

BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

**Docket UG-230393
Puget Sound Energy
Tacoma LNG Tracker**

PUBLIC COUNSEL DATA REQUEST NO. 028:

REQUESTED BY: Robert Earle

Re: Changes in Gas Quality. Dockets UE-220066 and UG-220067, Direct Testimony of Ronald J. Roberts, Exh. RJR-30T at 59:1–61:13.

- a. Please provide support for your statement with supporting documentation, including but not limited to engineering studies and industry standards, that “There is no significant difference between the gas quality needed for TOTE’s engines and the gas quality need for use by PSE’s retail gas customers.
- b. Please provide the presentation to PSE’s Board or other communications to PSE’s Board where it was explained that the pretreatment of the gas was for the benefit of PSE’s retail gas customers.
- c. PSE stated, “If left untreated, CO₂ and H₂O in the feed gas would freeze during the liquefaction process. Therefore, pretreatment is necessary to remove these molecules to avoid riming of the platefin heat exchangers. After pretreatment, but prior to liquefaction of the natural gas, heavy hydrocarbons that may freeze at the cryogenic temperatures encountered downstream would be removed by partial refrigeration.” Please provide support for these statements including but not limited to engineering studies and industry standards.
- d. At what level of change in gas quality did pretreatment become necessary? Please provide supporting documentation for your answer including but not limited to engineering studies and industry standards.
- e. Concerning Gig Harbor:
 1. Please provide details of the quality of the liquified natural gas delivered to Gig Harbor over the last five years. Please include measurements of heavy hydrocarbon content.
 2. Please list the liquefaction facilities that have delivered LNG to Gig Harbor over the last five years.
 3. For each of the liquefaction facilities that have delivered LNG to Gig Harbor over the last five years have any had to install pretreatment facilities in the last five years in order to deliver LNG to Gig Harbor? Please explain why or why not.

Response:

- a. The Tacoma LNG facility serves two industries (maritime & gas utility) which utilize different metrics regarding their gas specifications. The maritime industry primarily

utilizes *methane number* which can be very loosely interpreted as a form of octane number most motorists are familiar with at the gasoline pump. Meanwhile, the gas utility industry primarily utilizes *Wobbe Index* which loosely interpreted is a measure of combustion compatibility with commercial and residential gas-consuming equipment. Service to TOTE, by contract, requires a minimum 80 methane number. Meanwhile PSE aims to limit Wobbe Index to <1400 based off of industry best practice regarding maintaining consistency with gas customer equipment. Attached as Attachment A to Puget Sound Energy's ("PSE") Response to Public Counsel Data Request No. 028, please find an illustration of the corollary nature of both methane number and Wobbe Index and how, in only rare specific conditions, is there a significant difference between the gas requirements of both parties.

- b. PSE objects to this request to the extent it misstates and misconstrues testimony, assumes facts not included in testimony, and is not reasonably calculated to lead to admissible evidence. Subject to and without waiving its objections, PSE states as follows: PSE has no record of it being explicitly explained to PSE's Board of Directors that the pretreatment of the gas was for the benefit of PSE's retail gas customers. As described below, the pre-treatment of natural gas is a standard part of LNG production.
- c. The liquefaction process reduces the temperature of the natural gas to -258°F in order to convert it to a liquid, in part using a plate-fin exchanger. Water freezes at 32°F and CO₂ freezes at -109°F. Any water or CO₂ contained in the natural gas stream would form ice crystals in the plate-fin exchanger and cause an ice buildup on the walls of the exchanger (commonly called riming). This ice build-up on the exchanger walls reduces the ability of the plate-fin exchanger to transfer cooling effectively and liquefy the natural gas. In order to prevent this, the water and CO₂ impurities in the natural gas must be removed prior to the gas entering the liquefaction system.

Pipeline natural gas contains components other than methane, including ethane, propane, butane and pentane. These components are separated from the methane in order to achieve the desired purity of the liquefied natural gas product. After CO₂ and water removal and before the natural gas is sent to the liquefaction plate-fin exchanger, the natural gas is sent to another exchanger in which the temperature of the natural gas stream is reduced to between -60 and -100°F. At these temperatures, the methane component of the natural gas remains in vapor form, but other heavier components of the natural gas, like ethane, propane, butane and pentane, become liquid. These liquids are removed from the methane in order to achieve the desired purity of the liquefied natural gas product. The remaining vapor is then sent to the liquefaction plate-fin exchanger to be further cooled.

- d. PSE objects to this request to the extent it misstates and misconstrues testimony, assumes facts not included in testimony, and is not reasonably calculated to lead to admissible evidence. Subject to and without waiving its objections, PSE states as

follows: As stated above, pre-treatment of the natural gas feedstock is always necessary to produce LNG.

e. Responses are as follows.

1. PSE objects to Public Counsel Data Request No. 028 to the extent it requests information outside PSE's custody or control. Notwithstanding this objection and subject thereto, PSE responds as follows. PSE received detailed gas composition data with some shipments of LNG from Fortis BC Energy's Tilbury LNG plant. Those shipments, which ended coincident with the start-up of shipments from Tacoma LNG show LNG with high ethane and propane composition, essentially identical to composition of natural gas at Williams Northwest Pipeline's Sumas compressor station from the same time period. Please see Attachment A to PSE's Response to Public Counsel Data Request No. 029 for the composition of gas at Sumas. PSE did not routinely receive gas composition data on the few shipments from Intermountain Gas's Nampa LNG plant or Northwest Pipeline's Plymouth LNG plant.
2. Over the last 5 years, PSE has received LNG shipments liquefied at Fortis BC Energy's Tilbury LNG plant, Intermountain Gas's Nampa LNG plant, PSE's account at Williams Northwest Pipeline's Plymouth LNG plant and from PSE's Tacoma LNG plant.
3. PSE understands that all LNG liquefaction facilities include a pre-treatment process to prepare the expected range of incoming natural gas feedstock for chilling down to -258°F. PSE was aware that Fortis BC Energy had expressed difficulty meeting expected LNG vehicle fuel requirements with the changes in natural gas feedstock (high propane and ethane composition) and was making plans to improve their capabilities. PSE understands that Fortis BC Energy's Tilbury LNG has subsequently incorporated updated or enhanced pre-treatment facilities to respond to the significantly higher ethane and propane content of the feedstock gas in British Columbia. PSE is not aware of whether Intermountain Gas's Nampa LNG plant or Northwest Pipeline's Plymouth LNG plant have revised their pre-treatment facilities, however, PSE knows that the feedstock at the Nampa and Plymouth locations is likely to vary significantly from that at both Tilbury and Tacoma.

**ATTACHMENT A to PSE's Response to
Public Counsel Data Request No. 028**