2.0 PROJECT DESCRIPTION

2.1 PROPOSED FACILITIES

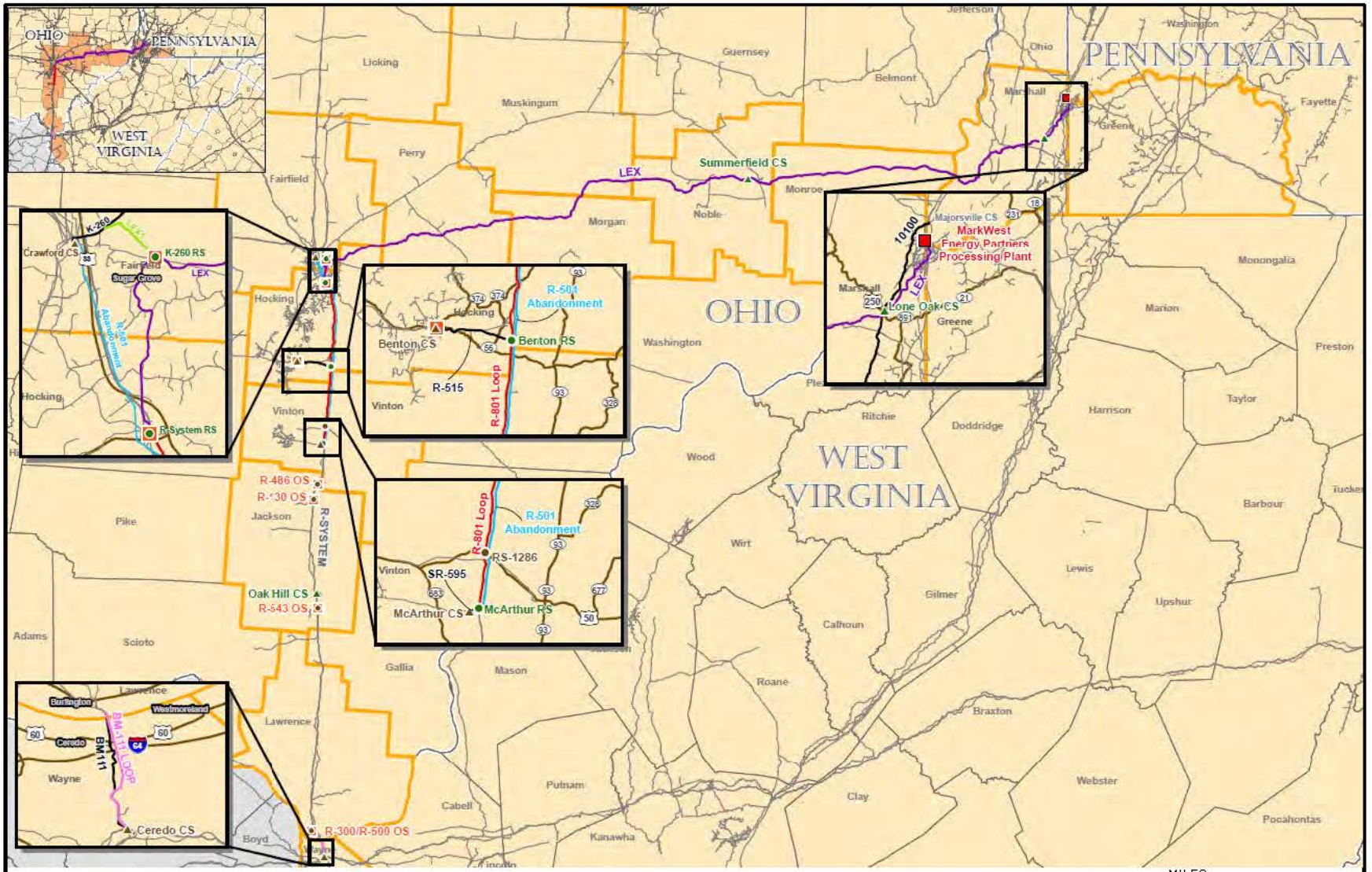
2.1.1 Pipeline Facilities

The LX Project consists of four new natural gas pipelines, LEX, LEX1, the R-801 Loop, and the BM-111 Loop, totaling 160.7 miles; the abandonment in-place of 28.2 miles of the existing Line R-501; and associated auxiliary and appurtenant facilities, as discussed in the aboveground facilities section below. An overview map of the LX Project location is provided in figure 2.1-1.

The proposed pipeline facilities consist of the following components:

- LEX – Installation of 132.4 miles of new 36-inch-diameter natural gas pipeline, which would begin near the existing MarkWest Energy Partners, LP Processing Plant (MarkWest Plant) located in Marshall County, West Virginia and traverse Greene County, Pennsylvania, and Monroe, Noble, Muskingum, Morgan, Perry, Hocking, and Fairfield Counties, Ohio before terminating at the proposed R-System RS in Hocking County, Ohio.
- LEX1 – Installation of 1.2 miles of new 30-inch-diameter natural gas pipeline, which would begin near milepost (MP) 127.4 of the proposed LEX pipeline and terminate at an intersection with the existing Line K-260 in Fairfield County, Ohio.
- R-801 Loop – Installation of 24.2 miles of new 36-inch-diameter natural gas pipeline loop, which would begin at the proposed R-System RS located in Hocking County, Ohio and extend south before terminating at the proposed McArthur RS in Vinton County, Ohio.
- BM-111 Loop – Installation of about 2.9 miles of new 36-inch-diameter natural gas pipeline loop, beginning in Lawrence County, Ohio and terminating at the existing Ceredo CS in Wayne County, West Virginia.
- R-501 Abandonment – Abandonment in-place of 28.2 miles of the existing 20-inch-diameter natural gas Line R-501, which begins at the existing Crawford CS in Fairfield County, Ohio and traverses Hocking County, Ohio before terminating at the proposed McArthur RS in Vinton County, Ohio.

About 40 percent (64.6 miles) of the new pipelines would be co-located with existing Columbia Gas rights-of-way (59.9 miles) or paralleling existing utility corridors (6.0 miles). Table 2.1.1-1 provides a summary of existing corridors with which the LX Project is paralleling or co-located. Areas where Columbia Gas was unable to co-locate the pipelines with existing rights-of-way or parallel existing corridors were primarily due to constructability issues (e.g., crossings of streams, wetlands, congested areas, or side-slope terrain) or efforts to minimize impacts on residential and commercial developments.



LEX
LEX1
R-801 Loop
BM-111 Loop
R-501 Abandonment
Existing Columbia Pipeline
Existing Columbia Pipeline Associated With Project

Existing Regulator Station (RS)
Existing Compressor Station (CS)
Odorization Site (OS)
New Regulator Station (RS)
New Compressor Station (CS)

Figure 2.1-1
Leach XPress Project
Project Overview Map

TABLE 2.1.1-1
Locations of Adjacent Corridors for the LX Project

Pipeline/Company	Corridor Type	Beginning Milepost	Ending Milepost	Length (miles)	Corresponding Construction Typical [a]
LEX					
Columbia	Pipeline	1.1	1.2	0.1	17
Columbia	Pipeline	1.4	1.6	0.2	17
Columbia	Pipeline	2.7	2.9	0.2	17
MarkWest	Pipeline	3.7	3.7	0.1	16
MarkWest	Pipeline	4.1	4.2	0.0	16
MarkWest	Pipeline	8.3 RR-1	8.3 RR-1	0.0	16
Texas Eastern	Pipeline	8.3 RR-1.	9.6 RR-1	1.2	16
Texas Eastern	Pipeline	11.3	14.1 RR-2	2.8	16
AEP	Powerline	14.1 RR-2	14.2 RR-2	0.1	18
Williams	Pipeline	14.3 RR-2	14.8 RR-2	0.5	16
Williams	Pipeline	15.0 RR-2	15.0 RR-2	0.0	16
AEP	Powerline	15.6 RR-2	15.6 RR-2	0.0	18
Spectra	Pipeline	16.2	16.7 RR-3	0.5	16
AEP	Powerline	17.1 RR-3	17.3	.1	18
Blue Racer	Pipeline	18.3	18.6 RR-4	0.3	16
Blue Racer	Pipeline	19.7	20.5	0.9	16
AEP	Power line	29.4	30.3	1.0	18
Spectra	Pipeline	30.4	30.8	0.5	16
AEP	Power line	30.8	31.2	0.4	18
Spectra	Pipeline	31.3	31.4	0.1	16
AEP	Power line	31.4	31.5	0.1	18
Spectra	Pipeline	32.5	35.7	3.2	16
Spectra	Pipeline	36.7	41.8	5.1	16/7
Spectra	Pipeline	42.3	45.0	2.7	7
Spectra	Pipeline	46.2	550.7	4.5	7
Spectra	Pipeline	51.1	51.3	0.3	7
Spectra	Pipeline	51.6	51.8	0.1	7
Spectra	Pipeline	59.6	60.9	1.3	7
W.E.C.	Power line	60.9	61.4	0.5	1
Spectra	Pipeline	62.2	63.1	0.9	7
AEP	Power line	68.7	68.8	0.1	1
AEP	Power line	69.6	70.5	0.9	1
AEP	Power line	71.4	72.0	0.6	1
Spectra	Pipeline	72.3	73.4	1.2	7
W.E.C.	Power line	73.5	74.2	0.7	1

TABLE 2.1.1-1 (cont'd)
Locations of Adjacent Corridors for the LX Project

Pipeline/Company	Corridor Type	Beginning Milepost	Ending Milepost	Length (miles)	Corresponding Construction Typical [a]
Spectra	Pipeline	74.2	75.4	1.2	7
East Ohio Gas Company	Pipeline	75.4	78.4	2.9	7
Spectra	Pipeline	78.4	81.0	2.5	7
Texas Eastern	Pipeline	80.9	82.6	1.7	7
Kinder Morgan	Pipeline	82.6	84.4	1.8	7
Kinder Morgan	Pipeline	85.3	85.7	0.4	7
Kinder Morgan	Pipeline	85.7	85.8	0.1	7
Kinder Morgan	Pipeline	87.3	87.5	0.2	7
Kinder Morgan	Pipeline	87.7	87.8	0.1	7
Kinder Morgan	Pipeline	88.3	88.4	0.1	7
Unknown	Power line	112.4	112.7	0.3	1
Columbia	Pipeline	127.2	127.4	0.2	8B
Columbia	Pipeline	128.1	128.1	0.1	8B
Columbia	Pipeline	127.7	128.8	0.1	8B
Columbia	Pipeline	130.9	131.1	0.1	8B
			Subtotal	42.9	
LEX1					
AEP	Power line	0.00	1.0	1.0	1
			Subtotal	1.0	-
R-801 Loop					
Columbia	Pipeline	0.0	0.5	0.5	8A
Columbia	Pipeline	0.6	6.4	5.8	8A
Unknown	Power line	7.2	7.5	0.3	1
Columbia	Pipeline	7.7	8.6	0.1	8A
Columbia	Pipeline	9.4	11.5	2.1	8A
Columbia	Pipeline	12.2	16.8	4.6	8A
Columbia	Pipeline	17.1	19.6	2.5	8A
Columbia	Pipeline	19.8	22.1	2.2	8A
Columbia	Pipeline	22.2	22.7	0.5	8A
Columbia	Pipeline	23.4	24.2	0.8	8A
			Subtotal	20.1	8A
BM-111 Loop					
Columbia	Pipeline	1.8	2.5	0.7	8B
			Subtotal	0.7	-
Total				**64.6**	**-**

[a] Typical construction right-of-way configurations are contained in appendix C.

2.1.2 Aboveground Facilities

Aboveground facilities associated with the LX Project include:

- Three new compressor stations (Lone Oak CS, Summerfield CS, and Oak Hill CS);
- modifications at two existing compressor stations (Crawford CS and Ceredo CS);
- four- new regulator stations (K-260 RS, R-System RS, Benton RS, and McArthur RS);
- modifications at 1 existing regulator station (RS-1286);
- thirteen bi-directional launcher and/or receiver facilities;
- nine mainline valves (MLV); and
- five new odorization stations along the existing R-System.

These facilities are summarized in table 2.1.2-1 and locations shown in appendix B maps.

Aboveground facilities associated with the RXE Project include two new compressor stations (Grayson CS and Means CS) and modifications at the Means Measuring and Regulator Station (Means M&R). These facilities are summarized in table 2.1.2-2 and the locations are shown in appendix B. An overview map of the RXE Project location is provided in figure 2.1.2-1.

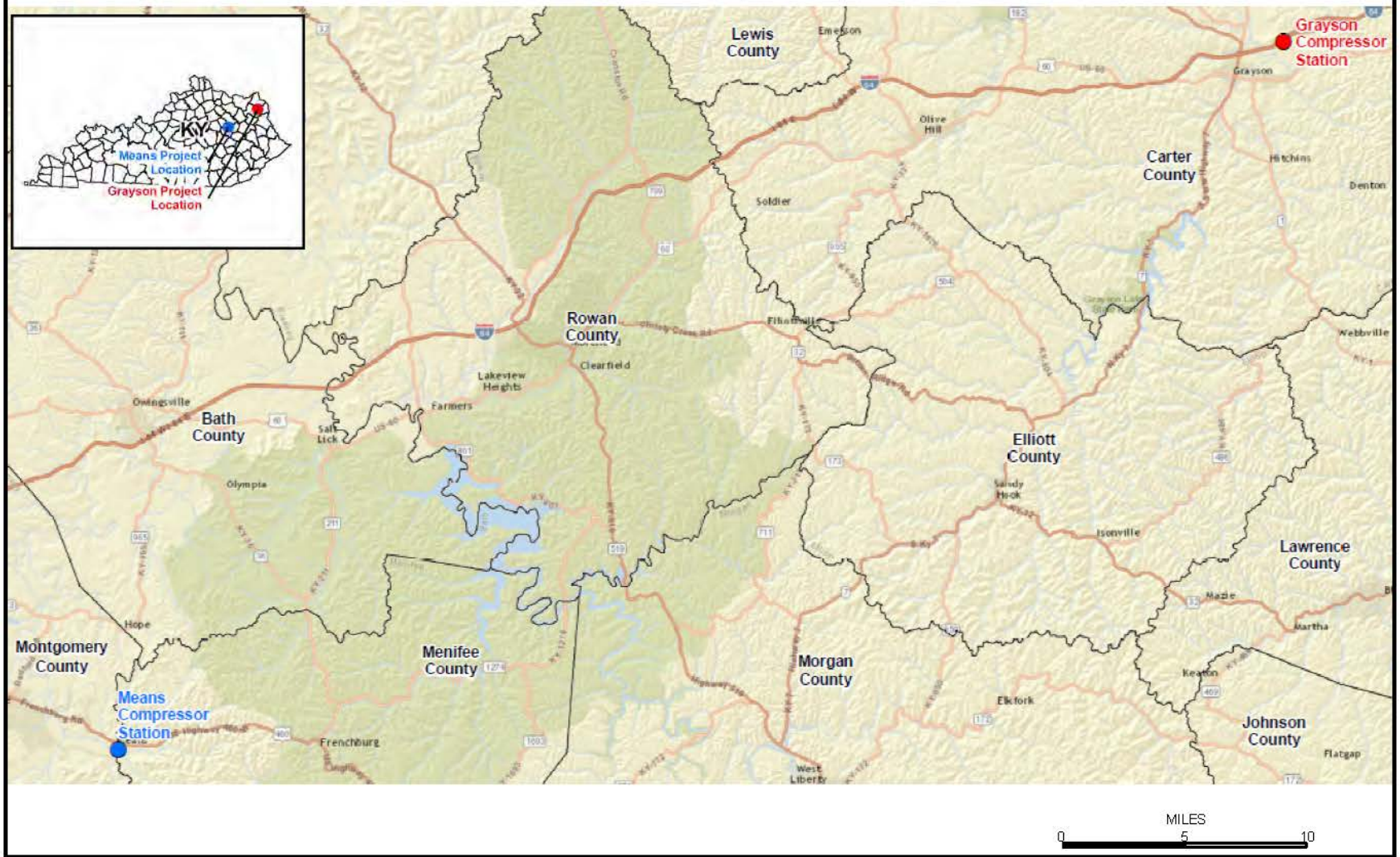
Further, detailed descriptions of the proposed aboveground facilities and modifications to existing aboveground facilities are provided in sections 2.1.2.1 and 2.1.2.2, respectively.

2.1.2.1 New Aboveground Facilities

LX Project

Lone Oak Compressor Station – Columbia Gas proposes to construct the Lone Oak CS, Marshall County, West Virginia to provide pressure management for deliveries from Columbia Gas' existing Line 10100 and the existing MarkWest Plant. The compressor station would include three natural gas-driven compressor units housed in two compressor buildings, metering, filter separators, gas coolers, valves, and associated piping. Columbia Gas would also install vent silencers, controls to allow for remote start/stop/by-pass of the compressor units, and security fencing around the facility. Outside of the compressor station facility fence lines, Columbia Gas would install a 24-inch-diameter suction line that would extend about 400 feet northwest of the Lone Oak CS to tie-in to the existing Line 10100. Additionally, a tie-in facility would be constructed at the end of the suction line to accommodate the proposed connection with the existing Line 10100. The location of the Lone Oak CS is provided in appendix B.

Summerfield Compressor Station – Columbia Gas proposes to construct the Summerfield CS in Noble County, Ohio to provide pressure management for deliveries to the existing Crawford CS. The Summerfield CS would include two natural gas-driven compressor units housed in a compressor building, metering, filter separators, valves, and associated piping. Columbia Gas would also install vent silencers, controls to allow for remote start/stop/by-pass of the compressor units, and security fencing around the facility.



Proposed Grayson Compressor Station

Proposed Means Compressor Station

Figure 2.1.2-1

Rayne XPress Expansion Project

Project Overview Map

TABLE 2.1.2-1
Aboveground Facilities for the LX Project

Facility	Milepost Location	County, State	Description
LEX			
Lone Oak Compressor Station	7.4	Marshall, WV	Construct a new compressor station facility for a combined 47,700 hp.
Summerfield Compressor Station	57.1	Noble, OH	Construct a new compressor station facility for a combined 15,400 hp.
Launcher and Receiver Facilities	0.0; 7.4; 57.1; 131.3	Marshall, WV; Noble and Hocking, OH	Install six bi-directional launcher and/or receiver facilities, including one at the start of LEX at the MarkWest Plan, two at the new Lone Oak CS, two at the new Summerfield CS, and one at the new R-System RS.
MLVs	3.1, 18.6 RR-4, 31.7, 49.3, 65.6, 84.3, 104.2, 122.0	Marshall, WV; Monroe, Noble, Morgan, Perry, and Hocking, OH	Install eight new MLV assemblies along LEX.
LEX1			
K-260 Regulator Station	0.0	Fairfield, OH	Construct a new RS and tie-in facility at the intersection of LEX and LEX1. Install a new odorization system to odorize from LEX to the existing Line K-260 and Crawford CS.
Launcher and Receiver Facilities	0.0, 1.2	Fairfield, OH	Install two bi-directional launcher and/or receiver facilities, including one at the new K-260 RS and one at the terminus of the pipeline.
R-801 Loop			
R-System Regulator Station	0.0	Hocking, OH	Construct a new RS and tie-in facility to the R-801 Loop and existing R-601 and R-701 Lines.
Benton Regulator Station	12.8	Hocking, OH	Construct a new RS and tie-in facility to the R-801 Loop and existing R-515, R-601, and R-701N lines at the terminus of the existing Line R-515 to allow flow from the existing Benton CS.
RS-1286 Regulator Station [b]	21.6	Vinton, OH	Modify the existing regulator and replace the associated building to tie-in to the R-801 Loop and existing Line R-443 at the existing RS-1286 RS.
McArthur Regulator Station	24.2	Vinton, OH	Construct a new RS and tie-in facility to the R-801 Loop and existing SR-595, R-501, R-601, and R-701S lines at the terminus of the R-801 Loop.
Launcher and Receiver Facilities	0.0; 24.2	Hocking and Vinton, OH	Install three bi-directional launcher and/or receiver facilities, including one at the new R-System RS and two at the new McArthur RS.
MLVs	9.7	Hocking, OH	Install one new MLV assembly along the R-801 Loop.

TABLE 2.1.2-1 (cont'd)
Aboveground Facilities for the LX Project

Facility	Milepost Location	County, State	Description
BM-111 Loop			
Ceredo Compressor Station [b]	2.9	Wayne, WV	Install three new electric motor-driven compressor units for a combined 33,000 hp (ISO), decommission one existing natural gas compressor unit replacing with one of the three new electric units, resulting in a total certificated capacity of 65,000 hp, and modify piping at the existing compressor station to increase operations flexibility.
Launcher and Receiver Facilities [b]	0.0; 2.9	Lawrence, OH and Wayne, WV	Install two bi-directional launcher and/or receiver facilities, including one at the start of the BM-111 Loop and one at the existing Ceredo CS at the terminus of the loop.
Existing Columbia Pipeline System			
Crawford Compressor Station [b]	0.0 [a]	Fairfield, OH	Modify piping, valves and regulators and construct new regulator buildings within and outside of the existing compressor station to allow for the flow of the proposed quantities of natural gas..
Oak Hill Compressor Station	51.5 [a]	Jackson, OH	Construct a new compressor station facility, which would include three new natural gas compressor units for a combined 47,700 hp.
Benton Compressor Station [b]	5.2 [c]	Hocking, OH	Install a new odorization system at the existing compressor station facility to odorize gas from the existing Line R-515 to the existing Line C-18. Replace about 700 feet of an existing 4-inch bypass line with a new 12-inch bypass line.
R-486 Odorization Station	34.7 [a]	Jackson, OH	Construct a new odorization system facility to odorize gas from the existing R-501 and R-601 Lines to the existing R-486 Line towards Hamden, OH.
R-130 Odorization Station	37.1 [a]	Jackson, OH	Install a new odorization system facility at the existing Wellston RS to odorize gas from the existing R-501 and R-601 lines to the existing Line R-130 towards Coalton and Altoona, OH.
R-543 Odorization Station	53.7 [a]	Jackson, OH	Install a new odorization system facility at the existing Oak Hill RS to odorize gas from the existing R-501, R-601, and R-701S lines to the existing Line R-543 toward Oak Hill and Cedar Heights Clay, OH.
R-300 / R-500 Odorization Station	88.0 [a]	Lawrence, OH	Install a new odorization system facility at the existing South Point RS to odorize gas from the existing Line R-501 to the existing Line R-300 towards South Point, OH.

[a] Milepost is associated with Columbia Gas' existing R-501 Line.
[b] Project activities would occur at existing aboveground facilities.
[c] Milepost is associated with Columbia Gas' existing Line R-515

TABLE 2.1.2-2
Aboveground Facilities for the RXE Project

Facility	Milepost Location	County, State	Description
Means Measurement and Regulation Station	6.0 [a]	Montgomery, KY	Modifications to station piping and SCADA[b] systems.
Grayson Compressor Station	68.0 [a]	Carter, KY	Construct a new compressor station facility consisting of two new natural gas compressor units for a combined 36,400 hp.
Means Compressor Station	6.5 [a]	Montgomery and Menifree, KY	Construct a new compressor station facility consisting of two new natural gas compressor units for a combined 15,400 hp.

[a] Approximate milepost associated with Columbia Gulf's existing Mainline 100, 200, and 300.
[b] Supervisory Control and Data Acquisition (SCADA).

Oak Hill Compressor Station – Columbia Gas proposes to construct the Oak Hill CS, about 1,500 feet east of MP 51.5 on the existing Line R-501 in Jackson County, Ohio to provide pressure management for deliveries from Columbia Gas' existing R-501, R-601, and R-701S lines to the existing Ceredo CS. The compressor station would include three natural gas-driven compressor units housed in two compressor buildings, metering, filter separators, gas coolers, valves, associated piping, vent silencers, controls to allow for remote start/stop/by-pass of the compressor units, and security fencing around the facility. Outside of the proposed compressor station facility fence lines, Columbia Gas would install 36-inch-diameter suction/discharge lines that would extend about 2000 feet west-northwest of the Oak Hill CS to connect to the existing R-System. Additionally, a tie-in facility would be constructed at the end of the suction/discharge lines to accommodate the proposed connection with the existing R-System.

Regulator Stations – Columbia Gas proposes to construct four new regulator stations to allow for natural gas flow between the proposed pipelines and Columbia Gas' existing pipeline system. In addition, Columbia Gas would install pressure regulation and overpressure protection at these facilities as well as an odorization system at the K-260 RS and the R-System RS. Columbia Gas would install a 30-inch-diameter incoming line that would extend about 210 feet south of the K-260 RS fence lines to connect to the proposed LEX pipeline. The R-System RS would require a 24-inch-diameter incoming line that would extend about 360 feet west of the facility fence lines to connect to the existing Line R-701N.

Launcher and Receiver Facilities – The proposed LX Project would require the construction of a total of 13 bi-directional launcher and/or receiver facilities, as shown in table 2.1.2-1. A launcher for Line R-501 would be installed within the McArthur RS to replace the existing launcher located at the Crawford CS that would be abandoned as part of the proposed R-501 Abandonment. The launcher facility at the BM-111 Loop would require the installation of a new 36-inch-diameter connecting line extending about 424 feet south from the launcher facility to tie in to the existing R-System within Columbia's existing Burlington Meter Station.

Mainline Valves – Columbia Gas proposes to install a total of nine new MLVs, including eight on LEX at and one on the R-801 Loop.

Odorization Stations – To maintain compliance with the U.S. Department of Transportation (DOT) Minimum Federal Safety Standards (49 CFR Part 192), Columbia Gas proposes to construct four new odorization stations along the R-System in Jackson and Lawrence Counties, Ohio to odorize its existing R-486, R-130, R-543, and R-300/R-500 lines. In addition, Columbia Gas would install odorant systems within the proposed K-260 RS and Benton RS as well as its existing Crawford CS.

RXE Project

Grayson Compressor Station – Columbia Gulf proposes to construct the Grayson CS about 2.5 miles northeast of Grayson, Kentucky. The Grayson CS would be surrounded by a 7.5-foot-tall security fence and accessed from the south via Beckwith Branch Road, an existing access road. Columbia Gulf proposes to install one 15,900 hp ISO rated Solar Mars 100 gas turbine/ compressor unit and one 20,500 hp ISO rated Solar Titan 130 gas turbine/compressor unit at the Grayson CS. The turbines/ compressor units would be housed in two new compressor buildings. The compressor buildings would be acoustically insulated to reduce the sound transmission. Additional buildings and major auxiliary equipment to be installed include an auxiliary building, control/ warehouse building, filter separators, and associated equipment piping. The Grayson CS would be designed in a manner which allows compression to be utilized to flow gas North to South or South to North in any of the Mainlines 100, 200, and 300. The station piping would be designed for a Maximum Allowable Operating Pressure (MAOP) of 1,200 pounds per square inch gauge (psig).

Means Compressor Station – Columbia Gulf proposes to construct the Means CS about 25 miles southeast of Mt. Sterling, Kentucky. The Means CS would be surrounded by a 7.5-foot-tall security fence and accessed from the east via Hawkins Branch Road, an existing access road. A new 30-foot-wide asphalt access driveway would be constructed within the site and maintained as part of the permanent station operations; within the fence line a 30-foot-wide paved road would provide access to the compressor building, control building, filter/separator area. With the exception of the access roads, the equipment area within the site shall be gravel covered as practical. In addition to periodic site visits by Columbia Gulf personnel, necessary automation and controls would be installed to allow for remote station operation from Columbia Gulf's Monitoring Center located in Charleston, West Virginia. Columbia Gulf proposes to install two 7,700 hp ISO rated Solar Taurus 60 gas turbine/ compressor units. The turbines/ compressor units would be housed in one new compressor Building, which would be acoustically insulated to reduce the sound transmission. Additional buildings and major auxiliary equipment to be installed include an Auxiliary Building, Control/ Warehouse Building, Filter Separators, station valves, and associated equipment piping. The station piping would be designed for a MAOP of 1,200 psig.

2.1.2.2 Existing Aboveground Facilities

LX Project

Crawford Compressor Station – Modifications at the Crawford CS would accommodate the capacity increase resulting from the proposed LX Project as well as the proposed R-501 Abandonment. The majority of the activities at the Crawford CS would be conducted entirely within the existing facility fence lines or existing facility access roads. However, a new regulator valve facility is proposed east of the existing Crawford CS outside of the facility fence.

Ceredo Compressor Station – Modifications at the Ceredo CS would accommodate the capacity increase resulting from the proposed LX Project. The proposed modifications would require a permanent expansion of the northern facility fence line to accommodate the proposed compressor units and equipment required for station blowdowns. In addition, the eastern fence line would be permanently expanded to accommodate gas coolers, piping a new office/warehouse building, permanent access road and parking area., .

RS-1286 Regulator Station – Modifications at the R-1286 RS would allow for interconnection on the proposed R-801 Loop would replace the current connection of RS-1286 Regulator Station at the existing Line R-501 that is proposed to be abandoned as part of the LX Project. Construction of the new

interconnect would require a minor expansion of the existing RS-1286 facility to accommodate the new regulator building.

Odorization Stations – Columbia Gas' existing pipeline system currently transports odorized natural gas from the existing Ceredo CS north along the existing Line BM-111 and into the R-System for deliveries throughout Ohio. However, following completion of the proposed LX Project, the flow of natural gas along the existing R-System would be reversed to accommodate the new capacity that would be provided by LEX and transport it south to various markets and delivery points located within and outside of Ohio. Therefore, to maintain compliance with the DOT Minimum Federal Safety Standards (49 CFR 192), Columbia Gas proposes to construct five new odorization stations at existing facilities to odorize natural gas along its existing pipeline system following the flow reversal that would be created by the proposed project.

RXE Project

Means Measuring and Regulation Station – The Means M&R Station is an existing facility located in Menifee County, Kentucky. Columbia Gulf owns the property on which Means M&R is located. Columbia Gulf proposes to modify the Supervisory Control and Data Acquisition (SCADA) system within an existing building as well install ancillary below ground piping and minor aboveground appurtenance facilities. All work would be conducted within the existing fenced boundary.

2.2 LAND REQUIREMENTS

The LX Project would disturb a total of about 3,161.6 acres of land during construction. Of this, operations would require use of 987.7 acres (consisting of 926.3 acres for the permanent pipeline facilities and 61.4 acres for aboveground facilities) and the remaining 2173.9 acres of disturbed land would be restored and allowed to revert to its pre-construction use. Tables 2.2-1 and 2.2-2 summarize the land requirements of the LX Project pipeline and aboveground facilities, respectively, and sections 2.2.1 through 2.2.4 describe the LX Project land requirements in further detail.

The RXE Project would disturb a total of about 32.2 acres of land during construction. Permanent operations would require 19.0 acres. Table 2.2-3 summarizes the land requirements of the RXE Project aboveground facilities and sections 2.2.5 and 2.2.6 describe the RXE Project land requirements in further detail.

TABLE 2.2-1
Summary of Land Requirements Associated with the LX Project Pipeline Facilities

Facility	Land Affected During Construction (acres) [a]	Land Affected During Operation (acres) [b]
LEX		
Pipeline	1796.2	800.1
Additional Temporary Workspace	202.2	0.0
Access Roads	49.4	1.7
Contractor Yards	397.1	0.0
Cathodic Protection	1.9	1.9
LEX1		
Pipeline	15.7	7.3
Additional Temporary Workspace	1.1	0.0
Contractor Yards	9.3	0.0
R-801 Loop		
Pipeline	318.4	98.4
Additional Temporary Workspace	29.3	0.0
Access Roads	17.3	0.0
Contractor/staging/PipeYards	110.7	0.0
Cathodic Protection	0.5	0.5
BM-111 Loop		
Pipeline	29.8	16.4
Additional Temporary Workspace	6.4	0.0
Access Roads	0.5	0.0
Existing Columbia Pipeline System		
R-501 Abandonment	12.9	0.0
Access Roads	16.4	0.0
LX Project Pipeline Facilities Total	**3,015.2**	**926.3**

[a] Land affected during construction includes land proposed for use under operations (permanent).

[b] Land affected during operation consists only of new permanent impacts.

TABLE 2.2-2
Summary of Land Requirements Associated with LX Project Aboveground Facilities

Facility	Land Affected During Construction (acres) [a]	Land Affected During Operation (acres) [b]
LEX		
Lone Oak Compressor Station	36.7	23.2
Summerfield Compressor Station	6.8	4.6
Access Roads	2.5	2.5
Launcher	0.8	0.6
MLVs	0.5	0.5
LEX1		
K-260 Regulator Station	9.4	1.2
Incoming Line	0.2	0.2
Tie in Valve	0.0	0.0
Receiver	2.1	1.0
Access Roads	4.0	4.0
R-801 Loop		
R-System Regulator Station	5.2	2.3
Outgoing Line	0.4	0.4
Tie- in Facility	0.2	0.2
Benton Regulator Station	2.4	1.1
RS-1286 Regulator Station [c]	0.2	0.1
McArthur Regulator Station	2.8	1.9
MLVs	0.1	0.1
Access Roads	1.4	1.4
BM-111 Loop		
Launcher	0.8	0.8
Ceredo Compressor Station [c]	16.4	2.9
Access Road	0.0	0.0
Existing Columbia Pipeline System		
Crawford Compressor Station [c]	22.0	0.4
Oak Hill Compressor Station	18.7	6.4
Suction/Discharge Lines	3.7	3.7
Tie-in Facility	0.4	0.4
Benton Compressor Station [c]	3.8	0.3
R-486 Odorization Station [c]	0.1	0.0
R-130 Odorization Station [c]	0.1	0.0
R-543 Odorization Station [c]	0.1	0.1
R-300 / R-500 Odorization Station [c]	1.3	0.0
Access Roads	3.4	1.3
Aboveground LX Facilities Total	**146.6**	**61.4**

[a] Land affected during construction includes land proposed for use under operations (permanent).
[b] Land affected during operation consists only of new permanent impacts.
[c] Project activities would occur at existing aboveground facilities

TABLE 2.2-3
Summary of Land Requirements Associated with RXE Project

Facility	Land Affected During Construction (acres) [a]	Land Affected During Operation (acres) [b]
Existing Facilities		
Means Measuring and Regulation Station	1.0 [c]	3.2 [c]
New Facilities		
Grayson Compressor Station	11.8	8.6
Means Compressor Station	19.4	7.2
RXE Project Total	***32.2***	***19.0***

[a] Land affected during construction includes land proposed for use under operations (permanent).

[b] Land affected during operation consists only of new permanent impacts.

[c] Construction and operation activities within the Means Measuring and Regulation Station would take place within the existing fence line which includes previously disturbed land within an industrial facility.

2.2.1 LX Project New Pipeline Facilities

It is anticipated that new pipeline construction would typically require a construction right-of-way width of 110 feet in upland areas to accommodate the proposed 30- and 36-inch-diameter pipelines. However, a width of 125 feet (in uplands) is required for construction of the LEX pipeline from MPs 0.0 to 39 in order to provide, sufficient working width for safe and efficient construction of 36-inch-diameter pipeline through hilly terrain and steep slope conditions. About 26 percent of this segment of LEX is characterized by slopes greater than 30 percent, requiring large construction equipment to be adequately stabilized to ensure safe working conditions during construction. In addition, if rock is encountered during construction, additional space would be needed to separate excavated rock from topsoil and to store rock separately from topsoil. Following construction, a 50-foot-wide permanent easement centered on the installed pipeline would be retained. See appendix C for typical construction right-of-way cross-section diagrams of various configurations for this proposal.

A 75-foot-wide construction right-of-way would be used in all wetland areas except where alternate measures are requested as discussed in section 4.3. In areas where the construction right-of-way is proposed to be co-located with existing Columbia Gas and non- Columbia Gas pipeline rights-of-way, Columbia Gas would overlap its temporary workspace to the extent feasible, while providing a safe distance of separation between the proposed and existing pipelines. Overlap areas often require less newly-disturbed construction right-of-way widths. In some areas of the proposed R-801 Loop, permanent easement would overlap up to 20 feet with existing easement, resulting in only 30 feet of new permanent easement.

In total, construction of the four new pipelines (excluding use of additional temporary workspace [ATWS], contractor yards, cathodic protection installations, and access roads) would affect 2,160.1 acres.

In addition to the four new pipelines, the R-501 Abandonment would require work at about 97 areas, primarily within the previously disturbed right-of-way, but including several temporary access roads, temporary workspaces, and pipe yards outside the right-of-way. These areas are depicted on the alignment sheets provided in appendix B, resulting in a total of 29.3 acres of temporary impacts. The majority of activities associated with the R-501 Abandonment (which involves leaving the existing pipeline in place) would occur within the existing, previously disturbed right-of-way

As presented in table 2.2-1, approximately 922.2 acres of the total land that would be affected by pipeline construction would be maintained as new permanent easement. Areas disturbed by construction

that are not part of the new permanent easement would be allowed to revegetate to previous conditions and contours would be restored to pre-construction conditions following the completion of construction activities. New permanent easement areas would be revegetated, with restrictions, and contoured to pre-construction conditions except for the addition of permanent slope breakers for erosion control.

Additional Temporary Workspace – In addition to the previously described typical pipeline construction right-of-ways, ATWS may be required where site-specific conditions warrant the use of specialized construction procedures to reduce environmental impacts and to maintain safe working conditions. Columbia Gas would require ATWS for road, wetland, waterbody, and foreign utility line crossings; steep and side slope terrain; horizontal directional drills (HDD); and areas using topsoil segregation. Additionally, ATWS would be required at the beginning and/or terminus of the pipelines to allow for mobilization of construction equipment. ATWS needed for the LX Project would total 239.0 acres. Descriptions of the specialized construction techniques typically requiring ATWS are provided in section 2.3.2. See appendix N for a listing of ATWS.

Contractor Yards – During construction of the pipelines, Columbia Gas would require work areas outside of the construction right-of-way for contractor parking and storage of pipe and equipment. These contractor yards would be located near the project at locations with convenient and safe access to the LX Project areas. All areas used for staging throughout the project would be allowed to revegetate and contours would be restored to pre-construction conditions upon Project completion unless otherwise agreed upon with the landowner and submitted to FERC for review and approval. Columbia Gas is in the process of evaluating the preferred and alternate sites for the contractor yards and has identified 39 potential sites. Columbia Gas estimates it would need approximately half of these potential sites for construction of the LX Project. To provide the most conservative assessment of potential impacts, we have included all of Columbia Gas' identified contractor yards in our calculation of the LX Project's land requirement/land use impacts. Using this assumption, a total of 517.1 acres of land, including eight areas within Palustrine Emergent (PEM) wetlands, would be temporarily affected during construction (see table 2.2.1-1). Columbia Gas would file its final list of preferred contractor yards prior to construction.

Cathodic Protection – The LX Project would require the installation of 14 buried cathodic protection units. The proposed cathodic protection units would consist of typical remote-impressed current groundbeds that include rectifiers with a remote monitoring unit. The pipeline integrity and safety benefits of cathodic protection units are discussed in section 4.12. Nine of the cathodic protection units would be installed within the fence lines of other aboveground facilities; therefore, impacts associated with the installation of these cathodic protection units are included with the impacts reported for the aboveground facilities within which they are located. The five remaining cathodic protection units proposed for installation along LEX and the R-801 Loop would be installed within 2.4 acres of new permanent right-of-way. Following installation, the areas above these cathodic protection units would be maintained in a manner consistent with that for the new permanent pipeline easement. Columbia Gas would conduct routine inspections of the functional capability of cathodic protection systems to ensure proper operating conditions.

TABLE 2.2.1-1
Pipe Yards Along the LX Project Route

Milepost	Name	Land Use	Size (acres)
LEX			
7.5 RR-1	Pipe Yard 37	Forest, Open land	2.0
16.0	Pipe Yard 26 [a]	Industrial	2.5
16.0	Pipe Yard 25 [a]	Agricultural, Forest	7.5
16.7 RR-3	Pipe Yard 46 [a]	Agricultural	23.0
16.9 RR-3	Pipe Yard 29 [a]	Industrial	2.6
23.6	Pipe Yard 02 [a]	Industrial, Forest, Open land	15.1
25.4 RR-5	Pipe Yard 01 [a]	Industrial	4.0
25.8 RR-5	Pipe Yard 35 [a]	Industrial	11.7
27.7	Pipe Yard 30 (Alternate) [a]	Industrial	3.3
37.6	Pipe Yard 47 [a]	Open land	42.6
42.0	Pipe Yard 49 [a]	Industrial, Forest	4.8
42.3	Pipe Yard 04 (Alternate)	Agricultural	15.7
42.8	Pipe Yard 34 (Alternate) [a]	Agricultural, Industrial, Forest	10.0
47.9	Pipe Yard 05 [a]	Agricultural, Industrial, Wetland (PEM)	16.0
57.1	Pipe Yard 38	Agricultural, Industrial, Forest	25.6
63.1	Pipe Yard 14 [a]	Agricultural, Wetland (PEM)	55.6
66.8	Pipe Yard 15 [a]	Agricultural, Wetland (PEM)	3.8
67.3	Pipe Yard 32 (Alternate) [a]	Industrial	3.0
67.5	Pipe Yard 33 [a]	Industrial	9.5
71.6	Pipe Yard 44	Industrial, Open land	2.3
77.3	Pipe Yard 45 [a]	Industrial, Open land	3.7
89.2	Pipe Yard 28 [a]	Agricultural, Industrial, Forest, Open land	17.9
89.3	Pipe Yard 16 (Alternate) [a]	Agricultural, Industrial, Forest	11.5
100.0	Pipe Yard 48 [a]	Industrial, Open land	11.1
100.0	Pipe Yard 36 [a]	Industrial, Open land, Open water, Wetland (PEM)	78.1
102.6	Pipe Yard 18 (Alternate) [a]	Industrial, Forest, Open land, Wetland (PEM)	8.2
120.2	Pipe Yard 11 (Alternate) [a]	Agricultural, Industrial	5.9
LEX1			
1.2	Pipe Yard 27 [a]	Agricultural, Industrial, Open land, Wetland (PEM)	9.3
R-801 Loop			
0.0	Pipe Yard 41	Industrial, Forest, Open land	16.6
3.8	Pipe Yard 09 [a]	Agricultural, Industrial, Wetland (PEM)	6.1
9.7	Pipe Yard 13 (Alternate)	Agricultural, Industrial	6.8
13.5	Pipe Yard 19 [a]	Agricultural, Open land	53.2
14.4	Pipe Yard 20 [a]	Agricultural, Industrial, Open land	7.5
19.3	Pipe Yard 43 [a]	Agricultural, Industrial	0.9
21.6	Pipe Yard 42 [a]	Industrial, Open land	1.2
22.1	Pipe Yard 24 [a]	Industrial, Open land	7.3
22.8	Pipe Yard 21 (Alternate) [a]	Agricultural	4.2
24.2	Pipe Yard 22 (Alternate) [a]	Forest, Open land	0.7
24.2	Pipe Yard 23 [a]	Agricultural, Wetland (PEM)	6.2
		Total	**517.1**

[a] Yard is located offline; therefore, the milepost provided is associated with the nearest temporary workspace, ATWS, access road, or aboveground facility boundary.

Pipeline Facility Access Roads – To access LX Project workspaces and facilities, Columbia Gas would use existing public and private roads to the extent practicable. A total of 130 temporary access

roads (including temporary walking paths to accommodate minor abandonment activities using handheld equipment along Line R-501), requiring 81.9 acres, are proposed for use to construct the proposed pipelines and R-501 Abandonment for the LX Project. Temporary access roads would be used during the construction phase of the LX Project but would be allowed to revegetate and contours would be restored to pre-construction conditions following completion. Columbia Gas is proposing to maintain six additional access roads as permanent (1.7 acre) to accommodate access to the rectifiers associated with each of the cathodic protection units proposed for installation along LEX and the R-801 Loop. Columbia Gas' proposed pipeline access road land requirements are summarized in table 2.2-1 and further detailed in appendix D.

Aboveground Facility Access Roads - A total of 31 private access roads (includes temporary and permanent access roads), requiring 9.1 acres, are proposed for use during construction of the aboveground facilities. When possible, existing public or private roads would be used to access work areas. Two of these roads would be used for temporary access to the aboveground facilities during construction and would require a total of 2.1 acres. Columbia Gas is proposing to maintain a total of 29 permanent access roads, comprising 9.2 acres of the LX Project area, to provide access to the remaining aboveground facilities. Details regarding the access roads that would be used for the aboveground facilities are provided in appendix D.

2.2.2 LX Project Aboveground New Facilities

In total, construction of the LX Project aboveground facilities would temporarily affect 111.6 acres of land. The LX Project would affect 48.7 acres of land during operation. Land requirements for the aboveground facilities associated with the LX Project are summarized in table 2.2-2.

Lone Oak Compressor Station – Columbia Gas has acquired and owns the parcels of land used for the Lone Oak CS construction and operation as well as additional portions of the surrounding parcels (total of 43.8 acres). Upon completion of construction, temporary workspaces would be graded, stabilized, and allowed to revegetate to pre-construction conditions. The compressor station facility would be fenced, and land within the permanent footprint not covered by rock or facility foundations would be maintained in an herbaceous state.

Summerfield Compressor Station –Columbia Gas has acquired and owns the parcels of land used for the Summerfield CS construction and operation as well as additional portions of the surrounding parcels (total of 41.6 acres). Upon completion of construction, temporary workspaces would be graded, stabilized, and allowed to revegetate to preconstruction conditions. The compressor station facility would be fenced, and land within the permanent footprint not covered by rock or facility foundations would be maintained in an herbaceous state.

Oak Hill Compressor Station –Columbia Gas has acquired and owns the parcels of land used for the Oak Hill CS construction and operation as well as additional portions of the surrounding parcels (total of 57.5 acres, of which 36.7 acres were previously acquired by Columbia Gas). Upon completion of construction, temporary workspaces would be graded, stabilized, and allowed to revegetate to preconstruction conditions.

Regulator Stations – Four new regulator stations, including the K-260 RS, R-System RS, Benton RS, and McArthur RS, would require a total of 19.9 acres for construction. A total of 6.4 acres would be used for operation of the four new regulator stations (land requirements associated with the facility access roads are discussed independently below). In addition to the new regulator station facilities, a total of 0.6 acre of land would be affected and maintained as new permanent easement for the suction lines associated with the K-260 RS and R-System RS. A fenced tie-in valve and new pipeline tie-in facility

requiring 0.2 acres will be constructed at the terminus of the R-System outgoing line. .Upon completion of construction, temporary workspaces would be graded, stabilized, and allowed to revegetate to pre-construction conditions. The regulator station facilities would be fenced, and land within the permanent footprint not covered by rock or facility foundations would be maintained in an herbaceous state.

Launcher and Receiver Facilities – A total of 13 new bi-directional launcher and/or receiver facilities would be constructed for the project Ten of the 13 facilities would be installed within other proposed aboveground facilities; therefore, impacts associated with the installation of these launcher and/or receiver facilities are included with the impacts reported for the other aboveground facilities within which they are located. Construction of the remaining three new stand-alone launcher and/or receiver facilities located at MP 0.0 of LEX, MP 1.2 of LEX1, and MP 0.0 of the BM-111 Loop would require a total of 3.6 acres, of which a total of 2.4 acres would be used for operation (land requirements associated with the facility access roads are discussed independently below).

Mainline Valves – Construction of the MLV facilities would require a total of 0.5 acre, all of which would be located within the construction right-of-way. Following completion of construction, an approximate 50- by 50-foot fenced gravel area would be retained for operation of each MLV facility.

2.2.3 LX Project Aboveground Existing Facilities

Crawford Compressor Station – The proposed piping and valve modifications at the existing Crawford CS would require 22.0 acres for construction. The majority of Project activities will occur within the limits of the existing facility fence lines or existing facility access roads. However, a new regulator and valve facility will be constructed outside of the existing facility fence lines resulting in 0.4 acres of permanent impacts.

Ceredo Compressor Station – The proposed electric compression installations and decommissioning of an existing natural gas compressor unit at the existing Ceredo CS would require 16.4 acres for construction. In addition, Columbia Gas proposes to expand the existing facility fence lines to accommodate the proposed new compressor units and equipment required for station blowdowns as well as a new office building, resulting in 2.9 acres of new permanent impacts (land requirements associated with the facility access road are discussed independently below). Although temporary workspace and new permanent facilities would be required outside of the existing compressor station facility, all impacts would occur within previously cleared areas located adjacent to the Ceredo CS.

2.2.4 RXE Project Aboveground New Facilities

Grayson Compressor Station – Construction of the Grayson CS would require a total of 11.8 acres of workspace for construction, with about 8.6 acres used for operation of the facility. Columbia Gulf would use an existing access road (Beckwith Branch Road). Road improvements to Beckwith Branch Road are being evaluated and Columbia Gulf would notify FERC if additional temporary or permanent improvements were needed. Upon completion of construction, temporary workspace (about 3.3 acres) would be graded, stabilized, and revegetated and maintained in an herbaceous state. The compressor station facility would be fenced, and land within the permanent footprint not covered by rock or facility foundations would be maintained in an herbaceous state.

Means Compressor Station –Construction of the Means CS would require a total of 19.4 acres of workspace for construction, with about 7.2 acres used for operation of the facility. Columbia Gulf would use an existing access road (Hawkins Branch Road) to access the site for construction and operation. Upon completion of construction, temporary workspace (about 12 acres) would be graded, stabilized, and allowed to revegetate and maintained in an herbaceous state. The compressor station facility would be

fenced, and land within the permanent footprint not covered by rock or facility foundations would be maintained in an herbaceous state.

2.2.5 RXE Project Aboveground Existing Facilities

Means Measurement and Regulation Station – Construction activities within the existing Means M&R Station would require a total of about 3.2 acres of workspace. Upon completion of construction, temporary workspace would be graded, stabilized, and allowed to revegetate to preconstruction conditions where gravel was not previously located. A depiction of the Means M&R Station is included on Means CS drawings provided in appendix B.

2.3 CONSTRUCTION PROCEDURES

Where possible, conventional pipeline construction techniques would be used to construct the LX and RXE Projects. These techniques are described in the following sections.

2.3.1 General Pipeline Construction Procedures

The LX and RXE Projects would be constructed in compliance with applicable federal regulations and guidelines, and the specific requirements of the necessary permits (section 1.5). The projects would be designed, constructed, tested, and operated in accordance with all applicable requirements included in the U.S. Department of Transportation (DOT) regulations in 49 CFR 192[12], *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards,* and other applicable federal and state regulations, including the U.S. Department of Labor, Occupational Safety and Health Administration requirements. These regulations are intended to ensure adequate protection for the public. Among other design standards, Part 192 specifies pipeline material and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion.

To reduce construction impacts, Columbia Gas and Columbia Gulf would each implement project-specific Environmental Construction Standards (ECS)[13], which incorporate requirements and recommendations from the FERC *Upland Erosion Control, Revegetation, and Maintenance Plan* (FERC Plan) and the FERC *Wetland and Waterbody Construction and Mitigation Procedures* (FERC Procedures), as well as from applicable state regulations and requirements. Columbia Gas and Columbia Gulf indicated that they are continuing to refine their ECSs and would provide revised drafts as agency consultations and recommendations are received throughout the permitting process. A copy of the final ECSs would be submitted to FERC prior to construction. Columbia Gas' and Columbia Gulf's ECSs adhere to the FERC Plan and Procedures to the greatest extent possible. Where alternate measures to the FERC Plan and Procedures are requested because they are necessary for site-specific reasons, they have been identified in appendix E and further discussed in section 2.3, section 4.3 and section 4.6. Columbia Gas' and Columbia Gulf's ECSs each also incorporate a project specific Spill Prevention, Control, and Countermeasures Plan.

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[12] Pipe design regulations for steel pipe are contained in subpart C, Part 192. Section 192.105 contains a design formula for the pipeline's design pressure. Sections 192.107 through 192.115 contain the components of the design formula, including yield strength, wall thickness, design factor, longitudinal joint factor, and temperature derating factor, which are adjusted according to the project design conditions, such as pipe manufacturing specifications, steel specifications, class location, and operating conditions. Pipeline operating regulations are contained in subpart L, Part 192.

[13] Columbia Gas' ECSs for the LX and RXE Projects are available on the FERC's eLibrary website at, respectively, http://ferc.gov/docs-filing/elibrary.asp, by searching Docket No. CP15-514, Accession No. 20151023-5090, titled "20151023_CP15-514-000-27_Vol_I_RR01_App1C.PDF", and by searching Docket No. CP15-539, Accession No. 20150729-5074, titled "ECS 20150729_CP15-000-05_Vol I_RR_01_App_1C".

Columbia Gas and Columbia Gulf would adhere to permit conditions outlined by various agencies in regard to environmentally sensitive areas, which are further discussed in section 4.7. In addition, Columbia Gas and Columbia Gulf would prepare and implement project-specific Erosion and Sedimentation Control Plans (ESCP) following guidance from the FERC Plan and Procedures, the OEPA, the WVDEP, the PADEP, the KYDEP, and the Greene County Conservation District (Pennsylvania). Columbia Gas would submit its ESCP to the Greene County (Pennsylvania) Conservation District for review and approval as identified in table 1.5-1, and copies of the ESCPs would be provided to FERC prior to construction.

2.3.1.1 Surveying and Staking

Along the pipeline route affected landowners would be notified no later than two weeks prior to pre-construction staking, unless the landowner has previously requested otherwise. Following notification, a crew would stake along the outside limits of the proposed construction right-of-way and ATWS, along the centerline of the pipeline, and along drainages, highway and railroad crossings and access roads. Existing utility lines (e.g., cables, conduits, and pipelines) would be located and marked with flags, stakes, or other devices to prevent accidental damage during pipeline construction.

At the compressor station sites, affected landowners would be notified at least three to five days prior to pre-construction activities. Adjacent landowners surrounding the station sites would also be notified prior to construction activities. Following these notifications, a crew would mark and fence the outside limits of the proposed construction workspace and access roads. Columbia would contact the national 811 "one-call" system and the applicable "Dig-Safe" call system to accurately and safely identify and flag buried utility lines by their respective owners.

Previously identified sensitive resources, such as wetland boundaries, cultural resources sites, and sensitive species habitats, would also be located and marked to minimize or avoid adverse impacts during pipeline construction.

2.3.1.2 Clearing and Grading

Following the establishment of workspace boundaries, the construction right-of-way would be cleared and graded. The construction right-of-way would be graded, where necessary, to create a level workspace to allow safe passage of equipment. Grading would be limited in wetland areas. Large obstacles, such as trees, rocks, brush, and logs would be moved, and the natural drainage would be preserved to the extent practicable. Columbia would implement soil mitigation procedures as outlined in the ECS, including the permit requirements in its ECPs, immediately following clearing and throughout grading activities. Cleared vegetation and debris along the construction right-of-way would be disposed of in accordance with federal and state regulations either by chipping and spreading or transportation to a commercial disposal facility.

Fences would be cut and braced along the construction right-of-way and temporary gates would be installed as necessary to control livestock and limit public access. In wetlands, agricultural, and residential areas, conserved topsoil would be stockpiled, usually along one side of the construction right-of-way (spoil side), allowing the other side to be used for access, material transport, and pipe assembly. Where topsoil is stripped from the entire construction right-of-way, ATWS may be used for topsoil storage with permission from the landowner and appropriate environmental approvals. A maximum of 12 inches of topsoil would typically be removed or stripped and segregated in these areas. If the topsoil is less than 12 inches in depth, the actual depth of the topsoil would be removed and segregated.

Temporary security fencing would be installed as necessary around the construction workspace to limit public access.

2.3.1.3 Trenching

Trenching involves excavation of a ditch for pipeline placement, and is accomplished through the use of a rotary trenching machine, track-mounted backhoe, or similar equipment. Trench spoil would be deposited adjacent to the trench within the construction work areas. In agricultural, residential, and wetland areas, topsoil would be stockpiled separately per the ECS. Typically, the bottom of the trench would be cut at least 12 inches wider than the width of the pipe. The width at the top of the trench would vary to allow the side slopes to be adapted to local conditions at the time of construction. The trench would be excavated to a sufficient depth to allow for a minimum 3 feet of cover between the top of the pipe and the final land surface after backfilling and contour restoration, as required by 49 CFR 192, with the exception of agricultural land, which would be excavated to a depth to allow for a minimum of 4 feet of cover. If the pipeline is being buried in an area containing rock, the pipeline may be placed in a ditch with a minimum 18 inches of cover for Class I areas and 24 inches of cover for Class II and Class III areas (refer to section 4.2.1 for class locations crossed by the project). Additional cover may be required at foreign utility line crossings to allow at least 18 inches of clearance between the proposed pipe and the foreign line.

Columbia Gas and Columbia Gulf would employ best-management practices outlined in their ECSs to minimize erosion during trenching operations and construction activities. Where necessary, temporary and permanent erosion control devices (ECD) would be installed and maintained to contain disturbed soils during trenching in uplands and to minimize potential erosion and sedimentation of wetlands and waterbodies. Additionally, permanent sediment filter devices would be installed in non-agricultural and residential areas with slope.

2.3.1.4 Stringing, Bending, Welding, and Coating

Steel pipe would be procured in nominal 40-foot lengths or joints, protected with an epoxy coating applied at the factory (the beveled ends would be left uncoated for welding), and shipped to the staging areas or strung directly onto the construction right-of-way. The individual joints would be transported to the construction right-of-way and placed along the excavated trench in a single line to allow welding operations to proceed efficiently.

Once placed on the construction right-of-way, some bending of the pipe would be required to allow the pipeline to follow natural grade changes and direction changes. Typically, joints would be bent in the field by track-mounted hydraulic bending machines, as necessary, prior to line-up and welding. For larger horizontal changes of direction, manufactured induction bends would be used.

Following stringing and bending, the joints of the pipe would be placed on temporary supports adjacent to the trench. The ends would be carefully aligned and welded together using multiple passes for a full penetration weld. Gaps in the pipe welding process are often left by the welding crews at wetland and waterbody crossings, road crossings, and other locations where access across the work area is required or when the pipe would be installed later in the construction process. Only welders qualified according to applicable American National Standards Institute, American Society of Mechanical Engineers, and American Petroleum Institute (API) Standards would be permitted to perform the welding.

To ensure that the assembled pipe would meet or exceed the design strength requirements, the welds would be visually inspected and non-destructively tested using radiographic (x-ray) or other

approved test method, in accordance with API Standards. Welds displaying inclusions (void spaces) or other defects would be repaired or cut out (removed) and a new weld would be installed and retested.

Following welding, the previously uncoated ends of the pipe at the joints would be epoxy coated. Prior to lowering the pipe into the trench, the coating on the entire pipe section would be inspected and any damaged areas would be repaired.

2.3.1.5 Pipe Lowering

The completed section of the pipe would be lifted off the temporary supports and lowered into the trench by side-boom tractors, or other equipment. Before lowering the pipe, the trench would be inspected to ensure that it is free of rock and other debris that could damage the pipe or the coating. In addition, the pipe and trench would be visually inspected to ensure that the pipe and trench configurations are compatible. Tie-in welding and pipeline coating would occur within the trench to join the newly lowered-in section with the previously installed sections of pipe.

2.3.1.6 Padding and Backfilling

After the pipe is lowered into the trench, the trench would be backfilled. Previously excavated materials would be pushed back into the trench using bladed equipment or back hoes. Where the previously excavated material contains large rocks or other materials that could damage the pipe or coating, clean fill would be placed around the pipe prior to backfilling. Any excess excavated materials or materials unsuitable for backfill would be spread evenly over the construction right-of-way or transported off-site for proper disposal. The trench would be backfilled to grade or above its original elevation (i.e., slightly crowned) to accommodate any subsequent settling.

Segregated topsoil would not be used for padding the pipe. In areas where topsoil has been segregated, the subsoil would be replaced and segregated topsoil would be returned to its original horizon as practicable. Subsoil and/or topsoil compaction would be conducted, as necessary, depending on the land use and landowner agreements. To minimize the possibility of subsurface water flow on slopes along the pipeline, sand bags or foam-type trench breakers would be placed across the trench prior to backfilling.

2.3.1.7 Hydrostatic Testing

Following backfilling of the trench, the pipeline would be cleaned and hydrostatically tested to ensure it is capable of operating at the design pressure. The water in the pipe would be pressurized and held for a minimum of eight hours. Any loss of pressure that cannot be attributed to other factors, such as temperature changes, would be investigated. Any leaks detected would be repaired and the segments that are repaired would be retested. Upon completion of the testing, the water would be discharged in well-vegetated upland areas or transported off-site for proper disposal, in accordance with applicable federal and state regulations.

Hydrostatic test water would only be in contact with new steel pipe that would be free of chemicals or lubricants. Once a segment of pipe has been successfully tested and dried, the test cap and manifold would be removed, and the pipe would be connected to the remainder of the pipeline. Hydrostatic testing is further discussed in section 4.3.

2.3.1.8 Foundations, Equipment, and Building Installations

Construction of the compressor stations would begin with grading, leveling, and compacting the soils for the construction of building foundations.

Excavation would be performed as necessary to accommodate the reinforced concrete foundation that is required for the new compressor units and buildings. Forms would be set, rebar would be installed, and concrete would be poured into the foundation settings. Concrete pours would be randomly sampled to verify compliance with minimum strength requirements. Backfill would be compacted in place, and excess soil would be used elsewhere or distributed around the site. Once the concrete foundations have been completed and determined to meet the design requirements, installation of the machinery and buildings for each compressor station would commence. Various piping and electrical conduit systems would be connected once the machinery is in place. Electrical wiring would be installed for power and instrumentation. Compression equipment is typically shipped to the site by truck after construction commences. The compressors would be offloaded, positioned on the foundation, leveled, grouted, and secured. Compressor station utilities supporting the operation of the gas compressor and cooling equipment would be housed in modularized, skid mounted buildings.

Aboveground and belowground piping would be installed at the stations and would be hydrostatically tested prior to operation. Columbia Gas and Columbia Gulf would develop and implement measures outlined in project-specific station commissioning plans to ensure the proper function of controls and safety features prior to placing the new compressor units into service. Roads and parking areas would be constructed using gravel, asphalt, or concrete, as appropriate. Fencing would be constructed around the facility sites. Once construction is complete, all disturbed areas not covered with gravel or asphalt would be graded, restored, and reseeded.

Construction of the new regulator stations, launcher and receiver facilities, MLVs, and odorization stations as well as activities at the existing facilities would be conducted using the same general procedures as those described above for the compressor stations and in accordance with the applicable federal and state regulations.

2.3.1.9 Piping Connections

Pipe connections associated with the new compressors and pumps would be flanged, screwed, or welded. All welders and welding procedures would be qualified in accordance with the USDOT requirements (49 CFR 192). All piping system welds would be verified by a non-destructive testing method to ensure compliance with code requirements.

2.3.1.10 Clean-up and Restoration

Following pipeline installation and backfilling, disturbed areas would be restored and graded to pre-construction contours as closely as practicable. Construction debris and organic refuse unsuitable for distribution over the construction right-of-way would be disposed of at appropriate facilities in accordance with applicable regulations. Permanent ECDs would be installed as appropriate, and revegetation measures would be applied in accordance with the ECS.

Restoration activities would be conducted in accordance with state and municipal permit requirements. Soils that supported vegetation prior to construction would be revegetated using seed mixes, application rates, and timing windows recommended by local soil conservation authorities or other duly authorized agencies, landowner requests, and in accordance with the ESC. The right-of-way would be seeded within 6 working days following final grading, weather and soil conditions permitting, unless

otherwise directed by local soil conservation authorities. Additionally, monitoring of revegetation after construction would be conducted to evaluate and correct areas requiring remediation.

2.3.2 Special Construction Techniques

In addition to conventional pipeline construction techniques, specialized construction techniques would be used in sensitive resource areas including waterbody crossings, wetland crossings, residential areas, agricultural areas, road crossings, areas with side slopes, and rocky areas as well as areas requiring reduced workspace. Specialized construction procedures are described in the following sections.

2.3.2.1 Wetland Crossings

In accordance with the ECS, the width of the pipeline construction right-of-way would be limited to 75 feet in wetlands. Areas where Columbia Gas requested additional workspace in wetlands is discussed in section 4.4.4. Prior to the start of construction activities, buffers would be clearly marked with signs and/or highly visible flagging. Columbia Gas would install BMPs as required by the ECS, at edges of the construction right-of-way in wetlands where there is a possibility for spoil to flow into undisturbed areas of the wetlands. Wetland crossing methods would be determined based on site-specific conditions. Wetlands with soils that can support construction equipment may be crossed using the conventional open-cut method, as described in section 2.3.2.2, with the use of timber mats to prevent soil rutting.

Vegetation would be cut to ground level, and grading and stump removal would be performed only over the trench, except where safety conditions dictate additional removal on the working side of the construction right-of-way. Topsoil segregation techniques would be utilized along the trench in unsaturated wetlands to preserve the seed bank and allow for successful restoration of the disturbed area. Trench plugs may be used in wetlands to minimize the flow of water and sediment discharges into the wetland from the open trench. Wetland entry and exit points would be sealed with trench sack breakers or foam breakers to maintain the hydrologic integrity of the wetland, as appropriate. Following pipeline installation, the trench would be backfilled and excess backfill would be spread over adjacent upland areas and stabilized during clean-up. Columbia Gas would restore wetland contours to pre-construction conditions to the extent practicable upon construction completion. A depiction of typical wetland construction techniques is provided in appendix C.

Push/Float Crossing Method

The push/float method of construction may be used in inundated lowland or saturated wetland areas where conventional pipe laying equipment cannot be supported and in areas that have a significant amount of water that would allow for pipe to be floated through the open trench. Implementation of this method requires excavation of the trench using low-ground weight equipment, limiting the need for grubbing and grading activities over the trench line or working side of the construction right-of-way. Topsoil segregation would not be implemented in areas where there is standing water or inundation at the time of construction.

Coated and weighted pipe would be welded at a staging area where floats are attached to the pipe. The welded pipe would be pushed along the water-filled trench until it is in place. Once in place over the trench, the floats would be cut and the pipe would be allowed to sink into place. The trench would then be backfilled using previously excavated material. Use of this method reduces wetland impacts and soil compaction by minimizing the number of construction passes necessary to install the pipe. Any required staging would be conducted within the construction right-of-way to the extent practicable. If ATWS is

required, approval would be requested from FERC prior to use. A depiction of typical push/float construction techniques is provided in appendix C.

2.3.2.2 Waterbody Crossings

Construction methods used at waterbody crossings are highly dependent on the characteristics of the waterbody encountered at the time of construction. Waterbody crossing methods anticipated to be used during construction include conventional open-cut, dam-and-pump, flume, and HDD as described below. The proposed construction method for each waterbody crossed by the projects is identified in section 4.3.2.5.

Conventional Open-Cut Crossing Method

The conventional open-cut method employs the same general construction procedures as described in section 2.3.1.3 for upland construction. The open-cut construction method involves the excavation of the pipeline trench across the waterbody, installation of a prefabricated segment of pipeline, and backfilling of the trench with native material.

Depending upon the width of the crossing and the reach of the excavating equipment, excavation and backfilling of the trench would generally be accomplished using backhoes or other excavation equipment operating from one or both banks of the waterbody. As required by the ECS, flow would be maintained at all times. The pipe segment would be weighted, as necessary, to provide negative buoyancy and placed below scour depth. Typical backfill cover requirements would be met, contours would be restored within the waterbody, and the banks would be stabilized via seeding and/or the installation of erosion control matting.

Impacts on water quality would be minimized through the implementation of measures outlined in the ECS. The pipeline trench would be excavated immediately prior to pipe installation to limit the duration of construction within the waterbody. Waterbody crossings 10 feet or less would be completed within 24 hours and crossings greater than 10 feet would be crossed within 48 hours. Excavated materials would be stored no less than 10 feet from the edge of the waterbody and temporary sediment barriers, such as silt fences, would be used to prevent the sediment from reentering the waterbody. A depiction of typical conventional open-cut waterbody crossing construction techniques is provided in appendix C.

Dam-and-Pump Crossing Method

The dam-and-pump crossing method is a modification of the conventional open-cut crossing method (section 2.3.1. that allows the trench to remain dry during pipe installation. Temporary dams, typically consisting of sandbags or plastic sheeting are installed upstream and downstream of the proposed waterbody crossing. Following dam installation, using the dam-and-pump method, appropriately sized pumps would be used to dewater and transport the stream flow around the construction work area and trench. Intake screens would be installed at the pump inlets to prevent entrainment of aquatic life, and energy-dissipating devices would be installed at the pump discharge points to minimize erosion and stream bed scour.

Trench excavation and pipeline installation would then commence through the dewatered portion of the waterbody channel. Following completion of pipeline installation, backfill of the trench, and restoration of stream banks, the temporary dams would be removed and flow through the construction work area would be restored. This method is generally only appropriate for those waterbodies where pumps can adequately transfer the stream flow volume around the work area and there are no concerns

about the passage of sensitive aquatic species. A depiction of typical dam-and-pump construction techniques is provided in appendix C.

Flume Crossing Method

The flume crossing method is another dry alternative to the conventional open-cut method in which water flow is temporarily directed through one or more flume pipes placed over the excavation area. The use of the flume(s) allows trenching and pipeline installation primarily under dry conditions without significant disruption of water flow and minimized downstream turbidity. A depiction of typical flume construction techniques is provided in appendix C.

2.3.2.3 Horizontal Directional Drill Crossings

The HDD crossing method is typically used at large or sensitive waterbody crossings, major roadways, significant cultural resources, or other sensitive areas. The HDD method allows for construction without the excavation of a trench, by drilling a hole significantly below conventional pipeline depth, and pulling the pipeline through the pre-drilled hole. Columbia Gas would use HDDs to avoid direct impacts on sensitive resources and/or to avoid areas in which constructability by conventional means is not feasible.

Columbia Gas anticipates that seven HDDs would be required for the LX Project to facilitate construction across some highways and waterbodies. Proposed HDD locations and crossing lengths are reflected in table 2.3.2-1. A depiction of typical HDD techniques, including site-specific plan and profile drawings, is provided in appendix C.

TABLE 2.3.2-1
Proposed Horizontal Directional Drill Crossings Associated with the LX Project

Name of HDD Crossing	Approximate Milepost		Length (feet)
	Entry	Exit	
LEX			
Fish Creek	21.4	21.2	1,380
Ohio River (north)	25.2 RR-5	25.9	3,371
Highway I-77	67.0	67.3	1,738
Muskingum River	89.3	89.7	2,529
Rush Creek	120.1	119.7	2,319
Highway I-33	130.9	130.3	3,220
BM-111 Loop			
Ohio River (south)	0.0	1.1	5,555

To facilitate proposed HDD installations, Columbia Gas is planning to place an electric guide wire coil (closed loop system) along the ground surface between each HDD entry point and exit point, where possible. This coil is used to facilitate tracking of the location of down hole drilling equipment and to determine steering inputs during advancement of the pilot bore. Wireline guidance systems typically require two guide wires for HDD crossings that parallel the centerline of an installation with a variable spacing or offset on each side of the centerline depending on the depth of the particular HDD installation. The wires would be put in place by hand, which would require only hand cutting of side limbs to facilitate a walking path, as needed. Guide wires would stop at the water's edge, with no guide wire coil placed within the waterbody.

Following the completion of the pilot hole, reaming tools would be used to enlarge the hole to accommodate the pipeline diameter. The reaming tools would be attached to the drill string at the exit

point and would then be rotated and drawn back to incrementally enlarge the pilot hole. During this process, drilling mud consisting of bentonite clay and water would be continuously pumped into the pilot hole to remove cuttings and maintain the integrity of the hole (sources and volumes of water for drilling mud are presented and further discussed in section 4.3.2.6). When the hole has been sufficiently enlarged, a prefabricated segment of pipe would be attached behind the reaming tool on the exit side of the crossing and pulled back through the drill hole towards the drill rig. In the event that a particular drill is unsuccessful, Columbia Gas would implement its Horizontal Directional Drill Contingency Plan (HDD Plan).[14]

2.3.2.4 Residential Areas

Where residences are located within 50 feet of the construction right-of-way, Columbia Gas would reduce the construction right-of-way as much as practicable to minimize inconvenience to property owners. Following completion of major construction activities, the property would be restored in compliance with FERC's Plan unless otherwise requested by the landowner. Columbia Gas has prepared site-specific Residential Construction Plans, included as appendix O, for residences located within 50 feet of the project workspace. Residential areas crossed by the LX Project are identified and discussed further in section 4.8.3.

In general, when working near or adjacent to residential areas, Columbia Gas would:

- notify landowners no later than two weeks before the start of construction;
- maintain a minimum of 25 feet between the residence and construction workspace for a distance of 100 feet on either side of the residence;
- perform construction activities during daytime hours whenever feasible;
- install safety fencing 100 feet on either side of the residence to contain construction equipment in the workspace;
- obtain written approval from landowners within 10 feet of the project area, as indicated in the Residential Construction Plans;
- preserve trees and landscaping, when possible;
- restore lawns and landscaping to final restoration immediately after backfilling of the trench, weather depending;
- use specialized construction techniques, such as stovepipe or drag section techniques, where necessary to minimize disturbances to residences;
- backfill the trench within 30 days, unless otherwise authorized, and fence off open trenches at the end of the workday;
- avoid disruption to utilities, when possible, and notify landowner as soon as possible prior to utility disruption; and
- inspect road surfaces near residences and clean soil and debris from roads, if necessary.

[14] Columbia Gas' HDD Plan is available on the FERC's eLibrary website at http://ferc.gov/docs-filing/elibrary.asp, by searching Docket No. CP15-514 and Accession No. 20150608-5049, titled "20150605_CP15-___-000-11_VolI_RR01_App1E-1F" (Appendix 1F).

Columbia Gulf would implement the following mitigation measures to limit impacts on nearby residences:

- conduct construction activities during daytime hours, whenever feasible;
- limit disruptions on utilities;
- provide notification to landowner should there be a need to disrupt utilities;
- notify adjacent landowners of construction at least two weeks prior; and
- inspect and clean road surfaces of nearby residences.

Stove Pipe Construction

The stove pipe construction method would be used in areas with limited workspace, and requires installation of a single length, or joint, of pipe (typically 40 feet) at a time. Following clearing and grading of the construction right-of-way, the trench would be excavated to accommodate the installation of only one joint of pipe. A bell hole would be excavated at each end of the joint, to allow for safe entry and exit of the workspace while the newly installed joint of pipe is attached to the adjacent pipe segment. From this point, the general construction procedures above would be followed. Following construction completion, the trench would be backfilled to level ground within 15 or 20 feet of the working end of the joint. In areas where the soils contain large rocks or other materials that could damage the pipe or coating, the pipe may be wrapped with a protective wrap prior to padding and backfill. This process would then be repeated. At the end of each work day, the working end of the ditch would be backfilled and temporarily stabilized or covered with a steel plate or mats and protected with safety fence.

The construction crew using the stove pipe construction method would be about one-third to one-fourth the size of a typical construction crew. Additionally, the amount of equipment used would be limited to that which is required at that point in construction. When a different piece of equipment or additional materials is required, it would be mobilized to the construction site from an off-site location.

Drag Section

The drag section construction method would be used in areas where there is insufficient space to assemble the pipe in place. This technique involves the trenching, installation, and backfill for a prefabricated section of pipe (i.e., drag section), typically containing several pipe segments. The trench is then backfilled and/or covered with steel plates or timber mats at the end of each work day. Adequate staging areas outside of residential congestion are required for assembly of the drag section. However, this construction method reduces the necessary timeframe for work to occur in a given location because the joint sections of the pipe are pre-assembled (bent, welded, x-rayed, and coated) in a nearby staging area.

2.3.2.5 Agricultural Areas

The trench would be excavated to a sufficient depth to allow for a minimum 4 feet of cover between the top of the pipe and the final land surface after backfilling and contour restoration. Columbia would conserve topsoil in all actively cultivated and rotated cropland and improved pasture. At least 12 inches of topsoil would be segregated in these areas. Topsoil would also be segregated in other areas at the specific request of the landowner. The topsoil and subsoil would be stored in separate spoil piles on the construction right-of-way and would not be allowed to mix. Where topsoil is less than 12 inches deep, the actual depth of the topsoil would be segregated. Upon completing construction, Columbia Gas would coordinate with landowners to ensure that agricultural use of property minimizes impacts on

pipeline operations. Agricultural areas crossed by the LX and RXE Projects are identified and discussed further in section 4.8.1.

2.3.2.6 Road Crossings

Paved roads encountered along the LX and RXE Project routes may be crossed via the use of open-cut or subsurface bores. Safe and accessible conditions would be maintained during construction at road crossings per the ECS. The open-cut method would typically be used for crossings of driveways, local roads, and small state roads with low traffic densities where pipeline installation activities would not adversely affect the general public.

The HDD or conventional bore methods would be used for crossings beneath the majority of public roads and all federal and major state highways. To complete a horizontal bore, a pit on either side of the road would be excavated to provide a working area for the equipment. A boring machine would be lowered into one pit, and a horizontal hole would be bored to a diameter slightly larger than the diameter of the pipe (or casing, if required) at the depth of pipeline installation. The pipeline section and/or casing would then be pushed through the bore to the opposite pit. If additional pipeline sections are required to span the length of the bore, they would be welded to the first section of the pipeline in the bore pit prior to being pushed through. ATWS would be required on both sides of the road crossing in order to complete the bore.

Where the construction right-of-way or access roads intersect public paved roads, a construction entrance would be installed for access at construction right-of-way entrances and as needed at additional access road locations. Trenches would be fenced or covered with steel plates during all non-working hours to control livestock and limit public access. To prevent right-of-way sediment from being washed onto roads during a rain event, temporary and permanent ECDs would be installed adjacent to paved roads as needed. Additional information regarding public roads crossed by the project is provided in section 4.9.4. A depiction of typical road crossing techniques is provided in appendix C.

2.3.2.7 Rugged Terrain

Additional surface grading may be required in areas where the project crosses rugged topography. It may be necessary to grade steep slopes to a gentler slope to accommodate pipe bending limitations and safe working conditions. In these areas, the slopes would be cut down and, after the pipeline is installed, returned to original contours. In side slope areas where the project route crosses laterally across the face of a slope, temporary cut-and-fill grading may be required to establish a safe, flat work terrace. In rugged terrain, temporary erosion control measures would require closer spacing and more frequent maintenance until permanent post- construction erosion control measures are established.

Although side slope terrain has been reduced to the maximum extent practicable during routing, severe side slopes may still be encountered. In such areas of side slope terrain, the upslope side of the construction corridor would be cut during grading. The material removed from the cut would be used to fill the downslope edge of the construction right-of-way to provide a safe and level surface from which to operate the heavy equipment. As such, additional ATWS may be required downslope of side slope terrain to accommodate the fill material (see appendix E for a list of site-specific deviations from the FERC Plan and Procedures). During grade restoration, the spoil would be placed back in the cut and compacted to restore original contours. If necessary, springs or seeps found in the cut can be diverted off of the construction workspace to stable areas or carried downslope through drain pipes and/or gravel French drains that may be required as part of the cut restoration.

2.3.2.8 Blasting

Blasting may be required to excavate the trench in areas where bedrock is encountered at depths that interfere with conventional excavation or rock-trenching methods. If blasting is deemed necessary, a licensed subcontractor would be hired to conduct the blasting operations. Columbia Gas has developed a Blasting Plan[15] that establishes implementation procedures and safety measures that Columbia Gas would adhere to during construction. As part of the Blasting Plan, the Columbia Gas would:

- comply with pre-blasting requirements prior to the initiation of blasting operations;
- outline site-specific areas designated for blasting;
- comply with state-special conditions;
- monitor operations for ground vibration and airblast;
- consult with local water authorities that may be affected during blasting;
- conduct a three axis seismic survey for each blast event within 300 feet of a Columbia Gas pipeline, unless otherwise permitted; and
- adhere to all federal, state, and local laws and regulations.

The subcontractor also would adhere to BMPs outlined in the ECS based on location, terrain, soil and rock types, and would use seismically monitored blasting techniques in compliance with federal and state regulations and include applicable mitigation measures such as the placement of blasting mats as appropriate.

Prior to blasting, the final Blasting Plan and schedule would be submitted to FERC for notification should blasting occur within any designated coldwater fishery, and within any waterbody identified as habitat for federally listed threatened or endangered species. Blasting is further discussed in section 4.1.

2.3.2.9 Winter Construction

Winter construction techniques are required in some parts of the United States that experience extended periods of freezing conditions or heavy snowfall events. Winter construction techniques typically include snow management, working with frozen soils, and managing hydrostatic discharge water under freezing conditions. These techniques also include the application of temporary erosion and sediment control measures to protect against accelerated erosion during spring melt and heavy spring rains. These temporary controls are maintained during project construction and reinstalled as necessary until permanent ECDs are constructed and/or permanent stabilization has occurred. When winter construction conditions are encountered, Columbia Gas would implement its Winter Construction Plan, included in the ECS.

Pipeline Abandonment Procedures

Landowner notification, surveying, and staking of the temporary workspace and access roads associated with the proposed R-501 Abandonment would be conducted using the same general procedures described in section 2.3.1.1 for the new pipeline facilities. Prior to abandonment, the R-501 Line would

[15] Columbia Gas' Blasting Plan is available on the FERC's eLibrary website at http://ferc.gov/docs-filing/elibrary.asp, by searching Docket No. CP15-514 and Accession No. 20150608-5049, titled "20150605_CP15-___-000-23_VolI_RR06_App6A-6F" (Appendix 6D).

be cleaned with water to remove any residual materials. Upon completion, the water would be transported off-site for proper disposal, in accordance with applicable federal and state regulations. Specific construction procedures would vary by site; however, activities would generally include abandoning the pipeline in place by cutting the pipe and capping with weld caps or a steel plate as well as relocating or removing all aboveground appurtenances. All removed piping and other materials would be disposed of by the contractor in accordance with all federal, state, and local regulations, with the exception of various appurtenant facilities that would be reinstalled along the proposed R-801 Loop.

2.4 CONSTRUCTION SCHEDULE

Pending all necessary authorizations and permits, Columbia Gas anticipates mobilization and construction of the LX Project to begin in November 2016 in order to meet its in-service date of November 1, 2017. Pending all necessary authorizations and permits, Columbia Gulf anticipates mobilization and construction of the RXE Project to begin in the 4th quarter of 2016 in order to meet its in-service date of November 1, 2017.

2.5 ENVIRONMENTAL COMPLIANCE INSPECTION AND MITIGATION MONITORING

2.5.1 Information Flow and Training

Columbia Gas and Columbia Gulf would include, whenever possible, implementation details in its construction drawings and specifications to ensure that the construction of the proposed facilities would comply with the FERC Certificate conditions, the mitigation measures identified in this report, and the requirements of other federal and state permitting agencies. Selected contractors would receive copies of design specifications, the ECS, the Stormwater Pollution Prevention Plan (SWPPP), and other environmental documents.

For mitigation measures that address pre-construction surveys and clearances, Columbia Gas and Columbia Gulf would provide pertinent correspondence and documentation to the pipeline contractor(s). For those mitigation measures that address permit conditions from federal and state agencies, Columbia Gas and Columbia Gulf would provide copies of permits and related drawings. For those mitigation measures that, in part, address post-construction requirements, Columbia Gas and Columbia Gulf engineers would provide instructions and documentation to operating personnel following the completion of the construction. Columbia Gas and Columbia Gulf would require selected contractors to install facilities according to Columbia Gas, Columbia Gulf, and DOT specifications, specific permit conditions, and the terms of the negotiated contract.

To specifically support the application of proper field construction methods, Columbia Gas and Columbia Gulf would adhere to the ECS, and the SWPPP, except where requested otherwise (see appendix E).

Columbia Gas and Columbia Gulf would conduct environmental training for its field personnel and the contractor's personnel regarding proper field implementation of the ECS, other site-specific environmental documents, regulatory conditions, and other mitigation measures. Columbia Gas and Columbia Gulf would provide copies of permits and related drawings to all personnel prior to the start of construction and ensure that all entities understand the proper procedures for construction, stabilization, and restoration.

2.5.2 Environmental Inspection

For purposes of quality assurance and compliance with mitigation measures, applicable regulatory requirements, and Columbia Gas and Columbia Gulf specifications, Columbia Gas and Columbia Gulf would be represented by at least one environmental inspector (EI) per construction spread. If necessary, additional EIs may be assigned to each spread. Columbia Gas and Columbia Gulf would also require the contractor to provide at least one environmental foreman (i.e., compliance specialist), and a crew for each construction spread. The environmental foreman would be responsible for the successful installation and maintenance of ECDs by the contractor and for construction in environmentally sensitive areas.

The EI position is a full-time position. The EIs would report directly to the Natural Resource Permitting Manager and coordinate with the Chief Inspector for Columbia Gas and Columbia Gulf, and would have stop-work authority. The EIs' duties would be consistent with those contained in paragraph II.B (Responsibilities of Environmental Inspectors) of the FERC Plan and would include ensuring compliance with environmental conditions from FERC's Certificate, Columbia Gas' and Columbia Gulf's environmental designs and specifications, and other permits or authorizations. An adequate number of copies of the construction drawing package would be distributed to Columbia Gas' and Columbia Gulf's inspectors and to the contractors' supervisory personnel. If the contractor's performance is unsatisfactory, the terms of the contract would allow Columbia Gas and Columbia Gulf to stop work in progress and cause a contractor to begin remedial work. At a minimum, the EI would be responsible for:

- inspecting construction activities for compliance, ensuring compliance with the requirements of the Environmental Management and Construction Plan, ECS, and any permits, landowner agreements, or FERC certificates obtained for the project, and identifying, documenting, and overseeing corrective actions, as necessary for compliance;
- verifying that the limits of authorized construction workspaces and locations of access roads are properly marked before clearing, and maintained throughout construction;
- verifying the location of drainage and irrigation systems;
- identifying, installing, maintaining, and inspecting erosion/sediment control and stabilization areas;
- ensuring the repair of all ineffective temporary erosion control measures within 24 hours of identification, or as soon as conditions allow;
- ensuring that the design of slope breakers would not cause erosion or direct water into sensitive environmental resource areas, including cultural resource sites, wetland, waterbodies, and sensitive species habitat;
- verifying that trench dewatering activities are properly monitored, discharged, and maintained;
- verifying the testing of subsoil and topsoil in agricultural and residential areas to measure compaction and determine the need for corrective action;
- advising the Chief Inspector when conditions make it advisable to restrict construction activities in agricultural areas;
- verifying that the soils imported for agricultural or residential use are noxious weed and soil pest free, unless otherwise approved by the landowner;

- keeping records of compliance and mitigation measures during active construction and restoration;
- identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase, including ensuring restoration of contours and topsoil;
- establishing a program to monitor the success of restoration. Implementation of this program may be transferred to (Field Services) upon completion of construction and restoration activities;
- identifying areas of contamination and following proper procedures for contaminated areas, including hazardous waste cleanup;
- verifying the location of signs and visible flagging marking the boundaries of wetlands, waterbodies other sensitive resource areas, or areas with special requirements along the construction workspace; and
- ensuring proper disposal of excess construction material.

Columbia Gas' and Columbia Gulf's engineering and construction departments are responsible for designing and constructing certificated facilities in compliance with regulatory and non-regulatory requirements and agreements. Any issues of non-compliance with mitigation measures or other regulatory requirements that cannot be solved in the field would be addressed by the Project Manager and the Natural Resource Permitting Manager for Columbia Gas and Columbia Gulf. Routine reporting or specific communication with the FERC staff regarding design, installation, and maintenance of the facilities described in this Application would be the responsibility of Columbia Gas' and Columbia Gulf's Natural Resource Permitting Department. FERC staff inquiries regarding these proposed facilities should be addressed to Columbia Gas' and Columbia Gulf's Natural Resource Permitting Department accordingly.

2.5.3 FERC Third-Party Compliance Monitoring

Columbia Gas and Columbia Gulf have committed to funding a separate FERC third-party compliance monitoring program during the construction phase of each project. Under this program, a contractor, is selected by, managed by, and reports solely to the FERC staff to provide environmental compliance monitoring services. The FERC Third-party Compliance Monitor would provide daily reports to FERC on compliance issues and make recommendations to the FERC Project Manager on how to deal with compliance issues and construction changes, should they arise. In addition to this program, FERC staff would also conduct periodic compliance inspections during all phases of construction.

2.5.4 Post-Approval Variance Process

The pipeline alignment and work areas identified in this draft EIS should be sufficient for construction and operation (including maintenance) of the projects. However, minor route realignments and other workspace refinements sometimes continue past the project planning phase and into the construction phase. These changes could involve minor route realignments, shifting or adding new extra workspaces or staging areas, adding additional access roads, or modifications to construction methods. We have developed a procedure for assessing impacts on those areas that have not been evaluated in this draft EIS and for approving or denying their use following any Certificate issuance. In general, biological and cultural resources surveys were conducted using a survey corridor larger than that necessary to construct the facilities. Where survey approvals were denied, Columbia Gas and Columbia Gulf would complete the required surveys following a Certificate issuance. If Columbia Gas and Columbia Gulf requests to shift an existing workspace or require a new extra workspace subsequent to issuance of a

Certificate, these areas would typically be within the previously surveyed area. Such requests would be reviewed using a variance request process.

2.5.5 Post-Construction Monitoring

After construction, Columbia Gas and Columbia Gulf would conduct follow-up inspections of all disturbed upland areas after the first and second growing seasons to determine the success of restoration. Restoration of upland areas would be considered successful if the right-of-way vegetation is visually successful in density and cover, surface conditions are similar to adjacent undisturbed lands, construction debris is removed, and proper drainage has been restored. For at least 2 years following construction, Columbia Gas and Columbia Gulf would submit quarterly reports to FERC that document any problems identified by Columbia Gas and Columbia Gulf or landowners and describe the corrective actions taken to remedy those problems. Columbia Gas and Columbia Gulf would follow measures outlined in their ECSs, as well as additional management and control measures to minimize the spread of invasive species. However, we are recommending in section 5.2 that Columbia Gas and Columbia Gulf prepare and submit an invasive species management plan that addresses post-construction monitoring requirements for invasive species. In accordance with their ECPs, Columbia Gas and Columbia Gulf would monitor the success of wetland revegetation annually for the first 3 years (or as required by permit) after construction or until wetland revegetation is successful. Wetland revegetation would be considered successful when the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent undisturbed wetland areas or as compared to documented, pre-project conditions. In accordance with their ECSs, if revegetation is not successful at the end of 3 years, Columbia Gas and Columbia Gulf would develop and implement (in consultation with a professional wetland ecologist) a plan to actively revegetate the wetland with native wetland herbaceous and woody plant species.

After construction, the FERC, cooperating agencies, and/or other agencies would continue to conduct oversight inspection and monitoring to assess the success of restoration. If it is determined that the success of any of the restoration activities is not adequate at the end of the respective timeframes, Columbia Gas and Columbia Gulf would be required to extend its post-construction monitoring programs.

2.6 OPERATION, MAINTENANCE, AND SAFETY CONTROLS

Columbia Gas and Columbia Gulf would operate and maintain the newly constructed project facilities in the same manner as it currently operates and maintains its existing system and in accordance with any restrictions or conditions specifically applied to the projects. It is anticipated that the projects would result in the need for 15 to 20 operations personnel. The proposed pipelines and aboveground facilities would be patrolled on a routine basis and personnel well-qualified to perform both routine and extraordinary maintenance on interstate pipeline facilities would handle all maintenance.

The following sections provide specific details on standard operating and maintenance procedures for permanent easement areas, including erosion control procedures and periodic pipeline right-of-way patrols.

2.6.1 Permanent Erosion Controls

If necessary, permanent structural controls would be installed and maintained to accomplish maximum stabilization, prevent erosion, and control sedimentation. Permanent erosion controls would be installed at the base of sloped approaches to streams, wetlands, and roads and at the edge of the construction areas as needed to prevent siltation into waterbodies and wetlands downslope of the

construction area (e.g., swales and side slopes). These measures would also be installed in non-agricultural and residential areas with slopes.

2.6.2 Pipeline Facilities

During periodic pipeline right-of-way patrols, permanent ECDs installed during construction would be inspected to verify that they are functioning properly. If necessary, additional permanent or temporary ECDs may be installed and maintained to accomplish maximum stabilization, prevent erosion, and control sedimentation. In addition, attention would be given to:

- erosion and wash-outs along the right-of-way;
- performance of water control devices such as diversions;
- condition of banks at stream and river crossings;
- fallen timber or other threats to the pipeline;
- general health of vegetation planted during construction; and
- other conditions that could damage the pipeline or create unsafe operating conditions.

The local operations supervisor would be notified of any conditions requiring attention, and corrective measures would be performed, as needed.

Vegetation on the permanent easement would be maintained by mowing, cutting, and trimming to prevent the establishment of trees or deep-rooted shrubs that could damage the protective coating on the pipeline, obscure periodic surveillance, or interfere with potential repairs. In accordance with the ECS, Columbia Gas may maintain a cleared path within the permanent easement not exceeding 10 feet in width in upland areas, as necessary, and may maintain the entire 50-foot-wide permanent easement no more frequently than every three years. Columbia Gas would not conduct vegetation clearing for maintenance of the full 50-foot-wide permanent easement between April 15 and August 1. Vegetation maintenance would normally not be required in agricultural or pasture areas.

Columbia Gas may also maintain a 10-foot-wide cleared permanent easement through wetlands in accordance with the ECS. In addition, in forested wetlands, trees within 15 feet of the pipeline with roots that could compromise the integrity of pipeline coating would be selectively cut and removed from the permanent easement to maintain pipeline integrity. The pipeline facilities would be clearly marked at line-of-sight intervals and at crossings of roads and other key points or resources. The markers would clearly indicate the presence of a pipeline and provide a telephone number and address where a company representative may be reached in the event of an emergency or before a third party commences any excavation in the area of the pipeline. Columbia Gas and Columbia Gulf participate in all One-Call systems and would clear all excavations with the state-specific One-Call service prior to work.

2.6.3 Aboveground Facilities

Columbia Gas and Columbia Gulf would operate and maintain the proposed aboveground facilities. Personnel would perform routine checks of these facilities, including calibration of equipment and instrumentation, inspection of critical components, and scheduled and routine maintenance of equipment and grounds. Vegetation within the fenced portion of the aboveground facilities would be maintained as needed. Operational testing would be performed on safety equipment to ensure proper function. Corrective actions would be taken as necessary if issues are identified.