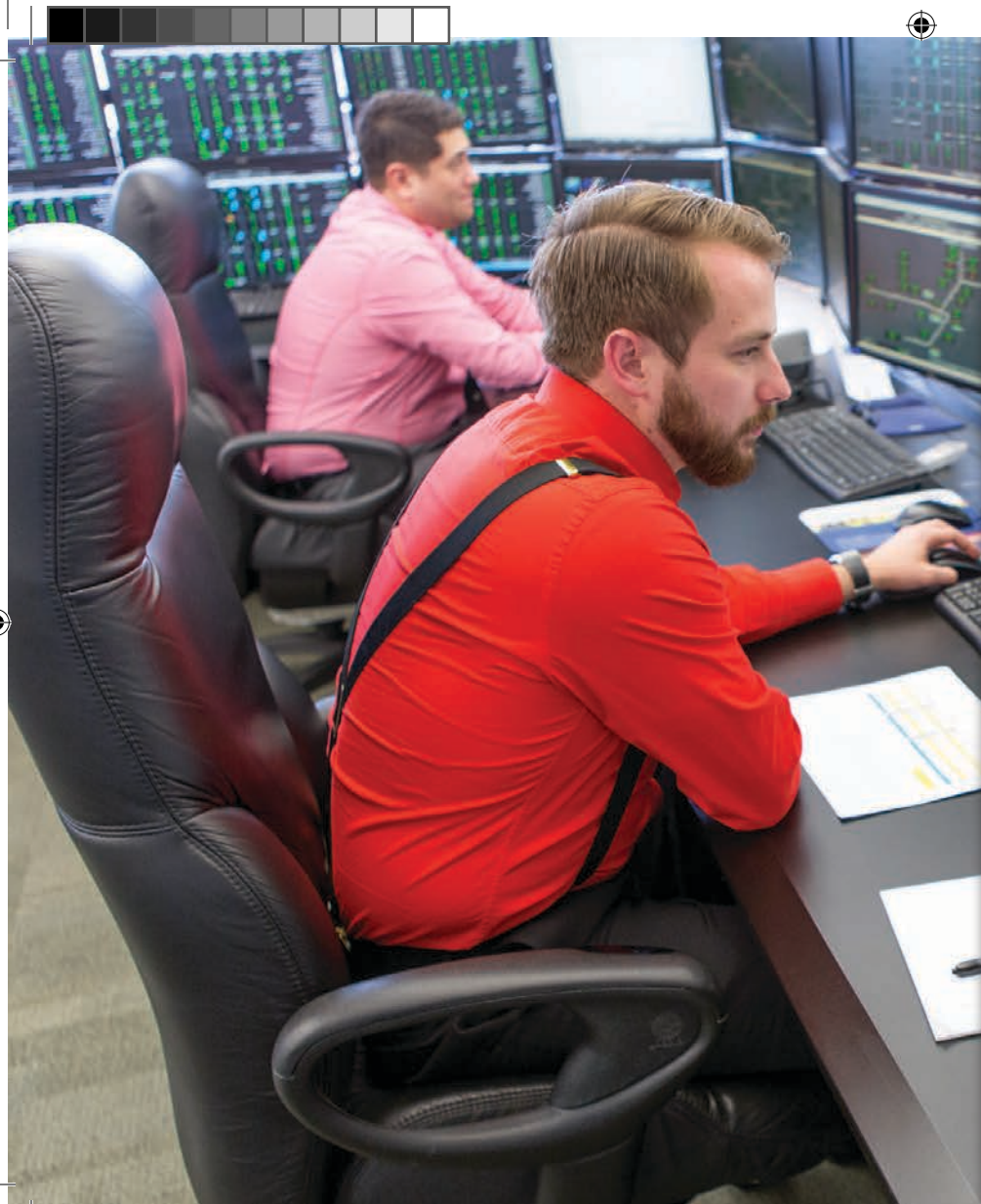
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911



Our Response:

Our control center will want to know:

- Caller's name / title / organization
- Caller's phone number(s) and phone number of person to call back (i.e. cell phone at site)
- Emergency information
- Location, include city and state
- What you see
- What you hear
- What you smell

Don't wait for an emergency to contact us. Please notify us anytime you have questions or would like more information concerning:

- Pipeline safety
- Emergency response plans
- Drills, table-top exercises, facility tours



***DON'T ATTEMPT TO OPERATE VALVES OR EQUIPMENT AS IT MAY
CREATE AN EVEN GREATER HAZARD.***





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