



WBI ENERGY TRANSMISSION, INC.

North Bakken Expansion Project

**Resource Report 11
Reliability and Safety**

Final

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**WBI ENERGY TRANSMISSION, INC.
NORTH BAKKEN EXPANSION PROJECT
RESOURCE REPORT 11 – RELIABILITY AND SAFETY**

Minimum Filing Requirements for Environmental Reports:	Addressed in:
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 – 18 CFR § 380.12 (m).	Sections 11.2 and 11.3

**WBI ENERGY TRANSMISSION, INC.
NORTH BAKKEN EXPANSION PROJECT
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ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
DOT	U.S. Department of Transportation
ERP	emergency response plan
HCA	High Consequence Area
IMP	integrity management program
MCA	moderate consequence area
NEPA	National Environmental Policy Act
PHMSA	Pipeline and Hazardous Materials Safety Administration
Project	North Bakken Expansion Project
SCADA	Supervisory, Control, and Data Acquisition System
WBI Energy	WBI Energy Transmission, Inc.

**WBI ENERGY TRANSMISSION, INC.
NORTH BAKKEN EXPANSION PROJECT**

11.0 RESOURCE REPORT 11 – RELIABILITY AND SAFETY

WBI Energy Transmission, Inc. (WBI Energy) proposes to construct and operate the North Bakken Expansion Project (or Project), which consists of an approximately 61.9-mile-long, new 24-inch-diameter natural gas pipeline from new facilities at WBI Energy's Tioga Compressor Station near Tioga, North Dakota, to a new compressor station (Elkhorn Creek Compressor Station) southeast of Watford City, North Dakota.

The Project also involves construction of approximately 0.3 mile of new 24-inch-diameter natural gas pipeline between the proposed Elkhorn Creek Compressor Station to a new interconnect with Northern Border Pipeline Company, approximately 20.4 miles of new 12-inch-diameter natural gas pipeline looping along WBI Energy's Line Section 25, approximately 9.4 miles of new 12-inch-diameter natural gas pipeline looping along WBI Energy's Line Section 30, approximately 0.5 mile of new 20-inch-diameter receipt lateral to the Tioga Compressor Station, and uprating of WBI Energy's Line Section 25. The Project includes additional horsepower at the Tioga Compressor Station; the installation of new and modifications to existing delivery, receipt, and transfer stations along WBI Energy's pipeline routes; the replacement of small segments of pipeline facilities; and the installation of block valves, pig launcher/receiver stations, and other associated appurtenances. Figure 1.1-1 of Resource Report 1 provides an overview of the proposed pipeline system and associated facilities.

In accordance with Title 18 of the Code of Federal Regulations (CFR) Part 380.12(m), Resource Report 11 provides a discussion of the reliability and safety aspects of WBI Energy's proposed Project. On behalf of WBI Energy will maintain and operate their facilities pursuant to federal safety standards and to company policies and procedures.

11.1 NATURAL GAS TRANSMISSION PIPELINE SAFETY STANDARDS

Most natural gas used in the United States is delivered to consumers through approximately 319,400 miles of gathering and transmission pipelines, providing about 25 percent of the total energy consumption in the United States (U.S. Department of Transportation [DOT], Pipeline and Hazardous Materials Safety Administration [PHMSA], 2019a,b). Because of the critical role transmission pipelines play in supplying a large portion of the country's energy needs, it is imperative that they are safe and reliable. Pipelines and related facilities are designed and maintained with strict adherence to PHMSA regulations, which are intended to provide public safety and reliability and minimize the risk of system failure.

The natural gas transmission industry has an excellent record of public safety and reliability. Nevertheless, the transportation of natural gas by pipeline involves some risk to the public in the event of an accidental release of natural gas. The Project will transport natural gas that contains primarily methane, but also smaller amounts of ethane, propane, and higher hydrocarbon gases such as butane. This product is a colorless, practically odorless gas. Project facilities will be odorized as appropriate per Title 49 of the CFR Part 192 (49 CFR 192) part 625. If natural gas is breathed in high concentrations, oxygen deficiency can occur, resulting in serious injury or suffocation. Natural gas has an auto-ignition temperature of approximately 1,000 degrees Fahrenheit and is flammable at methane concentrations between 5 and 15 percent in air. These concentrations can be reached when natural gas is in a confined space, and could

result in a hazard in the presence of an ignition source. Unconfined mixtures of natural gas and air become highly diluted and are not usually explosive. Lighter components of natural gas such as methane are buoyant at atmospheric temperatures and, if released, rise and disperse rapidly in air. Higher hydrocarbon components of natural gas such as propane are heavier than air and, although unlikely, may form a potentially flammable cloud near the ground until sufficiently dispersed in air.

The PHMSA administers the national regulatory program to provide for the safe transportation of natural gas and other hazardous materials by pipeline. Safety regulations and other approaches to risk management provide for safety in the design, construction, testing, operation, and maintenance of pipeline facilities. These standards are specified in 49 CFR 192.

11.1.1 Pipeline Design, Construction, and Operating Standards

WBI Energy is committed to protecting the safety of those living or working near its pipeline system and working proactively to keep its system operating safely and effectively. Accordingly, the Project will be designed, constructed, tested, operated, inspected, and maintained to meet or exceed the DOT's Minimum Federal Safety Standards specified in 49 CFR 192. These regulations are intended to ensure adequate protection of the public from natural gas pipeline facility accidents and failures; in addition, 49 CFR 192 specifies the minimum material, design, welding, construction, testing, protection from corrosion, operations, maintenance, and personnel qualifications for pipelines. Further, Subpart O requires each pipeline operator to have a detailed integrity management program (IMP). As a part of the IMP, high-resolution in-line inspection tools (i.e., smart pigs), pressure tests, or direct assessments are periodically performed on the line to assess the pipe for any features requiring remediation (e.g., corrosion, dents, gouges).

DOT regulations in 49 CFR 192 define area classifications (called class location units) based on population density in the vicinity of a pipeline, and specify more rigorous safety requirements for populated areas. Each class location unit covers the area extending 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. The proposed Project will fall under a Class 1 designation for its entire length, which is specified by any class location unit that has 10 or fewer buildings intended for human occupancy.

WBI Energy will monitor population changes in the vicinity of the pipeline over the life of the pipeline system. If an increase in population density adjacent to the right-of-way is detected, WBI Energy will evaluate whether a change in class location is required and respond accordingly while meeting requirements of 49 CFR 192.

DOT regulations (49 CFR 192, Subpart O) additionally specify how pipeline operators must identify, prioritize, assess, evaluate, repair, and validate the integrity of natural gas transmission pipelines that could affect High Consequence Areas (HCAs) in the event of a leak or failure. The regulations require pipeline operators to develop and follow a written IMP that contains all the elements described in 49 CFR 192.911 and addresses the risks on each covered segment of the transmission pipeline. The criteria for an HCA in regards to a natural gas pipeline is the area within the potential impact circle containing 20 or more buildings intended for human occupancy, or any area within a potential impact circle that contains an identified site.¹

¹ An identified site is defined as 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.

No HCAs have been identified along the proposed Project route. However, the Project will be incorporated into WBI Energy's existing IMP and use the following criteria to determine HCA locations if conditions change along the pipeline system:

- identification of a site with 20 or more buildings intended for human occupancy; or
- location of an identified site.

On October 1, 2019, PHMSA issued a final rule amending the Federal Pipeline Safety Regulations in 49 CFR 191 and 192 to address integrity management requirements and improve the safety of onshore gas transmission lines (84 Federal Register 52180). The amendments, which will become effective July 1, 2020, focus on reconfirmation of MAOP for existing pipelines and the expansion of assessment requirements for pipelines in areas not designated as HCAs. The criteria for a moderate consequence area (MCA) as defined in the new amendments is an area that is within the potential impact circle of the pipeline that contains five or more buildings intended for human occupancy, or any portion of the paved surface including shoulders of a designated interstate, freeway, expressway, or any other principal arterial roadway with four or more lanes that lies within the potential impact circle. WBI Energy has identified one MCA that will exist where the new Tioga-Elkhorn Creek pipeline will cross 64th Street NW/Highway 2. WBI Energy will install additional launching and receiving facilities on both sides of this MCA that will allow for assessing the area.

11.1.2 Aboveground Facility Design

In addition to the pipeline safety standards described above, 49 CFR 192 also specifies safety standards for the design and operation of compressor stations and other aboveground facilities, such as block valves and delivery, receipt and transfer stations. The aboveground facilities constructed as part of the Project will be designed, constructed, and operated to meet or exceed these standards.

11.2 OPERATING AND EMERGENCY RESPONSE MEASURES TO PROTECT THE PUBLIC

WBI Energy maintains operating policies and procedures that are periodically reviewed by the DOT. The policies provide specific directions in regular preventive maintenance and vigilant patrols of facilities, as well as procedures to follow in the event of an accident or natural catastrophe. All operating personnel are trained to perform operations and maintenance activities in accordance with these policies and procedures. Further, periodic training sessions are conducted for operations employees to review typical operating and emergency response procedures or to update employees on changes in procedures. This training includes safe operation of pipeline and aboveground facilities; hazardous material handling procedures; firefighting; public liaison; and general operating procedures. The proposed Project will be operated and maintained in accordance with each of these policies and procedures.

11.2.1 Line Patrols

WBI Energy will inspect the pipelines periodically on foot, by all-terrain vehicle, or by other vehicle as required by applicable regulatory requirements to identify potential concerns that may affect the safety and operation of the pipelines. Pipeline markers and signs will be inspected and maintained or replaced, as necessary, to ensure that pipeline locations are clearly identified. Field

personnel will advise the appropriate operations personnel of new construction along or near the pipeline system. Issues identified are investigated and appropriately remediated based on risk assessment.

11.2.2 Integrity Management

The proposed Project will be hydrostatically tested throughout its entire length before it is put into service. In this procedure, water or test media is introduced into the pipelines and pressurized to a specified level above the maximum allowable operating pressure for a specified amount of time. This test is used to confirm that the facility will operate safely at the designed pressure.

WBI Energy will also conduct a baseline assessment using in-line inspection of the proposed pipelines to check for damage, deformities, or other factors that could affect the integrity of the pipelines. If potential problems are identified, repairs will be made to the affected segment of pipe.

11.2.3 System Control

The proposed Project will be incorporated into WBI Energy's extensive Supervisory, Control, and Data Acquisition System (SCADA). The Gas Control Center is located at WBI Energy's headquarters in Bismarck, North Dakota, and is staffed 24 hours a day, 365 days a year. Gas controllers use SCADA to monitor the pipeline system, which includes a wide range of activities such as monitoring gas pressures and flows along the pipeline, physical startup and shutdown of compressor sites, and operating system valves along the pipeline.

Data acquisition occurs at many locations along the mainline, such as compressor stations, and meter stations. This data is transmitted to Gas Control through SCADA. If system parameters fall outside a predetermined range, an alarm is activated at Gas Control and corrective action is taken by the gas controller as needed. Local WBI Energy personnel are dispatched in response to these alarms if intervention is required outside Gas Control.

11.2.4 Corrosion and Cathodic Protection

49 CFR 192 Subpart I prescribes minimum requirements for the protection of metallic pipelines from external, internal, and atmospheric corrosion. Line pipe used to construct the Project will be externally coated at the pipe mill with fusion bond epoxy. A compatible coating will be applied in the field over circumferential welds and assembly piping will be coated with epoxy-based or tape style coatings.

In accordance with PHMSA requirements, WBI Energy will install cathodic protection systems at various points along the proposed pipelines to inhibit external corrosion of the underground facilities. This cathodic protection system imparts a low-voltage current to the pipeline to offset natural soil corrosion potential should the coating become damaged over the life of the pipeline. WBI Energy will inspect the cathodic protection system at regular intervals to ensure proper operating conditions consistent with PHMSA requirements for corrosion mitigation.

11.2.5 Pipeline Markers

WBI Energy will install markers at road and railroad crossings, as well as other locations (e.g., fence lines and stream crossings) to indicate the pipeline location and convey emergency information in accordance with DOT safety requirements.

11.2.6 Aboveground Facilities

WBI Energy personnel will operate and maintain the proposed compressor station and other aboveground facilities in accordance with all DOT requirements. Operational testing will be performed on safety equipment to ensure that it performs as intended, and corrective actions will be taken as necessary. The proposed compressor station will be equipped with gas and fire detection monitoring systems that have the ability to alert Gas Control through SCADA or automatically shut down the compressor station, close the valves isolating the station from the pipeline, and safely vent the gas inside the compressor station to a location that will not create a hazard. Individual pieces of equipment, such as the compressors, will be equipped with sensors and control systems that will shut down the equipment if operating improperly. Station piping will be equipped with overpressure protection devices or relief valves so that the maximum pressure is not exceeded.

11.2.7 Emergency Preparedness and Procedures

DOT regulations prescribe minimum standards for operating and maintaining pipeline facilities, including a requirement to establish a written plan governing these activities. Additionally, pipeline operators are required to establish an emergency plan that identifies procedures to minimize hazards in a natural gas pipeline emergency to protect the public and the environment. Key elements of the plan include procedures for the following tasks:

- receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters;
- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;
- emergency system shutdown and safe restoration of service;
- making personnel, equipment, tools, and materials available at the scene of an emergency; and
- protecting people first and then property, and making them safe from actual or potential hazards.

WBI Energy currently has an emergency response plan (ERP) for its existing pipeline system in accordance with DOT regulations. WBI Energy will update its ERP, as necessary, to incorporate the proposed Project. The ERP will be made available prior to and during construction and will contain the appropriate emergency contacts (e.g., names and telephone numbers).

11.2.8 Liaison with Local Authorities

The DOT requires that pipeline operators establish and maintain liaison with local fire, police, and other emergency responders to plan for and coordinate emergency response efforts

in the event of an incident during construction or operation of the proposed facilities. Each 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 the appropriate public officials. The proposed Project is located within WBI Energy's existing operating counties. As such, WBI Energy will continue to work with the local public officials and emergency responders, and provide appropriate training to responders.

11.2.9 Public Awareness

WBI Energy's public awareness program for its existing pipeline system provides information to the affected public, emergency officials, and public officials, as well as excavators. The messaging includes but is not limited to:

- pipeline purpose and reliability;
- awareness of hazards and prevention measures undertaken;
- emergency preparedness communications;
- damage prevention awareness;
- one-call requirements;
- leak recognition and response;
- pipeline location and operator information;
- National Pipeline Mapping System information; and
- how to get additional information.

WBI Energy will incorporate the Project into its public awareness program.

11.2.10 Damage Prevention

WBI Energy is a member of "One Call" and related pre-excavation notification organizations in the states where it operates, including North Dakota. Through "One Call," contractors or private individuals provide notification of proposed excavations to a central agency that, in turn, will notify WBI Energy of the excavation locations. If WBI Energy facilities are located in the area of proposed excavation, company representatives will mark the pipeline location, consult with the excavator as needed, and observe the excavation as necessary to prevent damage to the pipeline. WBI Energy supports enforceable one-call legislation in all of the states crossed by its pipeline facilities.

11.3 NATURAL GAS PIPELINE SAFETY OVERVIEW

11.3.1 Pipeline Safety Incident Data

The DOT requires operators of natural gas transmission pipelines to notify the National Response Center at the earliest practicable moment following discovery of a reportable incident. The National Response Center in turn notifies all appropriate response agencies including, but not limited to, DOT/PHMSA.

A reportable incident as defined by DOT/PHMSA (Electronic Code of Federal Regulations, 2019) is:

- (1) *An event that involves a release of gas from a pipeline, gas from an underground natural gas storage facility, liquefied natural gas, liquefied petroleum gas,*

refrigerant gas, or gas from an LNG facility, and that results in one or more of the following consequences:

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

Each operator must submit a written report to PHMSA (DOT Form PHMSA F 7100.2) as soon as practicable but not more than 30 days after detection of a reportable incident. WBI Energy is subject to the PHMSA’s incident reporting requirements.

The PHMSA has a comprehensive website to make accident data available to the public, including data on significant incidents. These are defined as any leaks that cause a death or personal injury requiring hospitalizations or involve property damage of more than \$50,000 in 1984 dollars (about \$124,000 in 2019 dollars). Table 11.3.1-1 summarizes significant incidents reported by operators of natural gas transmission pipelines to PHMSA during the 13-year period from 2005 to 2018. As shown in the table, the largest numbers of incidents are caused by excavation damage (31.4 percent) and other outside force damage (24.7 percent), and the largest numbers of fatalities have been caused by excavation damage. The pipelines included in the dataset used to compile these statistics vary in age, outside diameter, and the level of corrosion control, each of which influences the frequency of significant incidents.

TABLE 11.3.1-1				
North Bakken Expansion Project Significant Incident Summary by Cause from 2005 through 2018^a				
Cause of Incident	Number of Incidents	Percent of Total	Fatalities	Injuries
Corrosion	25	2.7	2	15
Excavation Damage ^b	287	31.4	33	152
Incorrect Operation	74	8.1	5	101
Material/Weld/Pipe Failure	76	8.3	4	46
Equipment Failure	32	3.5	2	9
Natural Force Damage ^c	84	9.2	23	77
Other Outside Force Damage ^d	226	24.7	28	132
All Other Causes ^e	111	12.1	29	127
TOTALS	915	100	126	1,059

TABLE 11.3.1-1				
North Bakken Expansion Project Significant Incident Summary by Cause from 2005 through 2018^a				
Cause of Incident	Number of Incidents	Percent of Total	Fatalities	Injuries
^a	PHMSA, 2019c; Serious Pipeline Incidents By Cause			
^b	Includes third-party damage.			
^c	Includes earth movement, heavy rain/floods, and lightning.			
^d	Includes vehicle damage, fire, explosion, previous damage, and intentional damage.			
^e	Miscellaneous or unknown causes.			

Incident data and trends are assessed by the PHMSA and influence pipeline regulatory program priorities. In the last decade, for example, rules imposing standards of expectation for state one-call systems, state efforts to strengthen damage prevention programs, PHMSA pipeline integrity management rules, operator qualification standards, pipeline control system and SCADA standards, and accident reporting guidelines have helped drive federal regulators, state partners, and the pipeline industry to improve technology and practices to reduce the number and consequences of accidents. WBI Energy is an active participant in such efforts.

11.3.2 Impact on Public Safety

The significant incident data summarized in table 11.3.1-1 includes pipeline failures of all magnitudes with widely varying consequences. These incidents collectively resulted in a total of 126 fatalities over the 13-year reporting period for an average of 9.7 fatalities per year.

To provide a measure of the relative safety of natural gas pipelines, table 11.3.2-1 below identifies annual fatality rates for accidents and other hazards. Direct comparisons between the categories are not practical because individual exposures to hazards and/or accidents are not uniform; the data nonetheless indicate a low risk of death due to incidents involving natural gas transmission pipelines compared to the other categories.

TABLE 11.3.2-1	
North Bakken Expansion Project Accidental Deaths by Cause	
Type of Accident	Number of Fatalities
All injuries (unintentional) ^a	169,936
Motor vehicle accident ^a	40,231
Poisoning/exposure to noxious chemicals (unintentional) ^a	64,795
Falls (unintentional) ^a	36,338
Suffocation (unintentional) ^a	6,946
Drowning (unintentional) ^a	3,709
Fire/flame (unintentional) ^a	2,812
Floods ^b	85
Tornado ^b	69
Lightning ^b	44
Natural gas transmission pipelines ^c	7

TABLE 11.3.2-1

**North Bakken Expansion Project
Accidental Deaths by Cause**

Type of Accident	Number of Fatalities
^a U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2019 ^b National Oceanic and Atmospheric Administration, National Weather Service, 2019; 30 Year Average (1988 to 2017) ^c PHMSA, 2019c; Serious Pipeline Incidents By Cause	

11.4 REFERENCES

- Electronic Code of Federal Regulations. 2019. Part 191—Transportation of Natural and Other Gas by Pipeline, Annual Reports, Incident Reports, and Safety-Related Condition Reports. Available online at <https://www.ecfr.gov/cgi-bin/text-idx?rgn=div5&node=49:3.1.1.1.7>. Accessed July 2019.
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