

**U.S. DEPARTMENT OF TRANSPORTATION**  
**PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION**  
**Crack Arrestor Spacing**  
**Special Permit Analysis and Findings**

**Special Permit Information:**

**Docket Number:** PHMSA-2017-0047  
**Requested By:** Alaska Gasline Development Corporation  
**Operator ID#:** 40015  
**Original Date Requested:** April 14, 2017  
**Original Issuance Date:** September 9, 2019  
**Effective Dates:** September 9, 2019  
**Code Section(s):** 49 CFR 192.112(b)(2)

**Purpose:**

The Pipeline and Hazardous Materials Safety Administration (PHMSA)<sup>1</sup> provides information to describe the facts of the subject special permit application submitted by the Alaska Gasline Development Corporation (AGDC), owner and operator of the Alaska Liquefied Natural Gas (LNG) Pipeline,<sup>2</sup> to discuss any relevant public comments received with respect to the application for a special permit, to present the engineering/safety analysis, and to make public the findings regarding whether the requested special permit should be granted and if so under what conditions. AGDC requested a special permit for the Alaska LNG Pipeline to waive compliance from 49 Code of Federal Regulations (CFR) 192.112(b)(2) for crack arrestor spacing in Class 1 locations in Alaska.

---

<sup>1</sup> Throughout this special permit the usage of “PHMSA” or “PHMSA OPS” means the U.S. Department of Transportation’s Pipeline and Hazardous Materials Safety Administration Office of Pipeline Safety.

<sup>2</sup> Alaska LNG Pipeline refers to the approximately 807 miles of 42-inch natural gas transmission pipeline. The special permit owner, operator, and applicant/permittee is Alaska Gasline Development Corporation. Please note that this pipeline does not transport liquefied natural gas (LNG). It will supply natural gas to a LNG facility for further transportation as LNG.

## **Pipeline System Affected:**

The Alaska LNG Pipeline will be approximately 807 miles of 42-inch-diameter steel pipe for transporting natural gas from AGDC's gas treatment plant (GTP) on Alaska's North Slope to the liquefaction facility on the eastern shore of the Cook Inlet near Nikiski, Alaska. The pipeline will be mostly onshore, with a segment of offshore pipeline crossing the Cook Inlet (Figure 1 – Alaska LNG Pipeline Route). The onshore portion of the pipeline will be a buried pipeline except for short, above-ground special design segments, such as aerial water crossings and aboveground fault crossings. The Alaska LNG Pipeline's design has a maximum allowable operating pressure (MAOP) of 2,075 pounds per square inch gauge (psig).

AGDC is requesting a special permit waiver of compliance of 49 CFR 192.112(b)(2) for segments along the 42-inch pipeline route. This Code paragraph details the requirements for crack arrestor frequency for non-intrinsically arresting pipe. AGDC's special permit request is specifically for pipeline segments where API 5L X80 pipe with wall thicknesses corresponding to design factors of 0.8 (alternative MAOP) and 0.72 will be installed. This includes most Class 1 locations along the pipeline route.

Federal pipeline safety regulations require natural gas transmission pipeline operators using the alternative MAOP, as allowed in 49 CFR 192.112, 192.328, and 192.620, to use pipe materials with properties that ensure resistance to fracture initiation. The operator must address the full range of operating temperatures, pressures, gas compositions, pipe grade, and operating stress levels, including maximum pressures and minimum temperatures for shut-in conditions that the pipeline is expected to experience. Section 192.112(b) requires pipeline segments to have crack arrest based upon pipe toughness properties or the spacing of crack arrestors to achieve 99 percent probability of fracture arrest within eight (8) pipe joints. AGDC's special permit with implementation of conditions allows for crack arrestor spacing of up to 1,600 feet, but requires a fracture control plan and mitigation measures to achieve an equivalent level of safety.

## **Special Permit Request:**

AGDC requested a special permit to increase the spacing between crack arrestors. ADGC will be required by the special permit conditions to implement procedures for the manufacturing, construction, and operation for increased crack arrestor spacing in *special permit segment*. The

special permit conditions will address the following topics for using increased crack arrestor spacing:

1. Alaska LNG Pipeline must develop and implement a fracture control plan (FCP) and procedures that detail the pipeline's compliance with 49 CFR 192.112(b) for Class 1 locations, except for the crack arrestor spacing requirements in 49 CFR 192.112(b)(3) for Class 1 locations. As part of the FCP, to ensure a robust design and reduce the probability of fracture initiation, material requirements for pipe body and seam welds must be specified to achieve a large through-wall critical flaw length (with a minimum length requirement of four (4) inches).
2. The materials testing and crack arrestor design and testing must meet the following requirements:
  - a. Material destructive testing must be carried out to demonstrate compliance with the fracture control requirements in 49 CFR 192.112(b)(2)(iv).
  - b. Either composite or steel crack arrestors or heavy walled pipe must be spaced at a maximum of 1,600 feet when the requirements of 49 CFR 192.112(b)(1) and (2) cannot be met in Class 1 locations based upon pipe properties.
3. Crack arrestor spacing is subject to the following requirements and limitations:
  - a. In Class 1 locations, the spacing of crack arrestors or pipe that otherwise meets the requirements of 49 CFR 192.112(b)(1) and (2) may extend up to 1,600 feet.
  - b. Where the *special permit segment* crosses the Trans-Alaska Pipeline System (TAPS), AGDC must comply with 49 CFR Part 192.112(b), when within 300 feet of crossings of TAPS or TAPS Fuel Gas Line.
  - c. For *special permit segment* pipe located in Class 2, 3, or 4 locations and high consequence areas (HCAs), AGDC must comply with 49 CFR 192.112(b) fracture control requirements.

PHMSA designed a comprehensive set of special permit conditions that AGDC is required to implement for operating the 42-inch diameter pipeline *special permit segment* with an increased crack arrestor spacing. An overview of the special permit condition topics is in the Operational Integrity Compliance section of this document. The special permit conditions were based upon pipeline safety considerations for the 49 CFR Part 192 sections that AGDC was seeking relief for an alternative crack arrestor spacing.

## **Special Permit Segment:**

### **State of Alaska**

The Alaska LNG Pipeline *special permit segment* is defined as: approximately 807 miles of 42-inch diameter pipeline originating in the North Slope Borough, traversing the Yukon-Koyukuk Census Area, the Fairbanks North Star Borough, the Denali Borough, the Matanuska-Susitna Borough, and the Kenai Peninsula Borough. The *special permit segment* terminates at the liquefaction facility on the shore of the Cook Inlet near Nikiski, Alaska.

The special permit allows alternative crack arrestor spacing in Class 1 locations. This includes a majority of the Alaska LNG Pipeline mileage.

### **Public Notice:**

On May 28, 2019, PHMSA published a special permit request in the Federal Register (84 FR 24594) for public comment. The public comment period ended on July 29, 2019, and PHMSA reviewed and considered all comments received through July 29, 2019. The special permit application from AGDC, pipeline route maps, public comments, final environmental assessment and finding of no significant impact, and special permit conditions are available in Docket No. PHMSA-2017-0047 at: [www.regulations.gov](http://www.regulations.gov).

### **PHMSA Overall Response and Considerations of Public Safety Concerns:**

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 three-layer polyethylene (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](http://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, and PHMSA reviewed and considered all comments received through July 29, 2019. PHMSA received a public comment concerning usage of fossil fuels, the building of the Alaska LNG Pipeline, and the building of a liquefied 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.

**Operational Integrity Compliance:**

PHMSA has reviewed this special permit request to ensure that integrity threats to the pipeline in the *special permit segment* are addressed in the operator’s operations and management plan (O&M procedures and specifications). PHMSA carefully designed a comprehensive set of conditions that AGDC is required to implement during design, construction, and operation of the Alaska LNG Pipeline to increase crack arrestor spacing. AGDC was granted a waiver of compliance with 49 CFR 192.112(b) for remote, sparsely populated segments in Class 1 locations designed to the alternative MAOP provisions to allow increased crack arrestor spacing from eight (8) pipe joints (320 feet) to approximately 40 pipe joints (1,600 feet). Class 1 locations are shown below in Table 1: Class Locations for the 42-inch Mainline.<sup>3</sup>

<b>TABLE 1: Class Locations for the 42-inch Mainline</b>		
<b>Milepost (MP)</b>		<b>Class Location</b>
<b>Start (MP)</b>	<b>End (MP)</b>	
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

The full special permit conditions can be reviewed in their entirety in the special permit, which can be reviewed on Docket PHMSA-2017-0047 at [www.regulations.gov](http://www.regulations.gov). The special permit conditions are summarized by topic in the below list.

- 1) Applicable Regulations
- 2) Maximum Allowable Operating Pressure
- 3) Fracture Control Plan
- 4) Intrinsic Arrest

<sup>3</sup> 49 CFR 192.5 defines Class location units and Class 1, 2, 3, and 4 locations.

- 5) Crack Arrestor Design and Materials Testing
- 6) Crack Arrestor Spacing
- 7) Coating Disbondment, Cathodic Protection Current, and Anomaly Remediation
- 8) Annual Reports
- 9) Certification
- 10) Limitations

**Past Enforcement History:**

AGDC has no gas transmission pipeline operating history or enforcement history with PHMSA.

**Findings:**

Based on the information submitted by AGDC and PHMSA's analysis of technical, operational, and safety issues, and given the conditions that will be imposed in the special permit, PHMSA finds that granting this special permit to AGDC to operate the Alaska LNG Pipeline *special permit segment* at increased crack arrestor spacing intervals and a fracture control plan will not be inconsistent with pipeline safety.

**Completed in Washington DC on:** September 9, 2019

**Prepared By:** PHMSA – Engineering and Research Division

**Figure 1: Alaska LNG Pipeline Route**

