U.S. DEPARTMENT OF TRANSPORTATION
PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION
SPECIAL PERMIT – 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
Issuance Date:	April 27, 2020
Effective Date:	April 27, 2020 to April 27, 2030
Code Section(s):	49 CFR 193.2167 and 193.2173

Grant of Special Permit:

By this order, subject to the terms and conditions set forth below, the Pipeline and Hazardous Materials Safety Administration (PHMSA), Office of Pipeline Safety (OPS),[1] grants this special permit to Alaska Gasline Development Corporation (AGDC), owner and operator of the Alaska LNG Terminal. This special permit waives compliance with 49 Code of Federal Regulations (CFR) 193.2167 prohibiting the use of covered systems and with 49 CFR 193.2173 for water removal requirements to use pipe-in-pipe (PIP) systems[2] at various segments of the liquefied natural gas (LNG) product lines and LNG quench lines.

I. Purpose and Need:

The Alaska LNG Project (Project) will consist of one (1) natural gas treatment plant (GTP) located on Alaska's North Slope, one (1) liquefaction and marine export facility (Alaska LNG Terminal) located on the eastern shore of the Cook Inlet near Nikiski, Alaska, and approximately 807 miles of 42-inch-

[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] Throughout this special permit, the usage of "PIP system(s)" or "PIP" means usage of an inner pipe within an outer pipe as further defined in the ***special permit segment*** definition.

diameter steel pipeline that connects the GTP with the Alaska LNG Terminal. Natural gas supplied from the Point Thomson Unit and Prudhoe Bay Unit production fields located on the North Slope will provide Alaska with the opportunities for in-state deliveries of natural gas with interdependent interconnection gas delivery points and the export of LNG in foreign commerce.

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 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 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 the PIP quench lines 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 and allows AGDC to use the PIP system for spill containment. Also, this special permit waives compliance with 49 CFR 193.2173 for water removal 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 waiving compliance with 49 CFR 193.2167 and 193.2173 allows AGDC to use the PIP system as a covered impoundment without a water removal system.

The sub-arctic winter weather conditions in Nikiski, Alaska led AGDC to evaluate and select an alternative rundown piping design. The traditional transfer design with open drainage channels for an impounding system will necessitate personnel manually clearing snow and ice, which will result in personnel entering LNG spill containment trenches. The anticipated snow volumes, which can exceed

12 inches, must be removed from the impounding system, including drainage channels and trenches, to ensure potential spills of LNG are conveyed to the designated impounding space. If snow volumes are not removed, based on the density of the snow, it could take up containment volume for LNG or obstruct LNG spills in the open trenches from being conveyed to impoundment sumps. With the use of PIP as a covered impoundment system without a water removal system, the use of traditional impounding systems will be greatly reduced.

The design requirements of a LNG facility under the Federal pipeline safety regulations prohibits the use of a covered system in 49 CFR 193.2167, which states that "a covered impounding system is prohibited except for concrete wall designed tanks where the concrete wall is an outer wall serving as a dike."

In addition, 49 CFR 193.2173, Water Removal, requires that:

1. Impoundment areas must be constructed such that all areas drain completely to prevent water collection. Drainage pumps and piping must be provided to remove water from collecting in the impoundment area. Alternative means of draining may be acceptable subject to the Administrator's approval.
2. The water removal system must have adequate capacity to remove water at a rate equal to 25% of the maximum predictable collection rate from a storm of 10-year frequency and 1-hour duration, and other natural causes. For rainfall amounts, operators must use the "Rainfall Frequency Atlas of the United States" published by the National Weather Service of the U.S. Department of Commerce.
3. Sump pumps for water removal must:
    a) Be operated as necessary to keep the impounding space as dry as practical; and
    b) If sump pumps are designed for automatic operation, have redundant automatic shutdown controls to prevent operation when LNG is present.

AGDC's design of PIP allows the outer pipe of the PIP system to serve as impoundment areas (i.e., secondary containment) in the event of LNG releases from the inner pipe. This design will not allow for snow or water accumulation because there will be no traditional impoundment area.

II. Special Permit Segment:

State of Alaska

The Project consists of an off-site pre-treatment plant, an 807-mile pipeline facility, and the Alaska LNG Terminal. The Alaska LNG Terminal will be located on the shore of the Cook Inlet near Nikiski, Alaska, and will consist of liquefaction, storage, and transfer facilities. The liquefaction unit includes three (3) onshore liquefaction trains designed to produce up to approximately 20 million metric tons per annum. The transfer of LNG will be from the liquefaction area to the LNG storage area via three (3) 20-inch diameter LNG rundown lines that will originate from each of the three liquefaction trains and combine into a 30-inch diameter rundown header. The LNG will be stored in two (2) LNG storage tanks, each with storage capacity of 240,000 cubic meters, and subsequently exported to two loading berths for marine carriers via a marine cargo transfer system.

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

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.

This 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.

PHMSA hereby grants this special permit for the ***special permit segment*** based on the findings set forth in the "*Final Environmental Assessment and Findings of No Significant Impact*" and the "*Special Permit Analysis and Findings*" documents, which can be read in their entirety in Docket No. PHMSA-2017-0157 in the Federal Docket Management System located on the internet at www.regulations.gov.

III. Conditions:

PHMSA grants this special permit for the ***special permit segment*** subject to AGDC implementing the following conditions:

1. **Applicable Regulations:** The ***special permit segment*** must be designed, constructed, operated, and maintained in accordance with these special permit conditions and 49 CFR Part 193, with the exceptions of 49 CFR 193.2167 and 193.2173. In the event of a conflict between these special permit conditions and the applicable requirements under 49 CFR Part 193, the special permit conditions prevail.

2. **Specifications and Procedures:** AGDC must develop and implement design, construction, and operating and maintenance (O&M) specifications and procedures in accordance with these special permit conditions and 49 CFR Part 193 for the ***special permit segment***. The design of the outer pipe must comply with all applicable requirements for impoundment systems specified in 49 CFR 193.2155 and spacing requirements for an impoundment system specified in NFPA 59A (2019 edition),[3] Chapter 6. AGDC must submit the final design, construction, and O&M specifications and procedures and process hazard analysis of the PIP systems to the Director, PHMSA Western Region or the PHMSA Project Designee, when requested.

3. **Final Design:** No later than 90 days prior to the shop and field fabrication of the ***special permit segment***, AGDC must submit the final design information of the PIP systems to the Director, PHMSA Western Region or the PHMSA Project Designee.[4] The following documentations must be submitted:

[3] Should 49 CFR 193.2013 documents incorporated by reference (IBR) change to a date later than the NFPA 59A 2019 edition, AGDC can submit a proposed change to the 49 CFR 193.2013 IBR document edition to the PHMSA Associate Administrator for Pipeline Safety. Upon a "no objection" from the PHMSA Associate Administrator for Pipeline Safety to use a later document, AGDC can use the later IBR document.

[4] The PHMSA Project Designee will be assigned by the Director, PHMSA Western Region. Also, PHMSA may elect to assign PHMSA regulatory duties for the Alaska LNG Project to another PHMSA Region and will notify AGDC if this should happen.

a) Piping and Instrumentation Diagrams;

b) PIP System Specification; and

c) Relief Valve Sizing Calculations.

4. **Inner Pipe:** The ***special permit segment*** inner pipe must be constructed of 36%-Ni / 64%-Fe alloy material, commonly referred to as Invar 36 (Unified Numbering System K93603).

5. **Outer Pipe:** The ***special permit segment*** outer pipe must be constructed of austenitic steel of Type 304L stainless steel.

6. **PIP Termination Bulkheads:** The outer pipe must be rigidly connected to the inner pipeline by means of a forged termination bulkhead. Installation of the termination bulkheads must create a sealed annulus between the outer and inner pipe.

7. **Design, Fabrication, Examination, and Testing:** The ***special permit segment*** inner pipe, outer pipe, and bulkheads must be designed, fabricated, examined, and tested in accordance with Section 10.13 in NPFA 59A (2019 edition). [5]

8. **Design Loading Documentation:** No later than 90 days prior to the field installation of the ***special permit segment***, AGDC must submit to the Director, PHMSA Western Region or the PHMSA Project Designee design calculations to demonstrate the PIP system integrity for design loadings. The design calculations must address the following items:

   a) Minimum and maximum design and allowable working parameters;

   b) Minimum, maximum, and normal operating parameters;

   c) Corrosion allowances;

   d) Shock loads on the outer pipe due to a worst-case inner pipe release of LNG at design pressures from at least a 2-inch diameter hole in the rundown line and 4-inch diameter hole in the quench line;

   e) Supporting structures;

[5] Should 49 CFR 193.2013 documents IBR change to a date later than the NFPA 59A 2019 edition, AGDC can submit a proposed change to the 49 CFR 193.2013 IBR document edition to the PHMSA Associate Administrator for Pipeline Safety. Upon a "no objection" from the PHMSA Associate Administrator for Pipeline Safety to use a later document, AGDC can use the later IBR document.

f) Ambient-to-operational thermal stresses, including stresses at bulkheads;

g) Static and dynamic loads;

h) Slug flow, pressure surge, and loads developed from surge analysis, loads arising from credible thermal bowing; and

i) Natural hazard design loadings, including wind forces, impact forces and potential penetrations by wind borne missiles, and seismic loads.

AGDC must receive a letter of "no objection" from PHMSA prior to field installation.

9. **Shop and Field Fabrication Procedures:** No later than 90 days prior to either shop or field fabrication, documentation for the ***special permit segment*** must be submitted to the Director, PHMSA Western Region or the PHMSA Project Designee on the following items:

   a) Shop fabrication procedures.

   b) Field fabrication procedures, including, at a minimum, the following items: girth weld testing, insulation continuity and installation, field installation of inner and outer pipe, and bulkhead connections.

10. **Quality Assurance and Quality Control Plan:** No later than 90 days prior to the field installation of the ***special permit segment***, AGDC must submit a quality assurance and quality control (QA/QC) plan to the Director, PHMSA Western Region or PHMSA Project Designee that addresses:

    a) Incorporation of the ***special permit segment*** within a project-wide QA/QC plan;

    b) Fabrication shop QA/QC;

    c) Transportation QA/QC;

    d) Materials testing and traceability;

    e) Welding procedure specification approval;

    f) Welder qualification;

    g) Weld materials inspection;

    h) Weld preparation requirements (fit-up, etc.);

i) Non-destructive testing procedures and non-destructive testing of all girth welds;

j) Non-destructive testing procedures and non-destructive testing of all fillet welds designed for pressure containment;

k) Pressure testing procedures for inner pipe, outer pipe, and bulkheads;

l) Inspection procedure approval; and

m) Documentation acceptance.

AGDC must receive a letter of "no objection" from PHMSA prior to implementing the QA/QC plan.

11. **Management of Change:** Justification for any change in design and operating parameters established in final design for the ***special permit segment*** must be provided by AGDC to the Director, PHMSA Western Region or the PHMSA Project Designee. AGDC must receive a letter of "no objection" from PHMSA prior to implementing a change in design or operating parameters after final design.

12. **Atmospheric Corrosion Protection – Outer Pipe:** No later than 90 days prior to the field installation of the ***special permit segment***, AGDC must submit a study of the susceptibility of the outer pipe to atmospheric corrosive attack and the required methods for corrosion protection to the Director, PHMSA Western Region or the PHMSA Project Designee for review and must receive a letter of "no objection" from PHMSA prior to installation.

13. **Integrity Management:** No later than 90 days prior to commencement of service of the PIP system, AGDC must submit to the Director, PHMSA Western Region or the PHMSA Project Designee, for review a preventative maintenance procedure to ensure long-term integrity of the ***special permit segment***. The procedure must include details of the inspections or tests and their frequency and description of actions necessary to maintain the integrity of the PIP. AGDC must receive a letter of "no objection" from PHMSA prior to commencement of service.

14. **PIP Annular Space:** "PIP annulus," "annulus," or "annular space" refers to the space between the carrier pipe and the casing pipe.

    a) AGDC must have specifications and procedures of the PIP system implemented for the following (as applicable to the selected vendor's technology):

i. Casing isolators and spacing;

ii. Sealing ends with bulkheads;

iii. Dew point sampling of the annulus prior to commissioning of the PIP system;

iv. Use of inert gas, such as nitrogen or argon;

v. Use of fiber optic cable;

vi. Outer pipe connections and vacuum and inert gas pressure supply systems used to maintain specified pressures; and

vii. Inner pipe connections and use.

b) Vacuum and inert gas pressure system must include block valves, a pressure regulator, pressure relief valves, vacuum pump, sample ports, and associated piping. The vacuum system must be operational at all times, except during maintenance activities, which must be conducted during a 12-hour shift and with the knowledge of Alaska LNG Terminal control room operators.

c) The annulus space must be continuously monitored in the control room for pressure and temperature changes. At least 90 days prior to introduction of hazardous fluids, AGDC must submit the alarm and shutdown set points to the Director, PHMSA Western Region or the PHMSA Project Designee for review and must receive a letter of "no objection" from PHMSA prior to introduction of hazardous fluids.

d) The PIP annulus system must be equipped with redundant pressure and temperature monitoring system.

e) At least 90 days prior to introduction of hazardous fluids, AGDC must submit the cause and effect diagram that demonstrates proper shutdown and isolation of LNG facilities should the annulus pressure exceed the established pressure thresholds, to the Director, PHMSA Western Region or PHMSA Project Designee, for review and must receive a letter of "no objection" from PHMSA prior to introduction of hazardous fluids.

15. **Temperature and Pressure Monitoring System:** The Alaska LNG ***special permit segment*** inner pipe must be continuously monitored for operating pressure, temperature, and flow rate, including the following requirements:

a) The inner pipe must be equipped with a redundant pressure and temperature monitoring system.

b) Valves at each end of the PIP ***special permit segment*** must be remote closure. The actuation of the valves must not result in an overpressure event of the inner pipeline, and closure rates must be substantiated by a hydraulic surge analysis. The remote closure valve status and adjacent pipeline pressures must be monitored at all times, except during scheduled equipment maintenance activities when LNG is not in the pipeline. AGDC must develop operations procedures that specify that the manual valves also located on both ends of the PIP segment remain open at all times of normal operations.

c) AGDC must submit the final design, construction, and O&M specifications and procedures and process hazard analysis for the PIP systems to the Director, PHMSA Western Region or the PHMSA Project Designee 30 days prior to construction of the PIP systems.

16. **Leak Monitoring System Design:** No later than 90 days prior to introduction of hazardous fluid in the ***special permit segment***, AGDC must submit to the Director, PHMSA Western Region or the PHMSA Project Designee the cause and effect diagram for the leak detection system, as well as the final design details that address the following:

    a) Continuous leak monitoring system;

    b) Specifics on the pressure, temperature, and hydrocarbon detection alarms, shutdown functions, and set points;

    c) Maximum and minimum design set points for alarms and emergency shutdown;

    d) Leak monitoring system inspections, testing, and frequency;

    e) Fiber optic cables; and

    f) Response actions with the time for those actions.

    AGDC must receive a letter of "no objection" from PHMSA prior to introduction of hazardous fluid in the ***special permit segment***.

17. **Purge Procedure:** No later than 90 days prior to introduction of hazardous fluid, AGDC must submit to the Director, PHMSA Western Region or the PHMSA Project Designee the purge

procedure for the annulus space, including purge pressure, and minimum and maximum dew point for the ***special permit segment***.

18. **<u>Construction Notices and Reporting of Repairs</u>:** In addition to the notifications required in the conditions above, AGDC must also provide the following notifications:

    a) AGDC must notify the Director, PHMSA Western Region or the PHMSA Project Designee 14 days prior to construction relating to shop fabrication and field construction of the ***special permit segment,*** so PHMSA can observe the activity.

    b) AGDC must notify the Director, PHMSA Western Region or the PHMSA Project Designee of immediate repair conditions no later than two (2) business days after a condition is discovered during operation.

    c) AGDC must notify Director, PHMSA Western Region or the PHMSA Project Designee of non-conformance items relating to the PIP system during construction.

19. **<u>Test Records Availability</u>:** All test records, destructive or non-destructive, must be made available upon request for review by the Director, PHMSA Western Region or the PHMSA Project Designee no later than 30 days after tests are completed.

20. **<u>Annual Report</u>:** Within twelve (12) months following installation of the ***special permit segment***, and annually thereafter, AGDC must develop and submit annual reports. The annual reports must be sent by AGDC to the Director, PHMSA Western Region or the PHMSA Project Designee, and a copy placed in the Federal Register Docket (PHMSA-2017-0157) at www.regulations.gov. The annual reports must include the following information:

    a) Any reportable incident or leak reported on the DOT Annual Report in the ***special permit segment***;

    b) Repairs that occurred during the previous year in the ***special permit segment***;

    c) Corrosion and corrosion preventative initiatives affecting the ***special permit segment***, as well as an evaluation of the performance of the initiatives; summary of all irregular annulus pressure changes, temperature changes, or dew point changes that required regional notification; and

    d) Any mergers, acquisitions, transfers of assets, or other events affecting the regulatory responsibility of the Alaska LNG Terminal.

21. **<u>Documentation</u>:** AGDC must maintain all ***special permit segment*** documentation required by paragraphs (a) and (b) below for the life of the special permit and provide such documentation to the Director, PHMSA Western Region or the PHMSA Project Designee upon request:

   a) Documentation showing that AGDC complied with 49 CFR 193.2301, 193.2303, and 193.2304 in Subpart D, as well as additional requirements for PIP in Section 10.13 of NFPA 59A (2019 edition). [6]
   b) Documentation of compliance with all conditions of this special permit.

22. **<u>Certification</u>:** No later than 30 days after placing the PIP system into LNG service at the Alaska LNG Terminal, a senior executive officer, vice president or higher, of AGDC must certify in writing the following:

   a) Alaska LNG Terminal meets the conditions described in this special permit or has procedures meeting these conditions for O&M activities that are completed after placing the ***special permit segment*** into operational service;
   b) The written manual of O&M procedures has been updated to include the additional requirements of this special permit;
   c) A compliance documentation summary showing that AGDC implemented all conditions as required by this special permit for the ***special permit segment*** in accordance with this special permit; and
   d) AGDC must send the signed and dated written certifications with corresponding completion dates to the PHMSA Associate Administrator for Pipeline Safety, with copies to the Director, PHMSA Western Region; and to the Federal Register Docket (PHMSA-2017-0157) at <u>www.regulations.gov</u>.

IV. Limitations:

This special permit is subject to the limitations set forth in 49 CFR 190.341 as well as the following limitations:

1. PHMSA has the sole authority to make all determinations on whether AGDC has complied

[6] Should 193.2013 documents IBR change to a date later than the NFPA 59A 2019 edition, AGDC can submit a proposed change to the 49 CFR 193.2013 IBR document edition to the PHMSA Associate Administrator for Pipeline Safety. Upon a “no objection” from the PHMSA Associate Administrator for Pipeline Safety to use a later document, AGDC can use the later IBR document.

with the specified conditions of this special permit for usage of the PIP system on the ***special permit segment*** at the Alaska LNG Terminal. Failure to comply with any condition of this special permit may result in revocation of the permit.

2. Any work plans and associated schedules for the PIP system associated with this special permit are automatically incorporated into this special permit and are enforceable in the same manner.

3. Failure by AGDC to submit the certifications required by **Condition 22 (Certification)** within the time frames specified may result in revocation of this special permit.

4. As provided in 49 CFR 190.341, PHMSA may issue an enforcement action for failure to comply with this special permit for the PIP system at the Alaska LNG Terminal. The terms and conditions of any corrective action order, compliance order or other order applicable to a pipeline facility covered by this special permit will take precedence over the terms of this special permit.

5. If AGDC sells, merges, transfers, or otherwise disposes of all or part of the assets known as the Alaska LNG Terminal, AGDC must provide PHMSA with written notice of the change within 30 days of the consummation date. In the event of such transfer, PHMSA reserves the right to revoke, suspend, or modify the special permit if the transfer constitutes a material change in conditions or circumstances underlying the permit. Any notifications for this limitation must be sent to the PHMSA Associate Administrator for Pipeline Safety with copies to the Director, PHMSA Western Region; and to the Director, PHMSA Engineering and Research Division.

AUTHORITY: 49 U.S.C. 60118 and 49 CFR 1.97.

Issued in Washington, DC on April 27, 2020

ALAN KRAMER MAYBERRY

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Alan K. Mayberry,
Associate Administrator for Pipeline Safety