Lake Charles Expansion Project

Resource Report 11
Reliability and Safety

Docket No. CP14-__-___

Public

Kinder Morgan Louisiana Pipeline LLC
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Summary of Filing Information

	Minimum Requirements	Found in Section
1.	Describe how the project facilities will 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]).	Section 11.2

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Abbreviations and Acronyms

AGA	American Gas Association
API	American Petroleum Institute
API 5L	API Specification for Line Pipe 5L
CFR	Code of Federal Regulations
ESD	emergency shutdown
FERC	Federal Energy Regulatory Commission
KM	Kinder Morgan, Inc.
KMLP	Kinder Morgan Louisiana Pipeline LLC
NEPA	National Environmental Policy Act
NGA	Natural Gas Act
OD	Outside Diameter
Project	Lake Charles Expansion Project
ROW	Right-of-Way
USDOT	U.S. Department of Transportation

11. RELIABILITY AND SAFETY

11.1 Introduction

Kinder Morgan Louisiana Pipeline LLC (KMLP) currently operates a 132-mile interstate natural gas pipeline system consisting of primarily a 42-inch-diameter pipeline that transports natural gas from the Cheniere Sabine Pass liquefied natural gas (LNG) terminal located in Cameron Parish, Louisiana, to various delivery points in Cameron, Calcasieu, Jefferson Davis, Acadia, and Evangeline parishes. KMLP was constructed to provide its two anchor shippers, Total Gas & Power North America and Chevron U.S.A. Inc., the means to import LNG into the United States of America (U.S.) using a south-to-north transportation path. KMLP is now proposing to provide up to approximately 1,400 thousand dekatherms per day (Mdth/d) of firm capacity on its system through a new north-to-south transportation path designed to connect to a liquefaction export facility to be constructed by Magnolia LNG LLC (Magnolia) to be located in the Lake Charles Harbor and Terminal District, near Lake Charles, Louisiana (Magnolia Terminal) (FERC Docket No. CP14-347-000). In order to accommodate Magnolia's request for service, KMLP has developed the proposed Lake Charles Expansion Project (Project) (Resource Report 1, Appendix 1.A, **Figure 1-1**) under which KMLP proposes to reconfigure its existing facilities by: (i) modifying certain of KMLP's existing delivery interconnections as bi-directional points to receive, as well as continue to deliver, natural gas at these points; (ii) adding compression facilities to move gas south to the proposed Magnolia Terminal, resulting in the creation of a new firm north-to-south service path; and (iii) adding new interconnect facilities for deliveries of gas on a primary firm basis to the proposed Magnolia Terminal.

Specifically, the Project is expected to require the following actions:

1) KMLP to construct and operate a new delivery interconnect: a) approximately 40 feet of 36-inch pipeline and a 36-inch tap on KMLP's existing 42-inch mainline in Calcasieu Parish, Louisiana to deliver natural gas to the proposed Magnolia Terminal, and b) a meter station to consist of two 16-inch ultrasonic meters, an 8-inch ultrasonic meter and a 6-inch turbine meter in Calcasieu Parish, Louisiana (Magnolia Meter Station);

2) KMLP to modify five existing meter stations located in Evangeline and Acadia Parishes, Louisiana to make them all bi-directional;

3) KMLP to construct and operate a new "greenfield" compressor station consisting of four 16,000 horsepower (hp) gas fired turbine driven compressor units near Eunice in Acadia Parish, Louisiana (CS 760); and

4) KMLP to construct and operate approximately 6,400 feet of 36-inch and 700 feet of 24-inch natural gas "header" pipelines to be constructed adjacent to the existing KMLP pipeline right-of-way (ROW) southwest of Eunice in Acadia Parish, Louisiana. The 36-inch header will connect three existing meter stations to the suction of the new CS 760, all in Acadia Parish, Louisiana. The 24-inch header will connect an existing meter station to discharge side of new CS 760 by means of a new 24-inch tap on the KMLP's existing 42-inch mainline within CS 760's property.

This Project is expected to be completed and placed in service on or before January 1, 2018.

KMLP is hereby submitting an application with the Federal Energy Regulatory Commission (FERC) for authorization under Section 7 of the Natural Gas Act (NGA) to construct and operate the above facilities.

The proposed Project components will be regulated by the FERC, with other federal agencies acting as cooperating partners in review of the Project under the National Environmental Policy Act. KMLP is using the traditional FERC filing process with this application under Section 7 of the NGA. A detailed description of the Project, its components, and Project location mapping are provided in Resource Report 1.

Resource Report 11 describes the reliability and safety of natural gas pipeline systems, of which compressor stations are integral components, and includes the safety record of natural gas pipelines as a national average. This report also describes efforts by KMLP to maintain public safety and includes the safety records and safety programs of KMLP. KMLP will design, construct, test, operate, and maintain the proposed facilities in accordance with United States Department of Transportation (USDOT) Minimum Federal Safety Standards in the Code of Federal Regulations Title 49, Part 192 (49 CFR 192) Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards.

11.2 Pipeline Safety Background Information

The natural gas transmission industry, as a whole, has an excellent public safety record. Pipelines and related facilities are designed and maintained in strict accordance with USDOT Office of Pipeline Safety standards to ensure both public safety and pipeline reliability and to minimize the opportunity for system failures.

Since 1970, the USDOT has maintained statistics on pipelines, which include statistics on incidents (including fatalities). The USDOT currently defines an "incident" as any of the following:

- An event that involves a release of gas from a pipeline and a death or personal injury necessitating in-patient hospitalization or estimated property damage, including cost of gas lost (for the operator or others or both), of $50,000 or more; or
- An event that is significant in the judgment of the operator, even though it did not meet the above criteria.

From 2003 through 2013, 1260 incidents (annual average: 126) were reported by natural gas transmission pipeline operators. In 2013, the latest year for which statistics are available, there were 106 transmission pipeline incidents. These 106 incidents resulted in 2 injuries and no deaths (USDOT 2014a) (**Table 11.2-1**).

TABLE 11.2-1
Office of Pipeline Safety: Natural Gas Pipeline Operators Incident Summary Statistics by Year (2005-2013)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
Incidents	160	129	111	123	105	111	119	110	106
Fatalities	0	3	2	0	0	10	0	0	0
Injuries	5	3	7	5	11	61	1	7	2

Source: USDOT 2014a

Table 11.2-2 summarizes gas transmission pipeline incidents reported from 1994 through 2013 by cause. The leading causes of transmission line incidents were internal corrosion, third-party excavation damage, and miscellaneous actions.

Using the annual average for incidents (117) from 2003 through 2013 and miles of transmission pipelines (306,000) in 2008 obtained from the U.S. Energy Information Administration (USEIA 2014), there were 0.0004 incidents per pipeline mile (or 1 incident for each 2,500 miles of pipeline) per year on average.

TABLE 11.2-2
Office of Pipeline Safety: Gas Transmission Pipeline Significant Incident Summary by Cause (1994-2013)

Reported Cause of Incident	Number	%	Fatalities	Injuries	Property Damage
Corrosion					
External Corrosion	115	9.3%	1	5	$79,762,213
Internal Corrosion	177	14.3%	12	1	$98,464,502
Sub Total	292	23.6%	13	6	$178,226,715
Excavation Damage					
Operator/contractor Excavation Damage	25	2.0%	0	5	$8,906,664
Third Party Excavation Damage	176	14.2%	14	43	$101,631,248
Previous Damage due to Excavation	6	0.4%	0	0	$1,831,489
Unspecified Excavation Damage	4	0.3%	1	1	$1,953,392
Sub Total	200	17.0%	15	49	$114,322,794
Incorrect Operation					
Incorrect Valve Position	2	0.1%	0	0	$485,394
Pipeline/Equipment Overpressured	1	0.0%	0	0	$79,813
Incorrect Installation	1	0.0%	0	0	$135,203
Other Incorrect Operation	8	0.6%	0	1	$8,885,661
Unspecified Incorrect Operation	21	1.7%	0	8	$4,360,915
Sub Total	33	2.6%	0	9	$13,946,987
Material/Weld/Equipment Failure					
Construction, Installation, or Fabrication Related	26	2.1%	0	0	$18,761,492
Manufacturing-related	15	1.2%	8	51	$406,794,650
Environmental Cracking Related	17	1.3%	0	3	$112,620,571
Body of Pipe	20	1.6%	0	0	$10,837,932
Pipe Seam	17	1.3%	0	0	$5,752,785
Butt Weld	28	2.2%	0	0	$21,097,224
Fillet Weld	6	0.4%	0	0	$1,884,576
Joint, Fitting, Component	32	2.5%	0	1	$10,017,070
Pump/Compressor-Related Equipment	5	0.4%	0	1	$8,266,913
Malfunction of Control/Relief Equipment	46	3.7%	0	2	$39,110,678
Threaded Connection/Coupling Failure	25	2.0%	0	3	$7,970,384
Non-threaded Connection Failure	8	0.6%	0	2	$13,898,584
Failure of Equipment Body	3	0.2%	0	0	$3,318,045

TABLE 11.2-2
Office of Pipeline Safety: Gas Transmission Pipeline Significant Incident Summary by Cause (1994-2013)

Reported Cause of Incident	Number	%	Fatalities	Injuries	Property Damage
Other Equipment Failure	8	0.6%	0	1	$2,647,373
Unspecified Material, Weld, or Equipment Failure	48	3.8%	0	6	$20,535,916
Sub Total	304	24.5%	8	70	$683,514,201
Natural Force Damage					
Earth Movement	35	2.8%	0	1	$30,831,965
Heavy Rains/Floods	72	5.8%	0	0	$312,226,618
Lightning	7	0.5%	0	0	$1,987,261
Temperature	4	0.3%	0	0	$922,690
High Winds	10	0.8%	0	0	$116,482,339
Other Natural Force Damage	4	0.3%	0	0	$4,710,412
Unspecified Natural Force Damage	10	0.8%	0	1	$15,176,476
Sub Total	142	11.4%	0	2	$482,337,764
Other Outside Force Damage					
Fire/Explosion as Primary Cause	8	0.6%	0	2	$10,986,012
Vehicle not Engaged in Excavation	45	3.6%	0	10	$47,242,048
Maritime Equipment or Vessel Adrift	1	0.0%	0	0	$97,995
Fishing or Maritime Activity	6	0.4%	0	0	$4,548,220
Electrical Arcing from Other Equipment	1	0.0%	0	0	$145,004
Previous Mechanical Damage	5	0.4%	0	1	$3,306,873
Intentional Damage	1	0.0%	0	0	$84,384
Other Outside Force Damage	6	0.4%	0	0	$27,512,843
Unspecified Outside Force Damage	1	0.0%	0	0	$667,062
Sub Total	74	5.9%	0	13	$94,590,445
All Other Causes					
Miscellaneous Cause	157	12.6%	5	44	$133,133,326
Unknown Cause	24	1.9%	0	2	$13,860,874
Sub Total	181	14.6%	5	46	$146,994,200
Totals	1,237	100.0%	41	195	$1,713,933,109

Source: USDOT 2014b

The regulations in 49 CFR 192 are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. Part 192 specifies material selection and qualification, minimum design requirements, and protection from internal, external, and atmospheric corrosion. In addition, the

safety standards in Part 192 require each operator to develop an emergency plan, working with local fire departments and other agencies to identify personnel to be contacted, equipment to be mobilized, and procedures to be performed to respond to a hazardous condition caused by the facility.

11.3 Kinder Morgan Louisiana Pipeline Safety Record

KMLP provides natural gas and related energy products to southwest and south-central Louisiana in a safe, efficient, and reliable manner. As a member of the Kinder Morgan, Inc. (KM) suite of companies, KMLP is part of North America's largest natural gas pipeline system. Safety is one of KM's core values. KM is committed to (1) the safe operation of its natural gas facilities, (2) the safety of the communities in which it operates, and (3) the safety of its customers and employees.

KMLP owns and operates a major pipeline system serving south Louisiana. The system consists of a 132-mile, 42-inch diameter pipeline that transports natural gas from the Cheniere Sabine Pass liquefied natural gas (LNG) terminal located in Cameron Parish, LA, to various delivery points in Cameron, Calcasieu, Jefferson Davis, Acadia, and Evangeline Parishes. KM's natural gas pipeline companies encompass a total of approximately 70,000 miles of pipeline that serve the major consuming markets in the U.S.

In various safety rankings of large interstate pipelines compiled by three national industry organizations, KM has earned a number one safety ranking in the American Gas Association (AGA), Southern Gas Association, and/or National Safety Council's "Very Large Units" category of the natural gas transmission industry for having the best accident record (since the program began in 1956) twenty-eight times. KM has been ranked second best in the industry eleven times and third best in the industry eleven times. KM earned the National Safety Council's "Award of Honor" for its safety record in 1953, 1956, 1958, 1974, and 1991. It earned the National Safety Council's "Award of Merit" in 1951 and 1963. Numerous other national, statewide, and industry awards have been awarded to KM.

The company received the AGA's 2010 Accident Prevention Award for achieving an incident rate below the industry average for medium-sized transmission companies. The AGA has recognized KM's safety achievements twenty-nine times over the past 50 plus years. During 2012, KM employees worked approximately 881,353 hours and recorded 6 recordable injuries and one lost-time injury. KM employees drove 3,629,951 miles and recorded 4 reportable vehicle incidents. In congratulating the company's employees on their accomplishment, the AGA emphasized that the company's excellent safety performance has contributed to the pipeline industry's record as one of the safest forms of transportation. In its history, KM knows of no public or landowner fatalities attributable to its pipelines.

The average number of USDOT reportable incidents (49 CFR Part 191) per transmission line mile per year reported for the period 2002 through 2010 on KMLP's system is 0.0005615, which compares favorably to the excellent industry average of 0.0020494.

11.4 Pipeline Safety Standard

The proposed Project facilities will be designed, constructed, operated, and maintained in accordance with the USDOT Minimum Federal Safety Standards in 49 CFR 192. The regulations are intended to ensure adequate protection for the public from natural gas pipeline failures. Specified in 49 CFR 192 are material selection and qualification procedures; minimum design requirements; and minimum maintenance requirements that include protection from internal, external, and atmospheric corrosion.

In addition, KMLP will implement the following procedures to help ensure the safety of the facilities:

- Radiograph 100 percent of all pipeline welds (Note that 49 CFR Part 192 radiography specifications require only 10 percent for Class 1, 15 percent for Class 2, and 100 percent for Class 3);

- At the pipe mill, the pipe manufacturer will certify on the mill test reports that the pipe meets the requirements outlined in Section 6 of American Petroleum Institute (API) Specification for Line Pipe 5L (API 5L). Additionally, the pipe will be traceable to certified mill test results, as follows:
    - Manufacturer will furnish two copies of mill test results presenting the mechanical properties, heat chemical analysis, and product chemical analysis of each heat of steel as outlined in Section 6 of API 5L;
    - Manufacturer will furnish two copies of mill test results presenting the test pressure of each length of pipe, as outlined in Section 9 of API 5L, and certifying that each length of pipe was tested and no leakage occurred; and
    - All pipe will meet the certification and traceability requirements of SR-15.
- Implement Construction Safety programs during construction and establish contact with local emergency response organizations to review plans and procedures for construction emergencies;
- Perform standard operation and maintenance programs; conduct in-house employee training programs; maintain contact with local fire, police, and other emergency personnel to review plans and procedures for emergencies; and consult annually with all property owners, utilities, and other interested parties in the compressor station areas to inform them of the procedures to be followed in reporting or responding to an emergency.

As indicated in **Table 11.2-2**, the primary causes of pipeline incidents between 1994 and 2013 were 1) miscellaneous, 2) corrosion, and 3) third party. KMLP will address each of these potentially adverse events for the Lake Charles Expansion Project by implementing safety practices and procedures during construction and operations. These practices and procedures will meet or exceed the USDOT's Pipeline Safety Regulations and will include:

- Using high quality and certified materials from approved vendors;
- Employing experienced and qualified construction contractors;
- Employing experienced and qualified inspection forces during construction;
- Installing high quality protective coating on station piping;
- Hydrostatically testing the completed facilities;
- Utilizing electronic "smart pig" technology to locate and correct any defects in the new pipeline prior to placing it in service. Once the pipeline is in service, electronic "smart pig" technology will be utilized at regular intervals to ensure that the integrity of the pipeline is maintained (this practice is in accordance with the USDOT's Integrity Management rule);
- Utilizing cathodic protection systems to prevent corrosion;
- Utilizing over pressure protection equipment;
- Continuously monitoring operations and pressures through the use of a remote sensing system, which will be monitored 24/7 from KMLP's Gas Control Center; and,
- Fully complying with the USDOT Minimum Federal Safety Standards in 49 CFR 192 regarding the design, construction, operation, and maintenance of the facilities.

KMLP has established programs designed to minimize the probability of an incident, and these programs are as follows:

- *Pipeline Surveillance Program* - Includes the aerial patrol of ROWs to identify items of concern that might impact the pipeline and areas adjacent to the ROWs. In addition to aerial patrol, the pipeline will be surface-patrolled periodically by KMLP's personnel;
- *Liaison with Public Officials* - KMLP's personnel will implement a communication program with public officials in the counties and municipalities that border the pipeline system. This program will inform public officials of the pipeline and its location, and apprise them of company emergency response procedures, characteristics of natural gas, and methods for communicating with the company in an emergency. The company will obtain information from public officials that can be utilized in emergency response at the company locations;
- *One-on-One Construction Meetings* - Such meetings will be held with persons who plan construction, blasting, or demolition, or who may arrange for the movement of heavy equipment in the immediate vicinity of the pipeline facilities;
- *One-Call Center Participation* - KMLP will respond to notices of excavation or blasting that are received through its participation in various states' One-Call centers. These centers provide those who call with information on the location of underground facilities so that an excavator can locate those underground facilities prior to excavation or blasting. The One-Call concept is well known for preventing damage to underground facilities;
- *Pipeline Marking Program* - KMLP will install and maintain pipeline markers and signs on the pipeline ROW to identify the presence of the underground pipeline and to provide local or toll-free telephone numbers for excavation notice or emergency;
- *Pipeline ROW Maintenance Program* - KMLP will maintain its pipeline ROW to keep it free from damaging erosion and obstructions; KMLP will ascertain that the ROW is easily recognizable as such to the general public, potential excavators, and aerial patrol pilots; and,
- *Public Education Program* - Persons living and working in the proximity of its natural gas facilities will be informed by KMLP of the existence of the facilities. KMLP also will provide information regarding KMLP's markings for identification/location purposes, properties of natural gas, pipeline leak/failure characteristics, excavation precautions and notification procedures, ROW information, and emergency telephone numbers. This program also will reach persons who excavate in the geographical areas bordering the pipeline system, as well as public officials, customers, regulatory officials, emergency management agencies, etc.

In the event of an incident on the pipeline or at a compressor station, KMLP field operations personnel located in the vicinity of the pipeline and compressor facilities will respond to the event. KMLP field operations personnel are available to be dispatched 24/7 by KMLP's Gas Control Center via cell phone and pager communications.

In addition to the updates to its Emergency Response Plan (Appendix 11.A), KMLP will develop a detailed Operations, Maintenance, and Inspection Manual and apply these standards to all aspects of the facility operations. The Emergency Response Plan will incorporate procedures for identifying an emergency event and establishing communication with local fire, police, and public officials. KMLP will participate in a One Call program for all of its facilities and has a public awareness program for its natural gas facilities.

To protect the public, company personnel, and property, all KMLP compressor stations are equipped with several safety devices. One of these safety systems, common to all compressor stations, is an Emergency Shutdown (ESD) System. When activated, the ESD System stops the engines, isolates and vents the compressor piping, and routes the gas away from the station. During the venting process, natural gas is released through a stack in a remote area of the plant yard. The ESD system will react when it senses preset or predetermined high operating temperatures, high natural gas pressures, high flow rate, and low flow rate.

The system also will react when fire or gas is detected within the compressor building or facility area. Detection systems will respond to and initiate a total ESD of the facilities. Because of the required venting, some noise can result from compressor maintenance, activation, or ESD System testing.

11.5 References

United States Department of Transportation (USDOT). 2014a. Department of Transportation, Office of Pipeline Safety, Natural Gas Pipeline Operators Incident Summary Statistics By Year. Internet site accessed on March 2014. http://primis.phmsa.dot.gov/comm/reports/safety/AllPSI.html?nocache=8669#_ngtrans

USDOT. 2014b. Department of Transportation, Office of Pipeline Safety Natural Gas Transmission Incident Summary by Cause. Accessed on March 2014. Available at: http://primis.phmsa.dot.gov/comm/reports/safety/SigPSIDet_1994_2013_US.html?nocache=7686.

United States Energy Information Administration (USEIA). 2013. Energy Information Administration. Natural Gas. Estimated Natural Gas Pipeline Mileage in the Lower 48 States, Close of 2008. Accessed on March 2014. Available at: http://205.254.135.7/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/mileage.html

CS 760 EMERGENCY RESPONSE PLAN

APPENDIX 1.A

IS LOCATED IN VOLUME II – CEII INFORMATION