PUGET SOUND ENERGY

Puget Sound Energy
P.O. Box 97034
Bellevue, WA 98009-9734
PSE.com

March 29, 2019

BY COURIER AND EMAIL

Mr. Ralph Munoz
Reviewing Engineer
Puget Sound Clean Air Agency
1904 3rd Avenue, Suite 105
Seattle, WA 98101-3317

Re: Supplemental Information for Tacoma LNG Notice of Construction Application

Dear Ralph:

Puget Sound Energy (PSE) is submitting this update to our May 22, 2017 Notice of Construction (NOC) application for the Tacoma LNG facility. This transmittal includes updates to our Best Available Control Technology (BACT) analysis and air quality dispersion modeling. Nothing about the proposed project's design and operation has changed since we last communicated with you on the NOC application, but we wanted to ensure that the most current information is being used in your assessment. For a summary of information submitted to date for this NOC application, please refer to Attachment A.

As you are aware, Puget Sound Clean Air Agency (PSCAA) issued its completeness determination for PSE's application on October 3, 2017. Since then, the U.S. Environmental Protection Agency (EPA) has released new executables for the AERMOD, AERMET, and AERMAP (version 18081) air quality dispersion modeling programs. The modeling submitted with this letter reflects the latest executables. We have also revised our BACT analysis to include determinations and guidance documents published since our permit application supplements were submitted to you.

Best Available Control Technology Review Update

As you are aware, BACT determinations and guidance published by the EPA, and the states of California and Texas, were reviewed in PSE's 2017 permit application documents. Relevant determinations were identified in the EPA's RACT/BACT/LAER Clearinghouse (RBLC); the California Air Resources Board's (CARB) and Texas Air Control Board's (TACB) clearinghouses; Texas Commission on Environmental Quality (TCEQ) guidelines; Bay Area Air Quality Management District (BAAQMD) guidelines; San Joaquin Valley Air Pollution Control District BACT clearinghouse; and South Coast South Coast Air Quality Management District (SCAQMD) BACT clearinghouse. For this update, we revisited all of these information sources

and found no relevant new BACT determinations or agency guidance. The approach and result of this updated review is summarized below for each emission source.

- **Ground Flare** –For the ground flare, we retained the approach for assessing BACT outlined in our August 11, 2017 letter to you. Specifically, PSE began its review by looking at clearinghouse entries and guidelines related to flares that were permitted in all types of facilities. Because combustion processes and emissions differ significantly for ground flares that have enclosed flames vs. elevated flares that have open flames, our review then narrowed to clearinghouse entries for ground flares. As we have previously mentioned, ground flares in use at landfills and oil and gas fields are not representative source types due to the significant differences in waste gas composition that we identified in our November 2017 communications with you. As a result, only flares in use at facilities flaring LNG-derived emissions were considered. As you may be aware, the TCEQ frequently updates portions of their online BACT Guidelines. The latest guidelines for both Combustion Sources[1] and for Chemical Sources[2] have been reviewed. In the Combustion Source's "Current BACT Spreadsheet", TCEQ's BACT guidance for flares was updated on October 1, 2018. However, the numerical limits and requirements have not changed since PSE's permit application was submitted.

- **Vaporizer** – Combustion devices sufficiently similar to our proposed vaporizer were not found in the clearinghouses. Because the proposed vaporizer heater is structurally similar to a fire-tube type water heater, clearinghouse and BACT guidelines for natural gas heaters are reviewed as a surrogate. Consistent with our previous review, draft determinations are not considered in our updated analysis. A list of RBLC determinations is provided in Table 1 of Attachment B. These determinations do not present any new or more stringent limits than those presented previously. As mentioned above, the TCEQ has updated portions of their BACT guideline for various sources; however, their numerical limits and requirements have not changed for heaters and boilers.

- **Fugitives Emissions** – No new published BACT determinations were found in EPA and state clearinghouses.

Based on our recent work, BACT limits proposed in PSE's 2017 application remain valid. These proposed BACT limits are summarized in Attachment C.

Dispersion Modeling

EPA released a new version of the modeling executables for AERMOD, AERMET, and AERMAP in early 2018. There have not been any other changes to modeling methodology or

[1] https://www.tceq.texas.gov/permitting/air/nav/air_bact_combustsources.html

[2] https://www.tceq.texas.gov/permitting/air/nav/air_bact_chemsource.html

guidance. Previously submitted source, receptor, and meteorology data were run in the updated executables. The results are the same as those presented in the September 8, 2017 modeling update letter. Predicted ambient concentration from emissions from the proposed project are still below the significant impact level (SIL) and acceptable source impact level (ASIL) for all pollutants. The updated modeling files are provided on the enclosed DVD (Attachment D).

Updated air quality dispersion modeling results for criteria pollutants are summarized in Table 1. The modeled ambient concentrations are still less than the cause or contribute threshold levels for all pollutants and averaging periods. Therefore, this project is not expected to cause or contribute to a violation of the NAAQS or WAAQS. As a result, no further modeling analysis is required.

Table 1: Criteria Pollutant Modeling Results

Criteria Pollutant	Averaging Period	NAAQS/ WAAQS ($\mu g/m^3$)	Threshold Value[a] ($\mu g/m^3$)	Modeled Concentration[b] ($\mu g/m^3$)				Scenario
				SEA	L+SEA	TCM	L+TCM	
CO	8-hour	10,000	500	11	10	10	10	Vaporizing + Transfer Case B
	1-hour	40,000	2,000	25	25	25	25	Vaporizing + Transfer Case A2
SO_2	Annual	52	1	0.35	0.35	0.35	0.35	Liquefying Case 1
	24-hour	260	5	3.9	3.9	3.9	3.9	Liquefying Case 1
	3-hour	1,310	25	12	12	10	10	Liquefying Case 1
	1-hour	200	30	26	26	20	20	Liquefying Case 1
PM_{10}	Annual	--	1	0.017	0.017	0.016	0.016	Liquefying Case 3
	24-hour	150	5	1.2	1.2	1.1	1.1	Vaporizing + Transfer Case A2
$PM_{2.5}$	Annual	12	0.3	0.017	0.017	0.016	0.016	Liquefying Case 3
	24-hour	35	1.2	1.2	1.2	1.1	1.1	Vaporizing + Transfer Case A2
NO_2	Annual	100	1	0.043	0.043	0.042	0.042	Liquefying Case 2
	1-hour	188	7.5	5.9	5.9	5.9	5.9	Vaporizing + Transfer Case A2

[a] Cause or contribute threshold value from WAC 173-400-113, Table 4a. So long as the estimated worst case emissions are less than or equal to the threshold value, a facility is not considered to cause or contribute to an exceedance in a nonattainment area. The 1-hour NO_2 threshold value reflects the EPA's Interim 1-hour NO_2 Significant Impact Level.

[b] Highest first high value for all receptors.

SEA = Meteorology from SeaTac
L+SEA = Meteorology from Tacoma South L and SeaTac
TCM = Meteorology from McChord
L+TCM = Meteorology from Tacoma South L and McChord

The first-tier ambient concentration screening analysis is summarized in Table 2. This screening analysis includes all toxic air pollutants (TAPs) with expected emission rates that exceed the small quantity emission rate (SQER). As shown in Table 2, the maximum modeled ambient concentrations for each TAP are less than their respective ASILs. As a result, no further modeling analysis is required.

Table 2: Toxic Air Pollutant Modeling Results

Toxic Air Pollutant	Averaging Period	ASIL[a] (µg/m³)	Modeled Concentration[b] (µg/m³)				Scenario
			SEA	L+SEA	TCM	L+TCM	
7,12-Dimethylbenz(a)anthracene	Annual	1.41E-05	4.00E-08	4.00E-08	3.00E-08	3.00E-08	Liquefying Case 3
Ammonia	24-hour	70.8	1.1	1.1	1.2	1.2	Vaporizing + Transfer Case A2
Arsenic	Annual	3.03E-04	4.40E-07	4.40E-07	4.30E-07	4.30E-07	Liquefying Case 3
Cadmium	Annual	2.38E-04	2.41E-06	2.41E-06	2.34E-06	2.34E-06	Liquefying Case 3
Chromium(VI)	Annual	6.67E-06	3.07E-06	3.07E-06	2.98E-06	2.98E-06	Liquefying Case 3
Hydrogen sulfide	24-hour	2	0.021	0.021	0.021	0.021	Liquefying Case 1
Sulfur dioxide	1-hour	660	26	26	20	20	Liquefying Case 1

[a] WAC 173-460-150
[b] Highest first high value for all receptors.
SEA = Meteorology from SeaTac
L+SEA = Meteorology from Tacoma South L and SeaTac
TCM = Meteorology from McChord
L+TCM = Meteorology from Tacoma South L and McChord

* * *

Please do not hesitate to contact me [or Bill Steiner of Landau Associates at (503) 347-3162 if I am not available] if you have any questions regarding this submittal or any further questions regarding the application.

Sincerely,

Keith Faretra

Attachments

Attachment A – List of NOC submittals
Attachment B – RBLC Search Update
Attachment C – Proposed BACT Limits
Attachment D – Dispersion Modeling Input and Output Files (DVD)

cc (by email):

Jim Hogan
Lorna Luebbe
Bill Steiner
Tom Wood

ATTACHMENT A – LIST OF NOC SUBMITTALS

Date	Type	From	Summary
5/22/2017	Full Application	PSE	PSE submitted NOC
6/21/2017	Letter	PSCAA	NOC Information Request (incompleteness letter)
6/22/2017	Hardcopy application supplements with DVD	PSE	Submitted modeling analysis
6/30/2017	Letter, Email (PDF)	PSE	Submitted response to PSCAA's request for additional information
8/11/2017	Letter, Email with attachments (PDS, Excel)	PSE	Submitted response to information related to Questions 1, 5, 6, & 7 of the IR. Included changed flare design for low-NOX burners and adjusted inlet sulfur concentration.
9/1/2017	Email with attachment (DOC)	PSCAA	Provided a draft BACT review, prepared by Ralph Munoz
9/8/2017	Letter, Email	PSE	Additional modeling analysis submitted for review of meteorological data options
9/15/2017	Letter, Email	PSE	Submit updated emissions and modeling for changes to flare design, incorporates changes to the sulfur content discussed in the 8/11/2017 submittal; and updated TAP emission factors provided by PSCAA
9/27/2017	Email with attachments (DOC)	PSE	Responded to questions related to hexavalent chromium emissions from natural gas combustion
10/3/2017	Email	PSCAA	PSCAA deemed the application complete
10/10/2017	Email	PSE	Summary of inapplicable LDAR requirements PSE will include in the LDAR manual
10/19/2017	Email with attachment (Excel)	PSE	Additional information provided related to gas sulfur limits and sampling; additional information provided related to ground flare BACT levels
11/6/2017	Email with attachment (Excel)	PSE	Provided flare inlet gas comparison to landfill gas, digester gas, and oil and gas field. Information discussed during call with PSCAA on 11/7/17
11/6/2017	Email	PSCAA	Clarifying questions from Ralph Munoz related to flare inlet
11/6/2017	Email	PSCAA	Clarifying questions from Ralph Munoz related to LDAR
11/21/2017	Email with attachment (PDF)	PSE	Supplemental information to help clarify and answer questions related to LDAR
11/21/2017	Email with attachment (Excel)	PSE	GHG emissions data provided for the facility.
12/4/2017	Email with attachments (PDF, Excel)	PSE	Corrects a minor error found in the 9/15/2017 modeling submittal (Table 1 of Attachment A, HAP PTE).

ATTACHMENT B – RBLC SEARCH UPDATE

Table 1 RBLC Vaporizer Summary
NOC Update Attachment B
Puget Sound Energy – Liquefied Natural Gas Project

Facility Name	RBLC ID	Issuance Date	Throughput	Primary Fuel	Process Code	Process	Control Technology Type	Pollutant	Emission Limits	Case-by-case Basis
MIDWEST FERTILIZER COMPANY LLC	IN-0263	3/23/2017	70 MMBtu/hr	Natural Gas	13.310	STARTUP HEATER EU-002	Good Combustion Practices	TPM_{10}	0.522 LB/H, 3HOUR AVERAGE; 200 h/yr	BACT-PSD
								$TPM_{2.5}$	0.522 LB/H, 3 HOUR AVERAGE; 200 h/yr	BACT-PSD
								VOC	0.378 LB/H, 3 HOUR AVERAGE; 200 h/yr	BACT-PSD
								CO	2.556 LB/H, 3 HOUR AVERAGE; 200 h/yr	BACT-PSD
								NO_X	12.611 LB/H, 3 HOUR AVERAGE; 200 h/yr	BACT-PSD
								FPM	0.13 LB/H, 3HR AVERAGE, 200 h/yr	BACT-PSD
INDECK NILES, LLC	MI-0423	1/4/2017	27 MMBtu/hr	Natural Gas	13.310	FGFUELHTR (Two fuel pre-heaters identified as EUFUELHTR1 & EUFUELHTR2)	Good Combustion Practices	TPM_{10}	0.2 LB/H, HOURLY, EACH FUEL HEATER	BACT-PSD
							Good Combustion Practices	$TPM_{2.5}$	0.2 LB/H, HOURLY, EACH FUEL HEATER	BACT-PSD
							Good Combustion Practices	VOC	0.15 LB/H, HOURLY, EACH FUEL HEATER	BACT-PSD
							Good Combustion Practices	CO	2.22 LB/H, HOURLY, EACH UNIT	BACT-PSD
							Good Combustion Practices	NO_X	2.65 LB/H, HOURLY, EACH UNIT	BACT-PSD
							Good Combustion Practices	FPM	0.002 LB/MMBTU, TEST PROTOCOL WILL SPECIFY AVG TIME.	BACT-PSD
							Good combustion practices and the use of pipeline quality natural gas.	SO_2	2000 GR/MMSCF, BASED UPON FUEL RECEIPT RECORDS.	BACT-PSD
BELLE RIVER COMBINED CYCLE POWER PLANT	MI-0435	7/16/2018	20.8 MMBtu/hr	Natural Gas	13.310	EUFUELHTR1: Natural gas fired fuel heater	Low sulfur fuel	TPM_{10}	0.15 LB/H, HOURLY	BACT-PSD
							Low sulfur fuel	$TPM_{2.5}$	0.15 LB/H, HOURLY	BACT-PSD
							Good combustion controls	VOC	0.17 LB/H, HOURLY	BACT-PSD
							Low sulfur fuel	H_2SO_4	0.34 GR S/100 SCF, FUEL SUPPLIER RECORDS	BACT-PSD
							Good combustion controls.	CO	0.77 LB/H, HOURLY	BACT-PSD
							Low NOx burner	NO_X	0.75 LB/H, HOURLY	BACT-PSD
							Low sulfur fuel	FPM	0.15 LB/H, HOURLY	BACT-PSD
CPV THREE RIVERS ENERGY CENTER	IL-0129	7/30/2018	12.8 MMBtu/hr	Natural Gas	19.600	Fuel heater	Good combustion practice	TPM	0.0075 lb/MMBtu	BACT-PSD
							Good combustion practice	H_2SO_4	0.014 lb/hr	BACT-PSD
							Good combustion practice	CO	0.08 lb/hr	BACT-PSD
WAUPACA FOUNDRY, INC. PLANT 5	IN-0288	6/25/2018	33.65 MMBtu/hr	Natural Gas	19.600	P51A, P54A, P51B, Hot Water Heater		VOC	0.005 LB/MILLION FT3	BACT-PSD
								CO	84 LB/MILLION FT3	BACT-PSD

ATTACHMENT C – PROPOSED BACT LIMITS

VAPORIZER

PSE's proposed BACT for the vaporizer exhaust remains consistent with the most restrictive determinations for boilers that we identified. The proposed technology and BACT emission limits are presented in Table C-1.

Table C-1: Proposed BACT for the Vaporizer

Pollutant	Control Technology	BACT Limit
NO_X	Good Combustion Practices/Low or Ultra-Low NO_X Burners	12 lb/MMcf
CO	Good Combustion Practices	40 lb/MMcf
PM, PM_{10}, $PM_{2.5}$	Good Combustion Practices, Fuel Selection	7.6 lb/MMcf
VOCs	Good Combustion Practices	5.5 lb/MMcf
SO_2	Good Combustion Practices, Fuel Selection	15 lb/MMcf
TAPs	Good Combustion Practices	5.7 lb/MMcf

GROUND FLARE

PSE's proposed BACT for the flare exhaust remains consistent with the most restrictive determinations for enclosed ground flares. The proposed technology and BACT emission limits are presented in Table C-2.

Table C-2: Proposed BACT for the Flare

Pollutant	Control Technology	BACT Limit
NO_X	Good Combustion Practices/Low NO_X Burners	0.06 lb/MMBtu
CO	Good Combustion Practices	0.2 lb/MMBtu
PM, PM_{10}, $PM_{2.5}$	Good Combustion Practices	0.0075 lb/MMBtu
VOCs	Good Combustion Practices	Flare designed to achieve a destruction efficiency of at least 99% for compounds up to 3 carbons.
SO_2	Good Combustion Practices	165 lb/MMscf
TAPs	Good Combustion Practices	0.37 lb/MMBtu

FUGITIVES

PSE's proposed BACT for fugitive emissions remains consistent with the most restrictive determinations. The proposed technology and BACT emission limits are presented in Table C-3.

Table C-3: Available and Feasible Control Technologies for Fugitive Emissions

Pollutant	Control Technology
VOC/TAPs	Efficient Capture and Control/LDAR Measures

ATTACHMENT D – DISPERSION MODELING INPUT AND OUTPUT FILES (DVD)