

U.S. DEPARTMENT OF TRANSPORTATION
PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION
Special Permit Analysis and Findings – Pipe-in-Pipe System

Special Permit Information:

Docket Number:	PHMSA-2017-0157
Requested By:	Alaska Gasline Development Corporation
Operator ID#:	40015
Original Date Requested:	September 8, 2017
Original Issuance Date:	April 27, 2020
Effective Dates:	April 27, 2020 to April 27, 2030
Code Section(s):	49 CFR 193.2167 and 193.2173

Purpose:

The Pipeline and Hazardous Materials Safety Administration (PHMSA)¹ 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 LNG Terminal,² 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 findings regarding whether the requested special permit should be granted and if so under what conditions. AGDC requested a special permit to waive compliance for the covered system requirements in 49 Code of Federal Regulations (CFR) 193.2167 and the water removal requirements in 49 CFR 193.2173 in order to use a pipe-in-pipe (PIP) system³ at various segments of the liquefied natural gas (LNG) product (i.e., rundown) lines and LNG quench lines.

¹ 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.

² Alaska LNG Terminal refers to the liquefaction, storage and marine export facilities located on the eastern shore of the Cook Inlet near Nikiski, Alaska.

³ Throughout this special permit analysis and findings document, the usage of “PIP system” or “PIP” means usage of an inner pipe within an outer pipe as further defined in the *special permit segment* definition.

Pipeline System Affected:

The Alaska LNG Terminal will include LNG rundown lines, which will transfer LNG from the liquefaction units to the LNG storage tanks. The PIP system consists of an inner pipe and an outer pipe. The PIP system outer pipe will contain releases from the inner pipe within an enclosed secondary outer pipe. Invar 36 will be used as the material of construction for the inner pipe (i.e., primary LNG containment), and austenitic steel of Type 304L stainless steel will be used for the outer pipe, which serves as a secondary containment. The PIP system rundown lines will start at the outlet line of each liquefaction train and combine to a rundown header, which transfers LNG to the storage tanks. The PIP system rundown header transitions to conventional stainless-steel piping in the LNG storage tank area and before branching into two (2) tank loading lines. Additionally, AGDC will use the PIP system for four (4) LNG quench lines (two (2) supply and two (2) return lines) that connect to the Boil-off Gas (BOG) Compressors. The PIP quench lines will connect to the dual LNG marine cargo transfer lines using fabricated PIP tees, and will continue to the northern edge of the BOG compressor unit spill collection area where the PIP transitions to conventional stainless-steel piping before connecting to the BOG Compressors.

This special permit waives compliance with the covered system requirements in 49 CFR 193.2167 for the LNG rundown lines and LNG quench lines using the PIP system for spill containment. Also, this special permit waives compliance with the requirement of 49 CFR 193.2173 for the removal of water from the impoundment area (or annulus) served by the outer pipe of the PIP system. In normal operating conditions, the collection of water within the annulus of the PIP system would not occur, thus a water removal system is not necessary. As such, this special permit for 49 CFR 193.2167 and 193.2173 allows AGDC to use the PIP system as a covered impoundment without a water removal system.

Special Permit Request:

AGDC requested a waiver of compliance with the covered system requirements in 49 CFR 193.2167 and removal of water from the impoundment area in 49 CFR 193.2173 for the *special permit segment* at the Alaska LNG Terminal. PHMSA designed a comprehensive set of special permit conditions that AGDC is required to implement in order to operate the LNG rundown lines and LNG quench lines. The special permit conditions are based upon safety considerations for the 49 CFR

Part 193 sections that AGDC was seeking to utilize for the outer pipe as containment of the inner pipe and waive the requirements for a covered system and water removal system for the *special permit segment*.

Special Permit Segment:

State of Alaska

The Alaska LNG Terminal *special permit segment* is defined as:

1. Approximately 2,670 feet of PIP LNG rundown lines used to transfer LNG from the liquefaction areas to the LNG storage tanks consisting of:
 - a) Three (3) 20-inch diameter inner pipe installed within 26-inch or 28-inch diameter outer pipe;
 - b) 30-inch diameter inner pipe installed within 36-inch or 38-inch diameter outer pipe; and
 - c) Four (4) outer to inner pipe bulkhead connections that form the transitions between the PIP segments and conventional piping segments.
2. Approximately 480 feet of PIP LNG quench lines used to cool down the boil-off gas at the inlet of the Boil-off Gas Compressors consisting of:
 - a) Four (4) 4-inch diameter inner pipe within 10.75-inch or 12.75-inch diameter outer pipe (two (2) supply and two (2) return lines); and
 - b) Four (4) outer to inner pipe bulkhead connections that form the transitions between the PIP segments and conventional piping segments.

The special permit allows AGDC to utilize the outer pipe of the *special permit segment* as containment of the inner pipe and waive the requirements for a covered system and water removal system.

Public Notice:

On December 10, 2019, PHMSA published a special permit request in the Federal Register (84 FR 67511) for public comment. The public comment period ended on February 10, 2020, with all comments received through February 28, 2020, being reviewed and considered. The special permit application from AGDC, public comments, final environmental assessment and finding of no

significant impact, and special permit conditions are available in Docket No. PHMSA-2017-0157 at: www.regulations.gov.

PHMSA Overall Response and Considerations of Public Safety Concerns:

PHMSA published a Notice of Availability in the Federal Register on December 10, 2019 for the special permit requests for the PIP LNG rundown and quench lines at the Alaska LNG Terminal (84 FR 67511, Docket No. PHMSA-2017-0157 at www.Regulations.gov). PHMSA requested comment on the special permit applications, the special permit conditions, and the environmental analyses. The public notice comment period ended on February 10, 2020, with all comments received through February 28, 2020, being reviewed and considered. PHMSA received four (4) public comments. One (1) commenter supported the project while three (3) commenters expressed concerns towards safety and environmental impacts of the facility. This special permit allows an alternative design for 49 CFR 193.2167 and 193.2173 with conditions in the special permit for AGDC to implement during the design, construction, and operation of the LNG Terminal to maintain an equivalent level of safety and environmental protection. The public comments received were not concerns directed toward 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.

Design, Construction, and Operational Compliance:

PHMSA has reviewed this special permit to ensure the special permit conditions address the safety standards for LNG facilities in the *special permit segment*. PHMSA carefully designed a comprehensive set of conditions that AGDC is required to implement in order to operate the Alaska LNG Terminal using the outer pipe of the *special permit segment* as containment of the inner pipe and waive the requirements for a covered system and water removal system. The Alaska LNG Terminal will include LNG rundown lines, which will transfer LNG from the liquefaction units to the LNG storage tanks. The PIP rundown lines will start at the outlet line of each liquefaction train and combine to a rundown header, which transfers LNG to the storage tanks. Additionally, AGDC will use PIP technology for four (4) LNG quench lines (two (2) supply and two (2) return lines) that connect to the BOG Compressors. AGDC is requesting a waiver of compliance with the covered system requirements in 49 CFR 193.2167 for the LNG rundown lines and LNG quench lines using PIP technology for spill containment. Furthermore, AGDC is requesting a waiver of compliance

with the requirement of 49 CFR 193.2173 for the removal of water from the impoundment area (or annulus) served by the outer pipe of the PIP system. In normal operating conditions, the collection of water within the annulus of the PIP system will not occur, thus a water removal system is not necessary. As such, AGDC is requesting this special permit for 49 CFR 193.2167 and 193.2173 to permit the integral use of PIP as a covered impoundment without a water removal system.

The special permit conditions can be reviewed in their entirety on Docket PHMSA-2017-0157 at www.regulations.gov. The special permit conditions address the design, construction, and operational topics as listed below.

1. Applicable Regulations
2. Design, Specification, and Procedures
3. Final Design
4. Inner Pipe
5. Outer Pipe
6. PIP Termination Bulkheads
7. Design, Fabrication, Examination, and Testing
8. Design Loading Documentation
9. Shop and Field Fabrication Procedures
10. Quality Assurance and Quality Control Plan
11. Management of Change
12. Atmospheric Corrosion Protection – Outer Pipe
13. Integrity Management
14. PIP Annular Space
15. Temperature and Pressure Monitoring System
16. Leak Monitoring System Design
17. Purge Procedure
18. Construction Notices and Reporting of Repairs

- 19. Test Records Availability
- 20. Annual Report
- 21. Documentation
- 22. Certification
- 23. Limitations

Past Enforcement History:

AGDC has no operating history or enforcement history for LNG facilities or pipeline facilities with PHMSA.

Findings:

Based on the information submitted by AGDC and PHMSA's analysis of the 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 Terminal using the PIP system for the *special permit segment* to waive the requirements for a covered system and water removal system in 49 CFR 193.2167 and 193.2173 will not be inconsistent with pipeline safety.

Completed in Washington DC on: April 27, 2020

Prepared By: PHMSA – Engineering and Research Division