U.S. Department
of Transportation

**Pipeline and Hazardous Materials Safety Administration**

1200 New Jersey Avenue, SE
Washington, D.C. 20590

SEP 28 2015

Mr. Rick Noecker
PHMSA Filing Coordinator
Alaska LNG
#19025, 237- 4th Ave SW
Calgary, Alberta T2P OH6, Canada

Dear Mr. Noecker:

In a letter to the Pipeline and Hazardous Materials Safety Administration (PHMSA) dated April 30, 2015, you requested an interpretation on 49 CFR 192.112(b)(3) and 192.112(b)(2)(iii) with respect to crack arrestor spacing for gas transmission lines.

You stated that you performed fracture control calculations in accordance with § 192.112(b)(1) and found that the fracture arrest requirements of § 192.112(b )(2)(iii) cannot be intrinsically obtained with modern X-80 line pipe for an anticipated 2,075 psi design pressure, 42" diameter gas transmission line. You plan to utilize an alternative maximum allowable operating pressure design with crack arrestor spacing of 8 joints to meet the requirements of §192.112(b)(3). You are seeking guidance regarding fracture control crack arrestor requirements under 49 CFR Part 192.112(b). Specifically, you asked how the § 192.112(b)(2)(iii) requirement is applied with the use of mechanical crack arrestors since every crack arrestor is expected to arrest a running ductile fracture, and you stated that there is no guidance on this in industry consensus standards.

Section 192.112(b) requires the remediation of potential pipe crack initiation, propagation, and arrest of fractures to be based upon the full range of gas compositions, operating pressures, operating temperatures, pipe grades, and maximum operating stresses including maximum pressures and minimum temperatures for shut-in conditions that the pipeline will experience during its operating life. The fracture control described in § 192.112(b) limits the maximum fracture length to 8 pipe joints with a 99 percent probability of arrest through several possible methods an operator may select, which may include higher pipe toughness, heavier walled pipe, crack arrestors (either mechanical or composite) or a combination of these methods.

Therefore, it is your responsibility to make sure that the methods chosen are appropriate to the relevant operating factors and § 192.112 requirements are met. I hope that this information is helpful to you. If we can be of further assistance, please contact Tewabe Asebe of my staff at 202-366-5523.

Sincerely,

John A. Gale
Director, Office of Standards
and Rulemaking

Alaska LNG

**Alaska LNG Project**
Pipeline Engineering
237 4th Ave SW
Calgary, AB T2P 0H6
CANADA

28 April 2015

Mr. John A. Gale, Director
Office of Standards and Rulemaking (PHP-30)
PHMSA, U.S. Department of Transportation,
1200 New Jersey Avenue, SE
Washington, DC 20590–0001
USA

**Re: Request for Interpretation of 49 CFR §192.112(b)(3) and §192.112(b)(2)(iii) with respect to crack arrestor spacing for gas transmission lines**

Dear Mr. Gale:

Our project has performed fracture control calculations in accordance with §192.112(b)(1) and found that the fracture arrest requirements of §192.112(b)(2)(iii) cannot be intrinsically obtained with modern X80 line pipe given our anticipated 2,075 psi design pressure, 42" diameter gas transmission line. We plan to utilize an alternative maximum allowable operating pressure design. Therefore, we plan to design crack arrestors with a spacing of 8 joints to meet the requirements of §192.112(b)(3). We are seeking confirmation in this request for interpretation regarding fracture control crack arrestor requirements under 49 CFR Part 192.112(b).

**Background**

The regulation at 49 CFR Part 192.112(b)(3) states that

> *If it is not physically possible to achieve the pipeline toughness properties of paragraphs (b)(1) and (2) of this section, additional design features, such as mechanical or composite crack arrestors and/or heavier walled pipe of proper design and spacing, must be used to ensure fracture arrest as* described in paragraph (b)(2)(iii) of this section.

§192.112(b)(2)(iii) goes on to state that fracture control must

> *ensure at least 99 percent probability of fracture arrest within eight pipe lengths with a probability of not less than 90 percent within five pipe lengths*

The language in Part 192.112 (b)(2)(iii) is based on the common approach of specifying pipe toughness requirements such that 50% of pipe joints will be capable of arresting a running ductile fracture. With 50% of pipe joints arresting a crack, the 99% probability in eight joints and 90% probability in five joints criteria are satisfied. It is not clear how this requirement is applied with the use of mechanical crack arrestors since every crack arrestor is expected to arrest a running ductile fracture, and there is no guidance on this in consensus standards.

In PHMSA's March 8, 2011 letter to the Alaskan Pipeline Project, it communicated the following with respect to "Crack arrestor spacing" (emphasis added):

> *As prescribed in 49 CFR § 192.112(b), a pipeline that operates under the alternative MAOP provisions of Part 192 must be able to demonstrate that failure cracks will self-arrest within five (5) pipe joints with 90% probability,* ***or*** *within eight (8) pipe joints with 99% probability.*

The PHMSA letter to APP, which includes the conjunction "or" between the two probabilistic requirements, indicates that ensuring arrest within eight (8) pipe lengths is sufficient to meet the regulatory requirements.

**Request for Interpretation**

AKLNG believes that a crack arrestor spacing of eight joints, with each arrestor designed to arrest a running ductile fracture, meets the requirements of §192.112(b)(3) and §192.112(b)(2)(iii). Confirmation of this interpretation is requested.

Thank you for your consideration of this request for interpretation.

Sincerely,

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