

Construction Permit Source Analysis & Technical Review

Company	Golden Pass Products LLC	Permit Number	116055 and PSDTX1386
City	Sabine Pass	Project Number	203458 and 203461
County	Jefferson	Account Number	N/A
Project Type	Initial	Regulated Entity Number	RN107053530
Project Reviewer	Erik Hendrickson, P.E.	Customer Reference Number	CN604502021
Site Name	LNG Export Terminal		

Project Overview

Golden Pass Products LLC (Golden Pass) proposes to construct and operate a natural gas liquefaction and export plant (an liquefied natural gas (LNG) terminal). The proposed liquefaction and export terminal will be located adjacent to the existing Golden Pass operation, which was designed and built to be an LNG import facility, near the Sabine Pass in Southeast Texas.

The proposed project will utilize some of the existing receiving terminal infrastructure to be used in the operations of the export terminal. This will be accomplished by using the existing LNG storage and marine facilities, adding three liquefaction trains, each with two GE Frame 7 gas-fired refrigeration compressor turbines equipped with heat recovery steam generating units (HRSGs). Pipeline quality natural gas will be delivered from interconnecting intrastate pipeline systems. The natural gas will be treated to remove carbon dioxide, sulfur compounds, water, mercury, and heavy hydrocarbons. The treated natural gas is then sent to the liquefaction process where the gas is cooled to become a liquid. The LNG will then be stored in an existing LNG storage tank or loaded onto a ship at the existing docks. Emissions from routine maintenance, startup, and shutdown (MSS) activities are included in the permit application and have been reviewed.

The proposed project will include the following new emission points:

- Six GE Frame 7 gas-fired refrigeration compressor turbines with HRSGs
- One LNG storage LP flare
- One wet/dry flare
- One auxiliary boiler
- Four thermal oxidizers
- Seven diesel-fired essential engine generators
- One gas-fired essential engine generator
- Eleven storage tanks
- Fugitive emissions

Emission Summary

Air Contaminants*	NO _x	CO	VOC	PM	PM ₁₀	PM _{2.5}	SO ₂	H ₂ S	H ₂ SO ₄	NH ₃	HAPS*
Proposed Emissions (TPY)	670.89	843.93	256.5 1	118.9 1	118.9 1	118.9 1	9.42	0.59	0.67	423.86	10/25

* Note: Total HAP emissions < 25 TPY and any Individual HAP <10 TPY.

Compliance History Evaluation - 30 TAC Chapter 60 Rules

A compliance history report was reviewed on:	11/21/2014
Compliance period:	09/01/2010 – 09/01/2014
Site rating & classification:	0.0, unclassified
Company rating & classification:	0.0, unclassified
If the rating is 50<RATING<55, what was the outcome, if any, based on the findings in the formal report:	Na
Has the permit changed on the basis of the compliance history or rating?	No

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Public Notice Information - 30 TAC Chapter 39 Rules

Rule Citation	Requirement	
39.403	Date Application Received:	12/23/2013
	Date Administratively Complete:	1/08/2014
	Small Business Source?	No
	Date Leg Letters mailed:	1/08/2014
39.603	Date Published:	1/14/2014
	Publication Name:	<i>Port Arthur News and Beaumont Enterprise</i>
	Pollutants:	nitrogen oxides, sulfur dioxide, carbon monoxide, ammonia, hazardous air pollutants, sulfuric acid mist, hydrogen sulfide, organic compounds and particulate matter including particulate matter with diameters of 10 microns or less and 2.5 microns or less
	Date Affidavits/Copies Received:	1/29/2014
	Is bilingual notice required?	No
	Date Certification of Sign Posting / Application Availability Received:	2/24/2014
	39.604	Public Comments Received?
Hearing Requested?		No
Meeting Request?		No
Date Response to Comments sent to OCC:		Na
Consideration of Comments:		Na
Is 2nd Public Notice required?		Yes
39.419	Date 2nd Public Notice/Preliminary Decision Letter Mailed:	11/24/2014
39.413	Date Cnty Judge, Mayor, and COG letters mailed:	11/24/2014
	Date Federal Land Manager letter mailed:	Na
39.605	Date affected states letter mailed:	11/24/2014
39.603	Date Published:	11/29/2014 and 12/9/2014
	Publication Name:	<i>Port Arthur News and Beaumont Enterprise</i>
	Pollutants:	nitrogen oxides, sulfur dioxide, carbon monoxide, ammonia, hazardous air pollutants, sulfuric acid mist, hydrogen sulfide, organic compounds and particulate matter including particulate matter with diameters of 10 microns or less and 2.5 microns or less
	Date Affidavits/Copies Received:	12/22/2014
	Date Certification of Sign Posting / Application Availability Received:	12/22/2014
	Public Comments Received?	None
	Meeting Request?	No
	Date Meeting Held:	Na
	Hearing Request?	No
	Date Hearing Held:	Na
	Request(s) withdrawn?	Na
	Date Withdrawn:	Na

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	Consideration of Comments:	Na
39.421	Date RTC, Technical Review & Draft Permit Conditions sent to OCC:	Na
	Request for Reconsideration Received?	Na
	Final Action:	Issue Permit
	Are letters Enclosed?	No

Construction Permit & Amendment Requirements - 30 TAC Chapter 116 Rules

Rule Citation	Requirement	
116.111(a)(2)(G)	Is the facility expected to perform as represented in the application?	Yes
116.111(a)(2)(A)(i)	Are emissions from this facility expected to comply with all TCEQ air quality Rules & Regulations, and the intent of the Texas Clean Air Act?	Yes
116.111(a)(2)(B)	Emissions will be measured using the following method:	The turbines will have NOx, CO, and NH3 CEMS. Auxiliary boiler will have a NOx CEMS. Initial Stack testing required for turbines, auxiliary boiler and thermal oxidizers will test for other pollutants. Fuel usage records will be used to calculate emissions for emissions not measured with CEMS. Engines will have run time meters. Flares will have flow meters.
116.111(a)(2)(D)	Subject to NSPS? Subparts A & Db, Kb, KKKK, IIII, JJJJ	Yes
116.111(a)(2)(E)	Subject to NESHAP? Subparts &	No
116.111(a)(2)(F)	Subject to NESHAP (MACT) for source categories? Subparts A & ZZZZ	Yes
116.111(a)(2)(H)	Is nonattainment review required?	No
	Is the site located in a nonattainment area?	No
116.111(a)(2)(I)	Is PSD applicable?	Yes
	Is the site a federal major source (100/250 tons/yr)?	Yes
	Is the project a federal major source by itself?	Yes
	Is the project a federal major modification?	Yes
	Did project emission increases, without decreases, for pollutant of concern, minus the two-year average actual emissions trigger netting?	Na
	Was the contemporaneous increase significant?	Na
	Is the change excluded by 40 CFR 52.21(b)(2)(iii)?	No
	Comment: New Greenfield site triggered PSD for NO _x , CO, VOC, PM, PM ₁₀ , and PM _{2.5} .	
116.111(a)(2)(L)	Is Mass Emissions Cap and Trade applicable to the new or modified facilities? If yes, did the proposed facility, group of facilities, or account obtain allowances to operate:	No
116.140 - 141	Permit Fee: \$ 75,000	Fee certification: R412964

Title V Applicability - 30 TAC Chapter 122 Rules

Rule Citation	Requirement	
122.10(13)(A)	Is the site a major source under FCAA Section 112(b)?	No
	Does the site emit 10 tons or more of any single HAP?	No
	Does the site emit 25 tons or more of a combination?	No
122.10(13)(C)	Does the site emit 100 tons or more of any air pollutant?	Yes
122.10(13)(D)	Is the site a non-attainment major source?	No

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122.602	<p>Periodic Monitoring (PM) applicability: Periodic monitoring is applicable because the site is a major source subject to 30 TAC Chapter 122. The permit contains the following requirements that satisfy periodic monitoring: CEMS for NO_x on the auxiliary boiler, quarterly visible emission/opacity observations from combustion sources, quarterly monitoring of sulfur content upstream and downstream of the thermal oxidizers, fuel usage monitoring of turbines and auxiliary boiler.</p>
122.604	<p>Compliance Assurance Monitoring (CAM) applicability: CAM is applicable because the site is major and facilities are equipped with control devices. The turbines will be monitored with NO_x, NH₃, and CO CEMS. Flares will have flow meters. Thermal oxidizers will have temperature and oxygen monitors.</p>

Request for Comments

Received From	Program/Area Name	Reviewed By/Date	Comments
ADMT:		Justin Cherry on 11/20/2014	Modeling Acceptable
Region:		Clint Burnett on 12/3/2014	Discussed comments with region. No change to permit conditions.
Toxicology:		Tiffany Bredfeldt on 12/5/2014	Adverse health effects from proposed facility emissions not anticipated.

Process/Project Description

The Golden pass LNG Terminal will have an export capacity of 15.6 million tonnes per annum of LNG. The terminal will consist of a natural gas pretreatment system, a liquefaction unit, utilities and other support facilities. The pretreatment system is comprised of the following activities: mercury removal, acid gas removal, dehydration, and heavy hydrocarbon removal. The liquefaction process is comprised of the following activities: liquefaction comprised of three trains, compression, LNG storage and loading, LNG circulation system, and vapor handling. The utilities and other support facilities are comprised of the following activities: steam generation and condensate recovery, electric power generation, fuel gas generation and distribution, flare relief system to dispose of vapors released during operations, and essential generators for backup power in the event of emergencies.

Pollution Prevention, Sources, Controls and BACT- [30 TAC 116.111(a)(2)(C)]

Emission sources for the proposed project consist of six gas-fired combustion turbines with duct burners, two flares (one ground flare and one elevated flare), one gas-fired auxiliary boiler, four thermal oxidizers, seven diesel-fired engine essential generators, one gas-fired engine essential generator, eleven storage tanks (eight tanks store diesel, one tanks store amine makeup solution, and two tanks stores condensate), condensate truck loading, one blowdown vent, and fugitive emissions. Golden Pass used EPA's "top-down" best available control technology (BACT) process for pollutants that triggered PSD. Golden Pass also used the Texas Commission on Environmental Quality's (TCEQ) Tier I BACT approach where it was applicable.

In addition to a review of control technology for steady state operations, the BACT analyses include startup and shutdown emissions and the numerical emission limits in the draft permit reflect this analysis. BACT for each pollutant include the numerical limits in the Maximum Allowable Emission Rate Table (MAERT).

As part of the BACT review process, the TCEQ evaluates information from the Environmental Protection Agency's (EPA's) RACT/BACT/LAER Clearinghouse (RBLC), on-going permitting in Texas and other states, and the TCEQ's continuing review of emissions control developments.

Combustion Turbines

Combustion Turbine (GE Frame 7) and Duct Burners (194 MMBtu/hr): NO_x will be controlled by selective catalytic reduction and low NO_x burners to 5.0 ppmvd @ 15% O₂. VOC and CO will be controlled by an oxidation catalyst and good combustion practices to 4.0 and 6.0 ppmvd @ 15% O₂, respectively. BACT for PM/PM₁₀/PM_{2.5} and SO₂ is the use of low sulfur gas. Ammonia slip will be limited to 10 ppmvd @ 15% O₂ as BACT. This is BACT for the combustion turbines.

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Golden Pass identified and evaluated the following NO_x reduction options: SCONO_x, SCR, and Selective Non-Catalytic Reduction (SNCR), DLN burners, water injection, and good combustion practices. SCONO_x and SNCR were eliminated due to technical infeasibility. Golden Pass identified and evaluated the following CO reduction options: SCONO_x, oxidation catalyst, and good combustion practices. SCONO_x was eliminated due to technical infeasibility.

PM/PM₁₀/PM_{2.5} is emitted from combustion processes as a result of the presence of inorganic constituents in the fuel, PM in the inlet air, and incomplete combustion of the organic constituents in the fuel. The size of this PM is less than one micron according to the EPA document AP-42. Because the turbines will only fire natural gas (and clean gas streams derived from natural gas), which contains little inorganic material, the PM/PM₁₀/PM_{2.5} emissions will primarily be the result of incomplete combustion and are anticipated to be relatively low. A search of the RBLC database shows that no add-on controls are required for natural gas-fired turbines to control PM/PM₁₀/PM_{2.5} emissions. Therefore, the use of clean gas and the application of good combustion controls is BACT for PM/PM₁₀/PM_{2.5} emissions.

Emissions of SO₂ and H₂SO₄ will occur as a result of the oxidation of sulfur in the gas fired in the turbines. The majority of the sulfur converts to SO₂, and a subsequent portion of the SO₂ will be further converted to H₂SO₄. The formation of these sulfur compounds will be minimized by using low sulfur gas. A search of the RBLC did not show any post-combustion SO₂ or H₂SO₄ control technologies applied to natural gas-fired CTs. Therefore, the use of low sulfur gas is BACT for SO₂ and H₂SO₄.

Operation of the turbines will result in emissions from startup and shutdown. BACT will be achieved by minimizing the duration of the startup and shutdown events as much as practicable. The duration of each startup and shutdown is limited to 180 minutes. The hourly emission limits are based on turbine vendor information. Emissions during startup and shutdown are subject to hourly and annual emission limits on the MAERT. Maintenance of the turbines includes a number of optimization activities that must be conducted while the turbines operate, sometimes under transient or reduced load, or similar circumstances where the emission controls are not fully operational. Emissions from turbine maintenance are subject to the hourly emission limits for MSS. Because turbine maintenance is not conducted frequently, annual emissions were not increased to account for maintenance.

Thermal Oxidizers

Thermal Oxidizers: Thermal oxidizers will control vents from the Acid Gas Removal Unit, the H₂s Scavenger Unit, the condensate storage tank at the GPX Terminal, and truck loading operations. The applicant proposed a thermal oxidizer which achieves 99.5% control for the VOC. The minimum operating temperature will be 1500 F with a residence time of one second. The use of low NO_x burners emitting 0.13 lb NO_x/MMBtu is BACT for NO_x. BACT for CO is the use of good combustion practices. BACT for H₂S emissions from the Acid Gas Removal Unit and the H₂s Scavenger Unit is the use of a thermal oxidizer. BACT for PM/PM₁₀/PM_{2.5} and SO₂ is the use of low sulfur gas. This is BACT for the thermal oxidizer and an amine treatment system.

Golden Pass identified and evaluated the following NO_x reduction options: SCR, SNCR, Low NO_x burners, Ultra Low NO_x burners, and good combustion practices. Ultra Low NO_x burners were eliminated due to technical infeasibility. SCR and SNCR were eliminated due to economic infeasibility. Golden Pass identified and evaluated oxidation catalyst and good combustion practices as CO reduction options. Oxidation catalyst was eliminated due to a lack of demonstrated feasibility for thermal oxidizers and to economic infeasibility.

Auxiliary Boiler

Auxiliary Boiler: BACT for NO_x is the use low NO_x burners to meet an emission limit of 30 ppmvd @ 3% O₂. BACT for VOC and CO is the use of good combustion practices to meet a CO emission limit of 50 ppmvd @ 3% O₂. The auxiliary boiler is limited to 1,440 hours of operation per year. BACT for PM/PM₁₀/PM_{2.5} and SO₂ is the use of low sulfur gaseous fuel. This is BACT for an auxiliary boiler.

Golden Pass identified and evaluated the following NO_x reduction options: SCR, SNCR, Ultra Low NO_x burners, Low NO_x burners, flue gas recirculation (FGR), and good combustion practices. SCR, SNCR, and Ultra Low NO_x burners were eliminated due to economic infeasibility. FGR was not selected since Low NO_x burners achieved a higher level of control. Golden Pass identified and evaluated oxidation catalyst and good combustion practices as CO reduction options. Oxidation catalyst was eliminated due to economic infeasibility.

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BACT will be achieved by minimizing the duration of the startup and shutdown events as much as practicable. The duration of each startup and shutdown is limited to 60 minutes. Emissions during startup and shutdown are subject to hourly and annual emission limits on the MAERT.

Flare and Maintenance, Startup, and Shutdown

Flare and Maintenance, Startup, and Shutdown: The flares will be designed to achieve 99 percent destruction of molecules with three or less carbon atoms and 98 percent destruction of molecules with more than three carbon atoms. This meets BACT for control of VOC emissions during MSS. Golden Pass will utilize good combustion practices and compliance with 40 CFR 60.18 as BACT for NO_x, CO, PM/PM₁₀/PM_{2.5} and SO₂. This is BACT for a flare. The permit also minimizes emissions by containing limitations on the volume of vent gas that can be sent to the flares, which represents several operational and MSS scenarios. BACT for each pollutant during flaring includes a numerical limit in the MAERT.

Golden Pass identified and evaluated the following NO_x reduction options: flare gas recovery, compliance with 40 CFR 60.18, and good combustion practices. Flare gas recovery was eliminated as technically infeasible to re-route the gas to the fuel system due to the sporadic nature of emission controlled by the flare.

Essential Engine Generators

The seven diesel-fired essential (emergency) engine generators at the site are each limited to 40 hours per year of non-emergency operations. The one gas-fired essential engine generator is limited to 100 hours per year of non-emergency operations. BACT for SO₂ for the diesel-fired engines is the use of ultra low sulfur diesel containing no more than 15 parts per million by weight sulfur. BACT for SO₂ for the gas-fired engine is the use of low sulfur gas. BACT for CO, VOC, and PM/PM₁₀/PM_{2.5} is limited hours of operation.

The diesel and gas fired essential engine generators will be new equipment which must comply with the federal Standards of Performance for New Stationary Sources (NSPS), Subpart IIII and JJJJ. The engine manufacturer must certify that both meet the Tier 2 non-road emission standard in 40 CFR § 89.112. Additional controls for the engine would not be economically reasonable, given the very low hours of operation allowed. Compliance with the NSPS Subpart IIII and JJJJ represents BACT for the essential engine generators.

Storage Tanks

Due to the low vapor pressure of diesel and amine makeup solution, and due to the relatively small size of the tanks, BACT for all tanks that will store diesel or amine makeup solution is a painted white fixed roof tank, which will utilize submerged fill pipes. The one condensate storage tank will be an internal floating roof tank equipped with a liquid-mounted primary seal and a rim mounted secondary seal. This is BACT for VOC for storage tanks storing these substances.

Equipment Leak Fugitives

The site has the potential to emit approximately 58 tons per year of VOC from equipment fugitive leaks. While VOC BACT does not require leak detection and repair (LDAR) for pipeline quality natural gas (or LNG), the applicant is applying TCEQ's 28VHP LDAR.

The definition of BACT at 40 CFR §52.21(b)(12) states that if technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of BACT. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.

Given the limitations on directly measuring the VOC emissions from the leaks at the site there is not an ability to prescribe a specific emission standard to the fugitive leaks. The applicant's proposed use of TCEQ's 28VHP LDAR program, a work practice, in lieu of an enforceable emission standard is BACT for VOC emissions from equipment fugitive leaks.

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Ammonia fugitives will be monitored by an audio, visual, and olfactory program once per day as BACT. The annual volume of gas that can be vented from the one blowdown vent at the MP1 Compressor Station to perform maintenance at the site has been limited to minimize maintenance related emissions.

Impacts Evaluation - 30 TAC 116.111(a)(2)(J)

Was modeling conducted?	Yes	Type of Modeling:	Refined - AERMOD
Will GLC of any air contaminant cause violation of NAAQS?			No
Is this a sensitive location with respect to nuisance?			No
[§116.111(a)(2)(A)(ii)] Is the site within 3000 feet of any school?			No
Additional site/land use information: Area primarily rural.			

Summary of Modeling Results

Golden Pass' air quality analysis (AQA) utilized air dispersion modeling and existing ambient monitoring data to demonstrate that the proposed project's emissions will not adversely affect public health and welfare, which includes the National Ambient Air Quality Standards (NAAQS), PSD increment, additional impacts, minor new source review of regulated pollutants without a NAAQS, and air toxics review. The AQA was audited by the TCEQ and deemed to be acceptable for all review types and pollutants, as supplemented by the TCEQ's Air Dispersion Modeling Team (ADMT). The results are summarized below.

De Minimis Analysis

A De Minimis analysis was initially conducted to determine if a full impacts analysis would be required. The De Minimis analysis modeling results indicate that 1-hr NO₂ exceeds the de minimis concentration and requires a full impacts analysis. The De Minimis analysis modeling results for 24-hr and annual PM₁₀, 24-hr and annual PM_{2.5} (NAAQS and Increment), and 1-hr and 8-hr CO indicate that the project is below the respective de minimis concentrations and no further analysis is required.

The justification for selecting the EPA's interim 1-hr NO₂ De Minimis level was based on the assumptions underlying EPA's development of the 1-hr NO₂ De Minimis level. As explained in EPA guidance memoranda¹, the EPA believes it is reasonable as an interim approach to use a De Minimis level that represents 4% of the 1-hr NO₂ NAAQS.

The applicant provided an evaluation of ambient PM_{2.5} monitoring data, consistent with draft EPA guidance for PM_{2.5}², for using the PM_{2.5} De Minimis levels in the NAAQS analysis. If monitoring data shows that the difference between the PM_{2.5} NAAQS and the monitored PM_{2.5} background concentrations in the area is greater than the PM_{2.5} De Minimis level, then the proposed project with predicted impacts below the De Minimis level would not cause or contribute to a violation of the PM_{2.5} NAAQS and does not require a full impacts analysis. See the discussion below in the air quality monitoring section for additional information on the evaluation of ambient PM_{2.5} monitoring data.

The applicant also provided an evaluation of ambient PM_{2.5} monitoring data for using the PM_{2.5} De Minimis levels for the PSD Increment analysis. If the difference between the PM_{2.5} increment and the change in ambient monitored PM_{2.5} background concentrations in the area is greater than the PM_{2.5} De Minimis level, then the use of the De Minimis levels are reasonable. See the discussion below in the increment analysis section for additional information on the evaluation of ambient PM_{2.5} monitoring data.

**Table 1. Modeling Results for PSD De Minimis Analysis
in Micrograms Per Cubic Meter (µg/m³)**

Pollutant	Averaging Time	GLCmax (µg/m ³)	De Minimis (µg/m ³)
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1 www.epa.gov/nsr/documents/20100629no2guidance.pdf

2 www.epa.gov/ttn/scram/guidance/guide/Guidance_for_PM25_Permit_Modeling.pdf

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PM ₁₀	24-hr	1.19	5
PM ₁₀	Annual	0.21	1
PM _{2.5}	24-hr	1.19	1.2
PM _{2.5}	Annual	0.21	0.3
NO ₂	1-hr	14.6	7.5
NO ₂	Annual	0.9	1
CO	1-hr	1501.6	2000
CO	8-hr	367.8	500

The 1-hr NO₂ GLCmax is based on the highest five-year average of the high, first high (H1H) predicted concentrations determined for each receptor.

The GLCmax for all other pollutants and averaging times represent the maximum predicted concentrations over five years of meteorological data.

The predicted concentrations reported by the applicant for 1-hr and 8-hr CO are not consistent with the model output. The values reported in Table 1 are from the model output.

The applicant provided an evaluation of secondary PM_{2.5} impacts that considers modeling results of the directly emitted PM_{2.5} emissions, ambient background monitoring data representative for the project site, and proposed allowable emission rates of SO₂ and NO_x:

Modeling results from the directly emitted PM_{2.5} emissions are less than the De Minimis levels.

Adding the modeling results from the directly emitted PM_{2.5} emissions to representative background concentrations gives total concentrations well below the NAAQS.

The proposed emissions of SO₂ are less than the Significant Emission Rate (SER) of 40 tons per year (tpy) and would not be expected to result in significant secondary formation of PM_{2.5}.

The proposed emissions of NO_x are greater than the NO_x SER (40 tpy). Secondary PM_{2.5} formation occurs as a result of chemical transformations that occur in the atmosphere gradually over time and only a portion of the NO_x emissions would be affected. Furthermore, secondary PM_{2.5} formation from NO_x is unlikely to overlap in space or time with nearby maximum primary PM_{2.5} impacts associated with the project sources.

The applicant considered the potential contribution of secondary PM_{2.5} from the proposed precursor emissions for the project expansion with a comparison to existing regional PM_{2.5} precursor emissions based on 2011 National Emissions Inventory database (NEI) and determined that the precursor emissions from the project (681 tpy) are a small percentage of the precursor emissions from the region (38, 470 tons).

In addition, only a small portion of the proposed NO_x emissions would be expected to convert to secondary PM_{2.5} in the form of ammonium nitrate. To support this claim, the applicant reviewed PM_{2.5} speciated monitoring data from a nearby monitor. Based on the monitoring data, particulate nitrate formation is most favorable during the colder winter months than during the summer months. The average nitrate contribution to the 24-hr average PM_{2.5} concentrations during the

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winter months was 2.99% of the total PM_{2.5} monitored concentration, which demonstrates that particulate nitrate formation is a small fraction of secondary formation of PM_{2.5}.

Air Quality Monitoring

The De Minimis analysis modeling results indicate that 24-hr PM₁₀, annual NO₂, and 8-hr CO are below their respective monitoring significance levels.

Table 2. Modeling Results for PSD Monitoring Significance Levels

Pollutant	Averaging Time	GLCmax (µg/m ³)	Significance (µg/m ³)
PM ₁₀	24-hr	1.19	10
NO ₂	Annual	0.9	14
CO	8-hr	367.8	575

The GLCmax for all pollutants and averaging times represent the maximum predicted concentrations over five years of meteorological data.

The applicant evaluated ambient PM_{2.5} monitoring data to satisfy the requirements for the pre-application air quality analysis. Background concentrations for PM_{2.5} were obtained from the EPA AIRS monitor 482450021 located at 2200 Jefferson Dr., Port Arthur, Jefferson County. The applicant used a three-year average (2011-2013) of the 98th percentile of the annual distribution of the 24-hr concentrations for the 24-hr value (21.3 µg/m³). The applicant used a three-year average (2011-2013) of the annual mean concentrations for the annual value (9.3 µg/m³). The use of this monitor for PM_{2.5} is reasonable based on this monitor being the closest PM_{2.5} monitor to the site (approximately 18 kilometers [km] to the north), a quantitative analysis of source emissions located within 10 km of the project site and monitor location, and the monitor is located in an area surrounded by industry that is similar to the project site.

National Ambient Air Quality Standards (NAAQS) Analysis

The De Minimis analysis modeling results indicate that 1-hr NO₂ exceeds the de minimis concentration and requires a full impacts analysis. The full NAAQS modeling results indicate the total predicted concentrations will not result in an exceedance of the NAAQS.

Table 3. Total Concentrations for PSD NAAQS (Concentrations > De Minimis)

Pollutant	Averaging Time	GLCmax (µg/m ³)	Background (µg/m ³)	Total Conc. = [Background + GLCmax] (µg/m ³)	Standard (µg/m ³)
NO ₂	1-hr	43.7	69.9	113.6	188

The GLCmax for 1-hr NO₂ is the maximum five-year average of the 98th percentile, or high, eighth high (H8H) predicted concentrations, determined for each receptor.

Background concentrations for NO₂ were obtained from the EPA AIRS monitor 482450628 located in Port Arthur, Jefferson County. The three-year average (2011-2013) of the 98th percentile of the annual distribution of the daily maximum 1-hr concentrations was used for the 1-hr value. The use of this monitor for NO₂ is reasonable based on this monitor being near the project site (approximately 12 km to the north), the quantitative analysis of source emissions located within 10 km of the project site and monitor location, and the monitor is located in an area surrounded by greater amount of industry than the project site.

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Table 4. PSD Ambient Air Quality Analysis for Ozone

Pollutant	Monitor	Averaging Time	Background (ppb)	Standard (ppb)
O ₃	482450101	8-hr	70	75

Background concentrations for ozone were obtained from the EPA AIRS monitor 482450101 located at 5200 Mechanic St., Port Arthur, Jefferson County. A three-year average (years 2012-2014) of the annual fourth highest daily maximum 8-hr concentrations was used in the analysis. Although 2014 is not a complete year, the monitor does reflect the concentrations associated with the complete ozone season (May 1 – October 31) for the Beaumont/Port Arthur area (BPA). Though the applicant did not provide sufficient documentation on the selection of this particular ozone monitor, the use of this monitor for a background concentration of ozone is reasonable since the current ozone design value for the BPA area is 70 parts per billion (ppb). Additionally, the selected monitor is the closest monitor to the project site, located approximately 2.5 km from the project site to the southeast.

To evaluate proposed emissions for the ozone analysis, the applicant reviewed photochemical modeling for a nearby project. The nearby project that conducted photochemical modeling is located a few kilometers away from this project site and was conducted for the same type of facilities (i.e. a liquefaction facility that liquefies natural gas for export from an existing terminal). However, the applicant noted that the photochemical modeling project had approximately four times the amount of NO_x emissions than what is proposed for this project. The photochemical modeling technical report notes that the predicted impacts at monitors in the BPA area ranged from 0.1-0.5 parts per billion (ppb) for the allowable case, which represents the base case plus the nearby project's allowable emissions. At other areas of the modeling domain away from the monitors, the model predicted impacts to be less than 1 ppb. Finally, the applicant concluded that their proposed project would be insignificant for ozone based on the current air quality trends and the photochemical modeling that demonstrates that the same type of facility, with approximately 4 times as much NO_x, is insignificant. The maximum 8-hr impact added together with the representative monitoring data is less than the 8-hr ozone NAAQS.

Increment Analysis

The De Minimis analysis modeling results indicate that 24-hr and annual PM₁₀, 24-hr and annual PM_{2.5}, and annual NO₂ did not exceed the respective de minimis concentrations and do not require a full PSD increment analysis.

The applicant used representative monitoring data to justify using the PM_{2.5} De Minimis levels for the PSD Increment analysis. Ambient concentrations for PM_{2.5} were obtained from the EPA AIRS monitor 482450021 located at 2200 Jefferson Dr., Port Arthur, Jefferson County. The applicant evaluated the difference in ambient concentrations for the time period between the most recent complete year and the year preceding the major source baseline date (2009-2013). A comparison of the 24-hr high, second high (H2H) and annual monitored concentrations for 2010 and 2013 show a change in ambient concentrations of 0.3 µg/m³ and -1.8 µg/m³, respectively. When the changes in ambient concentrations are subtracted from the applicable increments (9 µg/m³ and 4 µg/m³, respectively), the differences are greater than the De Minimis levels. Therefore, the use of the PM_{2.5} De Minimis levels is reasonable.

Additional Impacts Analysis

The applicant performed an Additional Impacts Analysis as part of the PSD AQA. The applicant conducted a growth analysis and determined that population will not significantly increase as a result of the proposed project. The applicant conducted a soils and vegetation analysis and determined that all evaluated criteria pollutant concentrations are below their respective secondary NAAQS. The applicant meets the Class II visibility analysis requirement by complying with the opacity requirements of 30 TAC 111. The Additional Impacts Analyses are reasonable and possible adverse impacts from this project are not expected.

The ADMT evaluated predicted concentrations from the project site to determine if emissions could adversely affect a Class I area. The nearest Class I area, Breton Wilderness, is located approximately 450 km from the project site.

The H₂SO₄ 24-hr maximum predicted concentration of 0.02 µg/m³ occurred along the property line towards the south. The H₂SO₄ 24-hr maximum predicted concentration occurring at the edge of the receptor grid, 1.4 km from the proposed

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sources, in the direction of the Breton Wilderness Class I area is 0.005 $\mu\text{g}/\text{m}^3$. The Breton Wilderness Class I area is an additional 448.6 km from the edge of the receptor grid. Therefore, emissions of H_2SO_4 from the proposed project are not expected to adversely affect the Breton Wilderness Class I area.

The predicted concentrations of PM_{10} , $\text{PM}_{2.5}$, NO_2 , and SO_2 for all averaging times, are all less than de minimis levels at a distance of 10.6 km from the proposed sources in the direction of the Breton Wilderness Class I area. The Breton Wilderness Class I area is an additional 439.4 km from the location where the predicted concentrations of PM_{10} , $\text{PM}_{2.5}$, NO_2 , and SO_2 for all averaging times are less than de minimis. Therefore, emissions from the proposed project are not expected to adversely affect the Breton Wilderness Class I area.

Minor Source NSR and Air Toxics Review

Criteria pollutants not triggering PSD were also reviewed to insure the NAAQS would not be exceeded. Other pollutants associated with the project are products of combustion of natural gas and are generally not reviewed by the Toxicology Division in accordance with Appendix B of the Modeling and Effects Review Applicability Document. Tables 5, 6, and 7 below summarize predicted impacts for criteria pollutants not triggering a PSD review.

Table 5. Project-Related Modeling Results for State Property Line

Pollutant	Averaging Time	GLCmax ($\mu\text{g}/\text{m}^3$)	De Minimis ($\mu\text{g}/\text{m}^3$)
SO_2	1-hr	1.1	16.3
H_2SO_4	1-hr	0.07	1
H_2SO_4	24-hr	0.02	0.3

Table 6. Site-wide Modeling Results for State Property Line

Pollutant	Averaging Time	GLCmax ($\mu\text{g}/\text{m}^3$)	Standard ($\mu\text{g}/\text{m}^3$)
H_2S	1-hr	7.7	108

The justification for selecting the EPA's interim 1-hr SO_2 De Minimis level was based on the assumptions underlying EPA's development of the 1-hr SO_2 De Minimis level. As explained in EPA guidance memoranda³, the EPA believes it is reasonable as an interim approach to use a De Minimis level that represents 4% of the 1-hr SO_2 NAAQS.

Table 7. Modeling Results for Minor NSR De Minimis

Pollutant	Averaging Time	GLCmax ($\mu\text{g}/\text{m}^3$)	De Minimis ($\mu\text{g}/\text{m}^3$)
SO_2	1-hr	1.1	7.8
SO_2	3-hr	0.9	25
SO_2	24-hr	0.3	5
SO_2	Annual	0.04	1

The GLCmax represent the maximum predicted concentrations over one year of meteorological data.

³ www.epa.gov/region07/air/nsr/nsrmemos/appwso2.pdf

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Table 8. Minor NSR Production Project-Related Modeling Results for Health Effects

Pollutant & CAS#	Averaging Time	GLCmax (µg/m ³)	10% ESL (µg/m ³)
benzene 71-43-2	Annual	1.85	0.45
cyclohexane 110-82-7	1-hr	325.8	340
marine gas oil (fuel diesel #2) 68476-34-6	1-hr	129.2	100
ethyl benzene 100-41-4	1-hr	271.7	74
ethylene 74-85-1	1-hr	158.6	140
ethylene 74-85-1	Annual	4.09	3.4
heptane 142-82-5	1-hr	657	275
hexane, n- 110-54-3	1-hr	966	530
isopentane 78-78-4	1-hr	404.8	380
methyl diethanolamine 105-59-9	1-hr	60.5	50
octane 111-65-9	1-hr	672.7	350
polycyclic aromatic HC's, particulate, <10% b(a)p, not otherwise classified NA	1-hr	0.09	0.05
pentane, n- 109-66-0	1-hr	1792.6	410
piperazine 110-85-0	1-hr	5.3	4
piperazine 110-85-0	Annual	0.13	0.4
xylene mixture 1330-20-7	1-hr	271.7	35

The applicant further evaluated all the constituents in Table 8 using Step 10 of the MERA guidance document except for cyclohexane.

Table 9. Minor NSR MSS Project-Related Modeling Results for Health Effects

Pollutant & CAS#	Averaging Time	GLCmax (µg/m ³)	25% ESL (µg/m ³)
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ethylene 74-85-1	1-hr	2.3	350
ethylene 74-85-1	Annual	0.00005	8.5

Table 10. Minor NSR Site-wide Modeling Results for Health Effects

Pollutant & CAS#	Averaging Time	GLCmax ($\mu\text{g}/\text{m}^3$)	GLCni ($\mu\text{g}/\text{m}^3$)	ESL ($\mu\text{g}/\text{m}^3$)
ammonia 7664-41-7	1-hr	48	< 48	170
benzene 71-43-2	1-hr	261	247	170

Table 11. Minor NSR Hours of Exceedance for Health Effects

Pollutant	Averaging Time	1 X ESL GLCni	2 X ESL GLCmax
benzene	1-hr	23	0

The GLCmax are located along the property line. The applicant modeled a separate receptor grid to determine the maximum predicted concentration for non-industrial receptors (GLCni) for benzene, and the maximum prediction from this grid is reported in Table 10. The applicant reported the maximum number of predicted exceedances in the modeling domain (reported in Table 11).

Permit Concurrence and Related Authorization Actions

Is the applicant in agreement with special conditions?	Yes
Company representative(s):	Jennifer Monopolis
Contacted Via:	Phone, Letter, E-Mail
Date of contact:	11/17/2014
Other permit(s) or permits by rule affected by this action:	No

Project Reviewer

Date

Team Leader/Section Manager/Backup

Date