Mountain Valley Pipeline Project

Docket No. CP16-__-000

Resource Report 11 – Reliability and Safety

October 2015

Mountain Valley Pipeline Project
Resource Report 11 – Reliability and Safety

Resource Report 11 Filing Requirements	
Information	**Location in Resource Report**
Minimum Filing 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 well as a result of accidents or natural catastrophes. (§ 380.12(m))	Section 11.0 through 11.3
2. Describe measures proposed to protect the public from failure of the proposed facilities (including coordination with local agencies). (§ 380.12(m)(1))	Section 11.3
3. Discuss hazards, the environmental impact, and service interruptions which could reasonably ensue from failure of the proposed facilities. (§ 380.12(m)(2))	Section 11.1
4. Discuss design and operational measures to avoid or reduce risk. (§ 380.12(m)(3))	Section 11.3
5. Discuss contingency plans for maintaining service or reducing downtime. (§ 380.12(m)(4))	Section 11.3.11
6. Describe measures used to exclude the public from hazardous areas. Discuss measures used to minimize problems arising from malfunctions and accidents (with estimates of probability of occurrence) and identify standard procedures for protecting services and public safety during maintenance and breakdowns. (§ 380.12(m)(5))	Section 11.1

FERC Environmental Information Request for Resource Report 11 Dated August 11, 2015	
Request	**Location in Resource Report**
1. Describe other actual or potential components of natural gas, with emphasis on likely other or trace components that may be particular to any known source areas for the natural gas to be transported for this Project. Describe potential risks to public health from leakage, venting, compressor stations, or any other Project component, along with any plans to avoid, minimize, or mitigate potential impacts.	Sections 11.1.1 through 11.3.11
2. Describe how Mountain Valley would monitor for changes in population density around the pipeline. If population density changes such that higher classification standards of safety must be met, discuss how and when MVP would be required to meet the new standards.	Section 11.1.2
3. In addition to schools, include a listing of nursing homes, hospitals, and other facilities with sensitive sub-groups that may be difficult to evacuate located within 0.5 mile of any Project facility as well as their distance (from the nearest milepost or facility) and direction relative to the Project.	Section 11.3.13
4. Clarify whether both methods to calculate high consequence areas (HCA) would be used and that all applicable sites would be reported, in order to provide the most comprehensive listing possible. Section 11.1.3 states the HCA analysis is pending. Include a timeline for when this analysis will be complete and provided to the FERC.	Section 11.1.3

FERC Environmental Information Request for Resource Report 11 Dated August 11, 2015		
	Request	**Location in Resource Report**
5.	Include a more detailed overview of how steep topography, land instability, geology, and other natural forces could affect reliability and safety for the Project, and describe any associated proposed impact avoidance, minimization, and/or mitigation measures proposed. Clarify whether MVP anticipates the use of strain gauges in steep or unstable areas, and if so describe their features and usage.	Section 11.1.5
6.	Mountain Valley states that it's "procedures and practices will meet or exceed the pipeline safety regulations." Describe any Project safety features that would result in facilities or measures that are more stringent than required by the U.S. Department of Transportation.	Section 11.3.7
7.	Identify where the pipeline control center would be located.	Section 11.3.11
8.	Discuss whether Mountain Valley would sponsor and financially support "periodic emergency response drills" conducted with local emergency responders. Include an analysis of existing emergency responders, equipment, labor, status (full-time or volunteer), and capability along the Project route, particularly for fire departments in remote or relatively inaccessible areas. In addition, page 11-16 indicates Mountain Valley would meet with emergency responders annually while page 11-17 says "periodically." Resolve the apparent discrepancy.	Sections 11.1.2, 11.2.3 and 11.3.3

U.S. Environmental Protection Agency Comments on Resource Report 11		
Page / Section	**Request**	**Location in Resource Report**
11-8	For Table 11.1-2, the next resource report should include the township and the type of land use to help readers not familiar with the mile markers distinguish if the pipeline will affect themselves or their community.	Section 11.1.3
11-10	It is understandable that the fatalities from pipelines are small compared to other types of accidents. It should be detailed how some of the accidents happened (by percentage), for example if it was through explosions or leaking. It is suggested to add if there was any environmental damage resulting from the accidents.	Sections 11.1.4 and 11.1.5

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RELIABILITY AND SAFETY
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LIST OF ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
EQT	EQT Corporation
ESD	emergency shutdown
ERP	Emergency Response Plan
FERC	Federal Energy Regulatory Commission
HCA	high consequence area
IMP	Integrity Management Plan
JNF	Jefferson National Forest
MAOP	maximum allowable operating pressure
MLVs	mainline valves
MVP	Mountain Valley Pipeline, LLC
O&M	Operations & Maintenance
PHMSA	Pipeline and Hazardous Materials Safety Administration of the USDOT
Project	Mountain Valley Pipeline Project
psig	pounds per square inch gauge
SCADA	Supervisory Control and Data Acquisition
USDOT	U.S. Department of Transportation

RESOURCE REPORT 11
RELIABILITY AND SAFETY

Introduction

Mountain Valley Pipeline, LLC (MVP), a joint venture between EQT Midstream Partners, LP and affiliates of NextEra Energy, Inc., WGL Holdings, Inc., Vega Energy Partners, Ltd., and RGC Midstream, LLC, is seeking a Certificate of Public Convenience and Necessity from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act authorizing it to construct and operate the proposed Mountain Valley Pipeline Project (Project) located in 17 counties in West Virginia and Virginia. MVP plans to construct an approximately 301-mile, 42-inch-diameter natural gas pipeline to provide timely, cost-effective access to the growing demand for natural gas for use by local distribution companies, industrial users and power generation in the Mid-Atlantic and southeastern markets, as well as potential markets in the Appalachian region.

The proposed pipeline will extend from the existing Equitrans, L.P. transmission system and other natural gas facilities in Wetzel County, West Virginia to Transcontinental Gas Pipe Line Company, LLC's Zone 5 compressor station 165 in Pittsylvania County, Virginia. In addition to the pipeline, the Project will include approximately 171,600 horsepower of compression at three compressor stations currently planned along the route, as well as measurement, regulation, and other ancillary facilities required for the safe and reliable operation of the pipeline. The pipeline is designed to transport up to 2.0 million dekatherms per day of natural gas. Resource Report 1 provides a complete summary of the Project facilities (see Table 1.2-2) and a general location map of the Project facilities (Figure 1.2-1).

Environmental Resource Report Organization

Resource Report 11 includes descriptions of natural gas pipeline industry safety, corporate risk management, and measures to protect the public, and is prepared and organized according to the FERC *Guidance Manual for Environmental Report Preparation* (August 2002). This report is organized into three major sections and a separate section listing the sources used to prepare this report. Section 11.1 includes an overview of natural gas pipeline industry safety. Section 11.2 includes a safety overview. Section 11.3 includes a description of measures to protect the public.

11.1 NATURAL GAS PIPELINE INDUSTRY SAFETY OVERVIEW

Natural gas pipelines present a number of potential safety issues, which are minimized via regulatory standards that have been adopted to prevent accidents, avoid hazards, improve safety, and minimize impacts. This section provides a summary of these hazards, safety standards, high consequence areas, pipeline accident data, and impacts on public safety.

11.1.1 Hazards

For pipelines that transport natural gas, pipeline ruptures that result in a fire or explosion are the greatest hazard, although this risk is very low.

According to the United States Department of Transportation's (USDOT) Pipeline and Hazardous Materials Safety Administration (PHMSA), there are approximately 303,000 miles of transmission pipelines, and these pipelines are the safest and most cost-efficient way to transport natural gas and hazardous materials.

Natural gas transmission pipelines are an integral part of the country's infrastructure network necessary to transport a large portion of the country's growing energy needs, and it is imperative that they be safe and reliable. PHMSA has established and enforces industry regulations for transmission pipelines and related facilities that are intended to provide for public safety and reliability and minimize the risk of system failure.

The natural gas transmission industry has an excellent track record of public safety and reliability. Nevertheless, the transportation of natural gas by pipeline involves some incremental risk to the public in the event of an accidental release of natural gas. The predominant hazard is a fire or explosion following a major pipeline rupture.

The Project is designed to transport natural gas. Methane, the primary component of natural gas, is colorless, odorless, tasteless, and will be transported in a gaseous state. It is not toxic, but is classified as an asphyxiant. If breathed in high concentration, oxygen deficiency can result in serious injury or death. Methane is flammable when concentrations are between 5 and 15 percent with an auto ignition temperature of over 1,100 degrees Fahrenheit. When unconfined, methane is not explosive; however, if confined in a closed space with an ignition source present an explosion may occur. MVP has established a specific tariff to which shippers are required to adhere to. The tariff limits transportation of only natural gas with components consisting primarily of methane gas, which will be continuously monitored as discussed in more detail below. Exceeding the limits set by the tariff may result in the shipper's gas being shut-in with discontinued service and/or with associated financial penalties.

11.1.2 Safety Standards

The USDOT "Minimum Federal Safety Standards" (49 Code of Federal Regulations (CFR) Part 192) provides the standards pursuant to which the Project will be designed, constructed, operated, and maintained. The proposed Project facilities will be designed, constructed, operated and maintained to meet or exceed the safety requirements set forth in 49 CFR Part 192. The intent of the USDOT regulations for pipeline facilities is to provide the public with adequate protection from pipeline failures. The USDOT "Minimum Federal Safety Standards" set forth in 49 CFR Part 192 include specifications for material selection and qualification, minimum design and construction requirements, and protection from internal, external, and atmospheric corrosion. These federal safety standards, together with pipeline integrity management programs and recent advances in pipeline manufacture, construction, and inspection techniques, minimize the potential for pipeline failure. These measures include improved public awareness initiatives, such as the "811" program, "Call Before You Dig," and other one-call programs that promote public awareness. These programs are intended to reduce third-party damage to underground utilities, including buried high pressure natural gas pipelines.

Class locations are defined in 49 CFR §192.5 and are based on population densities The definition for "class location unit" is the area that extends 220 yards (660 feet) on either side of the centerline of any continuous one-mile length of pipeline (sliding mile). Areas are broken down into four classifications:

- Class 1 – Class location unit with 10 or fewer buildings intended for human occupancy.
- Class 2 – Class location unit with more than 10 but fewer than 46 buildings intended for human occupancy.
- Class 3 – Class location unit 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 (such as a

playground or recreation area) occupied by 20 or more people on at least five days a week for 10 weeks in any 12-month period (the days and weeks need not be consecutive).

- Class 4 – Class location unit where buildings with four or more stories aboveground are prevalent.

More stringent pipeline design, wall thickness, testing, and operation characteristics are required in more populated areas. Specifically, for a Class 1 location, pipelines must be installed at a minimum depth of 30 inches in normal soil and 18 inches in rock, whereas Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroads, require a minimum cover of 36 inches in normal soil and 24 inches of coverage in consolidated rock (49 CFR §192.327). Design pressures, wall thickness, maximum allowable operating pressures (MAOPs), hydrostatic test pressures, weld testing and inspection, as well as frequency of leak surveys and patrols of the pipeline, are required to conform to higher standards in areas of greater population density. The Project incorporates these requirements. Table 11.1-1 provides the class locations crossed by the Project.

Table 11.1-1

MVP Pipeline Class Location

County, State	Class Location	Beginning Milepost	Ending Milepost
Wetzel, WV	1	0.00	9.60
Harrison, WV	1	9.60	11.10
	2	11.10	11.43
	1	11.43	12.01
	2	12.01	12.27
	1	12.27	31.60
Doddridge, WV	1	31.60	31.97
	2	31.97	32.07
	1	32.07	32.16
	2	32.16	32.21
	1	32.21	32.31
	2	32.31	32.70
Harrison, WV	2	32.70	32.90
	1	32.90	32.94
	2	32.94	33.24
	1	33.24	33.70
Doddridge, WV	1	33.70	34.12
	2	34.12	34.63
	1	34.63	34.79
	2	34.79	35.03
	1	35.03	37.50
Harrison, WV	1	37.50	38.10
Lewis, WV	1	38.10	65.60
Braxton, WV	1	65.60	80.30
Webster, WV	1	80.30	105.65
	2	105.65	106.04
	1	106.04	106.05
	2	106.05	106.31
	1	106.31	106.42
	2	106.42	106.86

Table 11.1-1

MVP Pipeline Class Location

County, State	Class Location	Beginning Milepost	Ending Milepost
	1	106.86	109.05
	2	109.05	109.27
	1	109.27	109.30
	2	109.30	109.50
Nicholas, WV	2	109.50	109.80
Webster, WV	2	109.80	109.87
	1	109.87	110.60
Nicholas, WV	1	110.60	112.42
	2	112.42	112.84
	1	112.84	113.25
	2	113.25	113.73
	1	113.73	114.10
	2	114.10	114.44
	1	114.44	121.83
	2	121.83	122.52
	1	122.52	135.00
Greenbrier, WV	1	135.00	136.34
	2	136.34	137.10
	1	137.10	143.26
	2	143.26	143.85
	1	143.85	153.80
Fayette, WV	1	153.80	154.30
Greenbrier, WV	1	154.30	156.70
Summers, WV	1	156.70	166.33
	2	166.33	166.85
	1	166.85	166.92
	2	166.92	167.02
	1	167.02	167.10
	2	167.10	167.33
	1	167.33	168.91
	2	168.91	169.65
	1	169.65	169.69
	2	169.69	170.05
	1	170.05	170.23
	2	170.23	170.98
	1	170.98	173.40
Monroe, WV	1	173.40	190.07
	2	190.07	190.61
	1	190.61	190.78
	2	190.78	191.07
	1	191.07	195.40
Giles, VA	1	195.40	202.06
	2	202.06	203.45
	1	203.45	209.67

Table 11.1-1

MVP Pipeline Class Location

County, State	Class Location	Beginning Milepost	Ending Milepost
	2	209.67	210.17
	1	210.17	210.18
	2	210.18	210.44
	1	210.44	210.53
	2	210.53	210.69
	1	210.69	210.88
	2	210.88	211.16
	1	211.16	211.31
	2	211.31	211.72
	1	211.72	215.40
Craig, VA	1	215.40	217.10
	1	217.10	220.72
	2	220.72	221.48
	1	221.48	221.51
	2	221.51	221.83
	1	221.83	227.18
	2	227.18	228.38
Montgomery, VA	1	228.38	232.85
	2	232.85	233.01
	1	233.01	233.43
	2	233.43	234.21
	1	234.21	234.46
	2	234.46	234.75
	1	234.75	236.10
	1	236.10	243.04
	2	243.04	243.68
	1	243.68	243.74
Roanoke, VA	2	243.74	244.07
	1	244.07	244.10
	2	244.10	244.20
	1	244.20	244.40
	1	244.40	254.06
	2	254.06	254.60
	1	254.60	255.07
	2	255.07	255.14
	1	255.14	255.52
	2	255.52	255.90
Franklin, VA	1	255.90	256.20
	2	256.20	256.87
	1	256.87	257.21
	2	257.21	258.41
	1	258.41	258.75
	2	258.75	259.56
	1	259.56	259.87

Table 11.1-1

MVP Pipeline Class Location

County, State	Class Location	Beginning Milepost	Ending Milepost
	2	259.87	259.97
	1	259.97	260.04
	2	260.04	260.15
	1	260.15	260.19
	2	260.19	260.63
	1	260.63	260.84
	2	260.84	260.99
	1	260.99	261.04
	2	261.04	261.29
	1	261.29	261.30
	2	261.30	262.05
	1	262.05	262.05
	2	262.05	262.54
	1	262.54	262.65
	2	262.65	263.32
	1	263.32	263.63
	2	263.63	264.36
	1	264.36	264.48
	2	264.48	264.80
	1	264.80	265.05
	2	265.05	265.32
	1	265.32	267.33
	2	267.33	267.59
	1	267.59	267.81
	2	267.81	268.85
	1	268.85	281.00
Pittsylvania, VA	1	281.00	292.59
	2	292.59	292.70
	1	292.70	292.73
	2	292.73	293.65
	1	293.65	294.33
	2	294.33	294.58
	1	294.58	294.84
	2	294.84	295.34
	1	295.34	295.56
	2	295.56	296.04
	1	296.04	296.69
	2	296.69	297.04
	1	297.04	297.17
	2	297.17	297.34
	1	297.34	300.97

If population densities near the pipeline increase after construction resulting in a change in class location, 49 CFR §192.609 and §192.611 require confirmation or revision to the MAOP to match the new class. If revisions are needed, they may be achieved by reducing the operating pressure, by pressure testing the segment of pipe using the applicable class location multiplier, or by replacing the segment of pipe for the class change, if required, with one that complies with the USDOT minimum PHMSA code for that class location.

During operation, monitoring of the pipeline will include either foot patrol during annual inspection of facilities, crossings, and accessible areas of the right-of-way or the use of high definition aerial photography obtained every year to determine areas that have changed population density. MVP will collect photography in the spring prior to the leaf-out. If the population increases enough to require a possible class location change, MVP will complete an additional class study and change the class of pipeline within 24 months to be in compliance with 49 CFR 192 requirements.

Additionally, 49 CFR Part 192 provides the minimum standards for operation and maintenance of pipeline facilities, which includes a requirement for a written plan to govern these activities. The pipeline operator must also establish an Emergency Response Plan (ERP) prior to operation of the pipeline with written procedures to minimize the hazards from a natural gas pipeline emergency. The ERP will include:

- Establishing and maintaining communications with appropriate fire, police, and public officials;
- Prompt and effective response to a notice of each type of emergency;
- Providing for personnel, equipment, tools, and materials available at the scene of an emergency;
- Protection of people first and then property, and making safe any actual or potential hazards to life or property;
- Emergency shutdown and pressure reduction in any section of the system necessary to minimize hazards to life or property;
- Notifying appropriate fire, police, and other public officials of gas pipeline emergencies and coordinating with them during an emergency; and
- Safely restoring any service outage.

In the unlikely event of an incident, MVP will work with emergency response agencies to maintain access to and from residences and businesses during potential emergency situations. MVP will implement its ERP to bring the incident under control, and work with local responders to maintain access to residences and businesses via existing roads. If a road is damaged by an incident, or access to residences and business is otherwise restricted, MVP responders will provide a new road for access to the affected residences and businesses. Additionally, in an emergency situation, MVP could use air lift services to reach affected residences and businesses.

EQT currently has an existing ERP covering existing pipeline systems. Prior to the MVP being placed in-service, EQT will modify the current ERP and implement an MVP Project-specific ERP in accordance with all requirements of 49 CFR Part 192 and in coordination with local emergency management. MVP has already initiated discussions with various emergency response units in the Project area during development of the Project. More extensive discussions will continue with the emergency response units along the pipeline route.

11.1.3 High Consequence Areas

A rule for Pipeline Integrity Management in High Consequence Areas (HCAs) for Gas Transmission was promulgated by the USDOT PHMSA, which was incorporated into 49 CFR Part 192, Subpart O. This rule requires that an Integrity Management Plan (IMP) be developed for each facility to provide procedures for monitoring and maintaining pipeline integrity in areas where the pipeline traverses lands or facilities that are considered HCAs as defined in 49 CFR §192.903.

Integrity management is the systematic application of management policies, procedures, resources, and inspection practices to the tasks of analyzing, assessing, and controlling pipeline system integrity in order to protect employees, the general public, and the environment. Integrity management includes threat identification measures such as:

- Incorporation of formal risk assessment;
- Decision justification record keeping;
- Prescribed baseline and recurring inspection and testing requirements; and
- Management of Program changes.

HCAs may be defined in one of two ways. In the first method, an HCA includes:

- current Class 3 and 4 locations in accordance with 49 CFR §192.5;
- any area in Class 1 or 2 locations where the potential impact radius is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle; or
- any area in Class 1 or 2 locations where the potential impact circle includes an identified site.

An identified site is an outside area or open structure that is occupied by 20 or more persons on at least 50 days in any 12-month period; a building that is occupied by 20 or more persons on at least 5 days a week for any 10 weeks in any 12-month period; or a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate. The potential impact radius as defined by 49 CFR §192.903 is determined by the following formula:

$$r = 0.69 \times \sqrt{(p \times d^2)},$$

where:

r = the radius of a circular area surrounding the point of failure (feet)
p = the MAOP in the pipeline segment (pounds per square inch gauge [psig])
d = the nominal diameter of the pipeline (inches)

The proposed 42-inch-diameter pipeline with a MAOP of 1,480 psig would have a potential impact radius of 1,115 feet.

In the second method, an HCA includes any area within a potential impact circle that contains:

- 20 or more buildings intended for human occupancy; or
- an identified site as described above.

Using the second method MVP has identified HCAs along the proposed pipeline route, as listed in Table 11.1-2. An additional HCA analysis will be done on each section of pipeline following pipeline construction (as-built analysis), prior to that section of the Project being placed in-service.

Table 11.1-2

Location of High Consequence Areas

State	County a/	HCA No.	Beginning Milepost	Ending Milepost	Length (Mile)
West Virginia	Harrison	HCA-1	25.53	26.05	0.52
	Webster	HCA-2	109.08	109.87	0.78
	Nicholas	HCA-3	110.82	111.35	0.53
	Nicholas	HCA-4	112.48	113.19	0.71
	Nicholas	HCA-5	113.90	114.51	0.62
	Nicholas	HCA-6	121.83	122.29	0.46
	Greenbrier	HCA-7	143.50	144.13	0.63
Virginia	Monroe	HCA-8	190.78	191.34	0.56
	Giles	HCA-9	202.87	203.41	0.54
	Montgomery	HCA-10	233.44	234.19	0.75
	Franklin	HCA-11	257.24	258.38	1.14
	Franklin	HCA-12	259.09	259.55	0.46
	Franklin	HCA-13	262.02	263.54	1.51
	Franklin	HCA-14	267.67	268.43	0.75
	Pittsylvania	HCA-15	295.58	296.94	1.36
	Pittsylvania	HCA-16	297.07	297.50	0.43

a/ See alignment sheets and maps included in Resource Report 1, Appendix 1-A for information on township and land use within each HCA.

11.1.4 Pipeline Markers

PHMSA also requires pipeline operators to place pipeline markers at frequent intervals along the pipeline rights-of-way, particularly at prominent points along the route, such as where a pipeline intersects a street, highway, railway, waterway, or other significant feature. These markers will display pipeline identifying information and an emergency telephone number that will be manned 24 hours a day, 7 days a week. Pipeline right-of-way markers can help prevent encroachment and excavation-related damage to pipelines. Since the pipeline right-of-way is wider than the pipeline itself, and a pipeline can be located anywhere within the right-of-way, state laws require excavators to call their state One-Call center well in advance of digging to locate underground utilities, to ensure it is safe for the contractor to dig in that location.

11.1.5 Aboveground Facilities

Compressor facilities will be equipped with an emergency shutdown (ESD) system to protect the public and operating personnel during an emergency, such as a fire or ruptured station piping. The ESD system will be designed to shut down the compressor units, close the station isolation valves, and vent gas from the station piping to reduce the possibility of gas ignition and fire. The ESD system could be activated automatically by sensors that continuously monitor for the presence of fire and explosive mixtures in the compressor building. They could also be activated manually by station personnel in emergency events or remotely by Gas Control.

11.1.6 Pipeline Accident Data

Since 1984, operators are required to report incidents that involve facility property damage of more than $50,000 (in 1984 dollars), injury requiring in-patient hospitalization, release of gas, or those incidents considered significant by the operator to the USDOT through PHMSA's National Response Center. PHMSA maintains a comprehensive website to make accident data available to the public, including data on significant incidents. For the most recent 20-year period on record (1995-2014) there were 1,265 natural gas transmission pipeline incidents meeting these criteria reported on the more than 303,000 total miles of natural gas transmission pipelines nationwide (USDOT PHMSA 2015a, 2015b). Incident rates during this time period have been relatively flat to trending slightly up.

During the 20-year period from 1995 through 2014, a total of 1,265 significant incidents were reported on the more than 303,000 total miles of natural gas transmission pipelines of all ages nationwide, as shown in Table 11.1-3 below.

Table 11.1-3

Natural Gas Transmission Dominant Incident Causes, 1995-2014

Incident	Number of Incidents	Percentage
Material/weld/equipment failure	335	26.5
Corrosion	290	22.9
Excavation damage	207	16.4
All other causes	167	13.2
Natural force damage	147	11.6
Other outside force damage	79	6.2
Incorrect operation	40	3.2
Total	**1,265**	**100**

Source: USDOT PHMSA 2015b

The single category accounting for the most frequent cause of all reportable gas transmission incidents is material/weld/equipment failure (approximately 26.5 percent). Material failure related incidents typically involve pipeline material failure, weld and/or equipment failure or malfunctioning equipment. Corrosion is the cause of approximately 23 percent of the total number of gas transmission incidents since 1995. Pipelines included in Table 11.1-3 vary widely in terms of age, pipe diameter, and level of corrosion control. Each of these variables influences the incident frequency that may be expected for a specific segment of pipeline. The frequency of significant incidents is strongly dependent on pipeline age. For example, older pipelines have a higher frequency of corrosion incidents because corrosion is a time-dependent process, and design standards at the time did not mandate certain corrosion controls, such as advanced coatings and cathodic protection. Since July of 1971, new pipelines are required to use both external coating and cathodic protection systems, which significantly reduce the rate of failure when compared to an unprotected or partially protected pipe. Systems for corrosion control are incorporated into the overall design of MVP. Once the pipeline has been constructed, extensive ongoing corrosion control measures will be implemented to monitor and maintain the pipeline integrity, as defined in 49 CFR Part 192 regulations and MVP's corrosion control operating procedures.

Damage caused by excavation accounts for approximately 16 percent of total reported incidents since 1995. These incidents are a result of heavy construction equipment, such as bulldozers and excavators, encroaching into pipeline rights-of-way. To minimize these types of incidents, pipeline operators have been required to participate in "one-call" public utility programs to help identify where these buried pipelines are located prior to excavation work.

Other techniques developed in recent years that have contributed to the overall improved safety performance of pipe and pipelines include (American Petroleum Institute 2001): universal use of non-destructive testing during construction, such as radiography and coating inspection; greater depth of cover; improved backfilling techniques; more effective coatings; and more identifying markers along pipeline rights-of-way.

11.1.7 Impact on Public Safety

Table 11.1-4 provides the number of fatalities annually that were a result of pipeline accidents on natural gas transmission lines from 1995 to 2014 as reported by USDOT PHMSA. The PHMSA data also includes the cause and sub-cause of pipeline accidents where available (PHMSA 2015c). There was an average of two fatalities annually during this 20 year time period. There were zero fatalities from natural gas transmission pipeline incidents in 1995, 2004, 2005, 2008, 2009, 2011, 2012, and 2013. The two highest years of fatalities from natural gas transmission pipeline incidents occurred in 2000 and 2010.

Information in Table 11.1-4 is summarized from data collected and maintained by PHMSA, which is largely based on required incident reporting. Data collected from the required incident reporting focuses on human impacts and property damage, and does not include analysis of environmental impacts, thus an analysis of environmental impacts from the incidents summarized in Table 11.1-4 is not available.

Table 11.1-4

Annual Gas Transmission System Accident Fatalities

Year	Fatalities
1995	0
1996	1
1997	1
1998	1
1999	2
2000	15
2001	2
2002	1
2003	1
2004	0
2005	0
2006	3
2007	2
2008	0
2009	0
2010	10

Table 11.1-4 Annual Gas Transmission System Accident Fatalities	
Year	**Fatalities**
2011	0
2012	0
2013	0
2014	1
Total	**40**
Annual Average (1995-2014)	2
Source: USDOT PHMSA 2015a, 2015b. National Gas Transmission: Significant Incidents Summary Statistics, 1995-2014.	

For comparative purposes, Table 11.1-5 provides accident statistics for the number of deaths by type of accident for the single year of 2014. The average of two fatalities annually over a 20-year period is significantly lower than any other fatal accidents for which there is recordable data; therefore, the likelihood that the Project will threaten human life is extremely remote.

Table 11.1-5 National Accidental Death Statistics for 2014	
Types of Accidents	**Number of Fatalities**
All Accidents	127,200
Motor Vehicles	36,300
Public non-work	34,546
Work	1,554
Home	200
Work	3,695
Non-motor-vehicle	2,141
Motor-vehicle	1,554
Home	63,000
Nonmotor-vehicle	62,800
Motor-vehicle	200
Public	26,000
Gas Transmission Pipelines	1
Sources: National Safety Council, Injury Facts 2014 Edition, 2014; USDOT PHMSA 2015b. National Gas Transmission: Significant Incidents Summary Statistics, 1995-2014.	

Public comments were received regarding the safety and reliability of construction and operation of a 42-inch-diameter, high-pressure natural gas pipeline through the rugged topography crossed by much of the proposed Project.

Steep topography offers some challenges to the construction of the Project. Where stability issues are identified, mitigation measures will be considered that include: realignment of the pipeline to avoid areas of instability, deepening the pipeline below surface instability, buttressing, surface and subsurface drainage, rock bolting/soil anchors, surface stabilization matting, and re-grading slopes to stable configurations. Construction of the pipeline has the potential to alter the stability of the slopes positively or negatively depending upon the circumstances. Where the construction flattens the top of slopes it will likely enhance stability, and where it requires excavation near the base of slopes it would tend to destabilize them. To the extent practicable, the pipe location will be adjusted to maximize its positive impact on stability. In addition, maintaining proper drainage will be critical to maintaining slope stability. The construction erosion and sediment control measures will be designed to avoid concentration of runoff onto or into steep areas prone to slope instability. Concentration of surface water will be discouraged through use of appropriate best management practices including level spreaders where necessary.

Steep topography can also affect the reliability of the pipeline should failures occur that would result in displacement of the pipeline. The safety of construction workers, facilities and individuals located in the vicinity of the alignment must be considered. The alignment of the pipeline will be evaluated and slide risk prone areas will be identified in advance of construction. These areas will require additional evaluation to ensure design considerations would address specific slope and geologic conditions to ensure stability of the pipeline. Steep hill slopes also have the potential to be avoided by adjusting the alignment to ridgelines in some of these areas. Field observations of these areas will be conducted and mitigation measures will be prepared for both construction and long term stability. As described in more detail in Resource Report 6, these mitigation measures could include staging spoil piles from trenching operations along the side of the right-of-way and will be compacted via rolling with dozers on site as additional material is added. Once a spoil pile is completed it will be temporarily mulched to control washouts. Within the trench sand filled sacks will be stacked across the width of the trench. This will permit water to filter through without carrying large amounts of soil with it. Similarly, permeable trench breakers constructed of sand or concrete filled sacks will be installed along the open ditch. In addition to the measures taken on slopes to control erosion and sedimentation, trench drains will be installed on side slopes and excessively steep slopes before the pipe is placed in order to channel water away from the ditch, and should not be removed after construction is complete. The potential for instability both in rock and earth slopes is being evaluated as part of the pipeline final design. Earth slopes are being evaluated for shallow sloughing, surface erosion, and deep seated sliding, while rock slopes will be assessed based on rock structure and potential for block sliding.

Ideally, the final pipeline configuration will result in all slopes having long term stable configurations. However, where an existing failure area is in close proximity to the pipeline, or where there remains some uncertainty, it may be appropriate to provide slope monitoring. MVP will evaluate each condition and assess the appropriate monitoring regime. In some cases, this may be limited to periodic visual evaluation, but in others, more robust monitoring may be appropriate. Technologies used for more robust monitoring can include: radar interferometry, time domain reflectometry, extensometers, inclinometers and appropriate telemetry for remote monitoring in inaccessible areas. If continuous remote monitoring is required, time domain reflectometry is likely to be the method of choice. This method employs a single coaxial cable that is laid across the area or features that are suspected to have movement. As the earth moves, it strains the cable changing the dielectric constant of the cable. The location of movement can be assessed remotely from one end of the cable. This method has proven reliable and can be installed in boreholes or in trenches

thousands of feet long. If required, specific requirements for time domain reflectometry will be established for each location.

MVP is in the process of reviewing identified areas of potential slope stability issues. This information will be assessed when field evaluations are completed. The potential impacts to the pipeline and slope will be evaluated for each area identified and mitigation measures will be recommended. The recommendations will be included in the final pipeline alignment sheets.

11.2 SAFETY OVERVIEW

MVP is committed to safely operating and maintaining the proposed Project and will instill the existing corporate risk management philosophies of its parent companies to efficiently identify and control or eliminate hazards throughout the life of the pipeline. The Project facilities will fully adhere to USDOT Minimum Federal Safety Standards in 49 CFR Part 192. These safety regulations will be reinforced by the comprehensive and strictly enforced practices of MVP. The effectiveness of the federal and corporate requirements in ensuring reliability and safety is illustrated by the following operating experience profile of the MVP companies. The empirical information presented illustrates that the potential for public hazard from accidents associated with the operation of the proposed facilities is low.

11.2.1 System Overview

MVP's Operating Partner, EQT, is an integrated energy company with experience in the rugged terrain of the Appalachian area of natural gas production, gathering, transmission, and distribution. EQT has been in operation for over 125 years, and operates more than 10,400 miles of gathering and transmission pipeline and 17 storage pools. EQT employs a highly trained and experienced staff of operators and engineers that are well-seasoned to handle any design, construction, operations, or compliance related issue with Constructing and Operating MVP. EQT's in-house expertise encompasses all areas of transmission pipeline industry disciplines. More specifically, the Engineering Department is comprised of over 80 engineers with over 2,000 man-years of experience in engineering within the natural gas midstream industry. EQT's engineering staff has a broad diversity of experience in working for other large transmission operating companies in addition to many years of experience managing EQT's asset growth, safely and reliably. The Engineering Department has specific subject matter expertise in areas such as; compression, measurement, and pipeline designs, regulatory compliance, equipment automation and controls, telecommunications, system planning and hydraulic modeling, civil, mechanical, operations, reliability, and electrical. NextEra, an additional partner in MVP, owns and operates 102 miles of natural gas and oil pipelines and one natural gas compressor station. NextEra has been providing pipeline services since 1978 for oil pipelines and since 1985 for natural gas pipelines. MVP's remaining partners, WGL Holdings, Inc., Vega Energy Partners, Ltd, and RGC Midstream, LLC, also have extensive background and history of managing pipeline networks. The founding members of EQT and NextEra are predominately involved with the safety and operational decisions of MVP.

11.2.2 Historical Operating Record

Generally, the natural gas transmission industry has an excellent record of public safety. Pipelines and related facilities are designed and maintained with strict adherence to 49 CFR Part 192 standards to ensure public safety, reliability, and to minimize the opportunity for system failure. EQT and NextEra have excellent records of public safety and established records operating pipelines and will continue to employ

proper system design, construction, operation, and maintenance practices to ensure this excellent record is maintained.

11.2.3 Safety

Construction

Concerns have been expressed that pipeline construction activities could increase the risk of forest fires. Fire prevention is extremely important to MVP, and MVP has developed a Fire Prevention and Suppression Plan designed to protect the public, employees, property, and the environment from fire that could result from construction and operation of the Project. A copy of the Fire Prevention and Suppression Plan is included in Resource Report 1.

MVP will implement the following safety measures that exceed the requirements in 49 CFR Part 192: USDOT requirements will be exceeded when preparing pipe specifications in karst identified areas by choosing a higher wall thickness above the minimum thickness required; construction standards will require 100 percent of welds to be non-destructively examined by an independent radiographic inspection company, regardless of class location; arc burns will be repaired or cut out as required by MVP specifications; pipe will be installed with a minimum of 36 inches of cover, regardless of class location; remote controlled shut off valves will be employed at all main line valve sites. The karst area design parameters, which are more stringent than those required by the USDOT will result in a longer unsupported span capability, increasing the operating safety should a sinkhole occur beneath the pipe.

Operation

Concerns have also been expressed that a pipeline accident during operation could cause forest fires, and that in some areas there are limited existing first response resources in the communities crossed by the pipeline. Other concerns have been expressed that it would be difficult to respond to fires in remote areas crossed by the pipeline.

In the event a fire was to occur on the surface in the vicinity of the pipeline, the presence of the pipeline would not increase fire hazards. Fires on the surface are not a direct threat to underground natural gas pipelines because of the insulating effects of soil cover over the pipeline. Soil is a poor conductor of heat with thermal conductivity values ranging from 0.44 to 1.44 Btu/ft-hr-°F. The heat capacity of most soils is 0.20 to 0.25 Btu/lb-°F. In one study, soil temperature from intense slash pile burns reached a maximum of only about 50°C (122°F) at a depth of about 24 inches directly under the burn piles (Massman et al. 2008). Based on the proposed burial depth of 24 to 36 inches, and the insulating effects of soil cover over the pipeline, forest fires would not affect pipeline integrity. In addition, additional burial depth would not be necessary to protect against damage by forest fires.

In the event that a fire were to occur in forest lands in the vicinity of, or including the pipeline easement, MVP would take an active role in the emergency response coordination with the local fire response personnel. Within forested areas, the local fire personnel would take on fire suppression and control duties similar to conventional forest fire situations. Local fire departments within forested areas are already trained and equipped to fight forest fires using conventional techniques and equipment. MVP would provide personnel knowledgeable with the pipeline to cooperatively work with fire responders to confirm the location of the pipeline easement, depth of ground cover and any precautionary measures to be undertaken if crossing the pipeline with heavy load bearing equipment or vehicles. Therefore, the presence

of the pipeline would not interfere with fire suppression efforts, or require the local fire departments to purchase any new or specialized equipment. The presence of the pipeline would also not require local fire departments to hire additional personnel.

MVP will establish open relationships with local fire, police, and other governmental leaders in order to efficiently respond in a cooperative manner to pipeline emergencies, including emergencies in remote areas crossed by the MVP Project. MVP will ensure that appropriate personnel are aware of ESD systems and emergency shutdown protocols. MVP will also coordinate and financially support periodic emergency response drills and table top exercises to build familiarity with emergency response personnel and response measures to be taken, including drills and exercises for remotes areas crossed by the pipeline where appropriate. EQT currently has on-going communications with local emergency response units in areas of operations and commonly supports fire department budgets through community donations from the EQT Foundation. MVP will continue community involvement and support through local donations to various support organizations.

11.3 MEASURES TO PROTECT THE PUBLIC

As a new pipeline, and with the continuing advancements in materials and pipeline operating and maintenance practices, the chances of a failure of the Project facilities are extremely low. The safety and reliability of the Project will be based on safe design, appropriate equipment selection, code compliance, thorough review, careful construction, post construction testing and competent long-term maintenance and operation. Measures will be incorporated according to approved design practices and standards that have been developed through industry-wide experience of pipeline construction projects.

Measures to protect the public from inadvertent natural gas releases due to accidents or natural catastrophes can be grouped into three categories: passive protection, active controls, and procedural controls. These measures are described below in Section 11.3.1. Further information on some of the specific measures is provided in Sections 11.3.2 through 11.3.12.

11.3.1 General Protective Measures and Controls

11.3.1.1 Passive Protection

Passive protection minimizes the hazards by incorporating process and equipment design features which will reduce either the frequency or consequence of a hazard without the active functioning of a device. The inherent design of modern pipeline systems affords protection for all but the most severe natural hazard events or inadvertent human actions, such as excavation damage by backhoe. Modern pipelines are made of high strength carbon steel with full penetration welds, resulting in a system with substantial, inherent strength and ductility. Passive protection will include:

- Pipeline design, construction, commissioning, and operation will be conducted in strict accordance with applicable USDOT regulations found in 49 CFR Part 192.
- In accordance with USDOT regulations, the pipeline design factor, wall thickness, location of mainline valves (MLVs), and other parameters will be established according to a classification system based on the number, proximity to the pipeline, and occupation levels of buildings intended for human occupancy located along the right-of-way.

- MVP will comply with the applicable sections of the American Society for Mechanical Engineers American National Standards Institute B31.8, Gas Transmission and Distribution Piping Systems, the most widely used industry Code, for the design, operation, maintenance, and repair of its natural gas transmission pipeline.
- The pipeline will be externally coated with a fusion-bonded epoxy and will be cathodically protected against external corrosion.

11.3.1.2 Active Controls

Active (or engineering) controls use instruments, valves, safety interlocks, and emergency shutdown systems to detect and correct process deviations (e.g., over pressure protection). Active controls will include:

- Applicable over pressure protection systems at receipt / delivery interconnect points where MAOPs differ.
- To protect the integrity of the pipeline system, an impressed current cathodic protection system will be installed as a corrosion control measure.
- A Supervisory Control and Data Acquisition (SCADA) system will provide for and enable continuous pipeline monitoring and the control of pressure and flow along the gas pipeline.
- Remote Terminal Units for the SCADA system will be located on every receipt / delivery interconnect.
- MLVs will be installed at regular intervals as specified by 49 CFR Part 192, based on class location.
- All of the field girth welds will be tested via x-ray or ultrasonic inspection (non-destructive examination).
- The pipeline and associated facilities will be hydrostatically tested for structural integrity before commencing operation.
- The pipeline will be equipped with facilities to accommodate inline inspection tool (smart pigging) operations for the purpose of locating anomalies in the pipeline wall thickness that may indicate corrosion, and out-of-roundness that may indicate the pipe has been subjected to external forces.
- The pipeline will be inspected with a geometry pig prior to placing in service, to verify the absence of any unacceptable geometric deviations.
- Compressor stations will be equipped with gas detection systems and ESD systems capable of depressurizing all station piping.

11.3.1.3 Procedural Controls

Procedural (or administrative) controls use operating procedures, administrative checks, emergency response, and other management approaches to prevent incidents, or to minimize the effects of an accident (e.g., operating procedures, safe work practices, inspections and testing, and training). The ERP for the Project will be provided to USDOT and will address the following procedural controls:

- Procedures for testing, start-up, operation, purging, and training of operations and maintenance staff on operational procedures.

- Regularly scheduled preventative maintenance programs to meet government regulations for pipeline segments, metering stations, and compressor stations.
- Pipe launchers and receivers capable of accommodating inline inspection tools (smart pigs) will be installed at the beginning of the line, the end of the line and at each of the compressor stations and will be used to inspect the pipeline with smart pigs at intervals not exceeding the requirements in the pipeline safety regulations. As discussed in Section 11.3.12, these inspections are intended to detect corrosion and third-party damage, among other issues.
- The ERP will be developed for reference during a response to hazardous conditions caused by the pipeline. The plan will include measures to ensure an ongoing liaison with the appropriate fire, police, and public officials to coordinate mutual assistance should an emergency occur.
- Procedures for aerial surveillance flights, on-ground inspection surveys, internal pipeline inspection with smart pigging equipment, and cathodic protection system inspection and maintenance.
- An IMP will be developed to provide procedures for monitoring and maintaining pipeline integrity in areas where the pipeline traverses lands or facilities that are considered HCAs as defined in 49 CFR §192.903 (see Section 11.1.3 above). The IMP will include threat identification measures such as, incorporation of formal risk assessment, selection of direct assessment methodologies, and prescribed inspection and testing requirements.
- A Public Awareness Plan will be prepared and implemented to enable customers, the public, government officials, and those engaged in excavation to recognize a natural gas pipeline emergency and report it to appropriate public officials and the company.
- Since April 1982, operators have been required to participate in "One-Call" public utility programs in populated areas to minimize unauthorized excavation activities near pipelines.

11.3.1.4 Continuous Evaluation and Improvement

MVP will continually refine and enhance the integrity management techniques as it implements the IMP on its pipeline system.

11.3.2 Public Safety

MVP is committed to safety, protecting the environment, preventing accidents/incidents and maintaining the highest standards for its pipeline operation and maintenance. MVP will accomplish this goal through routine preventative maintenance, pipeline patrols, detailed emergency response plans and a strong pipeline integrity management program. MVP will establish and maintain strict operating and maintenance policies and procedures that will be audited periodically by PHMSA and are in compliance with 49 CFR Part 192.

Trained and qualified pipeline personnel will operate and maintain the pipeline in accordance with Subpart N of 49 CFR Part 192. The training program will ensure all personnel possess the knowledge and competency necessary to efficiently operate and maintain the pipeline in a manner that protects the environment, the public and the health and safety of all employees. More specifically, personnel are trained to: execute normal operating and maintenance procedures; recognize abnormal conditions and take appropriate corrective actions; predict consequences of malfunctions or failures; recognize conditions likely to cause emergencies; respond to emergency situations; control accidental releases of gas; and recognize characteristics and hazards of natural gas.

Active pipeline construction can increase safety risks to the public generally in two ways: from an increase of traffic on roadways in the vicinity of the pipeline and from potential exposure to construction activity itself within the construction right-of-way.

During periods of active construction, roadways in the vicinity of the pipeline Project could experience an increase in small vehicle traffic from the construction work force, as well as large vehicle traffic transporting construction equipment and materials. Where the pipeline crosses roadways, access to and from the right-of-way by construction vehicles and construction activity itself at the roadway crossing could disrupt traffic and create potential safety hazards to the public. MVP has developed a Transportation Management Plan that describes measures that will be implemented to minimize public access and safety concerns as a result of construction vehicle traffic and construction activity at roadway crossings (see Resource Report 5). In addition, MVP will obtain all necessary permits for public roadway crossings and roadway use and will comply with traffic control and public safety mitigation measures that are conditions of these permits.

During construction, special care will be taken in residential and commercial areas to minimize neighborhood and traffic disruption, to control noise and dust to the extent practicable, and to protect the public at large. Measures to be implemented where the pipeline is near residential areas include, but are not limited to: fencing the construction work area boundary to ensure construction equipment, materials, and spoil remain in the construction right-of-way; ensuring piping is installed as quickly as reasonably possible consistent with prudent pipeline construction practices to minimize construction time affecting a neighborhood; overnight temporary end caps at the end of each work day in residential areas, backfilling the trench as soon as possible after the pipe is laid; covering the open trench of road crossing work areas with temporary steel plates, and completing cleanup and installation of permanent erosion control measures as soon as reasonable, weather conditions permitting. The work will be accomplished so emergency vehicles will be able to pass at all times and to limit disruption of access to residential driveways. MVP has developed site-specific residential construction plans in areas where residential dwellings are within 25 feet of construction. These plans are provided in Resource Report 8.

11.3.3 Emergency Response

Consistent with 49 CFR §192.615, Pipeline contractors will establish an Emergency Response Plan by spread that provides written procedures to minimize the hazards from a pipeline emergency. Key features will include:

- Receiving, identifying, verifying and classifying emergency events – leaks, fires, explosions or natural disasters;
- Managing communications with emergency responders and public officials to establish incident command and coordinate response efforts, including for remote areas crossed by MVP;
- Emergency evacuation routes, emergency helicopter landing areas, hospital locations, and contact numbers;
- Making personnel, equipment, tools and materials available for emergencies;
- Ensuring that response efforts focus on public safety first; and
- Ensuring emergency shutdown actions are taken in a timely manner.

Should the need arise, MVP will have field service personnel and repair contractors available that are capable of completing emergency repairs and restoration.

11.3.4 Public Awareness Program

MVP will develop a Public Awareness Program as outlined in 49 CFR §192.616, which will provide outreach measures to the affected public, emergency responders, public officials, and excavation businesses. This program will use multi-media channels (direct mail, e-mail, social networking, public service announcements, print advertisement, public meetings, etc.) to engage these core audiences.

MVP's objective is to educate the public on how to recognize the presence of pipelines; understand the potential hazards and safe actions they should take; recognize and report abnormal conditions; and encourage the safe behavior of calling for buried facility location before digging.

11.3.5 One-Call Response

When MVP receives notification from a one-call center that someone intends to dig near its pipeline facilities, personnel will be dispatched to mark the location of the facilities in the vicinity of proposed digging or other earth disturbance activities. If necessary, company employees will be on-site when the excavation occurs.

11.3.6 Pipeline Safety Brochures

MVP will mail information brochures to homeowners, businesses, potential excavators, and public officials along the pipeline system each year to inform them of the presence of the pipeline and instruct them on how to recognize and react to unusual activity in the area. These brochures will provide emergency contact phone numbers available 24 hours a day, 7 days a week, and reinforce the need for excavators to "call before you dig."

In addition to these outreach efforts, MVP will also provide pipeline location information in the National Pipeline Mapping System to inform the public and others as to the general location of MVP's pipeline facilities.

11.3.7 Interactions with Federal Authorities

MVP will maintain frequent contact with PHMSA. PHMSA routinely exercises its oversight authority to ensure that facilities under its jurisdiction are safely designed, constructed, and operated. With regard to its role in public safety for natural gas pipelines:

- PHMSA develops regulations and other approaches to risk management to assure safety in design, construction, testing, operation, maintenance, and emergency response of pipeline facilities; and
- PHMSA administers a national regulatory program to assure the safe transportation of natural gas, petroleum, and other hazardous materials by pipeline. PHMSA will routinely inspect MVP's pipeline facilities and records for compliance with design, construction, testing, operations, maintenance, and integrity regulations.

MVP's procedures and practices will meet or exceed the pipeline safety regulations and related risk management requirements administered by the PHMSA. For example, MVP is proposing to install a greater number of MLVs than are required by USDOT PHMSA regulations (i.e., the spacing between MLVs will

be less than the distance required by USDOT PHMSA regulations), and MVP will install remote controlled valves, which is not a current USDOT PHMSA requirement.

11.3.8 Liaison Procedures with Local Authorities

MVP's personnel involved with public awareness will ensure that appropriate liaisons and public education are established and maintained in the communities within which MVP operates. MVP will establish open relationships with local fire, police, and other governmental leaders in order to efficiently respond in a cooperative manner to pipeline emergencies, including emergencies in remote areas crossed by MVP's pipeline. To accomplish this MVP will:

- Have informational meetings and training with local fire and police departments, and other concerned government agencies at their request;
- Conduct periodic emergency response drills and table top exercises to build familiarity with emergency response personnel and response measures to be taken. These would be in addition to the information meetings and training mentioned in the previous bullet, and where appropriate will include drills and exercises for remotes areas crossed by the pipeline; and
- Provide literature listing emergency contact phone numbers and other pertinent information.

In addition to maintaining contact with local governmental and emergency response agencies along the pipeline, MVP's liaison efforts will allow MVP to:

- Determine how local officials may be able to assist MVP during an emergency with the determination of jurisdiction and resources that may be involved in responding to an emergency;
- Familiarize local officials with how MVP responds to an emergency on its pipeline system;
- Verify notification preferences for pipeline emergencies; and
- Review with local officials the use of Incident Command System to cooperate and assist with response to an emergency.

Outreach to emergency responders will be conducted by MVP on a periodic basis. MVP's focus with these organizations is to review firefighting methods and techniques for natural gas fires and to conduct periodic emergency drills and exercises.

11.3.9 Utility Protection

Prior to construction existing utility lines and other sensitive resources identified in easement agreements or by federal and state agencies, will be located and marked to prevent accidental damage during pipeline construction. MVP's contractors will contact the one-call system to verify and mark all utilities along the Project workspaces to minimize the potential for damage to other buried facilities in the area. Where there is a question as to the location of utilities (i.e. water, cable, oil, gas, product, and sewer lines), they will be located by field instrumentation and/or test pits.

11.3.10 Equipment Engineering and Design

MVP's pipeline system will include many equipment features that are designed to increase the overall safety of the system and protect the public from a potential failure of the system due to accidents or natural catastrophes. Cathodic protection systems will be installed at various points along the pipeline to mitigate

external corrosion of the pipeline facilities. The cathodic protection system impresses a low voltage DC current to the pipeline to off-set natural soil and groundwater corrosion potential. The functional capability of cathodic protection systems will be inspected bi-monthly to ensure proper operating conditions for corrosion mitigation.

MVP's pipeline, including depth of cover, will be built according to USDOT PHMSA 49 CFR Part 192 requirements. Specific site conditions, including karst terrain, were considered in the design of the pipeline. As designed, karst features will not pose a problem for a modern welded-steel pipeline.

MVP's pipeline will be equipped with remote control valves, which will allow the valves to be operated remotely in the event of an emergency, that is usually evidenced by a sudden loss of pressure or change of flow on the pipeline. Remotely closing the valve(s) allows a section of pipeline to be isolated from the rest of the pipeline system. Data acquisition systems will be installed at the metering and regulation stations as well as at sectionalizing block valves. If system pressures fall below predetermined ranges, alarms are activated alerting the pipeline operators.

11.3.11 Operations and Maintenance

The pipeline control center for the Project will be located at EQT's headquarters in Pittsburgh, Pennsylvania and will be staffed continuously by qualified pipeline controllers. The controllers will monitor all aspects of the pipeline including system pressures, temperatures, flows, and valve positions (open or closed). In case of an emergency at the pipeline control center, a secondary pipeline control center will be available at an alternate back-up site located in Finleyville, Pennsylvania.

The pipeline will be monitored for leaks continuously using the data acquisition system. Operators will use pressures, flows and rate of change alarms to monitor for leaks or other abnormal operating conditions. In the unlikely case that a shutdown of the pipeline system is needed, MVP's pipeline system will be equipped with remotely controlled sectionalizing block valves to isolate the affected pipeline segment. In some cases, as a result of an emergency shutdown or operational equipment testing, some minor venting may occur at controlled points at either the compressor stations or MLVs. MVP's Operating Procedures are developed, tested and continuously improved to protect the employees performing the work and the local public from any potential health risks.

USDOT PHMSA 49 CFR Part 192 prescribes the baseline standards for operating and maintaining pipeline facilities, including the establishment of a written plan governing these activities. MVP will develop an Operations & Maintenance (O&M) Manual for the facility during the construction phase. This O&M Manual will be in effect prior to filling the pipeline system with natural gas. The O&M Manual will include contingency plans for maintaining service or reducing downtime.

MVP will have field services crews to perform USDOT PHMSA 49 CFR Part 192 required operations, maintenance and inspection tasks along the pipeline. All personnel will have the proper training and qualifications as required by 49 CFR Part 192.

11.3.12 Corrosion Control

The Project will have cathodic protection and will be closely monitored and maintained in compliance with USDOT PHMSA 49 CFR Part 192 and NACE International (National Association of Corrosion Engineers) recommended practice RP-0169-96. Specifically, the health of the cathodic protection system will be monitored through routine rectifier readings and annual surveys. The pipeline will have a high quality

fusion-bonded epoxy coating system which will be applied after the pipe has been manufactured. Girth welds will be prepared and coated with a field-applied epoxy coating. Together, the combination of cathodic protection and the epoxy coating system provide excellent corrosion control.

In addition to the other measures, MVP will also inspect the pipeline using devices known in the industry as smart pigs at least every seven years, as required by 49 CFR Part 192, or more frequently if the baseline integrity assessment requires. These devices run inside the pipe and provide indications of internal and external metal loss, deformation, ovalities, dent detection; valve, fitting and casing locations; pipe repairs; and external metal objects in the vicinity of the pipeline.

11.3.13 Schools, Nursing Homes, and Hospitals within 0.5 Mile of MVP

In its August 11, 2015 comments on draft Resource Report 11, FERC asked for a listing of schools, nursing homes, hospitals, and other facilities with sensitive sub-groups that may be difficult to evacuate that are located within 0.5 mile of any Project facility. Such facilities that have been identified by MVP using publicly available data are listed in Table 11.3-1.

Table 11.3-1

Schools, Nursing Homes, and Hospitals Within 0.5 Mile of MVP

State	County	MP	Facility a/	Distance and Direction from Project Work Area
West Virginia	Nicholas	122.1	Panther Creek Elementary School	0.33 mile East
	Summers	170.2	Greenbrier Academy for Girls	0.55 mile East
Virginia	Giles	211.7	Mayapple Preschool, Newport Recreation Center	0.04 mile Northeast
	Franklin	249.6	Monte Vista School	0.42 mile South
	Franklin	265.2	Sunshine Valley School	0.05 mile North

a/ No nursing homes or hospitals were identified within 0.5 mile of any Project facility using publicly available data sources.

11.3.14 Pipeline Safety on the Jefferson National Forest

MVP will cross approximately 3.4 miles of the Jefferson National Forest (JNF) where it crosses Peters Mountain between MPs 195.3 and 196.9 (1.6 miles), Sinking Creek Mountain between MPs 217.2 and 218.0 (0.8 mile), and Brush Mountain between MPs 218.4 and 219.4 (1.0 mile). Pipeline design, construction, and operation for MVP within the JNF will be identical to design, construction, and operation on other lands. The jurisdiction and land ownership of lands crossed by MVP will have no effect on pipeline reliability and safety. Pipeline reliability and safety as described in the previous sections of Resource Report 11 will apply to the MVP pipeline within the JNF.

The pipeline will be designed for USDOT Class 1 locations at both crossings of the JNF (see Table 11.1-1), and no HCAs are located within the JNF (see Table 11.1-2).

11.4 REFERENCES

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