U.S. DEPARTMENT OF TRANSPORTATION

PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION

Final Environmental Assessment

and

Finding of No Significant Impact

Mainline Block Valve Spacing Special Permit

Special Permit Information:

Docket Number:	PHMSA-2017-0045
Requested By:	Alaska Gasline Development Corporation
Operator ID#:	40015
Original Date Requested:	April 14, 2017
Original Issuance Date:	September 9, 2019
Effective Date:	September 9, 2019
Code Sections:	49 CFR 192.179(a)(4)

Mainline Block Valve

Final Environmental Assessment

This Final Environmental Assessment (FEA) analyzes the Alaska LNG Pipeline for a special permit to waive the requirements of Title 49 of the Code of Federal Regulations (CFR) 192.179(a)(4). The special permit request described herein is related to, but distinct from the Federal Energy Regulatory Commission (FERC) decision making process for siting and permitting Alaska LNG's 42-inch pipeline (Mainline) to transport natural gas to a facility on Alaska's North Slope. The Pipeline and Hazardous Material Safety Administration (PHMSA) does not have pipeline siting or construction approval authority, but PHMSA's pipeline safety regulations impose certain safety requirements that will apply to the Alaska LNG Pipeline. The requirements for special permit applications to PHMSA to request waiver from one or more safety regulations are described at 49 CFR 190.341. This FEA references the Alaska Gasline Development Corporation's (AGDC) FERC Resource Reports for the Alaska LNG Pipeline to avoid duplication. Furthermore, this FEA accompanies AGDC's special permit request on crack arrestor spacing. This information can also be found in Appendix C, *Environmental Information for Mainline Block Valve and Crack Arrestor Spacing Special Permit* of the Alaska LNG Pipeline FERC Resource Report No. 11, *Reliability and Safety* found on the FERC docket CP17-178, Accession Number 20170417-5342 which can be accessed through https://elibrary.ferc.gov/IDMWS/common/OpenNat.asp?fileID=14562356.

I. Purpose and Need

AGDC is proposing to construct a 42-inch diameter pipeline as part of an integrated liquefied natural gas (LNG) project (Project) with interdependent facilities for the purpose of liquefying supplies of natural gas from Alaska, in particular from the Point Thomson Unit (PTU) and Prudhoe Bay Unit (PBU) production fields on the Alaska North Slope (North Slope), for export in foreign commerce and for in-state deliveries of natural gas. FERC is the lead Federal agency. Pursuant to 49 U.S.C. 60101, *et seq* and 49 CFR 192, PHMSA has authority over design, construction, operation, and maintenance of natural gas pipelines to maintain safety. As noted above, PHMSA does not have pipeline siting authority or construction approval authority. If required, special permits can be granted under 49 CFR 190.341 for deviations from the regulatory requirements. PHMSA imposes conditions on the grant of special permits to assure safety and environmental protection in accordance with 49 CFR 190.341. PHMSA complies with the National Environmental Policy Act (NEPA) in deciding whether to issue the special permit.

AGDC is requesting a special permit from PHMSA to waive compliance with 49 CFR 192.179 only in Class 1 locations. AGDC is proposing a mainline block valve (MLBV)

spacing of 50 miles north of Fairbanks, Alaska, and 30 miles south of Fairbanks.[1] The purpose of MLBVs is to isolate a segment of pipeline in the event of a pipeline failure in order to stop product flow to the failure site. The spacing of MLBV is defined in 49 CFR 192.179(a) as stated below:

> *Each transmission line, other than offshore segments, must have sectionalizing block valves spaced as follows, unless in a particular case the Administrator finds that alternative spacing would provide an equivalent level of safety:*
>
> *(4) Each point on the pipeline in a Class 1 location must be within 10 miles (16 kilometers) of a valve.*

II. Background and Site Description

The Alaska LNG Pipeline route from the proposed gas treatment plant (GTP) located at Prudhoe Bay to the proposed LNG Plant site located on the Kenai Peninsula is shown in Figure 1. The Alaska LNG Pipeline will be a 42-inch-diameter natural gas pipeline, approximately 807 miles in length, extending from the Alaska LNG's GTP on the North Slope, flowing south to the Liquefaction Facility on the shore of the Cook Inlet near Nikiski, including an offshore pipeline section crossing Cook Inlet. The onshore pipeline will be a buried pipeline except for short aboveground special design segments, such as aerial water crossings and aboveground fault crossings. As presented in Table 1.3.2-1 of FERC Resource Report 1 (inserted below), the Alaska LNG Pipeline will originate in the North Slope Borough, traverse south to the Yukon-Koyukuk Census Area, the Fairbanks North Star Borough, the Denali Borough, the Matanuska-Susitna Borough, and the Kenai Peninsula Borough, and terminate at the Liquefaction Facility. The Alaska LNG Pipeline's design has a maximum allowable operating pressure (MAOP) of 2,075 pounds per square inch gauge (psig).

[1] The average Class 1 MLBV spacing north of Fairbanks is about 42 miles, while the average spacing south of Fairbanks is about 24 miles.

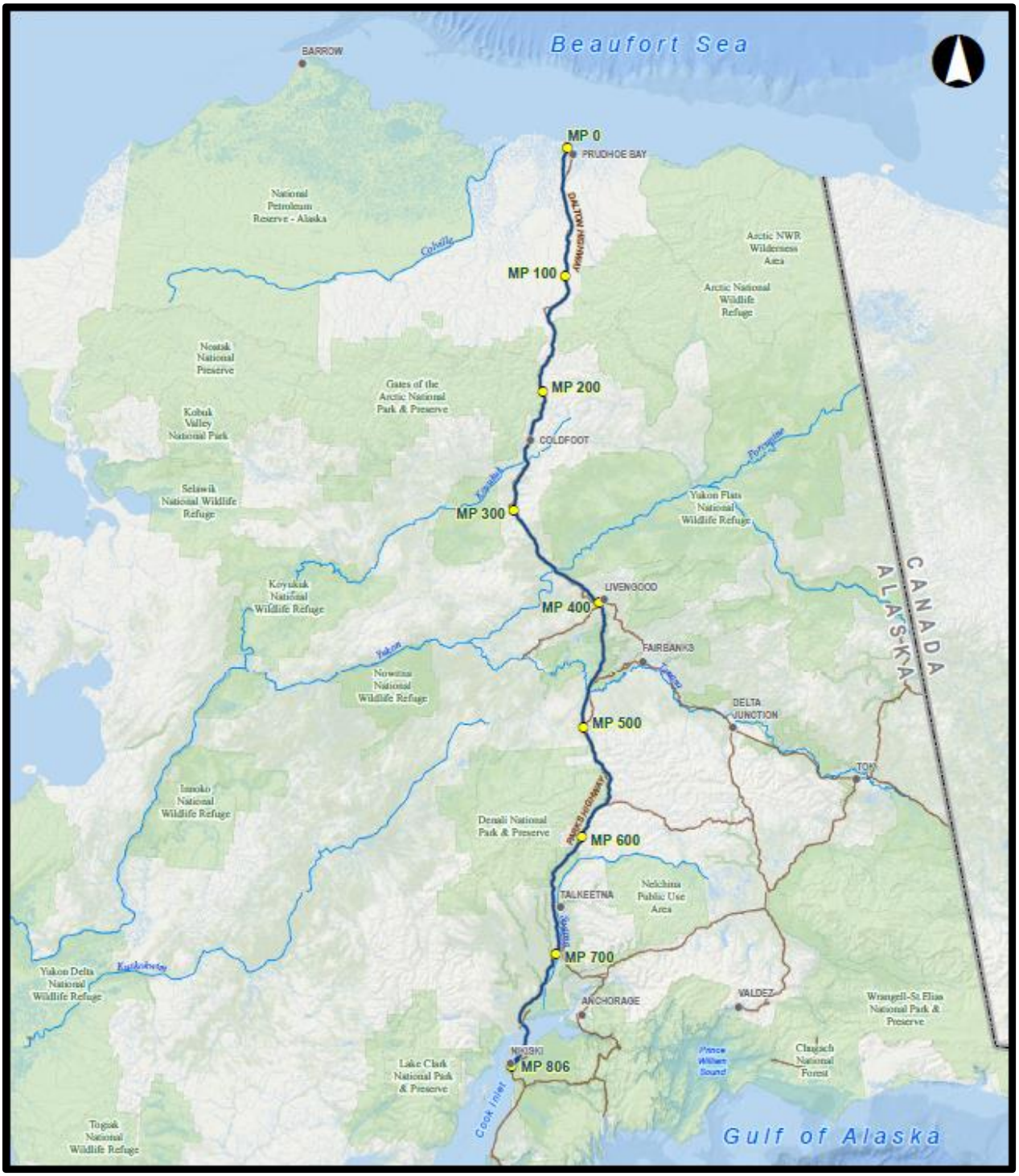

Figure 1: Alaska LNG Pipeline Route Map

TABLE 1.3.2-1 (From FERC Resource Report 1)
Mainline Route Summary for a 42-inch Pipeline

Segment or Facility Name	Boroughs or Census Areas	Approximate Length (miles)
Mainline	North Slope Borough	184.4
	Yukon-Koyukuk Census Areas	303.8
	Fairbanks North Star Borough	2.4
	Denali Borough	86.8
	Matanuska-Susitna Borough	179.9
	Kenai Peninsula Borough	51.3
Total		**806.6**

The Alaska LNG Pipeline will include several types of aboveground pipeline facilities. The design includes eight (8) compressor stations, four meter stations, multiple pig launching/receiving stations, multiple MLBVs, and five potential gas interconnection points (Figure 2 and Figure 3 to this FEA, and FERC Resource Report No. 1, Appendix A). A list of compressor stations, heater station, and meter stations is provided in Table 1.3.2-6 of FERC Resource Report 1.

Approximately 36 percent of the Alaska LNG Pipeline route is collocated within 500 feet of: an existing right-of-way (ROW) that includes the Trans Alaska Pipeline System (TAPS) and other pipelines; highways or major roads; utilities; and railroads. Table 1.3.2-2 of FERC Resource Report No. 1 (inserted below) identifies these areas along the pipeline. The Alaska LNG Pipeline crosses TAPS twelve times and its associated Fuel Gas Line five times, respectively, along with four railroad crossings. Design of the road and railroad crossings will determine the minimum wall thickness requirements for service loads in accordance with American Petroleum Institute (API) Recommended Practice (RP) 1102, and in compliance with 49 CFR 192.111. The minimum depth of cover will be four (4) feet for road crossings as specified by the Alaska Administrative Code 17.AAC 15.211 "Underground Facilities", and ten feet for railroad crossings as specified in Alaska Railroad Corporation (ARRC) standards. These values exceed the 49 CFR 192.327 requirement of a minimum of three feet at drainage ditches of public roads and railroads. Site-specific designs for major highway and railroad crossings are provided in Appendix H of FERC Resource Report No. 1, *General Project Description,* and in the table below:

Bridge and Railroad Crossings

Milepost (MP)	Crossing Type	Description
532.13	Bridge	Nenana River at Moody
537.90	Bridge	Lynx Creek
532.07	Railroad	Alaska Railroad Mainline

572.79	Railroad	Alaska Railroad Mainline
588.07	Railroad	Alaska Railroad Mainline
609.02	Railroad	Alaska Railroad Mainline

Additional details on roads, railroads, pipelines, utilities, and power line crossings can be found in FERC Resource Report No. 8, *Land Use, Recreation, and Aesthetics*.

TABLE 1.3.2-2 (From FERC Resource Report No. 1)
Collocated ROWs with the Mainline (within 500 feet)

Borough/Census Area Category	Length (Miles)	Length (Feet)
North Slope Borough		
Trans-Alaska Pipeline System (TAPS)	24.39	128,768
Other Pipelines[a]	34.83	183,904
Highways or Major Roads[b]	59.97	316,630
Utilities	108.65	573,692
Railroads	–	–
Yukon-Koyukuk Census Area		
TAPS	64.14	338,653
Other Pipelines[a]	–	–
Highways or Major Roads[b]	94.13	496.985
Utilities	106.42	561.898
Railroads	0.83	4,405
Denali Borough		
TAPS	–	–
Other Pipelines[a]	0.09	453
Highways or Major Roads[b]	13.25	69,984
Utilities	46.21	243,983
Railroads	1.00	5,283
Matanuska-Susitna Borough		
TAPS	–	–
Other Pipelines[a]	2.31	12,206
Highways or Major Roads[b]	26.76	141,289
Utilities	29.76	157,157
Railroads	2.30	12,123
Kenai Peninsula Borough[c]		
TAPS	–	–
Other Pipelines[a]	3.37	17,810
Highways or Major Roads[b]	1.58	8,342
Utilities	0.02	130
Railroads	–	–
Total Collocation Opportunities	**289.58**	**1,528,971**

Aerial crossings on pipeline specific bridges (i.e. bridges that carry only a pipeline) are located at Nenana River at Moody and Lynx Creek. The design factor for the pipeline at aerial crossings will comply with 49 CFR § 192.111 (i.e., the design factor in Class 1 Locations will be 0.60).

Pipeline design standards in 49 CFR 192.5(a)(1) are based on "class location units," which classify locations based on population density in the vicinity of an existing or proposed pipeline system. The lower the class location (1-4), the higher the design factor used to find the minimum required wall thickness for pressure containment, i.e. the required minimum thickness of the pipe increases as the Class location and population density increases. Ninety-nine percent of the Alaska LNG Pipeline route is in Class 1, which is defined as having 10 or fewer buildings intended for human occupancy located within 220 yards on either side of any continuous 1-mile length of pipeline. On the Kenai Peninsula, near Nikiski, there is a Class 2 location that is about 2.6 miles long, and a potential Class 3 location as the Mainline nears the LNG Plant. In the Nenana Canyon region of Denali National Park (~milepost [MP] 536) there is approximately 0.5 mile of Class 3. Additional details on class locations for the Mainline can be found in FERC Resource Report No. 11, *Reliability and Safety*, Section 11.7. Resource Report No. 11 and Table 11.7.2-1 identifying class locations for the pipeline route is reproduced below.

TABLE 11.7.2-1 (From FERC Resource Report No. 11)
Class Locations for the Mainline

Milepost (MP)		
Start (MP)	End (MP)	Class Location
0.00	535.99	1
535.99	536.49	3
536.49	798.65	1
798.65	801.27	2
801.27	803.78	1
803.78	806.25	2
806.25	806.57	1

There are 10 potential high consequence areas (HCA), as defined under 49 CFR 192.903, along the Alaska LNG Pipeline route. Details of HCA locations can be found in FERC Resource Report No. 11, Section 11.7, Table 11.7.4-1 (shown below with insertions for mainline valve

locations and valve type), Table 1, Table 2, and Attachment D - Main Line Block Valve Spacing Technical Support document[2] of the MLBV spacing special permit application.

TABLE 11.7.4-1 (From FERC Resource Report No. 11) – with insertions for mainline valve locations and type Potential HCA Takeoff for Proposed Route

From MP	To MP	Length (mi.)	Description
0.00			MLBV 1, GTP Meter Station
36.74			MLBV 2, Automatic Shut-off Valve (ASV)
75.97			MLBV 3, Remote Controlled Valve (RCV)
112.04			MLBV 4, ASV
148.51			MLBV 5, RCV
194.09			MLBV 6, ASV
236.08	237.33	1.25	Marion Creek Campground
240.1			MLBV 7, RCV
286.05			MLBV 8, RCV
332.64			MLBV 9, RCV
352.21	353.35	1.14	Hotspot Cafe
356.22			MLBV 9A, ASV
377.95			MLBV 10, ASV
421.56			MLBV 11, RCV
444.90			MLBV 12, ASV
467.10			MLBV 13, ASV
492.96			MLBV 14, ASV
517.62			MLBV 15, RCV
529.21	530.44	1.23	RV Park and Motel
534.79			MLBV 16, ASV
535.54	537.74	2.20	Denali Riverside RV Park, McKinley Chalet Resort, Denali Rainbow Village and RV, Denali Princess Wilderness Lodge, Denali Crow's Nest Cabins, Grand Denali Lodge, Denali Bluffs Hotel
538.79			MLBV 17, ASV
546.50			MLBV 18, ASV
551.34	552.27	0.93	Denali Perch Resort
565.77	567.23	1.46	DOT/PF Cantwell Station
572.23			MLBV 19, ASV
597.35			MLBV 20, RCV

[2] Attachment D can be found in www.regulations.gov in Docket PHMSA-2017-0045.

625.83			MLBV 21, ASV
629.75	631.35	1.60	Byers Lake Campground (73 units)
633.75	634.50	0.75	Trappers Creek Pizza Pub
648.16			MLBV 22, RCV
675.24			MLBV 23, ASV
703.67			MLBV 24, ASV
725.93			MLBV 25, RCV
749.11			MLBV 26, ASV
766.01			MLBV 27, ASV
793.34			MLBV 28, RCV
797.71	799.28	1.57	Nikiski Middle/High School, Kenai Heliport, Commercial Buildings, Industrial Sites
799.85			MLBV 29, RCV
803.39	806.05	2.66	Conoco Phillips Property and Tesoro Kenai Refinery
806.57			MLBV 30, LNG Meter Station
HCA Total Length		14.79	

In addition, the pipeline route special permit segments addressed in the special permit for Strain Based Design (SBD) segments, will be incorporated into the integrity management program (IMP), and treated as covered segments in HCA, in accordance with 49 CFR Part 192, Subpart O, and the associated special permit conditions, if the special permit for Strain Based Design is granted by PHMSA.

The construction ROW width will vary depending on the type of terrain, the season of construction, and the ease of access from nearby roads. The ROW width will be 50 feet plus the diameter of the pipeline, i.e. 53.5 feet. At MLBV locations the ROW width will expand to approximately 85 feet over lengths of approximately 100 feet. If a helipad associated with any MLBV location is deemed necessary, an additional section of expanded ROW (approximately 115 feet wide by approximately 115 feet long) will be required. See FERC Resource Report No. 1, *General Project Description*, Appendix E, drawing E-102 for further details of the overall arrangement. Greater details on the construction ROW can be found in FERC Resource Report No. 1, *General Project Description*. The Mainline will be sited on land composed of more than 85 percent Federal, State of Alaska, and borough land of various holdings, with the remainder on privately owned land (see FERC Resource Report No. 8, *Land Use, Recreation and Aesthetics*).

Environmental Setting

The corridor for the Alaska LNG Pipeline spans nine ecoregions including the Beaufort Coastal Plain, Brooks Foothills, Brooks Range, Kobuk Ridges and Valleys, Ray Mountains, Yukon-Tanana Uplands, Tanana-Kuskokwim Lowlands, Alaska Range, and Cook Inlet Basin. These regions host a variety of ecosystems including muskeg bogs, spruce upland forest, alpine and Arctic tundra, high brush, and bottomland spruce and poplar forests. The associated ecosystems support a variety of species which include grizzly and black bears, Arctic foxes, seals, caribou, moose, small terrestrial mammals, birds, and anadromous fish. A variety of marine mammals inhabit the coastal waters along the pipeline ROW, including the bowhead whale, polar bear, beluga whale, ringed seal, bearded seal, Stellar sea lion, harbor seal, ribbon seal and spotted seal. Some of these species are critical subsistence resources for Alaska Native peoples. For additional information see FERC Resource Report No.3, *Fish, Wildlife and Vegetation Resources*.

A detailed description of the Alaska LNG Pipeline ROW is included in Section 1.3.2.1 of FERC Resource Report No. 1, *General Project Description*. Supporting facilities are described in Section 1.3.2.1.3 and temporary construction infrastructure is described in Section 1.3.2.4 of FERC Resource Report No. 1, *General Project Description*. Baseline environmental conditions and the analysis of environmental effects resulting from construction and operation of the Alaska LNG Pipeline are addressed in the individual FERC Resource Reports which can be accessed by entering the FERC Docket Number "CP17-178" at https://elibrary.ferc.gov/IDMWS/common/OpenNat.asp?fileID=14562356 and then opening the Accession Number of the FERC filing for that Resource Report. Direct links to the Accession File for each Resource Report are given below:

a) Resource Report No. 1 (General Project Description) 20170417-5337.
https://elibrary.ferc.gov/idmws/file_list.asp?document_id=14561634

b) Resource Report No. 2 (Water Use and Quality) 20170417-5341.
https://elibrary.ferc.gov/idmws/file_list.asp?document_id=14561641

c) Resource Report No. 3 (Fish, Wildlife and Vegetation) 20170417-5351.
https://elibrary.ferc.gov/idmws/file_list.asp?document_id=14561657

d) Resource Report No. 4 (Cultural Resources) 20170417-5336.
https://elibrary.ferc.gov/idmws/file_list.asp?document_id=14561631

e) Resource Report No. 5 (Socioeconomics) 20170417-5338.
https://elibrary.ferc.gov/idmws/file_list.asp?document_id=14561635

f) Resource Report No. 6 (Geological Resources) 201704167-5338.
https://elibrary.ferc.gov/idmws/file_list.asp?document_id=14561635

g) Resource Report No. 7 (Soils) 20170417-5345.
https://elibrary.ferc.gov/idmws/file_list.asp?document_id=14561645

h) Resource Report No. 8 (Land Use, Recreation and Aesthetics) 20170417-5345.
https://elibrary.ferc.gov/idmws/file_list.asp?document_id=14561645

i) Resource Report No. 9 (Air and Noise Quality) 20170417-5345.
https://elibrary.ferc.gov/idmws/file_list.asp?document_id=14561645

j) Resource Report No. 10 (Alternatives) 20170417-5340
https://elibrary.ferc.gov/idmws/file_list.asp?document_id=14561638

k) Resource Report No. 11, (Reliability and Safety) 20170417-5342.
https://elibrary.ferc.gov/idmws/file_list.asp?document_id=14561642

Description of Special Permit Needs

As stated above, the Applicant is seeking exemption from the requirements for MLBV spacing requirements in 49 CFR 192.179 in Class 1 locations. Additional details on class locations for the Alaska LNG Pipeline can be found in FERC Resource Report No. 11, *Reliability and Safety*, Section 11.7.

The Alaska LNG Pipeline will traverse areas of high environmental value commonly used for outdoor recreation, sporting, and subsistence activities. It is possible that individuals could be in the vicinity of the pipeline even if there are 10 or fewer buildings intended for human occupancy located within 220 yards on either side of any continuous 1-mile length of pipeline. However, as the engineering analysis has shown, the proposed alternative to MLBV spacing will not expose these individuals or infrastructure to any risk greater than a 49 CFR Part 192 compliant design, as a result of additional mitigation measures designed to reduce risk to the public and nearby infrastructure.

III. Alternatives

An applicant requesting a special permit from PHMSA has the option of building a pipeline that will not require PHMSA to issue a special permit. This will require the design, construction, and operation of a pipeline in-compliance with all requirements of 49 CFR Part 192. Therefore, PHMSA's NEPA assessment is slightly different form other agencies in that the "No Action" alternative is not a "no build" alternative. Rather, the No Action alternative reflects a pipeline design that will not require issuance of a special permit. The "Proposed Action" alternative reflects the Applicant's increase of MLBV spacing for which a special permit with specific conditions will be issued. The two alternatives are described below.

No Action Alternative – Design, construct, operate and maintain the pipeline in compliance with 49 CFR Part 192. This will require MLBVs to be placed at intervals defined by 49 CFR 192.179(a)(4). A 20-mile maximum spacing is required in Class 1 locations.

Proposed Action Alternative – Design, construct, operate, and maintain the pipeline with MBLV spacing at longer intervals than allowed by 49 CFR 192.179(a)(4), and design, construct, operate, and maintain the pipeline in compliance with the MLBV spacing special permit conditions.

AGDC is requesting a special permit from PHMSA to allow for increased MLBV spacing, in low risk, Class 1 locations. This special permit contains conditions that will require enhanced monitoring of MLBVs with shorter valve activation times as compared to a design that is compliant to 49 CFR 192. The valves will include a combination of Remote Controlled Valves (RCV) and Automatic Shut-off Valves (ASV), both with pressure set points that will initiate automatic closure. In addition, the RCVs will be capable of remote operation (closure and opening) along with pressure monitoring, both upstream and downstream of the valve that is reported to a pipeline control center. Due to the faster response and the valves, any failure will result in equivalent gas release for the first 17.5 minutes following the failure. Thereafter, the shorter valve closure times required in the special permit will result in less gas released and lower thermal radiation factors. The below Figure 1A shows RCV and ASV closure times versus manual valve closure times.

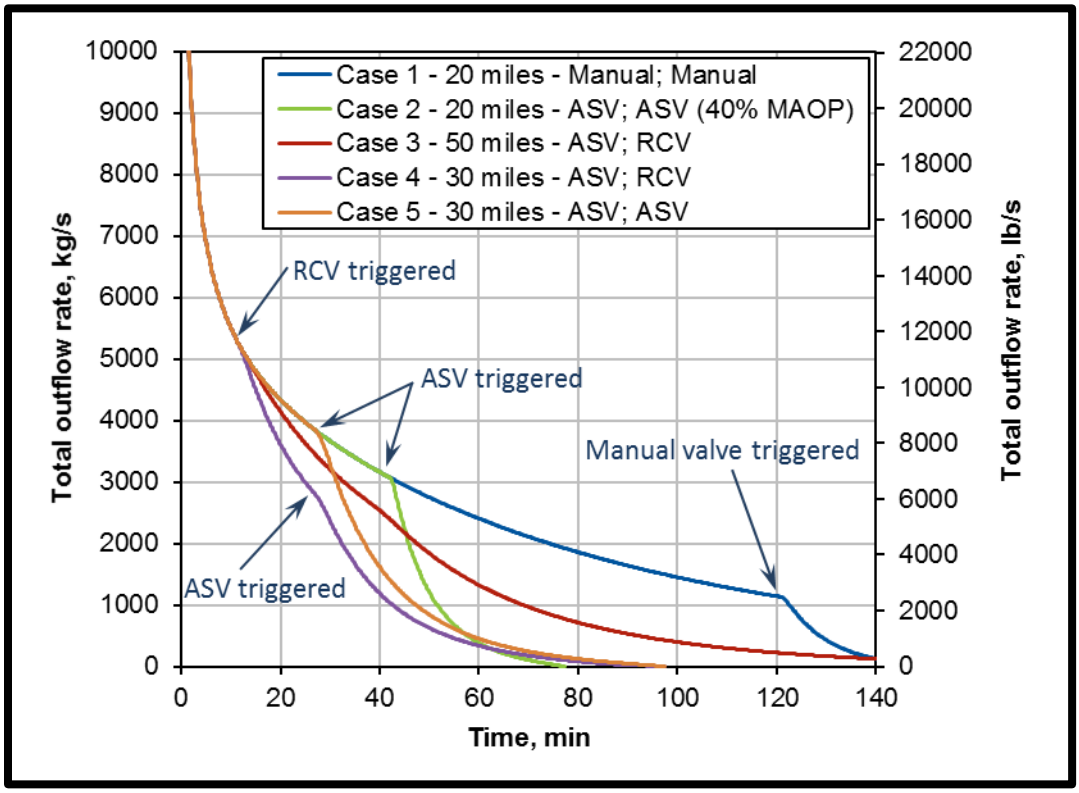

Figure 1A – Gas Outflow as a Function of Time

The special permit conditions are designed to provide for equal or greater pipeline safety than a pipeline constructed in accordance with 49 CFR Part 192.

a. Explain what the special permit application asks for.

The special permit will increase MLBV spacing up to 50 miles north of Fairbanks and 30 miles South of Fairbanks from the requirement in 49 CFR 192.179(a)(4), which requires MLB spacing of up to 20 miles in Class 1 locations.

i. *Cite regulation(s) for which special permit is sought in accordance with 49 CFR 190.341:*

49 CFR 192.179(a)(4).

ii. *Explain/summarize how the design/operation/maintenance of the pipeline operating under the special permit would differ from the pipeline in the no action alternative.*

There will be two (2) types of MLBVs utilized for line break detection and sectionalization: RCVs will be installed at all powered locations (i.e. compressor and heater stations), and ASVs will be installed at other locations. The ASVs will

automatically close based on either a pressure set point of 75% of the operating pressure at the valve location based upon maximum flow model gradients, or a decrease in operating pressure over a fifteen (15) minute period that is greater than approximately 10%, as these conditions will likely indicate a line break. Functionality will be added to the RCVs to allow the pipelines gas control center to remotely close these valves in an emergency when deemed safe to do so. The ASVs will close based on the 75% of maximum operating pressure (MOP) at the valve location based upon maximum flow model gradients. In addition, ASV set points shall not be less than that required to actuate the valve before a downstream RCV. Once activated, both types of valves will close in less than one (1) minute. Approximate closure times and gas release volumes for each valve-to-valve section are presented in Table 1 – MLBV Locations. These requirements are intended to result in a reduction of valve closure actuation times as compared to a 49 CFR Part 192 compliant design. Real time monitoring of the RCVs via the Supervisory Control and Data Acquisition (SCADA) system will be performed at the Alaska LNG Pipeline Control Center. Additional detail on the requirements for design, construction, and operation is provided in Section VII of this document and the special permit conditions.

iii. ***Applicant*** *should include the pipeline stationing and mile posts (MP) for the location or locations of the applicable* ***special permit segment(s)***

Details of the MLBV locations are presented in Table 1 – MLBV Locations. Maps showing the MLBV locations and other information are presented in Figure 2 and Figure 3.[3]

Table 1 MLBV Locations

MLBV #	MP	ΔMP	Location Description	Valve Type	Approximate Closure Time (minutes)[4]	Approximate Mass of Gas Released (tons)[5]
1	0.00		GTP Meter Station	RCV	10.7	14,600
2	36.74	36.74	Stand-alone MLBV - Potential Station	ASV	28.6	14,600
					29.9	15,300

[3] Estimated time to begin activation of a manual mainline valve, if the "No Action Alternative" is selected, is two hours with another 30 minutes to close the valve.

[4] Closure time is the total time measured from leak detection to complete valve closure and full interruption of flow.

[5] The mass of gas released is based on a rupture occurring between the adjacent valves using the closure times of the upstream and downstream valves. Based on the Alaska LNG Pipeline gas composition, there are 45,148 cubic feet per ton.

Table 1 MLBV Locations

MLBV #	MP	ΔMP	Location Description	Valve Type	Approximate Closure Time (minutes)[4]	Approximate Mass of Gas Released (tons)[5]
3	75.97	39.23	Compressor Station - Sagwon	RCV	10.7	15,300
					10.7	14,400
4	112.04	36.07	Stand-alone MLBV - Potential Station	ASV	28.3	14,400
					28.5	14,500
5	148.51	36.47	Compressor Station - Galbriath Lake	RCV	10.7	14,500
					10.7	17,000
6	194.09	45.58	Stand-alone MLBV - Potential Station	ASV	33.1	17,000
					33.3	14,600
7	240.10	46.01	Compressor Station - Coldfoot	RCV	10.7	14,600
					10.7	17,100
8	286.05	45.95	Stand-alone MLBV - Potential Station	ASV	33.3	17,100
					33.6	17,200
9	332.64	46.59	Compressor Station - Ray River	RCV	10.7	17,200
					10.7	16,900
9A	356.22	23.58	Added for potential "Hotspot Café" HCA	ASV	20.5	11,300
					23.7	11,500
10	377.95	21.78	Stand-alone MLBV - Potential Station	ASV	32.9	16,900
					32.1	16,500
11	421.56	43.61	Compressor Station - Minto	RCV	10.7	16,500
					10.7	10,200
12	444.90	23.34	Stand-alone MLBV	ASV	21.8	10,200
					20.4	11,200
13	467.10	22.20	Stand-alone MLBV - Potential Station	ASV	20.4	11,200
					22.7	12,700
14	492.96	25.86	Stand-alone MLBV	ASV	22.7	12,700
					22.5	10,700
15	517.62	24.66	Compressor Station - Healy	RCV	10.7	10,700
					10.7	7,800
16	534.79	17.17	Upstream of Class 3 Location - Nenana Canyon	ASV	18.7	7,800
					9.3	2,300
17	538.79	4.00	Downstream of Class 3 Location - Nenana Canyon	ASV	9.3	2,300
					11.6	4,400
18	546.50	7.71	Stand-alone MLBV - Potential Station	ASV	11.6	4,400
					22.6	12,700
19	572.23	25.73	Stand-alone MLBV	ASV	22.6	12,700

Table 1 MLBV Locations

MLBV #	MP	ΔMP	Location Description	Valve Type	Approximate Closure Time (minutes)[4]	Approximate Mass of Gas Released (tons)[5]
					22.7	10,800
20	597.35	25.12	Compressor Station - Honolulu Creek	RCV	10.7	10,800
					10.7	12,000
21	625.83	28.48	Stand-alone MLBV	ASV	24.4	12,000
					20.5	11,300
22	648.16	22.33	Stand-alone MLBV - Potential Station	ASV	20.5	11,300
					23.7	11,500
23	675.24	27.08	Compressor Station - Rabideux Creek	RCV	10.7	11,500
					10.7	12,000
24	703.67	28.43	Stand-alone MLBV - Potential Station	ASV	24.4	12,000
					20.5	11,300
25	725.93	22.26	Stand-alone MLBV - Potential Station	ASV	20.5	11,300
					21.8	10,100
26	749.11	23.18	Heater Station - Theodore River	RCV	10.7	10,100
					10.7	7,700
27	766.01	16.90	Upstream of Cook Inlet crossing	ASV	18.6	7,700
					23.6	13,300
28	793.34	27.33	Downstream of Cook Inlet crossing	RCV	23.6	13,300
					10.9	3,700
29	799.85	6.51	Stand-alone MLBV - Potential Class 2 Location	RCV	10.9	3,700
					13.4	3,300
30	806.57	6.72	LNG Meter Station	RCV	10.7	3,300

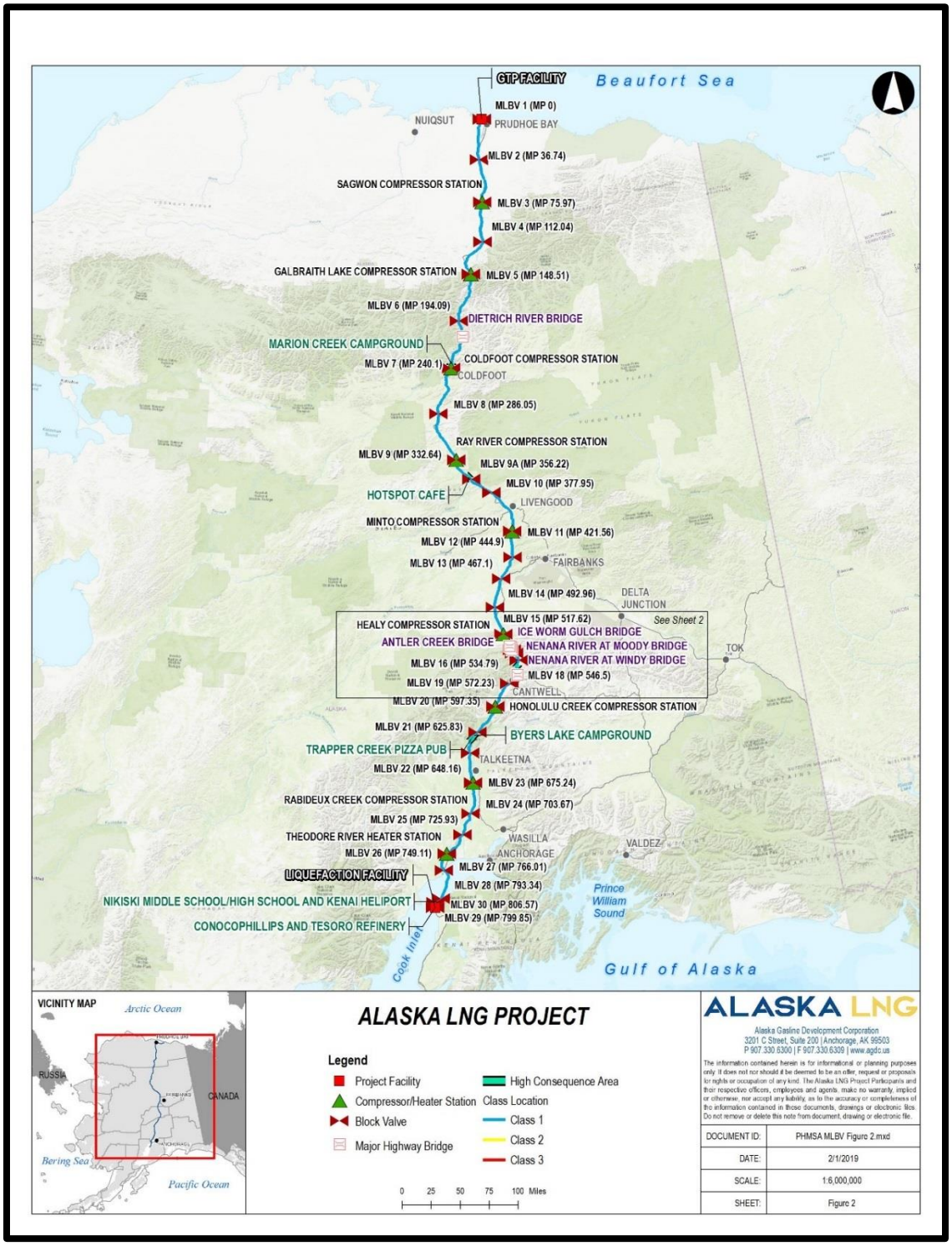

Figure 2: Valve Location Map

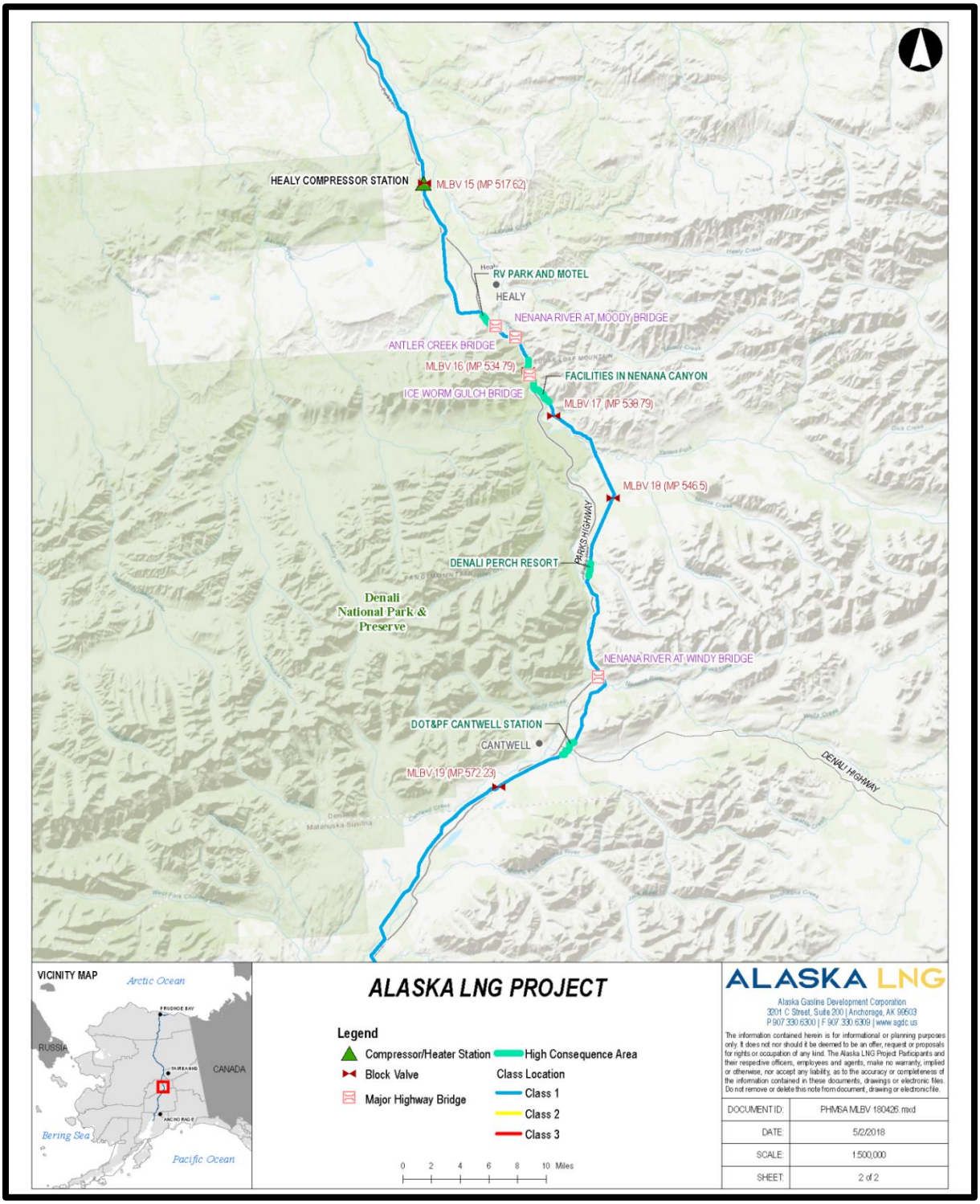

Figure 3: Valve Location Map (Nenana Canyon)

i. *Mitigation Measures*

Additional mitigation measures are addressed in Section VIII of this document and the special permit conditions.

RCVs and ASVs to be used on the Alaska LNG Pipeline are identical in material and construction but differ with respect to the logic systems within the valve actuators connected to the valves. In both cases, the RCVs and ASVs will be large diameter ball valves meeting API 6D requirements and will be controlled by valve actuators. The valve actuators are gas-hydraulic powered, using line gas pressure to open/close the valves. The ASV's will be configured to close automatically, utilizing energy stored in the valve actuator, when the gas pressure in the pipeline is below the valve close set point. An auxiliary device, such as a hand pump, may be required to reopen a valve after a closure event. RCV's will be shut-in from the gas control center.

The ASVs use mechanical systems to constantly compare the line pressure on either side of the valve to a pre-set value (75% MOP for the Alaska LNG Pipeline) and should the line pressure drop below this set point the valve will close. The use of purely mechanical and hydraulic systems for ASVs means they can operate without the need for electrical power in the event of a line break.

Actuators on RCVs will include the same internal mechanical/hydraulic logic systems as the ASVs but will additionally incorporate power-controlled solenoids (switches) to signal the valve to close when a computer-controlled system sends an alternate signal to the valve based on other criteria. AGDC will implement procedures that a decrease in operating pressure over a fifteen (15) minute period of greater than approximately 10% MOP will cause mainline valves to be closed to isolate the applicable pipeline segment. RCVs can also be closed by a signal from the pipeline control center should the need arise, such as when an observation of a leak or rupture[6] is reported.

IV. Environmental Impacts of Proposed Action and Alternatives

a. Describe how a small and large leak/rupture to the pipeline could impact safety and the environment/human health.

[6] Definitions for "leak" or "rupture" vary. However, the project defines a "leak" as a release from a stable through-wall defect, and "rupture" as a release where the defect expands under the influence of the applied stress after become through-wall.

Potential impacts of small and large pipeline leaks/ruptures to the environment/human health apply equally to the Proposed Action and No Action alternatives because:

i. Any discussion of the consequence of a leak or rupture must be put into the context of its probability. It is highly unlikely a leak or rupture occurring over the Alaska LNG Pipeline Class 1 locations will impact the environment or human health for the following reasons:

a) Remoteness of the pipeline route: more than 99% of the Alaska LNG Pipeline route is in Class 1 location (801 miles of 806.6 miles). The frequency of incidents is significantly less for pipelines in Class 1 locations than in Class 2, 3 or 4. Specifically, the number of incidents per 1,000 mile-years in Class 1 locations was 0.15 as compared with 0.24 and 0.65 for Class 2 and Class 3 and 4 locations, respectively.[7] The lower incident rate in Class 1 locations is attributed to fewer incidences of outside force damage in these lesser populated areas.

b) Resilience to third party mechanical damage: given the planned thickness of the pipe wall, there is very low risk of mechanical damage. Fracture mechanics calculations based on the mechanical properties of the pipe material and operating conditions of the pipe have shown the pipe is very resistant to puncture and fracture, capable of withstanding a through wall thickness flaw of greater than 4 inches in length without rupturing.

c) Very low probability of corrosion damage: The Alaska LNG Pipeline will be transporting a dry, LNG specification gas, which will contain no significant quantities of the microbial species required to cause corrosion: water (< 0.1 lbs./MMSCF), CO_2 (<50 ppmv) and H_2S (≤4 ppmv). With these low impurity contents, a corrosive liquid water phase will not form inside the pipeline. Therefore, the probability of internal corrosion is minimal. To ensure the integrity of the pipeline, the in-line inspection program will comply with the robust requirements of 49 CFR 192.620(d)(9) and (10). External corrosion will be mitigated by using a high-integrity coating with a cathodic protection system.[8]

d) Compliance with Alternative MAOP requirements: the entire Alaska LNG Pipeline will be operated and maintained per 49 CFR 192.620, which

[7] Eiber, R., and Kiefner, J. 2010. Review of Safety Considerations for Natural Gas Pipeline Block Valve Spacing. ASME Standards Technology, LLC. Columbus. July.

[8] See Alaska LNG Pipeline FEA for special permit request for use of 3LPE Coating. [Docket PHMSA-2017-0046 at www.regulations.gov]

establishes robust operational requirements. Additionally, more than 615 miles of the total Mainline length, to include Alternative MAOP and SBD segments, will also comply with 49 CFR 192.112 and 192.328, which, respectively, establish robust design and construction requirements.

e) AGDC performed an engineering study that considered requirements from ASME B31.8 § 846.1 for block valve spacing, including consideration of "the amount of gas released due to repair and maintenance blowdowns, leaks, or ruptures." The analysis results, summarized in Attachment D - Main Line Block Valve Spacing Technical Support document, suggest "that increased valve spacing could be implemented in remote, low population density areas without affecting safety" because, as the thermal radiation analysis demonstrated, there is a negligible difference in the potential consequence to people in Class 1 locations, where there is an extremely low density of buildings intended for human occupancy. Incident prevention (decreasing probability of rupture) is better controlled through other practices, such as design for fracture resistance and control, and robust integrity management practices that include in-line inspections.[9]

ii. A small leak from a buried pipeline would result in a much slower release of gas than a full-bore rupture, with the total amount of gas released being dependent on the time it takes for the leak to be detected and fixed. Small leaks would be identified through a variety of techniques, such as routine surveillance, pipeline inspection programs, and mass balance systems incorporated in gas pipeline control. These identification techniques are not impacted by mainline block valve spacing. Gas from a small leak would permeate up through the pipeline backfill material (soil) before dissipating into the air. An individual small leak is not a significant source of methane emissions, although such leaks in the aggregate can be. Also, small gas pipeline leaks may result in some impacts to, or loss of, surrounding vegetation. This localized browning of vegetation can facilitate identification of small underground leaks during ROW inspection, which will be performed at intervals not exceeding 45 days but a least 12 times each calendar year per 49 CFR 192.620(d)(4). The rate at which gas is lost, and total volume of gas lost from a small leak is independent of valve spacing and is more contingent on identification timelines. The environmental impacts caused from a small leak are the same in both the Proposed Action and No Action alternatives.

[9] See Alaska LNG Pipeline FEA for special permit request for Crack Arrestor Spacing. [Docket PHMSA-2017-0047 at www.regulations.gov].

iii. A pipeline rupture would result in the rapid release of a large volume of natural gas, resulting in significant damage to the pipeline and creating a trench or crater in the immediate vicinity of the rupture. If an ignition source is present, an intense fire or explosion would result. Damage from a fire resulting from a pipeline rupture would depend on the extent of the combustible materials in the vicinity (infrastructure, vegetation) and local environmental conditions (e.g., rain, snow cover, etc.). A thermal radiation intensity of approximately 4,750 Btu/hr-ft^2 (15 kW/m^2) will result in piloted ignition of nearby wooden structures. The calculated distance to this isotherm from an ignited rupture is approximately 1,700 feet after 30 seconds, and quickly diminishes. This distance is roughly equivalent to the calculated potential impact radius (PIR) of the pipeline. Thus, wooden structures within this distance (PIR) may ignite. Structures constructed of other materials (e.g. steel) would not be seriously affected within this distance. Human exposure to a fire within the PIR could result in serious injury or death; however, the probability for human injury or fatality, and property damage, is relatively small due to the remoteness of the pipeline. The risk to people and environmental resources decreases as distance from the rupture increases. The pipeline will be sectionalized with MLBVs and the gas released during a rupture scenario would be, limited to the gas volume between valves, once the valves have fully closed. This amount of gas volumes and pressures would determine the duration of the fire. For more information, see Table 1, Table 2, and Attachment D - of the special permit application. The spacing between the block valves is the subject of this special permit. Large ruptures would be detectable through monitoring of pressure and flow conditions at pipeline facilities and the MLBVs via the SCADA system.

*b. Submit an explanation of **delta/difference** in safety and possible effects to the environment between the 49 CFR Part 192 baseline (Code baseline) and usage of the proposed special permit conditions for MLBV spacing mitigation measures.*

i. The anticipated differences in effects for individual resources between the No Action alternative and the Proposed Action alternative are discussed below. References are made to FERC Resource Reports, where applicable, for further detailed information and analysis of impacted resources. The basis for the FERC Resource Reports is the Proposed Action alternative; however, the associated environmental impact analysis is also applicable to the No Action alternative, given both alternatives are based on below ground design and installation, and both follow an identical route.

1. Human Health and Safety

The impacts to human health and safety, and related infrastructure, due to the rupture and ignition event are similar with respect to the Proposed Action and No Action alternatives since, assuming ignition occurs, the thermal radiation released is identical between the 20 and 50 miles spacing cases for approximately 17.5 minutes because of the identical gas flow rate from the pipeline. As stated previously, it is within the initial period (seconds to minutes) immediately following pipeline rupture when most injuries and fatalities occur, as this is when the thermal radius is at its largest, but quickly dropping after the initial rupture. With this initial period being equal in both the Proposed Action and No Action alternatives, there are no differential safety risks.

However, the installation and operation of RCVs and ASVs in accordance with the special permit conditions will reduce the total duration and quantity of gas release when compared with a design in compliance with 49 CFR 192.179 or 192.620 (see Tables 5 and 6 in Attachment D - Main Line Block Valve Spacing Technical Support).

With respect to the impacts of the total rupture event (including the timeline beyond the initial 17.5 -minute window discussed above), the published rupture analysis report evaluating the impact of increased sectionalizing valve spacing further outlines that the total threshold thermal dosage (accumulated amount of damaging heat) is equivalent in all sectionalizing valve spacing cases examined.

2. Air Quality

There will be no significant difference during construction or operation in emissions between the No Action and Proposed Action alternatives. Most of the heavy equipment required for construction in either alternative will be the same, including equipment such as brushers and bulldozers for the clearing and leveling of the ROW, trucks for transporting pipe, and side booms and welding trucks for pipe placement and welding.

In the unlikely event of a pipeline rupture or leak, fewer MLBVs could result in more gas outflow because the pipeline mileage between valves will be greater and contain more gas. On the other hand, for a rupture or leak large enough to depressurize the pipeline and trigger valve closure, as shown in the supporting documentation and due to the special permit conditions related to use of RCVs and ASVs, the Proposed Action alternative will result in 31% less average gas outflow for the system per segment than the No Action alternative. This

highlights the importance of more responsive valve functionality (RCV and ASV) defined in the special permit conditions, which positively offsets larger pipeline segments due to longer MLBV spacing. The lower gas outflow also results in shorter duration of an ignited rupture and less total thermal radiation over the entire period of the rupture event than a system designed in compliance with 49 CFR Part 192.

Should there be an operational requirement to evacuate a pipeline section, (i.e. for maintenance reasons), there will be an incremental increase of greenhouse gas emissions based on the Proposed Action alternative design if the gas were directly vented, due to the increased volume between MLBVs that sectionalize the line. However, for operational events, if the special permit is granted, AGDC will employ several emissions reduction strategies, such as the following examples: gas drawdown strategies, voiding the pipeline of as much gas as possible before blowdown is initiated, and use of passive blocks (e.g. stopples) to significantly limit the volume of gas released to atmosphere. AGDC's commitment to utilize these emissions reduction strategies will mitigate or eliminate any increase in greenhouse gas or pollution emissions between the Proposed Action and No Action alternatives.

Pipeline maintenance activities for both the No Action and Proposed Action alternatives will require similar equipment and personnel. This comparison will apply equally to pollutant and greenhouse emissions.

A reduced number of MLBVs for the Project Action alternative will reduce the fugitive emissions sources of greenhouse gases.

A detailed description of air emissions, including greenhouse gas emissions, from pipeline construction and operations are contained in FERC Resource Report 9 (Air and Noise Quality).

3. Aesthetics

There will likely be a reduced aesthetics impact with the Proposed Action alternative as increased MLBV spacing will result in fewer valves and thus fewer overall pipeline facilities.

4. Biological Resources (including vegetation, wetlands, and wildlife)

There will be no significant difference in impacts to vegetation, wetlands and wildlife between the between the No Action and Proposed Action alternatives.

Based on calculations of accumulated thermal radiation dosage (function of thermal radiation intensity and time, see Attachment D - Main Line Block Valve Spacing Technical Support for more detail), MLBV spacing has no effect on piloted ignition of wooden structures for over an hour. This should correlate to similar effects on vegetation. Both of the Alaska LNG Pipeline alternatives for the consideration of this special permit application will be below ground and follow the same route. Fewer valves, under the Proposed Action alternative, may result in slightly less disturbance of or impact to biological resources on the right of way.

FERC Resource Report 3 (Fish, Wildlife and Vegetation) contains descriptions of vegetation and wildlife resources, and potential impacts associated with the Alaska LNG Pipeline route. FERC Resource Report 2 contains a detailed analysis of wetlands affected by the Alaska LNG Pipeline route and mitigation of the impacts. The extent of impacts to biological resources will be similar or identical under the No Action and Proposed Action alternatives.

5. Resilience and Adaptation

The potential effects of a changing climate on the Alaska LNG Pipeline design, construction, and operation are not expected to differ between the No Action and Proposed Action alternatives. Project design criteria incorporated consideration of a range of variable site conditions that could occur based upon historic information and future conditions. Mitigations are integrated into the design where appropriate or required for facility integrity and safe operations. Opportunities for resilience and adaptation to potential weather effects will be considered in the design of the Alaska LNG Pipeline. For example, geothermal modeling will be used to assess potential changes in ground temperatures that could be caused by longer-term geothermal impacts of pipeline construction, operations, and changes in climate. Other resilience and adaptation design considerations for the Alaska LNG Pipeline are addressed in FERC Resource Report No. 1.

FERC Resource Report 9 (Air and Noise Quality) discusses greenhouse gas emissions from the pipeline.

6. Cultural Resources

There will be no difference in the effect on Cultural Resources between the No Action and Proposed Action alternatives. Construction activities have the potential to affect cultural resources. Ground-clearing activities under both

alternatives will be similar. FERC is conducting the Section 106 consultation process with stakeholders that will lead to the development of a Programmatic Agreement to address management and recovery of known cultural resources and any discovered during construction. The Programmatic Agreement will apply to both the No Action and Proposed Action alternatives to mitigate effects on those resources. FERC Resource Report 6 (Cultural Resources) addresses cultural resources affected and associated mitigations.

7. Environmental Justice

Since both pipeline designs will be sited in the same footprint, there will be no difference in effects on environmental justice resulting from construction or operation of the pipeline between the No Action and Proposed Action alternatives.

8. Geology, Soils and Mineral Resources

There will be minimal differences in the effects on geology, soils and mineral resources between the No Action and Proposed Action alternatives. Construction activities have the potential to affect soils in a localized manner with minimal effect on regional geology or mineral resources. Construction activities that could contribute to erosion include clearing and grading, excavation trenching, stockpile management, backfilling, and the development of gravel pads. AGDC manages erosion impacts with the use of erosion and sediment control measures, including:

a) The use of winter construction in areas of inundated and frozen ground conditions;

b) Use of settlement basins, silt fences, and other Best Management Practices (BMP) for storm water control;

c) Use of engineered flow diversions and slope breakers to control water flow on slopes and around water courses; and

d) Installation of trench breakers to address storm and groundwater flow through the trench backfill or during construction.

Construction, operations, and maintenance activities along the pipeline right-of-way will be similar for the No Action and Proposed Action alternatives. All excavations will be conducted as authorized under the applicable ROW authorization. As the land management agencies responsible for lands along the pipeline route, ROW permits will be issued by the Bureau of Land Management

and/or the Alaska Department of Natural Resources. All excavations and other applicable activities will be permitted through the appropriate Federal and state agencies for both alternatives. Both alternatives will have similar impacts on soil resources.

FERC Resource Report 7 (Soils), contains a more detailed discussion of impacts to soils and erosion resulting from the pipeline construction and the potential mitigation measures to address those impacts. FERC also has a standard Upland Erosion Control, Revegetation and Maintenance Plan, to which AGDC has proposed alternative measures that will be subject to FERC approval.

9. Indian Trust Assets

No Indian Trust Assets or Native allotments are located within the pipeline route.

10. Land Use, Subsistence, and Recreation

There will be minimal difference in the effect on land use, subsistence, and recreation between the No Action and Proposed Action alternatives. During construction, land use in the form of subsistence activities and recreation for both alternatives could be altered in the immediate vicinity of the construction ROW. The pipeline's remote location combined with the relatively small width of the ROW will generally limit the extent of displacement by users to the active construction zones. Construction activities will be timed to avoid potential use conflicts with portions of the trail used during the annual Iditarod sled-dog race.

After construction, the ROW will be graded and revegetated to a stable condition in accordance with the FERC approved Alaska LNG Upland Erosion Control, Revegetation and Maintenance Plan; Alaska LNG Wetland & Waterbody Construction & Mitigation Procedures; and the associated Alaska LNG Project Restoration Plan. No long-term linear access along the pipeline alignment is proposed. Crossing of the ROW perpendicular to the pipeline is expected but use of the ROW itself as any type of access road is not proposed and in fact will be discouraged. However, under either alternative, PHMSA regulations will require that the pipeline ROW is brushed to prevent the growth of large vegetation over and around the pipeline to maintain a clearly defined ROW.

As shown in the supporting documentation in Attachment D - Main Line Block Valve Spacing Technical Support, in the unlikely event of a rupture, the special permit conditions require use of RCVs and ASVs, which will result in 31% less average gas outflow from the system per segment than strict compliance with 49

CFR Part 192. More responsive valve functionality (RCV and ASV) defined in the special permit conditions will positively offset larger pipeline segments due to longer MLBV spacing. The lower gas outflow resulting from more responsive valve functionality will result in shorter duration of an ignited rupture and less total thermal radiation than a system designed in full compliance with 49 CFR Part 192.

FERC Resource Report 8 (Land Use, Recreation and Aesthetics) considers potential effects to land use and recreation activities. FERC Resource Report 5 (Socioeconomics) considers potential impacts to subsistence.

11. Noise

During normal operations, there will be no difference in noise impacts between the two alternatives. The difference in noise impacts during pipeline blow down events should also be minimal.

12. Water Resources

There will be no difference in impacts to water resources between the No Action and the Proposed Action alternatives. For both alternatives, stabilization techniques, including gravel blankets, riprap, gabions, or geosynthetics, will be used to stabilize the channel bed and stream banks at stream crossings. Watercourse crossing methods for each watercourse crossing are the same for both alternatives. Most rivers and streams along the pipeline route will be crossed by an open-cut method during winter months. During these months, the flows of rivers and streams are lowest, and disturbance of the channel and stream bank can be minimized. Burial depths for crossings have been based on site specific calculations to avoid the potential for scour.

FERC Resource Report 2 (Water Use and Quality) contains a detailed discussion regarding the management of water during construction and operation of the pipeline, as well as impacts to ground, surface water flow and quality resulting from the construction and operation of the pipeline.

c. Describe safety protections provided by the proposed special permit conditions.

Several factors were taken into consideration. First, the Alaska LNG Pipeline route has been characterized for location of dwellings and structures in accordance with 49 CFR 192.5. Ninety-nine percent of the pipeline route is in Class 1 location, which is defined as having 10 or fewer buildings intended for human occupancy located within 220 yards on either side of any continuous 1-

mile length of pipeline. Route characterization has also determined that there are more than 700 miles of pipeline route crossing areas with no inhabited dwellings. Table 2 – Identified Sites and Structures within the Mainline PIR adjacent to Class 1 locations contains a list of mile posts where there are identified sites and structures that potentially could have human occupancy within 220 yards of the ROW. Given the geographic remoteness, robust size and grade of line pipe, unlikelihood of internal corrosion, and monitoring conditions imposed by the special permit, there is an extremely low probability that the pipeline will rupture.

The proposed special permit conditions, which are summarized in Section VII, result in less time between rupture and valve actuation, improved valve monitoring, and a resulting smaller quantity of natural gas released in the event of failure, and require more robust pipe to be placed in proximity to key infrastructure (e.g. key bridges identified by Alaska Department of Transportation & Public Facilities (ADOT&PF)).

d. *Explain the basis for the particular set of alternative mitigation measures used in the proposed special permit conditions. Explain whether the measures will ensure that a level of safety and environmental protection equivalent to compliance with existing regulations is maintained.*

The basis for the mitigation measures is the Alaska LNG Pipeline engineering analysis, combined with consultation with PHMSA and ADOT&PF. More details on these measures is provided in Section VIII. These measures help ensure that no significant environmental or human safety impact will result from increasing the MLBV spacing. The use of RCVs and ASVs allow for faster valve closure than will be achieved with valves meeting the minimum standard for strict 49 CFR Part 192 compliance. The use of more responsive valves mitigates the longer distances between valves proposed by the special permit.

e. *Discuss how the special permit would affect the risk or consequences of a pipeline leak, rupture or failure (positive, negative, or none). This would include how the special permits preventative and mitigation measures (conditions) would affect the consequences and socioeconomic impacts of a pipeline leak, rupture or failure.*

As highlighted in the Project's engineering and analysis as summarized in Attachment D - Main Line Block Valve Spacing Technical Support document, injuries and fatalities on gas transmission pipelines generally occur during the first 30 seconds after gas has been released from a pipeline. [11] In the event of an Alaska LNG Pipeline failure, there will be no difference in the volume of product released or in the likelihood of ignition in the first 17.5 minutes. The ASVs and RCVs will decrease the total product released and, therefore, the total thermal radiation.

f. Discuss any effects on pipeline longevity and reliability such as life-cycle and periodic maintenance including integrity management. Discuss any technical innovations as well.

The Proposed Alternative will result in reduced MLBV maintenance, with no overall impacts on pipeline longevity and reliability. Implementation of the special permit conditions will require enhanced monitoring of RCVs, ASVs, and more stringent valve actuation criteria than is normally required by 49 CFR Part 192.

g. Discuss how the special permit would impact human safety.

There will be no additional impact on human safety resulting from granting of the special permit.

h. Discuss whether the special permit would affect land use planning.

The special permit will not change land use planning processes. The ROW authorization requirements, and other land use planning notification processes will be the same with either the No Action or Proposed Action alternative. The Proposed Action alternative will require fewer valves along the ROW.

i. Discuss any pipeline facility, public infrastructure, safety impacts and/or environmental impacts associated with implementing the special permit. Discuss how any environmentally sensitive areas could be impacted.

Implementation of the special permit will reduce the number of MLBVs and associated valve station footprints by about half. The footprint at remote MLBVs (ASVs or RCVs) extends beyond the normal permanent ROW, affecting approximately 0.07 acres. The special permit will reduce the number of MLBVs by 22, resulting in approximately 1.6 acres less disturbance. The special permit will require a more robust pipeline design within proximity of key bridges resulting in a positive impact to public infrastructure. There is no impact to environmentally sensitive areas.

V. Response to Public Comments Placed on Docket PHMSA-2017-0045

PHMSA published a Notice of Availability in the Federal Register on May 28, 2019 for four (4) special permit requests for the line pipe of the Alaska LNG Pipeline. (84 FR 24594, Docket Nos.: PHMSA-2017-0046, Usage of 3LPE Coating; PHMSA-2017-0044, Usage of Strain Based Design; PHMSA-2017-0045, Alternative Mainline Block Valve Spacing; and PHMSA-2017-0047, Usage of Crack Arrestor Spacing at www.Regulations.gov). PHMSA requested comment on the special permit applications, the draft permit conditions, and the draft environmental analyses. The public notice comment period ended on July 29, 2019, with all comments received through July 29, 2019, being reviewed and considered. PHMSA

received a public comment concerning usage of fossil fuels, the building of the Alaska LNG Pipeline, and the building of a liquified natural gas (LNG) facility. PHMSA does not have siting authority over pipeline facilities. The public comment received did not submit concerns directed towards the special permit, the environmental assessment, or the special permit conditions, which were the issues within PHMSA's decision making authority and the intent of the public notice.

VI. Finding of No Significant Impact

Although technically distinct, PHMSA considered the combined impacts and safety risks associated with the issuance and implementation of the special permits, including the special permit conditions, for usage of three-layer polyethylene (3LPE) coating, usage of strain based design, alternative spacing of mainline block valves, and alternative spacing of crack arrestors. PHMSA finds that special permits and associated special permit conditions will not impose a significant impact on the human environment. The special permit conditions are designed to be consistent with pipeline safety and to ensure the same or a greater level of safety as will be achieved if the pipeline were designed, constructed, operated, and maintained in full compliance with 49 CFR Part 192.

VII. Consultation and Coordination

a. *Please list the name, title and company of any person involved in the preparation of this document.*

- **PHMSA** –Amelia Samaras (Senior Attorney), Steve Nanney (Engineer), Joshua Johnson (Engineer)
- **Alaska Gasline Development Corporation** – Frank Richards (Senior Vice President)
- **Alaska LNG LLC** – Rick Noecker (PHMSA Filing Coordinator), Mario Macia (Pipeline Technology Lead), Norm Scott (ERL Advisor)
- **Michael Baker International** – Keith Meyer (Senior Pipeline Advisor), Paul Carson (Corporate Pipeline Engineer)

b. Please provide names and contact information for any person or entity you know will be impacted by the special permit. PHMSA may perform appropriate public scoping. The applicant's assistance in identifying these parties will speed the process considerably.

Adjacent landowners/land managers potentially impacted:

Cook Inlet Region, Inc.
Jason Brune
Sr. Director, Land and Resources

PO Box 93330
Anchorage, AK 99509
(907) 263-5104

Bureau of Land Management
Earle Williams
Chief, Branch of realty and Conveyance Services
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Alaska Department of Natural Resources
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Don Striker
Superintendent
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PO Box 9
Denali Park, AK 99755-0009
(907) 683-9532

c. *If you have engaged in any stakeholder or public communication regarding this request, please include information regarding this contact.*

Alaska LNG has been active in stakeholder engagement throughout Alaska. As well, Federal, state and local agency engagement is ongoing. In 2015 and 2016,

Alaska LNG Pipeline held one-on-one as well as multiagency engagement meetings to cover pipeline design construction and routing. Additionally, there have been over 20 engagement meetings between Alaska LNG and PHMSA. The MLBV spacing special permit was a topic of discussion at multiple meetings. Additionally, an overview of this special permit was provided at a joint meeting with PHMSA and FERC on April 19, 2016.

PHMSA has participated in scoping and public outreach lead by FERC related to the Alaska LNG Pipeline FERC Resource Reports. Details of the public outreach, which included both members of tribal entities and the general public, are provided in Sections 1.9 and Appendix D of the FERC Resource Report 1.

VIII. Bibliography

Alaska LNG Project. 2017a. FERC Resource Report No. 1 (General Project Description)[10]

Alaska LNG Project. 2017b. FERC Resource Report No. 2 (Water Use and Quality)

Alaska LNG Project. 2017c. FERC Resource Report No. 3 (Fish, Wildlife, and Vegetation)

Alaska LNG Project. 2017d. FERC Resource Report No. 4 (Cultural Resources)

Alaska LNG Project. 2017e. FERC Resource Report No. 5 (Socioeconomics)

Alaska LNG Project. 2017f. FERC Resource Report No. 6 (Geological Resources)

Alaska LNG Project. 2017g. FERC Resource Report No. 7 (Soils)

Alaska LNG Project. 2017h. FERC Resource Report No. 8 (Land Use, Recreation, and Aesthetics)

Alaska LNG Project. 2017i. FERC Resource Report No. 9 (Air and Noise Quality)

Alaska LNG Project. 2017j. FERC Resource Report No. 10 (Alternatives)

Alaska LNG Project. 2017k. FERC Resource Report No. 11 (Reliability and Safety)

Eiber, R., and Kiefner, J. 2010. Review of Safety Considerations for Natural Gas Pipeline Block Valve Spacing. ASME Standards Technology, LLC. Columbus. July.

IX. Conditions: Example of what special permit (SP) conditions address

[10] Alaska LNG Project FERC Resource Reports are available for review at: https://alaska-lng.com/regulatory-process/ferc-application-exhibits/resource-reports/.

a) Spacing will only be increased beyond 49 CFR Part 192 limits in Class 1 locations. The maximum spacing north of Fairbanks will be 50 miles, while the maximum spacing south of Fairbanks will be 30 miles.

b) MLBVs will be placed as close as reasonably possible to the start and end mileposts in Class 2, 3 and 4 locations and will not exceed the spacing requirements of 49 CFR 192.179(a).

c) An engineering analysis must be performed to confirm that the number and location of MLBVs proposed in the special permit account for the criteria in Section 846.1.1 of ASME B31.8.

d) Enhanced valve closure criteria that will initiate valve closure when either of the following conditions occurs:

   - Pressure drops to 75% of the operating pressure at the sectionalizing mainline valve based upon maximum flow model gradients for the upstream compressor station discharge at MOP (2050 psig). In addition, ASV set points shall not be less than that required to actuate the valve before a downstream RCV actuates.
   - Decrease in operating pressure in fifteen (15) minutes is greater than 10%.

e) Real time monitoring at the Pipeline Control Center of MLBVs located at compressor, heater and metering stations (RCVs).

f) In high consequence areas (49 CFR 192.905) in Class 1 and 2 locations, sectionalizing block valve spacing must comply with the requirements of 49 CFR 192.179(a).

g) Emergency closure drills simulating shutting down of a randomly selected section of transmission line will be performed at least once in a calendar year, but within an interval not to exceed 15 months. The operator may conduct a table-top emergency closure drill to meet this requirement for no more than two out of each three calendar years. The operator will conduct a site-specific emergency closure drill at a field site at least once in every three calendar years.

h) Pipeline control room operators will immediately and directly notify the 911 emergency call center(s) for the affected communities and jurisdictions, when a rupture is indicated.

i) Valve position and operational status of all RCVs affected by a leak/rupture event until positive isolation of the effected segment is confirmed will be continually monitored by pipeline control center operators.

j) An emergency response plan will be developed:

- identifying the appropriate public safety access point (911 emergency call center), fire, police, and other public officials to be notified;
- identifying responsibility, resources, jurisdictional area, and emergency contact telephone numbers for both local and out-of-area calls of each government organization that may respond to a pipeline emergency; and
- establishing protocols for informing the officials about the operator's ability to respond to the pipeline emergency and means of communication.

k) Detailed maintenance procedures will be developed for all MLBV and operators installed on the Mainline. These procedures will follow manufacturer recommendations and industry practice.

l) Detailed maintenance procedures will be developed for all pressure sensing equipment installed with the MLBV. These procedures will follow manufacturer recommendations and industry practice.

m) A training program will be implemented for appropriate operating personnel to ensure they have a thorough knowledge of, and are qualified to implement, the emergency response plan procedures.

Table 3 – Identified Sites and Structures within the Mainline PIR adjacent to Class 1 Locations [See MLBV Locations in Table 1]

Milepost	Offset Distance (feet)	Direction	Class Location	Feature	Comment
80.66	693	Left	1	Structure	
174.78	363	Left	1	Structure	DOT/PF Garage
174.85	288	Left	1	Structure	
174.86	296	Left	1	Structure	
174.86	335	Left	1	Structure	
174.87	542	Left	1	Structure	
174.90	452	Left	1	Structure	
175.12	571	Left	1	Structure	
236.12	1450	Left	1	Structure	
236.12	494	Left	1	Structure	
236.12	542	Left	1	Structure	
236.12	547	Left	1	Structure	
236.68	867	Left	1	Identified Site	Marion Creek Campground
241.06	1364	Right	1	Structure	
310.41	760	Right	1	Structure	
310.42	821	Right	1	Structure	
352.79	603	Left	1	Associated Structure to Identified Site	Hotspot Cafe
352.80	638	Left	1	Identified Site	Hotspot Cafe
358.41	619	Right	1	Structure	
438.83	215	Left	1	Structure	
438.96	1324	Left	1	Structure	
438.98	966	Left	1	Structure	
439.14	938	Left	1	Structure	
439.20	514	Left	1	Structure	
439.20	872	Left	1	Structure	
439.21	1191	Left	1	Structure	
439.26	607	Left	1	Structure	
439.27	1203	Left	1	Structure	
439.31	971	Left	1	Structure	
469.64	589	Left	1	Structure	
469.69	983	Left	1	Structure	
469.70	1014	Left	1	Structure	
469.70	927	Left	1	Structure	
470.69	1194	Right	1	Structure	
470.69	833	Right	1	Structure	
470.69	750	Right	1	Structure	
470.71	302	Right	1	Structure	
470.71	412	Right	1	Structure	
471.40	1025	Right	1	Structure	
471.42	701	Right	1	Structure	
471.86	75	Left	1	Structure	
471.95	352	Right	1	Structure	

Table 3 – Identified Sites and Structures within the Mainline PIR adjacent to Class 1 Locations [See MLBV Locations in Table 1]

Milepost	Offset Distance (feet)	Direction	Class Location	Feature	Comment
471.96	252	Left	1	Structure	
471.97	662	Right	1	Structure	
471.97	418	Left	1	Structure	
471.97	399	Right	1	Structure	
471.97	208	Left	1	Structure	
471.98	242	Left	1	Structure	
472.04	535	Right	1	Structure	
472.28	754	Right	1	Structure	
472.33	564	Right	1	Structure	
472.34	651	Right	1	Structure	
472.35	577	Right	1	Structure	
472.37	597	Right	1	Structure	
472.38	710	Right	1	Structure	
497.83	1396	Right	1	Structure	
497.84	1210	Right	1	Structure	
497.88	1447	Right	1	Structure	
498.76	1157	Right	1	Structure	
501.37	941	Right	1	Structure	
502.73	1385	Right	1	Structure	
504.24	1396	Right	1	Structure	
504.87	269	Left	1	Structure	
505.03	1379	Left	1	Structure	
506.03	1338	Right	1	Structure	
511.07	1191	Right	1	Structure	
511.86	758	Right	1	Structure	
511.86	939	Right	1	Structure	
512.89	1057	Right	1	Structure	
513.05	760	Left	1	Structure	
513.06	1065	Left	1	Structure	
513.06	307	Left	1	Structure	
513.09	366	Left	1	Structure	
513.09	963	Left	1	Structure	
513.09	857	Left	1	Structure	
513.10	1311	Left	1	Structure	
513.16	1161	Left	1	Structure	
513.17	682	Left	1	Structure	
513.23	1071	Left	1	Structure	
514.79	1039	Left	1	Structure	
514.82	1232	Left	1	Structure	
523.45	585	Right	1	Structure	
526.82	359	Left	1	Structure	
529.54	497	Right	1	Structure	
529.80	934	Left	1	Identified Site	Denali RV Park and Motel
536.66	1457	Right	1	Structure	Denali Salmon Bake Cabins - Single cabin
536.66	1465	Right	1	Structure	Denali Salmon Bake Cabins - Single cabin
536.66	1420	Right	1	Structure	Denali Salmon Bake Cabins - Single cabin

Table 3 – Identified Sites and Structures within the Mainline PIR adjacent to Class 1 Locations [See MLBV Locations in Table 1]

Milepost	Offset Distance (feet)	Direction	Class Location	Feature	Comment
536.66	1345	Right	1	Structure	Denali Salmon Bake Cabins - Single cabin
536.66	1346	Right	1	Structure	Denali Salmon Bake Cabins - Single cabin
536.66	1409	Right	1	Structure	Denali Salmon Bake Cabins - Single cabin
536.68	1409	Right	1	Identified Site	Alpine Glow Restaurant
536.70	1016	Right	1	Structure	
536.71	1349	Right	1	Structure	Denali Bluffs Hotel - Single cabin
536.71	1359	Right	1	Structure	Denali Bluffs Hotel - Single cabin
536.72	1266	Right	1	Structure	Denali Bluffs Hotel - Single cabin
536.72	1378	Right	1	Structure	Denali Bluffs Hotel - Single cabin
536.72	1288	Right	1	Structure	Denali Bluffs Hotel - Single cabin
536.73	1393	Right	1	Structure	Denali Bluffs Hotel - Single cabin
536.73	1313	Right	1	Structure	Denali Bluffs Hotel - Single cabin
536.73	1401	Right	1	Structure	Denali Bluffs Hotel - Single cabin
536.74	1422	Right	1	Structure	Denali Bluffs Hotel - Single cabin
536.75	1437	Right	1	Structure	Denali Bluffs Hotel - Single cabin
536.81	1099	Right	1	Identified Site	Grand Denali Lodge
536.81	993	Right	1	Associated Structure to Identified Site	Grand Denali Lodge
536.85	1171	Right	1	Associated Structure to Identified Site	Grand Denali Lodge
537.10	1437	Right	1	Structure	
537.31	1344	Right	1	Associated Structure to Identified Site	ERA Helicopters
537.32	1312	Right	1	Identified Site	ERA Helicopters
551.32	1224	Right	1	Structure	
551.34	1457	Right	1	Structure	
551.39	1203	Right	1	Structure	
551.43	1357	Right	1	Structure	
551.65	1376	Right	1	Identified Site	McKinley Creekside Cabins
551.65	1442	Right	1	Associated Structure to Identified Site	McKinley Creekside Cabins
551.65	1258	Right	1	Associated Structure to Identified Site	McKinley Creekside Cabins
551.65	1435	Right	1	Associated Structure to Identified Site	McKinley Creekside Cabins
551.65	957	Right	1	Associated Structure to Identified Site	McKinley Creekside Cabins
551.66	1404	Right	1	Associated Structure to Identified Site	Denali Perch Resort
551.66	1430	Right	1	Associated Structure to Identified Site	Denali Perch Resort
551.66	1459	Right	1	Associated Structure to Identified Site	Denali Perch Resort
551.86	1335	Right	1	Associated Structure to Identified Site	Denali Perch Resort
551.87	1025	Right	1	Associated Structure to Identified Site	Denali Perch Resort
556.31	542	Right	1	Structure	
556.46	587	Right	1	Structure	
556.48	332	Right	1	Structure	
556.51	177	Right	1	Structure	
559.85	1380	Left	1	Structure	Power Plant
560.07	554	Right	1	Structure	Denali Fly Fishing Guides
560.15	845	Left	1	Structure	
564.83	809	Right	1	Structure	
566.33	1417	Right	1	Identified Site	Local Gov't building
566.35	607	Right	1	Identified Site	DOT/PF Cantwell Station

Table 3 – Identified Sites and Structures within the Mainline PIR adjacent to Class 1 Locations [See MLBV Locations in Table 1]

Milepost	Offset Distance (feet)	Direction	Class Location	Feature	Comment
566.48	651	Right	1	Structure	
566.50	511	Left	1	Structure	
566.51	473	Right	1	Structure	
566.69	394	Right	1	Structure	
566.69	604	Right	1	Structure	
566.74	654	Right	1	Structure	
566.79	1043	Right	1	Structure	
566.79	1361	Right	1	Structure	
566.79	1017	Right	1	Structure	
588.74	660	Right	1	Structure	
588.74	810	Right	1	Structure	
588.75	755	Right	1	Structure	
588.77	910	Right	1	Structure	
588.78	337	Right	1	Structure	
608.38	1389	Left	1	Structure	
608.39	1371	Left	1	Structure	
608.39	1435	Left	1	Structure	
608.45	1357	Left	1	Structure	
608.64	345	Left	1	Structure	
608.67	212	Right	1	Structure	
608.69	126	Left	1	Structure	
615.43	886	Left	1	Structure	
615.44	956	Left	1	Structure	
630.42	1125	Left	1	Identified Site	Byers Lake Campground (73 units)
634.11	1449	Right	1	Identified Site	Trapper Creek Pizza Pub
634.13	1430	Right	1	Associated Structure to Identified Site	Trapper Creek Pizza Pub
634.14	729	Right	1	Structure	
634.17	523	Right	1	Structure	
636.20	1244	Left	1	Structure	
650.39	1132	Right	1	Structure	
650.41	1379	Left	1	Structure	
657.69	982	Left	1	Structure	
658.27	533	Left	1	Structure	
662.53	1388	Left	1	Structure	
664.35	1282	Left	1	Structure	
664.66	1345	Left	1	Structure	
664.67	1008	Left	1	Structure	
664.68	581	Left	1	Structure	
664.74	1016	Right	1	Structure	
664.78	385	Right	1	Structure	
664.83	979	Right	1	Structure	
665.03	476	Right	1	Structure	
665.62	981	Left	1	Structure	
665.70	1432	Left	1	Structure	
665.70	1318	Left	1	Structure	
665.70	1239	Left	1	Structure	

Table 3 – Identified Sites and Structures within the Mainline PIR adjacent to Class 1 Locations [See MLBV Locations in Table 1]

Milepost	Offset Distance (feet)	Direction	Class Location	Feature	Comment
665.70	767	Left	1	Structure	
665.70	1055	Left	1	Structure	
665.71	1446	Left	1	Structure	
665.71	726	Left	1	Structure	
665.81	1342	Left	1	Structure	
665.88	1062	Left	1	Structure	
727.78	171	Right	1	Structure	
764.53	1206	Right	1	Structure	
764.54	1313	Right	1	Structure	
764.62	870	Left	1	Structure	
764.76	935	Left	1	Structure	
764.91	1412	Left	1	Structure	
764.92	1245	Left	1	Structure	
764.94	648	Left	1	Structure	
765.03	712	Left	1	Structure	
797.12	1254	Left	1	Structure	
797.13	487	Left	1	Structure	
797.14	1092	Left	1	Structure	
797.20	204	Right	1	Structure	
797.57	812	Left	1	Structure	
798.30	1246	Right	1	Associated Structure to Identified Site	Nikiski Ship Repair
798.33	1279	Right	1	Associated Structure to Identified Site	Nikiski Ship Repair
798.34	1150	Right	1	Identified Site	Nikiski Ship Repair
798.54	1447	Left	1	Identified Site	Commercial Building
801.27	767	Left	1	Structure	
801.31	1352	Left	1	Structure	
803.58	966	Left	1	Structure	
803.60	1038	Left	1	Structure	
803.62	1135	Left	1	Structure	
806.32	1030	Right	1	Structure	Tesoro Kenai Refinery
806.32	895	Right	1	Structure	Tesoro Kenai Refinery
806.32	1120	Right	1	Structure	Tesoro Kenai Refinery
806.32	1075	Right	1	Structure	Tesoro Kenai Refinery
806.32	662	Right	1	Structure	Tesoro Kenai Refinery
806.32	617	Right	1	Structure	Tesoro Kenai Refinery
806.33	1444	Left	1	Structure	

Completed by PHMSA in Washington, DC on: September 9, 2019