

TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC

**Resource Report No. 11
Reliability and Safety**

**Transcontinental Gas Pipe Line Company
Northeast Supply Link Project**

December 2011

SUMMARY OF FILING INFORMATION		
INFORMATION	Data Sources¹	Found in
Minimum FERC Requirements		
1. Describe how the Project facilities would be designed, constructed, operated, and maintained to minimize potential hazard to the public from the failure of Project components as a result of accidents or natural catastrophes. (§380.12 (m))	D	11.1 – 11.7

D = Applicant

Response to FERC Comments on September 28, 2011	
Comment:	Found in:
1. Identify by milepost and in table form all U.S. Department of Transportation (DOT) class locations and High Consequence Areas (as defined in Title 49 CFR Part 192.903) for the proposed pipeline routes.	11.2.1 (Table 11.2-1) and 11.2.2 (Table 11.2-2)
2. Section 11.1 indicates that the proposed pipeline and aboveground facilities would meet or exceed the DOT Minimum Federal Safety Standards found in Title 49 CFR Part 192. Specify any reliability or safety measures that Transco would implement which exceed the Minimum Federal Safety Standards.	11.2

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List of Acronyms

API	American Petroleum Institute
CBT	computer-based training
CFR	Code of Federal Regulations
CH ₄	methane
DC	direct current
HCA	High Consequence Area
LEPC	Local Emergency Planning Committee
LNG	liquefied natural gas
M&R	Meter and Regulator
NDT	non-destructively tested
NSL	Northeast Supply Link
PHMSA	Pipeline and Hazardous Materials Safety Administration
ROW	right-of-way
RP	Recommended Practice
SCADA	supervisory control and data acquisition
SG	specific gravity
TSA	Transportation Security Administration
USDOT	United States Department of Transportation

11. RELIABILITY AND SAFETY

11.1 HAZARDS

The transportation of natural gas by pipeline may involve some risk to the public in the event of an incident and subsequent release of gas. Potential impacts on public safety from pipeline transport of natural gas have historically been directly related to leaks or line breaks due to corrosion or equipment malfunctions, or indirectly related to leaks or line breaks resulting from external forces not associated with pipeline operations, such as damage from third-party digging near buried pipeline sections, or in some rare instances, seismic forces. However, interstate natural gas pipeline facilities are designed, constructed, operated, and maintained in accordance with United States Department of Transportation (USDOT)-Pipeline and Hazardous Materials Safety Administration (PHMSA) Standard Code of Federal Regulations 49 CFR] Part 192. These federal safety standards, together with recent advances in pipeline manufacture, construction, and inspection techniques, along with pipeline integrity management programs, minimize the potential for pipeline failure.

The primary component of natural gas in interstate transmission pipelines is methane (CH₄), a colorless, odorless and tasteless gas. In Pennsylvania, for natural gas delivered to New Jersey, odorant is added by Transco to pipeline gas to give natural gas a characteristic smell. While not chemically toxic, methane is classified as an asphyxiant with a slight inhalation hazard. Exposure to high concentrations can result in serious injury or death due to oxygen deficiency. The specific gravity (SG) of methane is 0.55, which is lighter than air (SG 1.0). This means methane tends to rise at normal atmospheric temperature and pressure and disperses rapidly in the atmosphere. In general, unconfined mixtures of methane in air are not flammable/explosive because of the dilution of the methane by nitrogen and oxygen in the atmosphere. Mixtures of methane in air are flammable at concentrations between 5.0 and 15.0 percent methane by volume. Methane has an ignition temperature >999°F (methane), 900°F (natural gas).

11.1.1 Transco Pipeline Incidents

The USDOT Pipeline Safety Regulation defines an “incident” as including any of the following events:

- (1) An event that involves a release of gas from a pipeline, or of liquefied natural gas (LNG), liquefied petroleum gas, refrigerant gas, or gas from an LNG facility, and that results in one or more of the following consequences:

- (i) A death or personal injury necessitating in-patient hospitalization,
 - (ii) Estimated property damage of \$50,000 or more, including loss to the operator and others, or both, but excluding cost of gas lost
 - (iii) Unintentional estimated gas loss of three million cubic feet or more;
- (2) An event that results in an emergency shutdown of an LNG facility. Activation of an emergency shutdown system for reasons other than an actual emergency does not constitute an incident.
- (3) An event that is significant in the judgment of the operator, even though it did not meet the criteria of paragraphs (1) or (2) of this definition.

Table 11.1-1 lists Transco pipeline incidents documented by the USDOT since 1984.

Table 11.1-1
USDOT Incident Reports - Transco onshore ruptures since 1984

Report Id	Date	County	State	Type	Fatalities	Injuries	Cause
19841073	12/3/1984	Pointe Coupee	La	Rupture	0	3	Damage by outside force
19870112	5/24/1987	St Landry	La	Rupture	0	0	Damage by outside force
19900091	2/25/1990	St Helena	La	Rupture	0	0	Corrosion
19900180	12/16/1989	Acadia	La	Rupture	0	0	Damage by outside force
19910030	1/18/1991	West Feliciana	La	Rupture	0	0	Other
19920166	10/5/1992	Dallas	Al	Rupture	0	0	Other
19930219	11/15/1993	Wharton	Tx	Rupture	0	0	Damage by outside force
19940120	4/17/1994	West Feliciana	La	Rupture	0	0	Other
19940142	5/6/1994	Acadia	La	Rupture	0	0	Damage by outside force
19940168	6/30/1994	Culpeper	Va	Rupture	0	0	Corrosion
19940182	8/10/1994	Terrebonne	La	Rupture	0	0	Corrosion
19950059	3/19/1995	St Helena	La	Rupture	0	0	Damage by outside force
20080090	9/14/2008	Appomattox	Va	Rupture	0	0(*)	External corrosion

Source: USDOT-PHMSA 2011.

11.2 SAFETY STANDARDS FOR PIPELINES

A natural gas pipeline company approaches safety from a system-wide perspective. Transco complies with the safety standards imposed by the USDOT-PHMSA. Transco is committed to maintaining the highest standards of safety and has created and implements procedures that meet or exceed these minimum requirements.

The proposed pipeline and aboveground facilities associated with the Northeast Supply Link (NSL) Project (Project) will be designed, constructed, operated, and maintained to meet or exceed the requirements of USDOT-PHMSA Safety Standards in 49 CFR Part 192. The USDOT-PHMSA regulations are intended to ensure adequate protection for the public and to

prevent natural gas pipeline incidents and failures. Part 192 specifies material selection and qualifications, minimum design requirements, operating and maintenance schedules, and protection from internal, external, and atmospheric corrosion.

Transco will implement the following reliability or safety measures which exceed the Minimum Federal Safety Standards:

- The pipe material will generally exceed the American Petroleum Institute (API)-5L requirements;
- A 0.5 design factor will be used for all fabricated mainline valve assemblies;
- All girth welds will be 100% non-destructively tested regardless of pipeline classification.;
- Additional cover depth may be provided at certain locations (e.g., roads, streams or other waterbodies);
- Class IV design pipe will be installed in certain Class III residential areas in order to increase the safety factor; and
- Transco generally tests new pipeline sections above the minimum required test pressure.

Williams is in full compliance with all existing regulations and guidelines from the Transportation Security Administration (TSA) as identified in the Office of Pipeline Safety Circular Guide Document. In addition, TSA has audited the Transco pipeline twice in the past three years to ensure Williams is in compliance with all applicable regulations. Williams is also currently in compliance with the New Jersey Domestic Security Preparedness Act (annual certification) as well as the following guidelines issued by the USDOT-PHMSA and adopted by the Department of Homeland Security, Pipeline Security Branch:

- *Security Practices – Natural Gas Industry Transmission and Distribution*; and
- *Pipeline Security Contingency Planning Guidance*.

Williams cannot discuss the vulnerability of the pipeline to terrorist attack or the measures we take to counter an attack. At most, Williams can say that the proposed pipeline will be buried and that our Operations personnel patrol the existing pipelines by air and vehicle on a routine basis. Also, the pipeline pressures are monitored 24 hours per day by our Gas Control office. Williams cannot divulge information in the public domain that would potentially place the pipeline system at risk by attempts to circumvent Transco's safety management program.

11.2.1 USDOT Class Locations

Part 192 also establishes pipeline design classification standards, based on population density in the vicinity of an existing or proposed pipeline. These class standards provide increasingly more conservative design requirements as population density increases. The class location unit area extends 220 yards (660 feet) on either side of the centerline of any continuous 1-mile length of pipeline. The four area classifications are defined as follows:

- Class 1: Location with 10 or fewer buildings intended for human occupancy.
- Class 2: Location with more than 10 but less than 46 buildings intended for human occupancy.
- Class 3: Location with 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building, or small, well-defined outside area (i.e., playground, recreational area) occupied by 20 or more people at least 5 days a week for 10 weeks in any 12-month period.
- Class 4: Location where buildings with four or more stories aboveground are prevalent.

Class location criteria and calculations determine minimum pipe wall thickness, the maximum distance between block valves, hydrostatic test pressures, maximum allowable operating pressure, and frequency of pipeline patrols and leak surveys. Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. Pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated rock. Transco's pipelines have typically exceeded this requirement by installing with 36 inches of cover in Class 1 locations with normal soils and with 36 inches of cover in rock.

Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil and 24 inches in consolidated rock. Class locations also specify the maximum distance between mainline block valve(s) (e.g., 10.0 miles in Class 1, 7.5 miles in Class 2, 4.0 miles in Class 3, and 2.5 miles in Class 4). Pipe wall thickness and pipeline design pressures, hydrostatic test pressures, inspection and testing of welds and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas.

Pipe design regulations for steel pipe are contained in Subpart C, Part 192. Section 192.105 contains a formula for the pipeline's design pressure. Sections 192.107 through 192.115 contain the components of the design formula, including yield strength, wall thickness, design factor, longitudinal joint factor, and temperature derating factor, which are adjusted

according to the project design conditions, such as pipe manufacturing specifications, steel specifications, class location, and operating conditions.

Pipeline operating regulations are contained in Subpart L, Part 192. Section 192.615 requires each pipeline operator to establish an operation and maintenance plan and an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency. Key elements of the plans include procedures for:

- Responding and managing an emergency incident (i.e., gas leakage, fires, explosions, and natural disasters);
- Establishing and maintaining communication with local fire, police, and public officials and coordinating emergency response;
- Ensuring that properly trained personnel, are supplied with the proper equipment, tools, and materials at the scene of an emergency;
- Making safe any actual or potential hazard to life or property; and
- Emergency shutdown of system and safe restoration of service.

The measures include monitoring the area around the pipeline for changes in population density. Heavily populated areas are subject to more frequent monitoring. When changes occur in population density, the pipeline operator is required to ensure that the installed pipeline meets the criteria for pipe design that applies in the higher class location. If the pipe does not meet these requirements, the pipe is replaced, the operating pressure in the line is reduced, or similar safety measures are undertaken to achieve the required margin of safety. The new class location may also require increased frequency of various inspections.

The specific class locations for the Project are detailed in Table 11.2-1.

**Table 11.2-1
Pipe Class Locations**

Facility	Milepost Locations	Current Pipeline Class Designation	Design Class for NSL Facilities
Muncy Loop	MP 128.97 to 129.10	Class 1	Class 2
	MP 129.10 to 129.30	Class 2	Class 2
	MP 129.30 to 129.79	Class 1	Class 2
	MP 129.79 to 130.31	Class 2	Class 2
	MP 130.31 to 130.60	Class 1	Class 2
	MP 130.60 to 130.88	Class 2	Class 2
	MP 130.88 to 131.19	Class 1	Class 2
Palmerton Loop	MP 40.50 to 41.08	Class 1	Class 2
	41.08 to 41.60	Class 1	Class 2
	41.60 to 41.82	Class 1	Class 2

**Table 11.2-1
Pipe Class Locations**

Facility	Milepost Locations	Current Pipeline Class Designation	Design Class for NSL Facilities
	41.82 to 43.35	Class 3	Class 3
	43.35 to 43.37	Class 1	Class 2
	43.37 to 43.43	Class 3	Class 3
	43.43 to 43.66	Class 3	Class 3
	43.66 to 43.67	Class 1	Class 2
Stanton Loop	MP 6.90 to 7.19	Class 2	Class 2
	MP 7.19to 7.41	Class 1	Class 2
	MP 7.41 to 8.12	Class 2	Class 2
	MP 8.12 to 8.30	Class 3	Class 3
	MP 8.30 to 8.48	Class 2	Class 2
	MP 8.48 to 10.98	Class 3	Class 3
	MP 10.98 to 11.10	Class 1	Class 2
	MP 11.10 to 11.48	Class 3	Class 3
	MP 11.48 to 11.83	Class 1	Class 2
	MP 11.83 to 11.94	Class 1	Class 2
	MP 11.94 to 12.26	Class 2	Class 2
	MP 12.26 to 12.64	Class 1	Class 2
	MP 12.64 to 13.34	Class 2	Class 2
	MP 13.34 to 13.51	Class 1	Class 2
MP 13.51 to MP 13.54	Class 2	Class 2	
Caldwell Replacement	MP 1821.11 to MP 1821. 58	Class 4	Class 4
Caldwell Uprate	Cld B MP 1820.66 – 1820.77	Class 3	NA
	Cld B MP 1820.77 – 1820.90	Class 2	NA
	Cld B MP 1820.90 – 1821.12	Class 1	NA
	Cld B MP 1821.12 – 1821.12	Class 2	NA
	Cld B MP 1821.12 – 1821.58	Class 4	NA
	Cld B MP 1821.58 – 1822.63	Class 1	NA
	Cld B MP 1822.63 – 1822.69	Class 2	NA
	Cld B MP 1822.69 – 1823.16	Class 1	NA
	Cld B MP 1823.16 – 1823.27	Class 3	NA
	Cld B MP 1823.27 – 1823.47	Class 1	NA
	Cld B MP 1823.47 – 1823.68	Class 3	NA
	Cld B MP 1823.68 – 1825.28	Class 1	NA
	Cld B MP 1825.28 – 1825.40	Class 3	NA
	Cld B MP 1825.40 – 1826.87	Class 1	NA
	Cld B MP 1826.87 – 1826.96	Class 3	NA
	Cld B MP 1826.96 – 1826.98	Class 1	NA
	Cld B MP 1826.98 – 1827.21	Class 3	NA
Cld B MP 1827.21 – 1827.69	Class 1	NA	

**Table 11.2-1
Pipe Class Locations**

Facility	Milepost Locations	Current Pipeline Class Designation	Design Class for NSL Facilities
	Cld B MP 1827.69 – 1827.81	Class 3	NA
	Cld B MP 1827.81 – 1828.89	Class 1	NA
	Cld B MP 1828.89 – 1829.39	Class 3	NA
	Cld B MP 1829.39 – 1830.55	Class 1	NA
	Cld B MP 1830.55 – 1830.63	Class 3	NA
	Cld B MP 1830.63 – 1831.07	Class 1	NA
	Cld B MP 1831.07 – 1831.13	Class 3	NA
	Cld B MP 1831.13 – 1836.19	Class 1	NA
	Cld B MP 1836.19 – 1836.61	Class 3	NA
	Cld B MP 1836.61 – 1837.30	Class 1	NA
	Cld B MP 1837.30 – 1837.38	Class 3	NA
	Cld B MP 1837.38 – 1837.62	Class 1	NA
	Cld B MP 1837.62 – 1837.74	Class 3	NA
	Cld B MP 1837.74 – 1838.80	Class 1	NA
	Cld B MP 1838.80 – 1838.91	Class 3	NA
	Cld B MP 1838.91 – 1839.12	Class 1	NA
	ML B MP 1822.01 – 1827.06	Class 1	NA
	72 L MP 0.00 – 0.85	Class 1	NA
	72 L MP 0.85 – 0.93	Class 2	NA
	72 L MP 0.93 – 1.85	Class 3	NA
Long Island Extension Uprate	MP 10.17 – 10.44	Class 3	NA
	MP 10.44 – 11.49	Class 1	NA
	MP 11.49 – 11.57	Class 3	NA
Key: Caldwell Uprate Cld B: Caldwell "B" Loop ML B: Existing Mainline B 72 L: 72 nd Street Lateral			

11.2.2 High Consequence Areas

On November 15, 2002, Congress passed the Pipeline Safety Improvement Act (HR 3609), which was signed into law on December 17, 2002. The Act required the USDOT to issue regulations establishing standards for risk analysis and development of an integrity management program to overall strengthen pipeline safety. The Act also established minimum requirements for integrity management programs for gas pipelines located in High Consequence Areas (HCAs). As required by the Pipeline Safety Improvement Act, the USDOT's PHMSA issued its final rule on December 15, 2003, requiring operators to develop integrity management programs for gas transmission pipelines located in HCAs. Transco's

Integrity Management Program is further summarized in Section 11.7. Definitions and identification of HCA's are further addressed below.

49 CFR Part 192.903 states:

High consequence area means an area established by one of the methods described in paragraphs (1) or (2) as follows:

- (1) *An area defined as-*
 - (i) *A Class 3 location under §192.5; or*
 - (ii) *A Class 4 location under §192.5; or*
 - (iii) *Any area in a Class 1 or Class 2 location where the potential impact radius is greater than 660 feet (200 meters), and the area within a potential impact circle contains 20 or more buildings intended for human occupancy; or*
 - (iv) *Any area in a Class 1 or Class 2 location where the potential impact circle contains an identified site.*
- (2) *The area within a potential impact circle containing-*
 - (i) *20 or more buildings intended for human occupancy, unless the exception in paragraph (4) applies; or*
 - (ii) *An identified site.*
- (3) *Where a potential impact circle is calculated under either method (1) or (2) to establish a high consequence area, the length of the high consequence area extends axially along the length of the pipeline from the outermost edge of the first potential impact circle that contains either an identified site or 20 or more buildings intended for human occupancy to the outermost edge of the last contiguous potential impact circle that contains either an identified site or 20 or more buildings intended for human occupancy.*
- (4) *If in identifying a high consequence area under paragraph (1)(iii) of this definition or paragraph (2)(i) of this definition, the radius of the potential impact circle is greater than 660 feet (200 meters), the operator may identify a high consequence area based on a prorated number of buildings intended for human occupancy with a distance of 660 feet (200 meters) from the centerline of the pipeline until December 17, 2006. If an operator chooses this approach, the operator must prorate the number of buildings intended for human occupancy based on the ratio of an area with a radius of 660 feet (200 meters) to the area of the potential impact circle (i.e., the prorated number of buildings intended for human occupancy is equal to $20 \times (660 \text{ feet})^2 / [\text{potential impact radius in feet}]^2$).*

Identified site means each of the following areas:

- (a) *An outside area or open structure that is occupied by twenty (20) or more persons on at least 50 days in any twelve (12)-month period. (The days need not be consecutive.) Examples include but are not limited to, beaches, playgrounds, recreational facilities, camping grounds, outdoor theaters, stadiums, recreational areas near a body of water, or areas outside a rural building such as a religious facility; or*

- (b) *A building that is occupied by twenty (20) or more persons on at least five (5) days a week for ten (10) weeks in any twelve (12)- month period. (The days and weeks need not be consecutive.) Examples include, but are not limited to, religious facilities, office buildings, community centers, general stores, 4-H facilities, or roller skating rinks; or*
- (c) *A facility occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate. Examples include but are not limited to hospitals, prisons, schools, day-care facilities, retirement facilities or assisted-living facilities.*

HCA locations crossed by the NSL Project pipeline facilities are listed in Table 11.2-2.

**Table 11.2-2
High Consequence Areas Crossed by the NSL Project**

Begin MP	End MP	Method	HCA Date	HCA Type
Palmerton Loop				
42.12	42.36	2	8/30/2004	cluster of 20+ structures
Stanton Loop				
7.91	8.51	2	9/5/2004	Identified Site
9.18	9.52	2	9/5/2004	cluster of 20+ structures
9.99	10.42	2	9/5/2004	cluster of 20+ structures
10.45	11.07	2	9/5/2004	cluster of 20+ structures

11.2.3 Pipeline Markers

The USDOT-PHMSA also requires pipeline operators to place pipeline markers at frequent intervals along the pipeline rights of way (ROWs), such as where a pipeline intersects a street, highway, railway or waterway, and at other prominent points along the route. Pipeline ROW markers can help prevent encroachment and excavation-related damage to pipelines. Since the pipeline ROW is much wider than the pipeline itself, and a pipeline can be located anywhere within the ROW, state laws require excavators to call their state One-Call center well in advance of digging to locate underground utilities and ensuring it is safe for the contractor to dig in that location.

11.2.4 Pipeline Pressure Increase

To provide an added increment of safety, PHMSA regulations provide that pipelines be operated not at the pressure to which the line was tested, but at a pressure less than the test pressure. In the case of the proposed Caldwell “B” and Long Island Extension pipeline uprates, Transco cannot, by regulation, operate the pipe at more than 50% of the design strength due to the existing Class 3 Location and the applicable USDOT design factor of 0.5. This high margin of safety is intended to protect the public above and beyond the pipe’s tested strength and all of the other safety and maintenance programs undertaken by Transco.

11.3 SAFETY STANDARDS FOR COMPRESSOR STATIONS

In addition to pipeline safety standards for any pipelines within compressor stations, 49 CFR Parts 192.731 through 192.736 establish guidelines for inspections, hazardous materials storage, and monitoring at compressor stations. Transco's construction of Compressor Station 303 and planned modifications at Compressor Stations 505 and 515 will be designed, constructed, and operated to meet or exceed applicable specifications. The piping at the station will be manufactured in accordance with API specifications and wall thickness will conform to USDOT-PHMSA safety regulations contained in 49 CFR Part 192.

Compressor Station 303 is proposed to be located adjacent to Transco's existing Roseland Meter and Regulator (M&R) Station in the Borough of Roseland in Essex County, New Jersey. Compressor Station 505 is located on Transco property in Somerset County, New Jersey. Compressor Station 515 is located on Transco property in Luzerne County, Pennsylvania. All facilities are or will be completely surrounded by a 6-foot-high chain-link fence with one-foot of barbed wire to maintain the security of the facility. A controlled access system restricts access to authorized personnel only. The compressor buildings are constructed of noncombustible material and are sufficiently ventilated to minimize the potential for gas to accumulate within enclosed areas.

These existing compressor stations are equipped with automatic emergency detection and shut down systems. These safety and emergency systems are tested routinely to ensure they are operating properly. The emergency shut down systems are designed to shut down and isolate areas of the compressor station in the event of a fire, before the development of a flammable mixture of gas could occur. The systems also include sensors for detecting natural gas concentrations as well as ultraviolet sensors for detecting potential ignition sources. Compressor Station 303 will be equipped with similar safety systems.

In addition, the compressor station equipment is designed to shut down automatically if a mechanical failure poses risks to the equipment or otherwise constitutes a hazard. The compressor station is equipped with relief valves to protect the piping from over-pressurization.

Fire protection, first aid, and safety equipment are maintained at the compressor stations and Transco's emergency response personnel are trained in proper equipment use and in first aid. The fire-fighting equipment that is maintained on site consists primarily of hand-held dry chemical fire extinguishers.

11.4 SAFETY STANDARDS FOR CONSTRUCTION

11.4.1 Traffic Control

Transco's construction contractors will provide traffic warning signs along road crossings as required by local and/or state road encroachment permit requirements and specifications. Flagmen will be strategically positioned to stop traffic, as necessary, when delivering and retrieving pipe or materials from the temporary pipe storage yards. For those roads where an open cut construction method will be used and one lane of traffic must remain open to traffic at all times, steel plating will be placed over the pipeline trench to maintain vehicle access within the open lane. Access will also be maintained for emergency vehicles. Further, Transco will coordinate with townships prior to construction to ensure both Transco and township representatives have appropriate contact information.

11.4.2 Affected Residents

Construction through areas in proximity to residences will be limited to the shortest timeframe possible to safely construct the pipeline. At a minimum, Transco will place safety fence along the construction corridor and if needed, temporary security fence can be installed at some locations to keep non-workers (children and adults) out of the workspace. In addition, Transco will hire a security guard to patrol the work sites after work hours and on weekends.

11.4.3 Working over Existing In-Service Pipelines

Conducting construction operations over existing pipelines is not a preferred construction method, but is done for short distances in certain areas to minimize impacts to surrounding areas. The Transco Onshore Pipeline Construction Specification 90.0500, Section 1.15 states: "The minimum cover required to operate heavy equipment over existing pipelines is 5-feet. Operation of heavy equipment over existing pipelines with less than 5 feet of cover shall not be permitted without Company approval. Company may require additional cover, mats, or other protection if soil appears muddy, rocky, or otherwise unsafe. Tracked equipment shall not spin or turn sharply while working over the existing line."

When work over existing in-service pipelines is required, Transco's engineers will calculate and analyze potential stresses in the hot lines caused by equipment, vehicles, spoil, or other loads. The engineer will recommend additional soil cover, matting, or other means of protecting the pressurized lines as necessary to keep calculated potential stresses within Transco specifications and public safety codes.

11.4.4 Minimum Distances between Pipelines

The preferred separation for safely constructing and maintaining large-diameter high-pressure pipelines is 25 feet. Transco has allowed reductions in separation below 25 feet for short distances to avoid obstacles that cannot reasonably be relocated or removed from the ROW. The reduction in separation distance is considered on a case-by-case basis for each location and varies according to site conditions, type of obstacle, and availability of alternate routing.

Transco has, in recent practice, reduced the pipeline separation distance for new pipelines to 15 feet to avoid residences and certain high-value obstacles or clusters of obstacles. Where such reductions were approved, the separation was increased back to 25 feet immediately beyond the area of concern. Transco has safely installed portions of new lines less than 25 feet from existing lines in many instances over the years.

11.4.5 Pipeline Crossovers

Crossing over/under existing pipelines or other infrastructure is very common for all types of utilities and can be done safely. Transco and its contractors avoid unnecessarily crossing over/under its lines. Typically, cross-overs are installed under the existing pipelines, not over. All cross-overs proposed for this Project will be installed under the existing Transco pipelines. Where cross-overs are unavoidable, Transco develops individual work plans for each cross-over and relies on written safety procedures (e.g., Transco Onshore Pipeline Construction (Manual) Specification 90.0500, Section 1.16 that states: "Machine excavation will not be permitted closer than 18 inches from pipelines.... Final exposure shall be by hand excavation only." and participating in the one-call system to locate utilities).

A cross-over requires deeper excavation, greater volume of spoil, additional workspace, and exposure of the crossed pipelines. All of these factors increase impacts to the surrounding land, and require extra care during installation of the new pipeline. Consequently, the cross-over method of avoiding obstacles is reserved for locations of particular concern.

Transco will review the material specifications of any pipe to be exposed during installation of a cross-over. Before a cross-over is allowed, Transco engineers will evaluate the excavation plan and analyze potential stresses in the pipe by calculations to confirm that no calculated stress exceeds Transco specifications or public safety codes. Transco's construction inspectors and pipeline construction contractors have extensive experience and knowledge of the proper means and methods for safely installing pipeline cross-overs.

11.4.6 Welding

It is Transco's policy that only company approved and tested welders are permitted to work on Transco pipeline facilities. All welding activities are carried out under the supervision of a Transco welding inspector and are 100% x-ray tested. Additionally, all qualified welders meet the following standards: American Society of Mechanical Engineers Section IX, API 1104, and Subpart E 49 CFR 192.

11.5 PIPELINE SAFETY MONITORING PROGRAM

The first step in Transco's pipeline safety monitoring process is to make sure that the pipeline is constructed properly. Safety begins at the pipe mill where the steel pipe is manufactured. Transco representatives inspect the pipe and coating at the mill to ensure that it meets quality control standards and specifications. During construction, the integrity of pipeline coatings, designed to protect the pipeline against corrosion, are inspected, examined, are corrected or repaired in the field, and are verified on-site by experienced inspectors. Transco requirements include that all pipe girth-welds are non-destructively tested (NDT) and verified by x-ray in the field prior to backfilling the pipeline. In addition, the pipeline will be tested with water to a pressure significantly higher than its maximum operating pressure prior to being placed into service (i.e., hydrostatic testing).

Once the pipeline is in the ground, Transco will implement a number of routine monitoring measures including:

- Physically walking and inspecting the pipeline corridor periodically;
- Conducting fly-over inspections of the ROW as required, generally weekly;
- Inspecting valves and maintaining compressor engines; and
- Conducting leak surveys at least once every calendar year or as required by regulations.

During inspections, Transco employees look for signs of unusual activity on the ROW. Upon discovery, Transco personnel respond immediately to assess the nature of the activity and remedy with prescribed corrective action. Additional tests are conducted using analyzers to verify the effectiveness of cathodic protection systems.

In addition to USDOT-PHMSA required surveys listed above, Transco monitors portions of its pipeline systems using a supervisory control and data acquisition (SCADA) system. SCADA systems are used to monitor and control facilities or equipment in industries, such as telecommunications, water and waste control, energy, oil and gas refining, and transportation.

A SCADA system gathers information, transfers the information back to a control center alerting the personnel that a leak may have occurred, carries out necessary analysis and control, and displays the information in a logical and organized fashion. The Gas Control Center for the facilities to be installed under the Project is located in Houston, Texas.

Transco has also developed an enhanced pipeline Integrity Management Program to improve pipeline safety along its entire pipeline system. This is discussed further in Section 11.7. This program is auditable by USDOT-PHMSA. The Integrity Management Program was developed and implemented to comply with the prescriptive based requirements of Subpart O, 49 CFR 192 and Transco is monitoring the program's effectiveness and striving for continuous improvement.

11.5.1 Cathodic Protection/Stray Current

Cathodic protection systems (i.e., low voltage electrical systems) are installed on all of Transco's pipeline facilities to prevent corrosion. Transco's pipeline system has an impressed current cathodic protection system, whereby a direct current (DC) of about one volt is applied or impressed on the pipeline to protect against external corrosion. Transco personnel check the voltage and amperage every two months as well as the pipe-to-soil potentials and rectifiers. In addition, annual surveys are completed.

11.5.2 Emergency Response Capabilities

Operation of the pipeline is regulated by the federal USDOT-PHMSA under 49 CFR 192. All inspections follow code requirements, and audits are performed by PHMSA.

Transco has a Public Awareness and Damage Prevention Program, which calls for communication with emergency responders on an annual basis. The message communicated revolves around pipeline safety: How to identify a pipeline marker, what a pipeline ROW is and looks like, who to call in case of an emergency, physical properties of natural gas, and what is expected of first responders during an emergency.

Transco maintains 24-hour emergency response capabilities, including an emergency-only phone number, which accepts collect charges. The number will be included in informational mail-outs, posted on all pipeline markers, and provided to local emergency agencies in the vicinity of the pipeline and compressor station.

In addition, Transco has developed emergency response plans for its entire system and Transco's operating personnel attend training for emergency response procedures and plans. Transco will review and revise its emergency response plans prior to placing the new facilities in

operation. Transco will meet with Local Emergency Planning Committees (LEPCs) which include fire departments, police departments, and public officials to review plans and will work with these LEPCs to communicate the specifics about the pipeline facilities in the area and the need for emergency response. Transco will also meet periodically with the groups to review the plans and revise their plans when necessary. LEPC personnel will be involved in any operator-simulated emergency exercises and post-exercise critiques, if conducted. Transco will use all available, reasonable, and relevant means to support the pipeline and facilities if an emergency occurs.

All of the information that a company gathers about its system goes back into tailoring the safety and integrity management activities of the company, so that parts of the system in the greatest need of attention receive greater scrutiny. For example, the company decides where and when to internally inspect the pipeline based on this accumulated knowledge. Risk assessment of the pipeline system determines what inspection criteria are required. This may include in-line inspection tools (e.g., smart pigs), which are designed to provide specific integrity information about the condition of the pipe, as well as inspection tools and practices that the company has determined will be the most effective at any given location on the pipeline.

No special fire-fighting apparatus is required to fight a high-pressure natural gas fire. The most effective and immediate way to begin to address a gas pipeline rupture is to shut off the gas source. Transco has valves spaced along the pipeline that can be used to shut off the gas and isolate each pipeline segment.

11.6 PUBLIC EDUCATION PROGRAM

The API Pipeline Standards Committee has developed an industry Recommended Practice (RP) for pipeline operators to use in developing public awareness programs. API standards are well established and widely used and accepted. Referred to as RP 1162, it mandates the distribution of pertinent information to landowners, excavators, and emergency responders. Transco's public awareness program exceeds the requirements of RP 1162.

Transco provides residents who live along the pipeline ROW Transco's 24-hour emergency only number and information about the pipeline, including what activities to look for and what to do in an emergency, . Transco works with local emergency response officials to educate them about the nature of pipeline operations and the appropriate actions to take if there is an accident. Written information about recognizing leaks and properly reporting pipeline emergencies is distributed annually to the public, appropriate government agencies, and third party excavators.

Transco formally evaluates its public education program on a regular basis to assure consistent baseline evaluations by all pipeline operators. Some of the evaluation techniques described will include formal self-assessment, surveys, and other feedback instruments.

In any emergency Transco relies on the local emergency services (e.g., fire and police) to communicate with the public. Transco follows the Incident Command protocol, developed by the Fire Marshall and implemented by local fire departments, and maintains contact with the emergency responders.

Transco has a strong public education program. Each year Transco mails emergency contact information and maps of our pipeline facilities to emergency officials located along our entire pipeline system, including all municipalities crossed by the Project. The information Transco sends provides the web address to an online pipeline emergency computer-based training (CBT) module. Transco also meets regularly with local emergency officials.

Each year, Transco distributes public awareness materials to residents located within the Potential Impact Radius¹. This practice exceeds industry guidelines, which recommend distributing public awareness communications every two years. The public awareness materials provide basic information related to pipeline damage prevention, hazard awareness, emergency response guidelines and pipe location information.

In 2010 Transco mailed about 3,000 letters to emergency officials. In addition, Transco mailed 231,000 letters containing basic emergency response information to residents living up to 1,200 feet from the pipeline. This practice is consistent with API Recommended Practice 1162, *Public Awareness Programs for Pipeline Operators* (<http://committees.api.org/pipeline//standards/docs/1162finaldraft.pdf>), which is referenced in Subpart O, 49 CFR 192. Transco also sends information to all excavators in each county where it operates (about 300,000), in addition to public officials (about 1,400 mailed last year). In 2010, Transco conducted about 450 meetings with emergency officials for the purpose of emergency response education.

More information about Transco and pipeline safety can be found at www.williams.com.

11.7 INTEGRITY MANAGEMENT PROGRAM

Transco has developed an enhanced pipeline Integrity Management Program to improve pipeline safety along its entire pipeline system. This program is routinely audited by the USDOT-PHMSA as the Integrity Management Program was developed and implemented to

¹ The Potential Impact Radius (PIR) is calculated from a mathematical formula ($PIR = 0.69 \times (\sqrt{MAOP}) \times \text{pipe diameter}$). The PIR is considered an area of interest by the USDOT.

comply with the prescriptive based requirements of Subpart O, 49 CFR 192. Transco implements the program through:

- Assessing the integrity of pipelines in High Consequence Areas and other areas;
- Improving integrity management data systems within the company;
- Increasing the integrity and reliability of the pipeline system;
- Improving the government's role in reviewing the adequacy of integrity programs and plans; and
- Providing increased public assurance of pipeline safety.

The proposed new pipeline segments (i.e., loops, replacement, and uprates) will be incorporated into the Integrity Management Program. Facilities will be installed or modified to allow the internal pipeline inspections and assessment for these new pipeline segments.

11.7.1 Hydrostatic Testing

Hydrostatic tests are an integral part of Transco's pipeline integrity management programs. Hydrostatic testing is conducted for both new and existing pipelines.

New Pipelines

Pipelines are designed to operate at certain pressures based on the pipe metal's yield strength, diameter, and wall thickness. Before newly installed pipeline segments are placed into service, the line is pressure tested by filling it with water and pressuring the line up to a level that exceeds the maximum pressure at which the pipeline will operate. The test pressure is held for a specific period of time to determine if the pipeline meets the design strength requirements and if any leaks are present.

Existing Pipelines

The testing procedure is the same as for new pipelines but may be used on existing pipelines in special circumstances when a line cannot be modified to accommodate a smart pig or in other circumstances, such as setting a new maximum allowable operating pressure for a pipeline that is not used to its full design capacity (uprating).

11.7.2 Smart Pigs

An important part of the integrity program is the use of an internal pipeline inspection gauge known as a "smart pig." A smart pig is a mechanical device that travels inside the pipe and checks for anomalies, such as pipe wall metal loss caused by corrosion. They are used to

inspect the pipeline with various sensors and record the data for later analysis. These “pigs” use technologies such as Magnetic Flux Leakage and ultrasonics to detect the various aspects of the pipeline. Transco was the smart-pigging pioneer in the pipeline industry, utilizing the technology almost 25 years ago. This practice is now mandated by federal law pursuant to the Pipeline Safety Act and is required to be done every seven years.

11.7.3 Caliper Pigs

A caliper, or geometry, pig is an inline inspection tool designed to record pipe features, such as dents, ovality, bend radius, and angle. In addition to hydrostatically testing pipelines before they are placed in service, Transco also runs caliper pigs to ensure the integrity of the pipeline.

11.7.4 Smart Pig Data

A number of landowners along the proposed Stanton Loop and Caldwell B Loop Uprate have requested data on the results of recent pipeline integrity management testing for these facilities. The most recent pig runs in the Stanton Loop area were in 2006 for B-Line and in 2009 for A-Line. The Caldwell Loop’s most recent pig run was in 2005, with another pig run being scheduled for the latter part of 2011. Data gathered through these pig runs indicate that the pipelines have retained their integrity and remain free of structural defects.

11.8 REFERENCES

United States Department of Transportation Pipeline and Hazardous Materials Safety Administration (USDOT-PHMSA). 2011. Distribution, Transmission, and Liquid Accident and Incident Data. Accessed online at: <http://phmsa.dot.gov/portal/site/PHMSA/menuitem.ebdc7a8a7e39f2e55cf2031050248a0c/?vgnextoid=fdd2dfa122a1d110VgnVCM1000009ed07898RCRD&vgnnextchannel=3430fb649a2dc110VgnVCM1000009ed07898RCRD&vgnnextfmt=print>