



## **SABAL TRAIL PROJECT**

### ***RESOURCE REPORT 11*** *Reliability and Safety*

*FERC Docket No. CP15-\_\_\_\_-000*

**November 2014**

## TABLE OF CONTENTS

<b>11.0</b>	<b>RESOURCE REPORT 11 – RELIABILITY AND SAFETY</b>	<b>11-1</b>
11.1	INTRODUCTION	11-1
11.2	NATURAL GAS PIPELINE INDUSTRY SAFETY OVERVIEW	11-3
11.2.1	Pipeline Safety	11-3
11.2.1.1	Hazards	11-3
11.2.1.2	Safety Standards	11-3
11.2.1.3	High Consequence Areas	11-5
11.2.2	Pipeline Accident Data	11-5
11.2.3	Impact on Public Safety	11-6
11.3	SAFETY OVERVIEW	11-6
11.3.1	System Overview	11-6
11.3.2	Historical Operating Record	11-7
11.4	MEASURES TO PROTECT THE PUBLIC AND UTILITIES	11-7
11.4.1	High Consequence Area Identification	11-7
11.4.2	Data Gathering	11-8
11.4.3	Risk Assessment	11-8
11.4.4	Integrity Assessments	11-9
11.4.5	Response and Remediation	11-9
11.4.6	Preventive and Mitigative Measures	11-9
11.4.7	Continuous Evaluation and Improvement	11-10
11.4.8	Public Safety	11-10
11.4.9	Emergency Response	11-11
11.4.10	Public Awareness Program	11-11
11.4.11	One-Call Response	11-12
11.4.12	Pipeline Safety Brochures	11-12
11.4.13	Contact Information	11-12
11.4.13.1	Interactions with Federal Authorities	11-12
11.4.13.2	Liaison Procedures with Local Authorities	11-12
11.4.14	Utility Protection	11-13
11.4.15	Other Protection Measures	11-15
11.4.15.1	Surveys	11-15
11.4.15.2	Equipment	11-15
11.4.15.3	Pipeline Markers	11-16
11.4.15.4	Operations and Maintenance	11-16
11.4.15.5	Corrosion Control	11-17
11.5	REFERENCES	11-17

## LIST OF TABLES

Table 11.2-1	Area Classifications along the Sabal Trail Project Pipeline Facilities
Table 11.2-2	Incident Summary for Onshore Natural Gas Transmission Pipelines by Cause 1994-2013
Table 11.2-3	Outside Force Incidents on Onshore Natural Gas Transmission Pipelines by Cause 1994 - 2013
Table 11.2-4	Natural Gas Transmission Systems Fatalities and Injuries 1994 - 2013
Table 11.2-5	Transportation Fatalities and Injuries in the US by Mode in 2012
Table 11.4-1	Location of High Consequence Areas along the Sabal Trail Project Pipeline Facilities

<b>RESOURCE REPORT 11—RELIABILITY AND SAFETY</b>	
<b>Filing Requirement</b>	<b>Location in Environmental Report</b>
<input checked="" type="checkbox"/> Describe how the project facilities would be designed, constructed, operated, and maintained to minimize potential hazard to the public from the failure of project components as a result of accidents or natural catastrophes. (§ 380.12(m))	Sections 11.2 to 11.4

<b>FERC COMMENTS ON DRAFT RESOURCE REPORT 11</b>	<b>LOCATION OR RESPONSE TO COMMENT</b>
<b><u>Resource Report 11 – Reliability and Safety</u></b>	
<b>AUGUST 26, 2014 COMMENTS</b>	
76. Confirm that Sabal Trail would install the proposed pipelines with a minimum of 36 inches of cover including in areas with consolidated bedrock. Also, identify the locations where the burial depths would exceed 36 inches.	Confirmation provided in Section 11.2.1.2.
77. In section 11.4.8 discuss how Sabal Trail would maintain emergency vehicle access to nearby residences during construction of the proposed facilities.	Discussion provided in Section 11.4.8.
78. In section 11.4.14, discuss how Sabal Trail would protect existing utilities from potential damage due to blasting operations.	Discussion provided in Section 11.4.14.
79. Generally describe the design features and operational procedures that would be implemented to ensure the reliability and safety of the proposed compressor stations.	Discussion provided in Section 11.4.15.2.
80. In section 11.4.15.5, discuss the effectiveness of the corrosion control systems that would be implemented to protect the pipeline in wetlands and other areas with a shallow water table.	Discussion provided in Section 11.4.15.5.

## ACRONYMS AND ABBREVIATIONS

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AC	alternating current
CFR	Code of Federal Regulations
DEF	Duke Energy Florida, Inc.
Dth/day	dekatherms per day
FERC	Federal Energy Regulatory Commission
FGT	Florida Gas Transmission Company, LLC
FSC	Florida Southeast Connection, LLC
Gulfstream	Gulfstream Natural Gas System, LLC
HCA	High Consequence Areas
M&R	meter and regulating
MLV	mainline valve
MP	milepost
NACE	National Association of Corrosion Engineers International
OSHA	Occupational Safety and Health Administration
Part 192	Title 49 of the CFR Part 192
PHMSA	Pipeline and Hazardous Materials Safety Administration
Project	Sabal Trail Project
ROW	right of way
Sabal Trail	Sabal Trail Transmission, LLC
Spectra Energy	Spectra Energy Partners, LP
Transco	Transcontinental Gas Pipe Line Company, LLC
U.S.	United States
USDOT	U.S. Department of Transportation

## 11.0 RESOURCE REPORT 11 – RELIABILITY AND SAFETY

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### 11.1 Introduction

Sabal Trail Transmission, LLC (“Sabal Trail”), a joint venture between affiliates of Spectra Energy Partners, LP and NextEra Energy, Inc. (“NextEra”), is seeking a Certificate of Public Convenience and Necessity (“Certificate”) from the Federal Energy Regulatory Commission (“FERC”) pursuant to Section 7 (c) of the Natural Gas Act authorizing the construction and operation of the Sabal Trail Project (“Project”).

The Project is a new natural gas transmission pipeline comprised of a combination of lease capacity and new greenfield pipeline construction that will provide approximately 1,075,000 dekatherms per day (“Dth/d”) of new firm natural gas transportation capacity. Sabal Trail will acquire the capacity created by Transcontinental Gas Pipe Line Company, LLC’s (“Transco”) Hillabee Expansion Project (FERC Docket Nos. PF14-6-000 and CP15-16-000) pursuant to a capacity lease, which extends from Transco’s Compressor Station 85 in Choctaw County, Alabama to an interconnection with the new greenfield pipeline in Tallapoosa County, Alabama. Sabal Trail will construct, own and operate the greenfield pipeline, which will extend from Tallapoosa County, Alabama to a new interconnection hub (“the Central Florida Hub”) in Osceola County, Florida. At the Central Florida Hub, the Project will connect with the Florida Southeast Connection Pipeline Project, currently being proposed by Florida Southeast Connection, LLC (“FSC”) (FERC Docket No. PF14-2-000 and CP14-554-000). In addition, at or near the Central Florida Hub, the Project will interconnect with Gulfstream Natural Gas System, LLC (“Gulfstream”) and Florida Gas Transmission Company, LLC (“FGT”). The greenfield portion of the Project will have an initial capacity of 830,000 Dth/day with a proposed in-service date of May 1, 2017. Through a series of phased compressor station expansions to meet the future capacity needs of Sabal Trail’s customers, the Project capacity will increase to approximately 999,000 Dth/day by 2020 and 1,075,000 Dth/day by 2021.

#### *Pipeline Facilities*

The Project includes construction of approximately 474.4 miles of new 36-inch diameter natural gas transmission pipeline (the “Mainline Route”), approximately 13.1 miles of new 36-inch diameter natural gas pipeline (the “Hunters Creek Line”), and approximately 21.4 miles of new 24-inch diameter natural gas pipeline (the “Citrus County Line”). A summary of the Project pipeline facilities is provided in Table 1.1-1 of Resource Report 1 (*see* Tables section). A location map of the Project pipeline facilities is provided as Figure 1.1-1 of Resource Report 1 (*see* Figures section).

- Mainline Route – Originates in Tallapoosa County, Alabama near Transco milepost (“MP”) 944 and ends at an interconnection with the Florida Southeast Connection Pipeline Project at the Central Florida Hub in Osceola County, Florida;
- Hunters Creek Line – Connects at the proposed Reunion Compressor Station located at approximately MP 474.4 to FGT’s existing 24-inch diameter mainline natural gas pipeline in Orange County, Florida; and
- Citrus County Line – Located in Marion and Citrus Counties, Florida, extending from Sabal Trail’s facilities at approximately MP 389.8 to a new electric generation plant proposed by Duke Energy Florida, Inc. (“DEF”) to be located in Citrus County, Florida.

#### *Aboveground Facilities*

Five new compressor stations are proposed to be constructed along the Mainline Route. Three compressor stations (Alexander City, Hildreth, and Reunion) would have a 2017 in-service date, followed by two additional compressor stations (Dunnellon and Albany) with a 2020 in-service date. Expansion work (*i.e.*, additional compression) at two of these five new compressor stations (Hildreth and Albany) would then be

completed with an in-service date of 2021. Natural gas will be the proposed fuel source for the facilities within each compressor station. A summary of the Project aboveground facilities is provided in Table 1.1-2. Aboveground facility plot plans are provided in Appendix 1A, Volume II-B of Resource Report 1. United States (“U.S.”) Geological Survey (“USGS”) topographic location excerpts and aerial photography are provided as Figures 1.1-2 and 1.1-3 of Resource Report 1.

- Compressor Stations

- Alexander City Compressor Station (approximate MP 0.0) – In service 2017. Construction of a new compressor station near Alexander City in Tallapoosa County, Alabama. The compressor station will include two Solar Titan 130 and one Solar Titan 250 compressor units;
- Albany Compressor Station (approximate MP 159.3) – In service 2020. Construction of a new compressor station near Albany in Dougherty County, Georgia after the initial Project in-service date. The compressor station will include one Solar Titan 130 compressor unit. An additional Solar Titan 130 compressor unit will be constructed in a later phase of the Project with an in-service date of 2021;
- Hildreth Compressor Station (approximate MP 296.3) – In service 2017. Construction of a new compressor station near Lake City in Suwannee County, Florida, consisting of one Solar Titan 130 compressor unit. An additional Solar Titan 130 compressor unit will be constructed in a later phase of the Project with an in-service date of 2021;
- Dunnellon Compressor Station (approximate MP 389.8) – In service 2020. Construction of a new compressor station near Ocala in Marion County, Florida after the initial in-service date. The compressor station will include one Solar Titan 130 compressor unit; and
- Reunion Compressor Station (approximate MP 474.4) – In service 2017. Construction of a new compressor station near Intercession City in Osceola County, Florida, consisting of one Titan 130 compressor unit and one Solar Mars 100 compressor unit.

In addition, six meter and regulating (“M&R”) stations are proposed for the Project.

- M&R Stations

- Mainline Route M&R Stations
  - Transco Hillabee M&R Station in Tallapoosa County, Alabama (MP 0.0)
  - FGT Suwannee M&R Station in Suwannee County, Florida (MP 299.7)
  - FSC M&R Station in Osceola County, Florida (MP 474.4)
  - Gulfstream M&R Station in Osceola County, Florida (MP 474.4)
- Hunters Creek Line M&R Station
  - FGT Hunters Creek M&R Station in Orange County, Florida (MP 13.1)
- Citrus County Line M&R Station
  - DEF Citrus County M&R Station in Citrus County, Florida (MP 21.4)

A total of 39 mainline valves (“MLVs”), five ”pig” launcher, and five ”pig” receiver facilities are also proposed for the Project. Thirty-three MLVs would be located along the Mainline Route, four of which would be located within the site of proposed compressor stations. Three MLVs would be located along the

Hunters Creek Line, one of which would be located within the Reunion Compressor Station (MP 0.0 on the Hunters Creek Line) and one within the FGT Hunters Creek M&R Station (MP 13.1 on the Hunters Creek Line). Three MLVs would be located along the Citrus County Line, one of which would be located within the Dunnellon Compressor Station (MP 0.0 on the Citrus County Line) and one within the DEF Citrus County M&R Station (MP 21.4 on the Citrus County Line). All MLVs will have blow down capabilities, however four MLVs along the Mainline Route (MLVs 2, 18, 23, and 24) will be equipped with remote blow down facilities where the right-of-way (“ROW”) is located next to an electric transmission line corridor. The locations of proposed MLV sites are listed in Table 1.1-2 and shown on the aerial-based alignment sheets in Appendix 1A, Volume II-B of Resource Report 1.

#### *Proposed Mainline Capacity Lease*

Transco Lease – Mainline capacity lease on Transco’s existing pipeline facilities extending from Transco’s Zone 4 Pool and Transco’s interconnections with Midcontinent Express Pipeline, LLC and Gulf South Pipeline Company, LP, all located at Transco Compressor Station 85 near Transco MP 784 in Choctaw County, Alabama to the point of interconnection with the proposed Sabal Trail facilities to be located near Transco MP 944 in Tallapoosa County, Alabama. The facilities associated with the Transco Lease will be addressed in a separate certificate application filed by Transco.

This Resource Report 11 describes the reliability and safety aspects of the proposed Project. Tables for this resource report are provided in the Tables section appended to this report.

Project drawings, maps, alignment sheets, and aerials are provided in Resource Report 1, Appendix 1A.

## **11.2 Natural Gas Pipeline Industry Safety Overview**

The following information provides a perspective of Sabal Trail’s experience with respect to safety and reliability compared to industry-wide operational data. The information presented also helps to define the key industry related safety issues.

### **11.2.1 Pipeline Safety**

#### **11.2.1.1 Hazards**

According to the *Pipeline and Hazardous Materials Safety Administration* (“PHMSA”), the federal agency with authority for regulating oil and gas pipelines, there are 2.6 million miles of pipelines across the United States, and those pipelines offer the safest and most cost-efficient way to transport hazardous materials. The risk of pipeline incidents with death or major injury have decreased over the past two decades by approximately 10 percent every three years (PHMSA, 2013). As presented in subsequent sections of this report, through the application of federal law there are multiple layers of safeguards built into the design, construction and operation of the proposed pipeline. As the risk of accidents has declined steadily over the past two decades, the probability of risk for new pipelines is even less.

Methane, the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic, but is classified as an asphyxiant, possessing only an inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death. Methane has an ignition temperature of 1,000 degrees Fahrenheit and is flammable at concentrations between five percent and 15.0 percent in air. Unconfined mixtures of methane in air are generally not explosive or a significant health hazard. However, a flammable concentration within an enclosed space in the presence of an ignition source can result in a fire or explosion. The specific gravity of methane is 0.55; therefore, it is buoyant at atmospheric temperatures and disperses readily in ambient air.

#### **11.2.1.2 Safety Standards**



Under the Pipeline Safety Act, as amended (49 USC 60101 *et seq.*), the U.S. Department of Transportation (“USDOT”) is exclusively authorized to promulgate pipeline safety and design standards for interstate pipelines and transportation facilities. The proposed Project facilities will be designed, constructed, operated, and maintained to meet or exceed USDOT minimum federal safety standards set forth in Title 49 of the Code of Federal Regulations (“CFR”) Part 192 (“Part 192”). Sabal Trail safety specifications for the following equipment exceed the minimum standards set forth in Part 192: pipe, valves, pigging facilities, fabrications, pipe fittings, and welding, as well as procedures for pressure testing, corrosion protection, inspection, and record keeping.

Examples of specifications that meet or exceed those required by Part 192 are listed below:

- Minimum cover of 36-inches are required at all Class Locations and geological conditions;
- All welding, coating, and backfilling activities are inspected;
- All welds are non-destructively examined by an independent radiographic inspection company, regardless of Class Location;
- Remote controlled valves and monitoring equipment will be installed for all mainline valves on the Project;
- Valves are typically spaced at closer distances than required;
- All mainline piping will have at least 16 mils nominal thickness of epoxy coating; and
- The minimum pressure for pressure tests is greater than the operating pressure of the pipeline.

Part 192 defines area classifications, based on population density in the vicinity of the pipeline, which determine more rigorous safety requirements for populated areas. The Class Location Unit is an area that extends 220 yards (660 feet) on either side of the centerline of any continuous 1-mile length of pipeline. The four Class Location Units defined by federal law are as follows:

- Class 1 – Location with 10 or fewer buildings intended for human occupancy.
- Class 2 – Location with more than 10 but fewer than 46 buildings intended for human occupancy.
- Class 3 – Location with 46 or more buildings intended for human occupancy or where pipeline lies within 100 yards of any building, or small, well-defined outside area (such as a playground, recreation area, outdoor theater, or other place of public assembly) occupied by 20 or more people on at least five days a week for 10 weeks in any 12 month period.
- Class 4 – Location where buildings with four or more stories aboveground are prevalent.

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. Per USDOT requirements, pipelines constructed in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil, and 18 inches in consolidated rock. Class 2, 3 and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a depth of cover of 36 inches in normal soil and 24 inches in consolidated rock. Sabal Trail will install the pipeline with a minimum of 36 inches of cover in all areas, including areas of consolidated rock. Sabal Trail could exceed this minimum 36-inch depth of cover at road crossings, at waterbody crossings, along horizontal directional drills, and at foreign utility line crossing locations. Additionally, Sabal Trail plans to install the pipeline with 48-inches of cover through active agricultural lands.

Class locations also specify the maximum distance between sectionalizing block valves with intervals of 20 miles in Class 1, 15 miles in Class 2, 8 miles in Class 3, and 5 miles in Class 4. Pipeline design pressures, hydrostatic test pressures, maximum allowable operating pressure, inspection and testing of welds and



frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas. Table 11.2-1 shows USDOT area classifications for the Project.

Part 192 prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. Under Section 192.615, each pipeline operator must also establish an emergency plan that provides written procedures to minimize the hazards from a gas pipeline emergency. Key elements of the plan include procedures for:

1. Receiving, identifying, and classifying emergency events - gas leakage, fires, explosions, and natural disasters;
2. Establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;
3. Making personnel, equipment, tools, and materials available at the scene of an emergency;
4. Protecting people first and then property, and making them safe from actual or potential hazards; and
5. Emergency shutdown of system and safe restoration of service.

Each operator must establish and maintain liaison with appropriate fire, police, and public officials to communicate the resources and responsibilities of each organization that may respond to a gas pipeline emergency, and coordinate mutual assistance in responding to emergencies. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials.

### **11.2.1.3 High Consequence Areas**

USDOT's PHMSA has promulgated a rule for Pipeline Integrity Management in High Consequence Areas ("HCAs") for Gas Transmission, which requires that a facility-specific Integrity Management Plan be developed to document procedures under which pipeline integrity will be monitored and maintained for those areas where the pipeline traverses lands or facilities that are considered HCAs (Part 192 Subpart O). Pipeline integrity management is a systematic approach for identification and mitigation of potential risks to the pipeline. The Pipeline Safety Improvement Act of 2002 mandated that USDOT's PHMSA issue regulations that require operators of natural gas transmission pipelines to develop and implement Integrity Management Programs for pipelines in HCAs. HCAs are defined and discussed further in Section 11.4.1.

Sabal Trail will implement a comprehensive Integrity Management Program that meets or exceeds these regulations. While the pipeline integrity management regulations apply only to HCAs, Sabal Trail will implement the same rigorous practices across its entire pipeline system. These practices will enable Sabal Trail to identify and mitigate risks for the entire pipeline system, inside and outside of HCAs.

### **11.2.2 Pipeline Accident Data**

USDOT has set forth certain reporting requirements for operators of natural gas pipelines in 49 CFR Part 191. Since June 1984, 49 CFR Part 191 has required all operators of transmission and gathering systems to notify USDOT of any reportable incident, and to submit a written report on form 7100.2 within 30 days after detection of the incident's occurrence. A reportable incident includes incidents that involve property damage valued at more than \$50,000, injury, death, unintentional loss of 3,000,000 cubic feet or more of gas, or incidents that are otherwise considered significant by the operator. Table 11.2-2 summarizes reported onshore natural gas transmission incidents and accidents by category from 1994 to 2013. As evidenced in Table 11.2-2, the highest percentage of onshore natural gas transmission pipeline incident fatalities is caused by excavation damage (approximately 38 percent).

The most frequent cause of onshore natural gas transmission pipeline incidents from 1994 to 2013 was material failure (approximately 28 percent). The frequency of material failure related incidents is largely dependent on material, weld, and/or equipment failure or malfunctioning equipment. Corrosion is the cause of approximately 17 percent of the onshore natural gas transmission pipeline incidents. The frequency of corrosion-related incidents is largely dependent on external corrosion. While pipelines installed since 1950 exhibit a fairly constant frequency of corrosion incidents, pipelines installed before that time have a significantly higher rate. Older pipelines have a higher frequency of corrosion incidents because corrosion is a time-dependent process. The corrosion potential for new pipe over time is further reduced by the use of more advanced coatings and cathodic protection. Prior to 1971, pipelines were not required to use cathodic protection and protective coatings. The use of both an external protective coating and a cathodic protection system significantly reduces the rate of material failure compared to unprotected or partially protected pipe (*see* Section 11.4.15.5 below on Sabal Trail’s corrosion control).

Outside force incidents result from excavation damage (*i.e.*, encroachment of mechanical equipment such as bulldozers and backhoes), natural force damage (*i.e.*, earth movements due to soil settlement, washouts, or geologic hazards, and weather effects such as winds, storms and thermal strains), and other outside forces. The breakdown of outside force incidents in Table 11.2-3 shows that third party excavation damage was responsible for 18.6 percent of all onshore incidents from 1994 to 2013. Since April 1982, operators have been required to participate in “811 Call Before You Dig” public utility programs in populated areas to minimize unauthorized excavation activities in the vicinity of pipelines. State laws also require excavators to call their state “811 Call Before You Dig” centers well in advance of digging (*see* Section 11.4.15.3 below on Sabal Trail’s pipeline markers).

### ***11.2.3 Impact on Public Safety***

The reported incident data summarized in Table 11.2-2 includes onshore natural gas pipeline incidents of all magnitudes with widely varying consequences. The majority of incidents were attributed to material, welding, or equipment failure and excavation damage. Table 11.2-4 presents the annual fatalities and injuries which occurred on natural gas transmission lines from 1994 through 2013.

Table 11.2-5 presents the 2012 nationwide totals of transportation-related fatalities and injuries, broken down by mode of transportation. This table provides a relative measure of the industry-wide safety of natural gas transmission pipelines. Direct comparisons between modes of transportation categories should be made cautiously since individuals are not uniformly exposed to hazards from all of the modes. Nevertheless, the average number of fatalities resulting from natural gas transmission pipelines is proportionally small considering the 320,500 miles of onshore and offshore transmission lines in service nationwide. A more recent comparison from USDOT is not available. However, Table 11.2-5 shows that the average number of fatalities and injuries resulting from natural gas transmission pipelines for 2012 is small.

## **11.3 Safety Overview**

The Project facilities constructed by Sabal Trail will, at a minimum, adhere to USDOT regulations pertaining to pipeline safety. These safety regulations will be reinforced by the comprehensive and strictly enforced corporate practices of Sabal Trail. The effectiveness of the federal and corporate requirements in ensuring reliability and safety is illustrated by the following operating experience profile of Sabal Trail’s parent company, Spectra Energy. The empirical information presented illustrates the low potential for public hazard from accidents associated with the operation of the proposed Project facilities.

### ***11.3.1 System Overview***

One of Sabal Trail’s parent companies, Spectra Energy, owns and operates a natural gas transmission system consisting of approximately 13,827 miles of transmission pipeline in the U.S., as well as natural gas

gathering, processing, and local distribution assets. Spectra Energy, and its predecessor companies, have been providing service since the early 1940s when the major portion of its transmission system was constructed.

### ***11.3.2 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 USDOT standards to ensure public safety, reliability, and to minimize the opportunity for system failure. Sabal Trail's parent companies have an excellent record of public safety. Over the past five years, the incident rate for Spectra Energy's onshore pipelines in the U.S. is half that of the industry as a whole. However, no incident is acceptable. Spectra Energy works closely with federal and state regulators to ensure safe, reliable natural gas for Americans and inspects more pipeline annually than required by state and federal regulations. Spectra Energy is also committed to being a good neighbor in the communities that host our facilities. Sabal Trail will continue to employ similar system design, construction, operation, and maintenance practices to ensure this excellent record is maintained.

## **11.4 Measures to Protect the Public and Utilities**

### ***11.4.1 High Consequence Area Identification***

Integrity management regulations require pipeline companies like Sabal Trail to identify HCAs located along the pipeline. HCAs are designated locations along the pipeline that are near either densely populated areas, facilities that would be difficult to evacuate (such as hospitals or schools), or locations where people congregate (such as churches, offices or parks). The federal regulations include specific criteria for pipeline companies to identify and designate HCAs.

Sabal Trail uses a number of methods to identify HCAs to ensure that it identifies all HCAs along its pipeline, including aerial photography, field surveys, consultation with emergency response officials, and multiple database searches. Sabal Trail will perform a comprehensive review each year, or as frequently as needed to meet the requirements of Part 192 to assure that its identification of HCAs is accurate and up to date.

HCAs are identified as an area established by one of the methods described below:

1. An area defined as:
  - Class 3 or 4 Locations; or
  - Class 1 or 2 Locations where the potential impact radius is greater than 660 feet and the area within a potential impact circle contains 20 or more buildings intended for human occupancy; or
  - Any Class 1 or 2 location where the potential impact radius contains an identified site.
2. An area within a potential impact circle containing:
  - 20 or more buildings intended for human occupancy;
  - An identified site such as:
    - An outside area or open structure that is occupied by 20 or more persons for at least 50 days in any 12-month period;
    - A building that is occupied by 20 or more persons for at least five days a week for 10 weeks in a 12-month period; or

- A facility occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate.

The potential impact radius means the radius of a circle within which the hypothetical failure of a pipeline could have significant impact on people or property. The potential impact radius is determined by the formula  $r = 0.69 \times (\text{square root of } (p \times d^2))$ , where 'r' is the radius of a circular area surrounding the point of hypothetical failure, 'p' is the maximum allowable operating pressure in the pipeline segment in pounds per square inch, and 'd' is the nominal diameter of the pipeline in inches.

Table 11.4-1 contains a listing of the identified HCAs along the proposed Project facilities.

As discussed above, the Project facilities will be designed, constructed, operated, and maintained to meet or exceed USDOT Minimum Federal Safety Standards in Part 192.

#### ***11.4.2 Data Gathering***

The risk analysis process involves the use of data about the pipeline, potential activities near the pipeline and potential consequences in the unlikely event of a pipeline failure. This data is needed to properly identify integrity risks and potential consequences and is gathered from a number of sources, including but not limited to:

- Original construction records;
- Quadrangle United States Geological Survey maps;
- Pipeline alignment sheet records;
- Digital elevation models;
- Personnel interviews;
- Historical data;
- Database searches;
- Cathodic protection surveys
- Leak and incident data/reports;
- Subject matter experts;
- Operating characteristics;
- One-call notices;
- Corrosion monitoring; and
- Aerial photography.

#### ***11.4.3 Risk Assessment***

In accordance with Part 192.917, Sabal Trail will routinely perform a detailed risk analysis for its entire pipeline system to identify potential integrity threats to the pipeline and potential consequences in the unlikely event of a pipeline failure. This risk analysis allows Sabal Trail to prioritize integrity management activities, such as integrity assessments and additional prevention measures, to those pipeline segments that have higher risks. Examples of potential integrity threats could include:

- Excavation damage by third parties;
- Metal loss or corrosion;

- Defects related to pipe manufacturing process; and
- Cracking related to exposure to natural environments.

The risk assessment is performed by subject matter experts using modern risk management tools and techniques to assure the risk assessment process provides an accurate determination of pipeline risks.

#### ***11.4.4 Integrity Assessments***

Integrity assessments are prioritized based on the risk assessment, and are conducted to find pipeline defects well before they could become a threat. The integrity assessment method for each pipeline segment is selected based on the types of potential integrity threats applicable to that segment. The integrity assessment methods could include:

- In-Line Inspection – an assessment method that uses an internal inspection tool (commonly referred to as a “Smart Pig”) that is capable of identifying and classifying pipe defects, including metal loss, dents, gouges and other types of defects. The Smart Pig is inserted into the pipeline and is typically pushed by the flow of natural gas in the pipeline.
- Direct Assessment – an assessment method that uses a systematic approach to identifying potential defects through data review, indirect assessments and targeted hands-on inspections.
- Pressure Testing – an assessment method where the pipeline is filled with an inert substance, typically water, and is tested to a pressure that is well above the normal operating pressure to validate the strength of the pipe and identify any smaller defects long before they could become a threat.

#### ***11.4.5 Response and Remediation***

Pipeline defects identified by the integrity assessments are prioritized and scheduled for field investigation and repair, if required, in accordance with Part 192.933 and the integrity management regulations and standards issued by the American Society of Mechanical Engineers, the National Association of Corrosion Engineers, other consensus standards, and industry best practices. Sabal Trail will schedule and conduct investigations and repairs for any potential defects that exceed specified thresholds. This will be done regardless of whether or not the pipeline is located in a designated HCA.

#### ***11.4.6 Preventive and Mitigative Measures***

Preventive measures begin with the design and construction of Sabal Trail’s facilities. These measures include design specifications, selection of suitable construction materials, development and selection of welding procedures, pipe coatings and cathodic protection systems. Additionally, manufacturing controls are used to promote high-quality installation of the pipeline and to limit operating stress. During the installation phase, all welders and radiographic technicians performing work on the facilities must take and pass a qualification test. Qualified oversight inspection staff is used to monitor the installation of the facilities.

In roadways, in-streets, and parking lots, a 15:1 sand to concrete mix called flowable fill, or Controlled Density Fill, or clean compacted material may be used as backfill around the pipeline following consultation with municipal, county, and state roadway authorities. A two-foot wide brightly colored warning tape is placed one-foot below natural grade at road and utility line crossings. A variety of pipeline location markers (e.g., adhesive decals, marker posts, and signage) will be used to clearly identify the location of the pipeline and provide contact information for the public and parties excavating in the area.

The pipeline will be patrolled in accordance with the requirements of Part 192.705 and personnel well-qualified to perform both emergency and routine maintenance on interstate pipeline facilities will handle emergencies and maintenance related to:

- Erosion and wash-outs along the ROW;
- Settling, undermining or degradation of repaired ditch line in streets or parking lots;
- Performance of water control devices such as diversions;
- Condition of banks at stream and river crossings;
- Third-party activity along the pipeline ROW;
- Evidence of subsidence, surface cracks or depressions which could indicate sinkhole formation; and
- Any other conditions that could endanger the pipeline.

Sabal Trail will also monitor the pipeline 24 hours a day, seven days a week, from Spectra Energy's Gas Control Center. This high-tech computer control center monitors the flow of gas throughout Spectra Energy's interstate transmission pipeline. The center collects data from all of these pipelines to ensure they are operating within their design parameters. The Gas Control Center monitors and reacts to equipment anomalies and, when necessary, dispatches employees who live and work along the pipeline to respond. As an added safety measure, remote control equipment is installed along the pipeline system, enabling remote operation of the pipeline valves from the Gas Control Center (*see* Section 11.4.15.2 below). Patrolling will also be performed regularly to monitor activity near Sabal Trail's pipeline, and Sabal Trail will become a member of the "811 Call Before You Dig" and related pre-excitation notification organizations in the states of Alabama ("811"), Georgia ("811"), and Florida ("Sunshine 811") (*see* Section 11.4.15.1 below).

Other preventive and mitigative measures will be implemented as appropriate under the integrity management regulations set forth in Part 192.935 depending on any threats that may be identified for each pipeline segment.

#### ***11.4.7 Continuous Evaluation and Improvement***

As required by PHMSA Integrity Management Program regulations, Sabal Trail will continually refine and enhance the integrity management techniques as it implements the Integrity Management Program on its pipeline system, including performing integrity assessments at specified intervals and periodically evaluating the integrity of a pipeline segment as required under Part 192.937.

#### ***11.4.8 Public Safety***

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

Trained and qualified pipeline personnel will operate and maintain the pipeline in accordance with Subpart N of 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 gas.

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 traverses 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 ROW;
- Ensuring piping is welded and installed as quickly as reasonably possible consistent with prudent pipeline construction practices to minimize construction time affecting a neighborhood;
- Backfilling the trench as soon as the pipe is laid or temporarily steel plating the trench; and
- Completing final cleanup and installation of permanent erosion control measures within 10 days after the trench is backfilled, weather conditions permitting.

No ditch will remain open overnight in residential and commercial areas. The installed pipe will be backfilled to near the end of the section, and the remaining open trench will be covered with temporary steel plating. The work will be accomplished so that emergency vehicle access to nearby residences will be maintained using “shoe-fly” constructions, or by installing steel plating over the trench-line. Steel plates will also be available to insure homeowners are able to access to their driveways. Sabal Trail will coordinate with residences while construction activities are underway. Sabal Trail has developed residential construction plans in areas where residential dwellings are within 50 feet of construction workspace. These plans are included in Resource Report 8, Appendix 8A.

#### ***11.4.9 Emergency Response***

Consistent with Part 192.615, Sabal Trail will establish an emergency action plan 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;
- 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, Sabal Trail will have field service personnel and repair contractors available that are capable of completing emergency repairs and restoration.

#### ***11.4.10 Public Awareness Program***

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



Sabal Trail’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.

#### ***11.4.11 One-Call Response***

When Sabal Trail receives notification from a “811 Call Before You Dig” 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. Sabal Trail will have company employees on-site when the excavation occurs to ensure that the facility is not compromised.

#### ***11.4.12 Pipeline Safety Brochures***

Sabal Trail will mail informational brochures to landowners, 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 provide emergency contact phone numbers available 24/7 and reinforces the need for excavators to “811 Call Before You Dig”.

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

#### ***11.4.13 Contact Information***

Sabal Trail will provide contact information as part of its Emergency Response Plan.

##### **11.4.13.1 Interactions with Federal Authorities**

Sabal Trail will be required by law to notify the USDOT’s PHMSA at least 60 days prior to commencement of construction. In fact, Sabal Trail has already submitted that construction notification and has met with PHMSA twice to review the project scope and schedule. PHMSA has the authority to review the design of the Project facilities prior to construction. PHMSA routinely exercises its oversight authority to ensure that facilities under its jurisdiction are safely designed, constructed, and operated.

1. The PHMSA develops regulations and other approaches to risk management to assure safety in design, construction, testing, operation, maintenance, and emergency response of pipeline facilities.
2. The PHMSA administers the USDOT’s national regulatory program to assure the safe transportation of natural gas, petroleum, and other hazardous materials by pipeline. PHMSA routinely inspects pipeline facilities and records for compliance with design, construction, testing, operations, maintenance, and integrity regulations. Sabal Trail’s procedures and practices will be prepared in a manner to meet or exceed the pipeline safety regulations and related risk management requirements administered by PHMSA.

##### **11.4.13.2 Liaison Procedures with Local Authorities**

Sabal Trail’s personnel involved with public awareness will ensure that appropriate liaisons and public education is established and maintained in the communities within which Sabal Trail operates. Sabal Trail will establish open relationships with local fire, police, and other governmental leaders in order to efficiently respond in a cooperative manner to pipeline emergencies.

To accomplish this Sabal Trail, on an annual basis, 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; 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, Sabal Trail’s liaison efforts will allow Sabal Trail to:

- Determine how local officials may be able to assist Sabal Trail during an emergency with the determination of jurisdiction and resources that may be involved in responding to an emergency;
- Familiarize local officials with how Sabal Trail 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 Sabal Trail on a periodic basis. Sabal Trail’s focus with these organizations is to review firefighting methods and techniques for natural gas fires to conduct periodic emergency drills and exercises.

#### ***11.4.14 Utility Protection***

The majority of the proposed pipeline segments for the Project will be within or adjacent to existing ROWs, consisting of pipeline ROWs, public roadway, and/or other utility ROWs. Some portions of the pipeline segments deviate from existing ROWs, generally to avoid specific construction constraints, provide adequate separation from existing residences, or to reduce impacts to sensitive resources.

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. Sabal Trail’s contractors will contact the “811 Call Before You Dig” system, or state or local utility operators, 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, such as water, cable, gas, and sewer lines, they will be located by field instrumentation and test pits. Test pits to verify location of utilities will be excavated using “soft digging” techniques, such as rubber buckets on an excavator, vacuum trucks, jetting of the soil, or excavation by hand.

When trenching for construction activities, soft digging methods can be used to fully excavate any foreign line. At minimum, an excavator bucket without teeth or side cutters will be used. Sabal Trail can also shield sensitive lines using rock shield or plywood. The lines will also be supported, either from below or from a beam installed across the trench. Sabal Trail plans to work directly with existing utility owner/operators during the development of any site-specific Sabal Trail blasting plans to mitigate potential damage to foreign utility lines during blasting operations, if such operations are required. Project Blasting Contractors will submit a blasting plan for approval to Sabal Trail. Additionally, the contractor will be responsible for obtaining any local or state blasting permits required for the work. The plan will be prepared in compliance with all Federal and State regulations pertaining to blasting, including but not limited to:

- Bureau of Alcohol, Tobacco and Firearms – 27CFR 181 (Commerce in Explosives).
- Occupational Safety and Health Administration (“OSHA”) – 29CFR 1926.90 (Safety and Health Regulations for Construction Blasting and Use of Explosives).
- Carriage by Public Highway – USDOT 49 CFR 177.

- Explosives and Blasting Agents – OSHA, 29CFR 1910.109 (Safety in the Workplace When Using Explosives).
- Siting and Maintenance Requirements – FERC 18 CFR 380.15.
- USDOT regulation regarding protection from hazards and continuing surveillance – 49 CFR Part 192.317, Part 192.613(b).

It is not uncommon for natural gas pipeline facilities to parallel existing utility ROWs, including electric transmissions ROWs. As part of Sabal Trail’s assessment of the reliability and safety of constructing and maintaining its proposed pipeline in proximity to overhead electric facilities, it considered the following.

#### *Sabal Trail’s Use of Heavy Construction Equipment in the Vicinity of High Voltage Powerlines*

Sabal Trail has and continues to meet with electric utilities to obtain information on their requirements for construction activities within the vicinity of their overhead electric transmission lines and structures. Sabal Trail has conducted surveys and collected information on the location and size of existing powerline structures within the proposed construction corridor, tower footing locations and dimensions, and wire heights (lowest point between towers). Based on its consultations, and construction experience within and adjacent to existing overhead electric transmission lines and structures, Sabal Trail has designed or will modify its construction technique on the Project with sufficient offsets to eliminate the risk of heavy construction equipment interfering with overhead high voltage electric transmission lines during construction and operation of the Project.

#### *Potential Structural Impacts to Electric Transmission Towers Due to Nearby Blasting*

Where possible Sabal Trail has offset its pipeline trench by 50 feet to avoid any potential damage to electric transmission towers and, in those areas that this offset could not be achieved the construction technique will be modified. Sabal Trail has extensive experience in blasting near structures including other underground pipelines and overhead powerlines. Sabal Trail will use a state licensed blasting engineer and will follow the Project Blasting Plan (refer to Resource Report 6) to avoid damage to overhead electric transmission lines and structures from blasting.

#### *Effects on the Pipeline Resulting from Lightning Strikes to the Electric Transmission Towers*

Sabal Trail will consult with an engineer that specializes in developing alternating current (“AC”) mitigation systems for pipeline utility companies. An AC mitigation system will be designed and installed to mitigate the steady state induced AC on the pipeline and deal with any fault current should they occur. Typically lightning arrestors along with decoupling devices are employed on the pipeline to protect against any electrical surges.

#### *Effects on the Pipeline Resulting from a Direct Ground Fault Current by a nearby 345 kV Electric Transmission Line*

As previously stated, it is not uncommon for natural gas pipelines to share ROWs with electric transmission and other utilities. Since pipelines and electric transmission lines often share ROWs, there is a need to ground the pipeline to dissipate potential electrical interference. In these situations, AC voltages are transmitted to the pipeline by conductive or inductive interference. Magnetic induction acts along the pipeline or pipeline segment that is approximately parallel to the powerline and can cause significant pipeline potentials even at relatively large separation distances.

Consideration must be given to safety of personnel and the public who may come into contact with aboveground portions of the pipeline such as valves and test stations. These exposed structures can be a potential shock hazard when touched while the soil is at a significantly different potential. Typically

grounding mats are installed at above ground pipeline facilities adjacent to powerlines to mitigate this potential.

As stated above, Sabal Trail will consult with an engineer that specializes in developing AC mitigation systems for pipeline utility companies. Typically zinc ribbon is used to mitigate AC voltages to industry acceptable levels. The control method consists of one or more bare zinc conductors buried parallel to and near the pipeline and connected to it at regular intervals through decoupling devices. The zinc ribbon used in this way is very effective in mitigating excessive pipeline potentials due to both inductive and conductive interference.

#### ***11.4.15 Other Protection Measures***

##### **11.4.15.1 Surveys**

Sabal Trail will employ an array of patrol methods to conduct comprehensive and effective patrols, again as required by federal law. Aerial, driving, or foot patrols will be used to physically inspect the pipeline facilities. Aerial flyovers will occur weekly, weather permitting. Sabal Trail will have line field service crews that perform the ground based patrols and facility inspections. When performing patrols, technicians will observe surface conditions on and adjacent to the pipeline ROW for indications of leaks, construction activity, and other factors affecting safety and operation. Conditions identified during patrols will be entered into Sabal Trail's work management system and remedial actions taken. Preventative maintenance checks shall be performed on the pipeline at a set frequency and shall be compliant with Part 192 safety regulations.

Sabal Trail will become a member of the "811 Call Before You Dig" and related pre-excavation notification organizations in the states in which it operates, as required by law. Through "811 Call Before You Dig" contractors provide notification to a central agency of proposed excavation that in turn notifies Sabal Trail of the excavation locations. If Sabal Trail's facilities are located in the area of proposed contractor activity, they will be marked in the field and a representative will be present during excavation to ensure that the facility is not compromised.

##### **11.4.15.2 Equipment**

Sabal Trail's pipeline system includes 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 corrosion of the pipeline facilities. The cathodic protection system impresses a low voltage current to the pipeline to off-set natural soil and groundwater corrosion potential. The functional capability of cathodic protection systems are inspected frequently to ensure proper operating conditions for corrosion mitigation.

Sabal Trail's pipeline will be built to meet or exceed the USDOT safety standards. Since the pipeline is buried a minimum of three feet underground, it is relatively immune from direct lightning strikes. Specific site conditions, including earthquakes, are considered in the design of the pipeline. The magnitude of earthquakes in the southeast is relatively low and the ground vibration would not pose a problem for a modern welded-steel pipeline. Even under much higher ground vibrations, the main risk to pipelines would be a slip fault (e.g., San Andreas in California) that displaces laterally during the quake, or an area where the pipeline is buried in a steep hillside in an area of moderate to high landslide incidence. The proposed pipeline route does not cross these types of land features.

Sabal Trail's proposed Project pipeline will be equipped with remote control shutoff valves as required by the USDOT regulations. This allows the shutoff valves to be operated remotely by Sabal Trail's Gas Control Center in the event of an emergency, usually evidenced by a sudden loss of pressure on the pipeline.

Remotely closing the shutoff valve allows the section of pipeline to be isolated from the rest of the pipeline system.

Compressor Stations will be located on Sabal Trail property and will each be completely surrounded by a chain link fence with barbed wire, to maintain the safety of the facility and workers. Facilities will be powered from local electric utility companies and, in case of outage of commercial electric power, each station will switch over to standby gas generator systems.

A controlled access system and intrusion alarm network will be installed to restrict access to authorized personnel. The facilities will be monitored with video cameras located at strategic locations. The compressor buildings will be properly ventilated to minimize the potential of gas accumulating in enclosed areas and will be constructed of noncombustible material.

Compressor Stations will also be equipped with automatic emergency detection and shut down systems. For example, the stations will have hazardous gas and fire detection systems and an emergency shutdown system. These safety and emergency systems will be maintained and tested routinely to ensure they are operating properly. The emergency shut-down system will be designed to shut down and isolate elements of the compressor station in the event of gas detection or fire detection. The system will include sensors for detecting natural gas concentrations as well as sensors for detecting flames. The critical buildings and areas will be equipped with beacons and alarms as well as emergency and exit lights.

In addition, the compressor station equipment will be designed to shut down automatically if system operation deviates from its designed operating limits, which could cause a mechanical failure and pose risk to personnel and equipment or otherwise constitute a hazard. The compressor stations will be equipped with relief valves to protect the piping from over-pressurization. Fire protection, first aid, and safety equipment will be maintained at the compressor stations and Sabal Trail's emergency response personnel will be trained in proper equipment use and in first aid. The firefighting equipment that will be maintained on site will consist primarily of hand-held dry chemical fire extinguishers strategically located in the buildings.

Data acquisition systems will be installed at all M&R stations along the system. If system pressures fall outside a predetermined range, an alarm is activated alerting Sabal Trail's Gas Control Center.

#### **11.4.15.3 Pipeline Markers**

PHMSA regulations at Part 192.707 also requires pipeline operators to place pipeline markers at frequent intervals along the pipeline ROW, particularly at prominent points along the route, such as where a pipeline intersects a street, highway, railway, waterway, or other significant feature. Pipeline markers will be placed along the upland portion of pipeline as required. At locations where the pipeline is under pavement, circular decals will be adhesively attached to the surface over the pipeline. In addition, approximately 12 inches below the natural grade, bright yellow ribbon, 24-inches in width, will be installed over the pipeline providing another set of warning of a natural gas pipeline and a toll free number to contact. Pipeline ROW markers can help prevent encroachment and excavation-related damage to pipelines. Since the pipeline ROW is much wider than the pipeline itself, and a pipeline can be located anywhere within the ROW, state laws require excavators to call their state One-Call center well in advance of digging to locate underground utilities, to ensure it is safe for the contractor to dig in that location.

#### **11.4.15.4 Operations and Maintenance**

The Sabal Trail Gas Control Center will be located in Houston, Texas and will be staffed continuously by qualified pipeline operators. Operators will monitor all aspects of the pipeline including system pressures, temperatures, flows, and valve positions (open or closed). A secondary Pipeline Control Center will be available in cases of an emergency in Nashville, Tennessee.



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, the Sabal Trail pipeline system will be equipped with remotely controlled sectionalizing block valves to isolate the affected pipeline segment.

Part 192 prescribes the minimum standards for operating and maintaining pipeline facilities, including the establishment of a written plan governing these activities. Sabal Trail will develop an Operations & Maintenance Manual for the facility during the construction phase and this Operations & Maintenance Manual will be in effect prior to initial filling of the pipeline system with natural gas.

Sabal Trail will have field services crews to perform Part 192 required operations, maintenance and inspection tasks along the 508.9 mile long pipeline. All personnel will have the proper training and qualifications as required by Part 192.

#### **11.4.15.5 Corrosion Control**

Design of the corrosion control systems is incorporated into the overall construction of the Project pipeline. See Section 1.3.4 of Resource Report 1 for a description of the external corrosion control measures to be implemented. The Project pipeline will have cathodic protection and will be closely monitored and maintained in compliance with Part 192 Subpart I and National Association of Corrosion Engineers International (“NACE”) standard practice SP 0169. The pipeline will be built with high-strength carbon steel with an epoxy coating. The epoxy coating is a corrosive resistant nonconductive resin that forms a protective coating around the pipe. Pipe sections, or joints, are welded together forming a continuous pipeline. Each of the welded joints are also covered with the epoxy coating which forms a continuous coating of the entire pipeline. Together, the combination of cathodic protection and coating system provide excellent corrosion control. A continuous direct current will then be applied to the entire length of the pipeline to manage the potential corrosive nature of the soils and interference potential of nearby underground facilities. The corrosion control system will also include anodes strategically placed within the easements to manage and harmlessly disperse stray currents.

Once the pipeline has been built, extensive ongoing corrosion control measures will be implemented to monitor and maintain the pipeline integrity, as defined in USDOT regulations and Sabal Trail’s corrosion control operating procedures. In addition to the other measures, Sabal Trail will also inspect the pipeline using devices known in the industry as “smart pigs” every seven years, or more frequently as Integrity Assessment may require. 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; casing ovalities; and external metal objects in the vicinity of the pipeline.

The external corrosion control system for pipeline segments located in wetlands or in areas with a shallow water table will be the same as the remainder of the pipeline. The pipeline will have a corrosion coating and an impressed current cathodic protection system. After construction, the cathodic protection system will be adjusted to achieve a pipe-to-soil potential criterion for cathodic protection, as established by NACE and the appropriate sections of CFR Title 49 Part 192, along the entire pipeline. The monitoring of the cathodic protection system for the pipeline will include the wetland and shallow water table areas to ensure that the corrosion control system continues to satisfy the established criterion for cathodic protection.

## **11.5 References**

[PHMSA] – Pipeline and Hazardous Materials Safety Administration. 2013. Written Statement of Cynthia L. Quarterman, Administrator PHMSA, Before the Committee on Commerce, Science, and Transportation United States Senate. Field Hearing—Charleston, WV. *Pipeline Safety: An On-the-Ground Look at Safeguarding the Public*. January 28, 2013.

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## **TABLES**

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TABLE 11.2-1

Area Classifications along the Sabal Trail Project Pipeline Facilities

State/Facility	County	Begin Milepost	End Milepost	Class <u>a/</u>
<b>Alabama</b>				
<u>Mainline</u>	Tallapoosa	0.00	4.05	1
	Tallapoosa	4.05	4.43	2
	Tallapoosa	4.43	4.63	1
	Tallapoosa	4.63	4.78	2
	Tallapoosa	4.78	4.9	1
	Tallapoosa	4.90	5.32	2
	Tallapoosa	5.32	20.45	1
	Chambers	20.45	22.88	1
	Chambers	22.88	23.54	2
	Chambers	23.54	27.1	1
	Chambers	27.10	27.45	2
	Chambers	27.45	27.71	1
	Chambers	27.71	27.92	2
	Chambers	27.92	27.95	1
	Chambers	27.95	28.04	2
	Chambers	28.04	28.23	1
	Chambers	28.23	28.26	2
	Chambers	28.26	40.1	1
	Chambers	40.10	40.12	1
	Lee	40.12	44.89	1
	Lee	44.89	44.9	2
	Lee	44.90	44.93	1
	Lee	44.93	45.34	2
	Lee	45.34	45.76	1
	Lee	45.76	45.87	2
	Lee	45.87	45.92	1
	Lee	45.92	46.19	2
	Lee	46.19	47.7	1
	Lee	47.70	48.37	2
	Lee	48.37	48.47	1
	Lee	48.47	48.62	2
	Lee	48.62	48.72	3
	Lee	48.72	48.79	2
	Lee	48.79	48.97	1
	Lee	48.97	49.16	2
	Lee	49.16	53.67	1

TABLE 11.2-1

Area Classifications along the Sabal Trail Project Pipeline Facilities

State/Facility	County	Begin Milepost	End Milepost	Class <u>a/</u>
	Lee	53.67	53.75	2
	Lee	53.75	54.19	1
	Lee	54.19	54.96	2
	Lee	54.96	60.75	1
	Russell	60.75	60.75	1
	Russell	60.75	61.47	1
	Russell	61.47	61.89	2
	Russell	61.89	61.94	1
	Russell	61.94	62.12	2
	Russell	62.12	62.18	1
	Russell	62.18	62.99	2
	Russell	62.99	63.05	1
	Russell	63.05	63.15	2
	Russell	63.15	63.19	1
	Russell	63.19	63.44	2
	Russell	63.44	65.21	1
	Russell	65.21	65.47	2
	Russell	65.47	65.57	1
	Russell	65.57	66.79	2
	Russell	66.79	67.3	1
	Russell	67.30	67.63	2
	Russell	67.63	74.03	1
	Russell	74.03	75.31	3
	Russell	75.31	75.36	1
	Russell	75.36	75.73	2
	Russell	75.73	75.73	1
	Russell	75.73	75.79	2
	Russell	75.79	76.01	1
	Russell	76.01	76.23	2
	Russell	76.23	76.65	1
	Russell	76.65	77.09	2
	Russell	77.09	77.4	1
	Russell	77.40	77.87	2
	Russell	77.87	86.38	1
<b>Georgia</b>				
<u>Mainline</u>	Stewart	86.38	110.26	1
	Webster	110.26	110.27	1
	Webster	110.27	120.47	1
	Terrell	120.47	141.23	1

TABLE 11.2-1

**Area Classifications along the Sabal Trail Project Pipeline Facilities**

<b>State/Facility</b>	<b>County</b>	<b>Begin Milepost</b>	<b>End Milepost</b>	<b>Class <u>a/</u></b>
	Lee	141.23	141.84	1
	Terrell	141.84	146.69	1
	Dougherty	146.69	154.02	1
	Dougherty	154.02	154.63	2
	Dougherty	154.63	161.76	1
	Dougherty	161.76	162.11	2
	Dougherty	162.11	162.15	1
	Dougherty	162.15	162.75	2
	Dougherty	162.75	164.25	1
	Dougherty	164.25	164.26	2
	Dougherty	164.26	164.45	1
	Dougherty	164.45	164.82	2
	Dougherty	164.82	164.85	1
	Dougherty	164.85	165.12	2
	Dougherty	165.12	165.18	1
	Dougherty	165.18	165.46	2
	Dougherty	165.46	166.95	1
	Dougherty	166.95	167.45	2
	Dougherty	167.45	167.45	1
	Dougherty	167.45	168.52	2
	Dougherty	168.52	169.83	1
	Mitchell	169.83	182.58	1
	Colquitt	182.58	188.92	1
	Colquitt	188.92	189.62	2
	Colquitt	189.62	189.8	1
	Colquitt	189.80	190.52	2
	Colquitt	190.52	190.65	1
	Colquitt	190.65	190.8	2
	Colquitt	190.80	190.93	1
	Colquitt	190.93	191.24	2
	Colquitt	191.24	194.04	1
	Colquitt	194.04	194.2	2
	Colquitt	194.20	194.22	1
	Colquitt	194.22	194.23	2
	Colquitt	194.23	194.36	1
	Colquitt	194.36	195.15	2
	Colquitt	195.15	195.15	1
	Colquitt	195.15	195.74	2
	Colquitt	195.74	196.39	1

TABLE 11.2-1

**Area Classifications along the Sabal Trail Project Pipeline Facilities**

<b>State/Facility</b>	<b>County</b>	<b>Begin Milepost</b>	<b>End Milepost</b>	<b>Class <u>a/</u></b>
	Colquitt	196.39	197.77	2
	Colquitt	197.77	199.89	1
	Colquitt	199.89	200.15	2
	Colquitt	200.15	200.3	1
	Colquitt	200.30	200.55	2
	Colquitt	200.55	200.62	1
	Colquitt	200.62	200.75	2
	Colquitt	200.75	200.93	3
	Colquitt	200.93	201.34	2
	Colquitt	201.34	203.62	1
	Colquitt	203.62	204.74	2
	Colquitt	204.74	208.56	1
	Brooks	208.56	231.34	1
	Lowndes	231.34	233.9	1
	Lowndes	233.90	234.76	2
	Lowndes	234.76	234.8	1
	Lowndes	234.80	234.92	2
	Lowndes	234.92	236.49	1
	Lowndes	236.49	236.78	2
	Lowndes	236.78	236.87	1
	Lowndes	236.87	238.19	2
	Lowndes	238.19	241.54	1
	Lowndes	241.54	242.34	2
	Lowndes	242.34	242.35	1
	Lowndes	242.35	242.56	2
	Lowndes	242.56	245.93	1
	Lowndes	245.93	246.2	2
	Lowndes	246.20	246.4	1
	Lowndes	246.40	246.83	2
	Lowndes	246.83	247.8	1
<b>Florida</b>				
<u>Mainline</u>	Hamilton	247.80	264.07	1
	Madison	264.07	268.15	1
	Suwannee	268.15	274.8	1
	Suwannee	274.80	274.9	2
	Suwannee	274.90	275.16	1
	Suwannee	275.16	276.35	2
	Suwannee	276.35	276.37	1
	Suwannee	276.37	277.18	2

TABLE 11.2-1

**Area Classifications along the Sabal Trail Project Pipeline Facilities**

<b>State/Facility</b>	<b>County</b>	<b>Begin Milepost</b>	<b>End Milepost</b>	<b>Class <u>a/</u></b>
	Suwannee	277.18	277.71	1
	Suwannee	277.71	278.03	2
	Suwannee	278.03	278.3	1
	Suwannee	278.30	279.17	2
	Suwannee	279.17	279.69	1
	Suwannee	279.69	279.93	2
	Suwannee	279.93	279.98	1
	Suwannee	279.98	280.51	2
	Suwannee	280.51	280.58	1
	Suwannee	280.58	281.39	2
	Suwannee	281.39	286.44	1
	Suwannee	286.44	287.74	2
	Suwannee	287.74	287.78	1
	Suwannee	287.78	288.34	2
	Suwannee	288.34	290.93	1
	Suwannee	290.93	291.41	2
	Suwannee	291.41	291.48	1
	Suwannee	291.48	291.62	2
	Suwannee	291.62	291.64	1
	Suwannee	291.64	292.37	2
	Suwannee	292.37	292.42	1
	Suwannee	292.42	292.51	2
	Suwannee	292.51	292.7	1
	Suwannee	292.70	292.8	2
	Suwannee	292.80	297.38	1
	Suwannee	297.38	297.66	2
	Suwannee	297.66	297.78	1
	Suwannee	297.78	298.01	2
	Suwannee	298.01	298.2	1
	Suwannee	298.20	298.67	2
	Suwannee	298.67	298.67	1
	Suwannee	298.67	298.83	2
	Suwannee	298.83	304.98	1
	Suwannee	304.98	305.1	3
	Suwannee	305.10	307.24	1
	Suwannee	307.24	307.79	2
	Suwannee	307.79	307.84	1
	Suwannee	307.84	308.32	2
	Gilchrist	308.32	308.38	2

TABLE 11.2-1

**Area Classifications along the Sabal Trail Project Pipeline Facilities**

<b>State/Facility</b>	<b>County</b>	<b>Begin Milepost</b>	<b>End Milepost</b>	<b>Class <u>a/</u></b>
	Gilchrist	308.38	315.59	1
	Gilchrist	315.59	315.77	2
	Gilchrist	316.03	316.09	2
	Gilchrist	316.09	316.19	1
	Gilchrist	316.19	317.86	2
	Gilchrist	317.86	332.9	1
	Gilchrist	332.90	333.28	2
	Gilchrist	333.28	333.44	1
	Gilchrist	333.44	333.82	2
	Gilchrist	333.82	334.51	1
	Gilchrist	334.51	334.92	2
	Gilchrist	334.92	336.97	1
	Gilchrist	336.97	337.47	2
	Gilchrist	337.47	337.47	2
	Alachua	337.47	337.77	2
	Alachua	337.77	338.04	1
	Alachua	338.04	338.31	2
	Alachua	338.31	341.05	1
	Alachua	341.05	341.15	2
	<Null>	341.15	341.15	2
	Levy	341.15	341.51	2
	Levy	341.51	341.57	1
	Levy	341.57	341.61	2
	Levy	341.61	341.66	1
	Levy	341.66	341.9	2
	Levy	341.90	359.9	1
	Levy	359.90	360.83	2
	Levy	360.83	367.44	1
	Levy	367.44	367.69	2
	Levy	367.69	367.73	1
	Levy	367.73	368.42	2
	Levy	368.42	368.66	1
	Levy	368.66	369.28	2
	Levy	369.28	369.8	1
	Marion	369.80	374.68	1
	Marion	374.68	375.35	2
	Marion	375.35	392.4	1
	Marion	392.40	392.98	2
	Marion	392.98	392.98	1

TABLE 11.2-1

**Area Classifications along the Sabal Trail Project Pipeline Facilities**

<b>State/Facility</b>	<b>County</b>	<b>Begin Milepost</b>	<b>End Milepost</b>	<b>Class <u>a/</u></b>
	Marion	392.98	394.48	2
	Marion	394.48	394.61	1
	Marion	394.61	395.01	2
	Marion	395.01	399.47	1
	Sumter	399.47	409.65	1
	Sumter	409.65	410.08	2
	Sumter	410.08	411.8	1
	Sumter	411.80	412.15	3
	Sumter	412.15	429.25	1
	Sumter	429.25	429.57	2
	Sumter	429.57	429.86	1
	Sumter	429.86	429.88	2
	Sumter	429.88	429.9	1
	Sumter	429.90	430.06	2
	Lake	430.06	430.2	2
	Sumter	430.20	430.31	2
	Sumter	430.31	430.32	1
	Sumter	430.32	430.54	2
	Sumter	430.54	435.82	1
	Lake	435.82	441.44	1
	Lake	441.44	441.53	2
	Lake	441.53	441.61	1
	Lake	441.61	442.18	2
	Lake	442.18	442.2	1
	Lake	442.20	442.4	2
	Lake	442.40	442.49	1
	Lake	442.49	442.74	2
	Lake	442.74	457.58	1
	Polk	457.58	463.33	1
	Polk	463.33	463.57	3
	Polk	463.57	463.92	1
	Polk	463.92	465.39	3
	Polk	465.39	465.77	1
	Osceola	465.77	466.78	1
	Osceola	466.78	467.95	2
	Osceola	467.95	468	1
	Osceola	468.00	468.16	2
	Osceola	468.16	468.48	1
	Osceola	468.48	468.69	2



TABLE 11.2-1

**Area Classifications along the Sabal Trail Project Pipeline Facilities**

State/Facility	County	Begin Milepost	End Milepost	Class <u>a/</u>
	Osceola	468.69	468.88	1
	Osceola	468.88	469.05	2
	Osceola	469.05	469.07	1
	Osceola	469.07	469.22	2
	Osceola	469.22	469.37	1
	Osceola	469.37	469.87	2
	Osceola	469.87	469.92	1
	Osceola	469.92	470.37	2
	Osceola	470.37	470.53	1
	Osceola	470.53	470.7	2
	Osceola	470.70	474.36	1
<u>Hunters Creek Line</u>	Osceola	0.00	0.11	1
	Osceola	0.11	0.55	2
	Osceola	0.55	5.89	1
	Osceola	5.89	7.63	3
	Osceola	7.63	7.85	1
	Osceola	7.85	8.34	3
	Osceola	8.34	9.75	1
	Osceola	9.75	11.07	3
	Osceola	11.07	11.13	1
	Osceola	11.13	12.41	3
	Osceola	12.41	13.05	1
	Orange	13.05	13.13	1
<u>Citrus County Line</u>	Marion	0.00	1.2	1
	Marion	1.20	1.26	2
	Citrus	1.26	1.67	2
	Citrus	1.67	6.13	1
	Citrus	6.13	6.4	2
	Citrus	6.40	6.66	1
	Citrus	6.66	7.04	3
	Citrus	7.04	7.15	1
	Citrus	7.15	8.1	2
	Citrus	8.10	8.39	1
	Citrus	8.39	8.86	2
	Citrus	8.86	8.94	1
	Citrus	8.94	9.3	2
	Citrus	9.30	9.3	1
	Citrus	9.30	9.99	2
	Citrus	9.99	10.1	1

TABLE 11.2-1

**Area Classifications along the Sabal Trail Project Pipeline Facilities**

<b>State/Facility</b>	<b>County</b>	<b>Begin Milepost</b>	<b>End Milepost</b>	<b>Class <u>a/</u></b>
	Citrus	10.10	10.28	2
	Citrus	10.28	11.95	1
	Citrus	11.95	12.22	2
	Citrus	12.22	12.36	1
	Citrus	12.36	13.76	2
	Citrus	13.76	14.14	1
	Citrus	14.14	14.84	2
	Citrus	14.84	14.85	1
	Citrus	14.85	15.2	2
	Citrus	15.20	21.41	1

- a/ Class 1: Location with 10 or fewer buildings intended for human occupancy.  
 Class 2: Location with more than 10 but fewer than 46 buildings intended for human occupancy.  
 Class 3: Location with 46 or more buildings intended for human occupancy or where pipeline lies within 100 yards of any building, or small, well-defined outside area occupied by 20 or more people during normal use.  
 Class 4: Location where buildings with four or more stories aboveground are prevalent.

TABLE 11.2-2

**Incident Summary for Onshore Natural Gas Transmission Pipelines by Cause 1994-2013**

<b>Reported Cause of Incident</b>	<b>Number of Incidents <u>a/</u></b>	<b>Fatalities</b>	<b>Injuries</b>
Corrosion	259	13	6
Excavation Damage	347	15	42
Human Error	45	0	9
Material Failure	436	8	71
Natural Force Damage	136	0	2
Other Outside Force Damage	97	0	13
Other Causes	218	3	45
<b>TOTALS</b>	<b>1538</b>	<b>39</b>	<b>188</b>

a/ Includes all reported incidents.

Source: U.S. Department of Transportation. Pipeline and Hazardous Materials Safety Administration ("PHMSA") Internet site accessed on November 20, 2014: [http://opsweb.phmsa.dot.gov/primis\\_pdm/all\\_reported\\_inc\\_trend.asp](http://opsweb.phmsa.dot.gov/primis_pdm/all_reported_inc_trend.asp).

TABLE 11.2-3

**Outside Force Incidents on Onshore Natural Gas Transmission Pipelines by Cause 1994 - 2013**

Cause	Percentage
Third Party Excavation Damage	18.7
Earth Movement	3.0
Heavy Rains/Floods	2.2
Other Outside Forces	0.5

Source: U.S. Department of Transportation. Pipeline and Hazardous Materials Safety Administration. Internet site accessed on November 20, 2014: [http://opsweb.phmsa.dot.gov/primis\\_pdm/all\\_reported\\_inc\\_trend.asp](http://opsweb.phmsa.dot.gov/primis_pdm/all_reported_inc_trend.asp).

TABLE 11.2-4

**Natural Gas Transmission Systems Fatalities and Injuries 1994 - 2013**

<b>Year</b>	<b>Fatalities</b>	<b>Injuries</b>
1994	0	22
1995	2	7
1996	1	5
1997	1	5
1998	1	11
1999	2	8
2000	15	16
2001	2	5
2002	1	4
2003	1	8
2004	0	2
2005	0	5
2006	3	3
2007	2	7
2008	0	5
2009	0	11
2010	10	61
2011	0	1
2012	0	7
2013	0	2
<b>Total</b>	<b>41</b>	<b>195</b>

Source: U.S. Department of Transportation. Pipeline and Hazardous materials Safety Administration.  
Internet site accessed on November 20, 2014:  
[http://opsweb.phmsa.dot.gov/primis\\_pdm/all\\_reported\\_inc\\_trend.asp](http://opsweb.phmsa.dot.gov/primis_pdm/all_reported_inc_trend.asp).

TABLE 11.2-5

**Transportation Fatalities and Injuries in the US by Mode in 2012**

<b>Mode</b>	<b>Fatalities</b>	<b>Injuries</b>
Highway	33,561	2,362,000
Railroad	557	7,622
Waterborne	714	3,688
Air	447	276
Transit	80	Data Unavailable
Pipeline (All)	12	58
Gas Transmission Pipelines <sup>1</sup>	0	7

Source: U.S. Department of Transportation Bureau of Transportation Statistic, Research and Innovation Technology Administration. Pipeline data updated with 2012 statistics. Tables 2-1 and 2-2.

[http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national\\_transportation\\_statistics/index.html](http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/index.html)

<sup>1</sup> Fatalities and injuries for gas transmission pipelines taken from Table 11.2-4.

TABLE 11.4-1

Location of High Consequence Areas along the Sabal Trail Project Pipeline Facilities a/

State/Facility	County	Begin Milepost	End Milepost	Approximate Length (feet)
<b>Alabama</b>				
<u>Mainline</u>	Tallapoosa	14.32	15.20	4,638
	Lee	48.30	48.46	855
	Lee	48.46	48.85	2,045
	Lee	48.85	49.06	1,124
	Russell	62.09	62.58	2,604
	Russell	72.73	73.21	2,515
	Russell	73.99	74.68	3,619
	Russell	84.55	85.23	3,568
			<b>Alabama Subtotal:</b>	<b>20,968</b>
<b>Georgia</b>				
<u>Mainline</u>	Dougherty	153.99	154.77	4,085
	Dougherty	159.86	160.69	4,373
	Dougherty	164.78	164.80	95
	Dougherty	164.80	165.32	2,746
	Dougherty	165.32	165.71	2,060
	Dougherty	167.62	168.20	3,066
	Mitchell	175.90	176.59	3,644
	Colquitt	182.30	182.94	3,357
	Colquitt	200.36	200.76	2,119
	Colquitt	200.76	201.36	3,171
	Colquitt	201.36	201.87	2,654
	Brooks	228.20	228.83	3,279
				<b>Georgia Subtotal:</b>
<b>Florida</b>				
<u>Mainline</u>	Suwannee	304.67	305.41	3,923
	Gilchrist	316.31	316.85	2,864
	Gilchrist	332.56	333.31	3,981
	Gilchrist	334.46	334.94	2,554
	Levy	355.73	356.50	4,040
	Levy	363.74	364.36	3,268
	Sumter	411.53	411.62	452
	Sumter	411.62	412.34	3,827
	Sumter	412.34	412.42	391
	Sumter	415.48	416.37	4,679
	Sumter	419.55	420.43	4,617
	Polk	463.70	464.22	2,743
	Polk	464.22	465.14	4,830
	Polk	465.14	465.64	2,629
	Osceola	469.77	470.51	3,913
	Osceola	473.62	473.72	497
	Osceola	473.72	474.34	3,304
Osceola	474.34	474.36	67	



TABLE 11.4-1

Location of High Consequence Areas along the Sabal Trail Project Pipeline Facilities <sup>a/</sup>

State/Facility	County	Begin Milepost	End Milepost	Approximate Length (feet)
<u>Hunters Creek Line</u>	Osceola	0.16	0.64	2,532
	Osceola	5.67	5.69	80
	Osceola	5.69	8.32	13,902
	Osceola	8.32	8.55	1,212
	Osceola	9.57	10.30	3,821
	Osceola	10.30	12.56	11,966
	Osceola	12.56	12.92	1,884
<u>Citrus County Line</u>	Citrus	5.72	6.47	3,916
	Citrus	6.53	6.58	282
	Citrus	6.58	7.23	3,416
	Citrus	7.23	7.29	325
<b>Florida Subtotal:</b>				<b>95,917</b>
<b>PROJECT TOTAL:</b>				<b>151,534</b>

<sup>a/</sup> As set forth under Part 192, Subpart O integrity management regulations, High Consequence Areas (“HCAs”) are designated locations along the pipeline that are near either densely populated areas, facilities that would be difficult to evacuate (such as hospitals or schools), or locations where people congregate (such as churches, offices or parks). While this table identifies the HCAs along the pipeline, the Project will apply Part 192 integrity management regulations across entire pipeline system.