APPENDIX T
AIR DISPERSION MODELING REPORT

Air Dispersion Modeling Report

BW TX

Bluewater Texas Terminal LLC
Bluewater SPM Project
Gulf of Mexico

MAY 2019

DiSorbo
Environmental Consulting Firm

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Section 1
Introduction

Bluewater Texas Terminal LLC (“BWTT”), an affiliate of Phillips 66 Company, proposes to construct a deepwater port for export of crude oil in the United States Gulf of Mexico, approximately 18 statute miles offshore of Port Aransas, Texas.

The Deepwater Port Act (“DWPA”, 33 USC § 1501 et seq.) requires that a person wishing to construct, own or operate a deepwater port obtain a license from the Secretary of Transportation. The proposed deepwater port will consist of two single point mooring (SPM) systems, subsea pipelines for transporting crude oil from shoreside storage points, and other equipment. The terminal meets the definition of a “deepwater port” (33 USC § 1502(9)) and is subject to the licensing requirements of the DWPA. BWTT must obtain a license from the U.S. Department of Transportation Maritime Administration (MARAD) before construction on the terminal may begin.

MARAD regulations implementing the DWPA require an analysis showing that the deepwater port will comply with all applicable Federal, tribal, and State requirements for the protection of the environment (33 CFR § 148.105(z)). An air dispersion modeling analysis is provided which details the analysis associated with the estimated air quality impacts from the operation phase of the project, described in Vol. II, Section 13 of the DWPA license application. The present analysis includes the following components:

1. An evaluation to determine whether air emissions of “criteria” pollutants during the operation phase of the project could cause or contribute to a violation of any National Ambient Air Quality Standard (NAAQS). The NAAQS analysis for ozone is included as part of the required Prevention of Significant Deterioration (PSD) permit application, in a separate part of the license application

2. An evaluation to determine whether air emissions of sulfur compounds during the operation phase could contravene any ambient air quality standard established by the State of Texas.

3. An evaluation to determine whether air emissions of crude oil vapors during the operation phase of the project could result in adverse impacts to public health or property, considering

Effects Screening Levels (ESLs) established by the Texas Commission on Environmental Quality (TCEQ).

The analysis described in this report conforms to applicable guidelines established by EPA and TCEQ for conducting dispersion modeling analyses and evaluating model results. Based on the analysis described in the remainder of this report, and consistent with the findings presented in Vol. II, Section 13 of the DWPA license application, adverse air quality impacts are not expected.

Section 2
Project Description

2.1 Facility Background

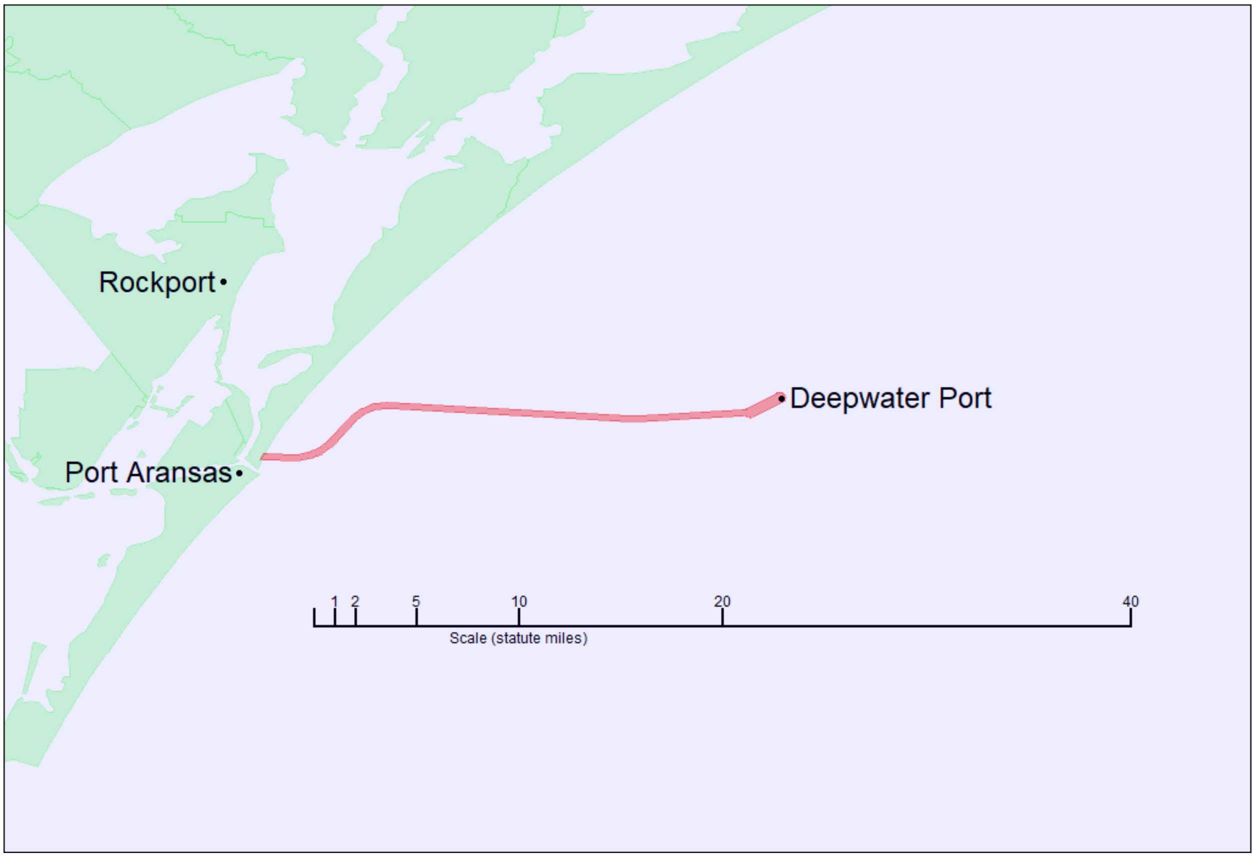
BWTT proposes to construct a deepwater port for export of crude oil via two Single Point Mooring (SPM) systems. The SPM's will be located at 27º 53 21.70" N, 96º 39'4.16" W and at 27º 54' 9.28" N, 96º 37' 41.23" W, in BOEM lease block TX4, subdivisions 698 and 699. The facility will be approximately 18 statute miles from Matagorda Island at its nearest point and 26 statute miles from the entrance to Port Aransas. At the location of the deepwater port, the water depth is approximately 89 feet, which provides sufficient under keel clearance for a fully laden oil tanker in the Very Large Crude Carrier (VLCC) size range. A simplified depiction of the facility's location is presented in Figure 2-1.

Loading of vessels is accomplished through two single point mooring (SPM) systems, each consisting of a pipeline end manifold (PLEM), a catenary anchor leg mooring (CALM) buoy, and hose strings. During loading operations, crude oil is pumped from the onshore valve and pipeline infrastructure to the deepwater port through two 30" offshore pipelines. The pipelines run along the seabed and terminate at a PLEM which is also affixed to the seabed. Each CALM mooring buoy is anchored by several catenary chains extending radially outward and down to the seabed. The buoy moves up and down with the tide and waves, and floats above the PLEM. The CALM buoy is partially submerged and its upper part is able to freely rotate about its base. One or more under-buoy hoses connect to the submerged portion of the CALM buoy and transfer crude oil from the PLEM to the CALM buoy. A floating hose string connects the CALM buoy to a tanker vessel in order to deliver crude oil.

During loading operations, inert gas and crude oil vapors contained in the headspace of the crude oil tanker cargo tanks is vented to the atmosphere through the ship's mast risers. The vent gas contains Volatile Organic Compounds (VOC) in the form of crude oil vapors, and may contain hydrogen sulfide (H_2S), depending on the sulfur content of the crude oil loaded. Emissions of products of combustion (NO_X, CO, SO_2 and Particulate matter) occur from the ship's engines as well as the engines of support vessels used to assist with loading operations.

Figure 2-1

Depiction of Facility Location (simplified)



The proposed deepwater port will consist of subsea pipelines, single point mooring connections, mooring lines, a hose string and other necessary equipment. A shoreside pumping station will be used to transfer crude oil from an inshore storage terminal into the deepwater port. This analysis is confined to emissions during operation of the offshore portion of the project.

2.2 Acronyms and Abbreviations

Acronyms and customary abbreviations in this application are as follows.

Term	Gloss
AERCOARE	Meteorological data preprocessor program to AERMOD for overwater conditions
AERMET	AERMOD Meteorological Preprocessor
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
AERMOD-COARE	Alternative Modeling Approach Using AERCOARE and AERMOD for Overwater Applications
AMS	American Meteorological Society
BOEM	Bureau of Ocean Energy Management
BWTT	Bluewater Texas Terminal LLC
CAA	Clean Air Act (42 USC § 7401 et seq.)
CALM	Catenary anchor-leg mooring
CAMx	Comprehensive Air Quality Model with Extensions
CFR	Code of Federal Regulations
CO	Carbon Monoxide
COARE	Coupled Ocean Atmosphere Response Experiment
DWPA	Deepwater Port Act (33 USC § 1501 et seq.)
EPA/USEPA	Environmental Protection Agency
H_2S	Hydrogen Sulfide
MARAD	Maritime Administration, U.S. Department of Transportation
MIXOPT	Mixing Height Option
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NSRDB	National Solar Radiation Database
OCD	Offshore Coastal Dispersion Model
PFL	AERMOD-ready upper air profile meteorological data file
PLEM	Pipeline end manifold
PM_{10}	Inhalable particles with diameters < 10 micrometers
$PM_{2.5}$	Fine inhalable particles with diameters < 2.5 micrometers
PSD	Prevention of Significant Deterioration
SFC	AERMOD-ready surface meteorological data file
SILs	Significant Impact Levels
SPM	Single-point mooring
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
VLCC	Very Large Crude Carrier
VOC	Volatile Organic Compounds
AERCOARE	Meteorological data preprocessor program to AERMOD for overwater conditions
AERMET	AERMOD Meteorological Preprocessor

Term	Gloss
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
AERMOD-COARE	Alternative Modeling Approach Using AERCOARE and AERMOD for Overwater Applications

Section 3
Model Selection and Model Inputs

3.1 Regulatory Modeling Requirements

Stationary source pollutants from the project are VOC and H_2S. VOC is an ozone precursor, and an ozone analysis has been separately submitted as part of the required PSD permit application.

Impacts from criteria pollutants other than Ozone (NO_2, CO, PM_{10}, $PM_{2.5}$, and SO_2) are evaluated following guidelines established in EPA's Guideline on Air Quality Models (Appendix W to 40 CFR Part 51; "Appendix W"), as well as TCEQ's Air Quality Modeling Guidelines (TCEQ Publication APDG 6232), and other applicable guidance memoranda issued by EPA and TCEQ.

NAAQS for criteria pollutants are codified at 40 CFR §§ 50.1–19. Ambient air quality standards for H_2S established by the State of Texas are codified at 30 TAC §§ 112.31–32. Effects Screening Levels for air contaminants not subject to a regulatory ambient air quality standard are published by the TCEQ Toxicology, Risk Assessment, and Research Division via the online Toxicity Factor Database.[1]

3.2 Model Selection and Justification

The latest version of the AMS/EPA Regulatory Model (AERMOD-COARE, AERMOD Version 18081, AERCOARE Version D13108) was used to conduct the dispersion modeling analysis. AERMOD is a Gaussian plume dispersion model that is based on planetary boundary layer principals for characterizing atmospheric stability. The model evaluates the non-Gaussian vertical behavior of

[1] https://www.tceq.texas.gov/toxicology/esl/list_main.html

plumes during convective conditions with the probability density function and the superposition of several Gaussian plumes. AERMOD is a modeling system with three components:

- AERMAP is the terrain preprocessor program;
- AERMET is the typical, overland meteorological data preprocessor; and
- AERMOD includes the dispersion modeling algorithms.

However, development of the AERMET pre-processor was dependent upon the diurnal cycle of solar heating over land. AERMET will not adequately calculate the boundary layer parameters over a marine environment because the ocean does not respond the same to diurnal heating and cooling effects. Therefore, the AERCOARE meteorological processor was used to process overwater meteorological data for use in AERMOD.

AERCOARE is essentially the overwater counterpart to AERMET. As stated in the AERCOARE User's Guide, the combination of AERCOARE and AERMOD may eventually replace the current regulatory approach for offshore projects, the OCD model, because OCD has not been updated for many years and does not reflect the latest scientific advancements found in AERMOD. In addition, OCD does not provide model output in a form suitable for comparison to the statistical basis of some of the newer NAAQS.

Pursuant to Section 3.2.2 of Appendix W, a request for approval for the use of AERCOARE as an alternate model to the preferred OCD model was submitted to USEPA Region 6 on May 9, 2019. The letter provided detailed justification for AERMOD-COARE as a more suitable model than OCD for the BWTT project. AERCOARE applies the COARE air-sea flux algorithm to overwater meteorological measurements to estimate surface energy fluxes and assembles these estimates and other measurements for subsequent dispersion model simulations with AERMOD.

AERMOD is the most appropriate dispersion model for calculating ambient concentrations from the proposed BWTT project, based on the model's ability to incorporate multiple sources and source types. The model can also account for convective updrafts and downdrafts and meteorological data throughout the plume depth. The model also provides parameters required for use with up-to-date planetary boundary layer parameterization. In addition, the model has the ability to incorporate building wake effects and calculate concentrations within the cavity recirculation zone. All model options were selected as recommended in the USEPA Guidelines on Air Quality Models.

Oris Solution's BEEST Graphical User Interface (GUI) was used to run AERMOD. The GUI uses an altered version of the AERMOD code to allow for flexibility in the file naming convention. The dispersion algorithms of AERMOD are not altered. Therefore, there is no need for a model equivalency evaluation pursuant to Section 3.2 of Appendix W.

3.3 Model Control Options

AERMOD was run with all regulatory default options with the exception of the FLAT option. The area over water is naturally flat and does not require the use of complex terrain processing. The default rural dispersion coefficients in AERMOD were used because the area within three kilometers of the facility consists of water.

3.4 Source Data

All modeled emission sources at the BWTT are stacks with a well-defined openings and were characterized as point sources.

Potential hourly emission rates were modeled for all both stationary and mobile sources in assessing compliance with both short-term and annual standards. There are numerous activities performed by the vessels including transiting the safety zone and mooring. A worst-case scenario described in Section 4.1 was used to estimate concentrations for comparison with applicable standards. Maximum hourly emissions from each vessel activity were also used in assessing compliance with both short-term and annual standards for all pollutants except for NO_X.

The modeled input data as well as modeled emissions are provided in Tables 3-1 and 3-2. All source locations were based upon a NAD83, UTM Zone 14 projection.

3.5 Monitored Background Data

Ambient pollutant concentrations are needed to establish a representative background concentration, consistent with EPA Appendix W guidelines. The background concentrations are added to the modeled concentrations to account for sources not explicitly modeled before assessing NAAQS compliance.

The 2015-2017, quality assured ozone data from the Galveston 99th Street monitor (AQS # 48-167-1034) was used to establish representative background NO_2 for the sitewide NAAQS analysis.

3.5.1 Data Quality

The monitor data were collected and quality assured by the TCEQ.

3.5.2 Currentness of Data

The data were collected during 2016-2018 and represent the most recent quality assured data available for use in assessing compliance

Table 3-1

On-Property Source Parameters

Bluewater Texas Terminal LLC

Source	Model ID	Source Description	Easting (X)	Northing (Y)	Stack Height		Temperature		Exit Velocity		Stack Diameter	
			(m)	(m)	(ft)	(m)	(°F)	(K)	(fps)	(m/s)	(ft)	(m)
Tug Boat	TUG_1	Tug Boat 1 Emission	730,987	3,087,402	35.0	10.66	850	727.60	40.3	12.28	1.5	0.46
Tug Boat	TUG_2	Tug Boat 2 Emission	733,230	3,088,913	35.0	10.66	850	727.60	40.3	12.28	1.5	0.46
VLCC Engine	CTE_1	Crude Tanker 1 Emission	731,102	3,087,283	180.5	55.00	850	727.60	41.8	12.74	4.9	1.50
VLCC Engine	CTE_2	Crude Tanker 2 Emission	733,343	3,088,793	180.5	55.00	850	727.60	41.8	12.74	4.9	1.50
Loading	MLE_1	Marine Loading 1 Emission	731,102	3,087,283	180.5	55.00	100	310.93	4.4	1.33	4.9	1.50
Loading	MLE_2	Marine Loading 2 Emission	733,343	3,088,793	180.5	55.00	100	310.93	4.4	1.33	4.9	1.50
Work Boat	WRK_1	Workboat 1	730,987	3,087,402	35.0	10.66	850	727.60	40.3	12.28	1.5	0.46
Work Boat	WRK_2	Workboat 2	733,230	3,088,913	35.0	10.66	850	727.60	40.3	12.28	1.5	0.46

Table 3-2
On-Property Emission Rates
Bluewater Texas Terminal LLC

EPN	Model Id	Source Description	NOx		CO	SO2		PM10	PM2.5		H_2S	Crude Oil	
			lb/hr	tpy	lb/hr	lb/hr	tpy	lb/hr	lb/hr	tpy	lb/hr	lb/hr	tpy
Tug Boat	TUG_1	Tug Boat 1 Emission	39.45	172.78	2.06	0.30	1.33	0.26	0.26	1.15	0.00	0.00	0.00
Tug Boat	TUG_2	Tug Boat 2 Emission	39.45	172.78	2.06	0.30	1.33	0.26	0.26	1.15	0.00	0.00	0.00
VLCC Engine	CTE_1	Crude Tanker 1 Emission	82.54	361.52	0.83	0.12	0.53	0.11	0.11	0.46	0.00	0.00	0.00
VLCC Engine	CTE_2	Crude Tanker 2 Emission	82.54	361.52	0.83	0.12	0.53	0.11	0.11	0.46	0.00	0.00	0.00
Loading	MLE_1	Marine Loading 1 Emission	-	-	-	-	-	-	-	-	6.25	9624.00	23098.00
Loading	MLE_2	Marine Loading 2 Emission	-	-	-	-	-	-	-	-	*	*	*
Work Boat	WRK_1	Workboat 1	5.92	25.92	2.06	0.30	1.33	0.26	0.26	1.15	0.00	0.00	0.00
Work Boat	WRK_2	Workboat 2	5.92	25.92	2.06	0.30	1.33	0.26	0.26	1.15	0.00	0.00	0.00

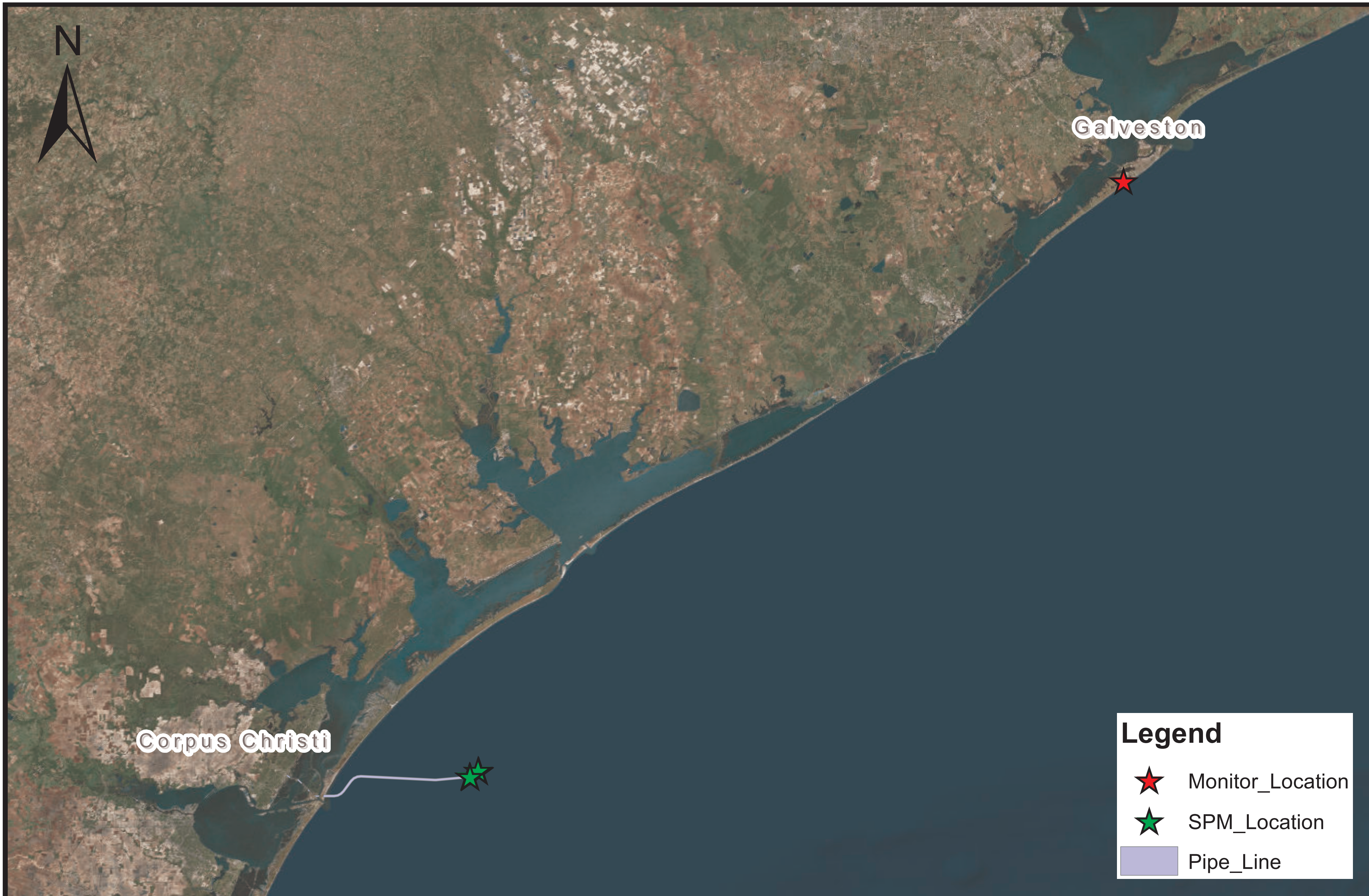
* Worst case loading impacts are generated when a single VLCC is loaded at a maximum emission rates (rather than splitting the emissions between the two moored vessels). Assumed the VLCC at position 1 is loaded at the maximum rate while the VLCC at position 2 is not loaded.

3.6 Monitor Location

Of the monitors available, the Galveston monitor best represents an ambient background concentration, as it is the closest active NO_2 monitors that are not significantly influenced by the localized source impacts. This monitor offers a conservative representation of NO_2 concentrations offshore as the offshore location of the BWTT is expected to have reduced pollutant loading when compared to an industrialized onshore locale. Figure 3-1 shows the monitor location and Table 3-3 summarizes the monitored NO_2 concentrations.

3.7 Receptor Data

Each of the single point mooring systems will be surrounded by a circular “safety zone” and an additional circular “area to be avoided” making a composite circular boundary with a total radius of 1,350 meters around each of the central buoys. The area inside these circles is considered facility property (for the purposes of modeling) and anything outside the circles was considered ambient air. Receptors were be placed along the circular boundaries at a spacing of 100 meters. The 100-meter spaced receptors continue in a cartesian grid from the circular boundary to a distance of 2,500 meters beyond the property. A second grid of receptors spaced 250 meters apart were placed from 2,500 meters to 7,500 meters from the circular boundaries. The last grid of receptors spaced 500 meters apart were placed from 7,500 meters to 20,000 meters from the circular boundaries. Figure 3-2 illustrates the modeled receptor grid. Figure 3-3 shows the sources and building locations as well as the nearest receptors to the BWTT.



0 4 8 16 24 32
Miles

Figure 3-1 Monitor Location

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Table 3-3
Monitoring Data
Bluewater Texas Terminal LLC

Compound	Monitor Name	AQS Code	Year	Percent Valid Data				Value Rank	Concentration [1,2] (ppb)	Concentration [1,2] ($\mu g/m^3$)	Concentrations for Modeling Analysis: 3-Year Average Concentration [3] ($\mu g/m^3$)	Concentrations for Modeling Analysis: Maximum Concentration [4] ($\mu g/m^3$)
				Qtr. 1	Qtr. 2	Qtr. 3	Qtr. 4					
Nitrogen Dioxide (NO_2)	Galveston 99th Street	480391016	2016	98%	97%	95%	98%	98% Max. Daily 1-hr	31.0	58.3	53.3	
			2017	98%	96%	88%	96%		28.0	52.6		
			2018	94%	97%	96%	95%		26.0	48.9		
			2018	94%	97%	96%	95%	Annual Avg.	2.4	4.5		4.5

NOTES:
1. The monitor value for 1-hour NO_2 is the 98th percentile of daily maximum values. The monitor value for 24-hour $PM_{2.5}$ is the 98th percentile of 24-Hour average values.
2. The monitor value for annual NO_2 is the average annual value.
3. This is the value which is used in the Full Impacts Analysis. For the 1-hour NO_2 averaging period, the background value is the average from the 3 years of background data.
4. The highest value from the most recent year of monitoring data is used for the annual NO_2 Full Impacts Analysis

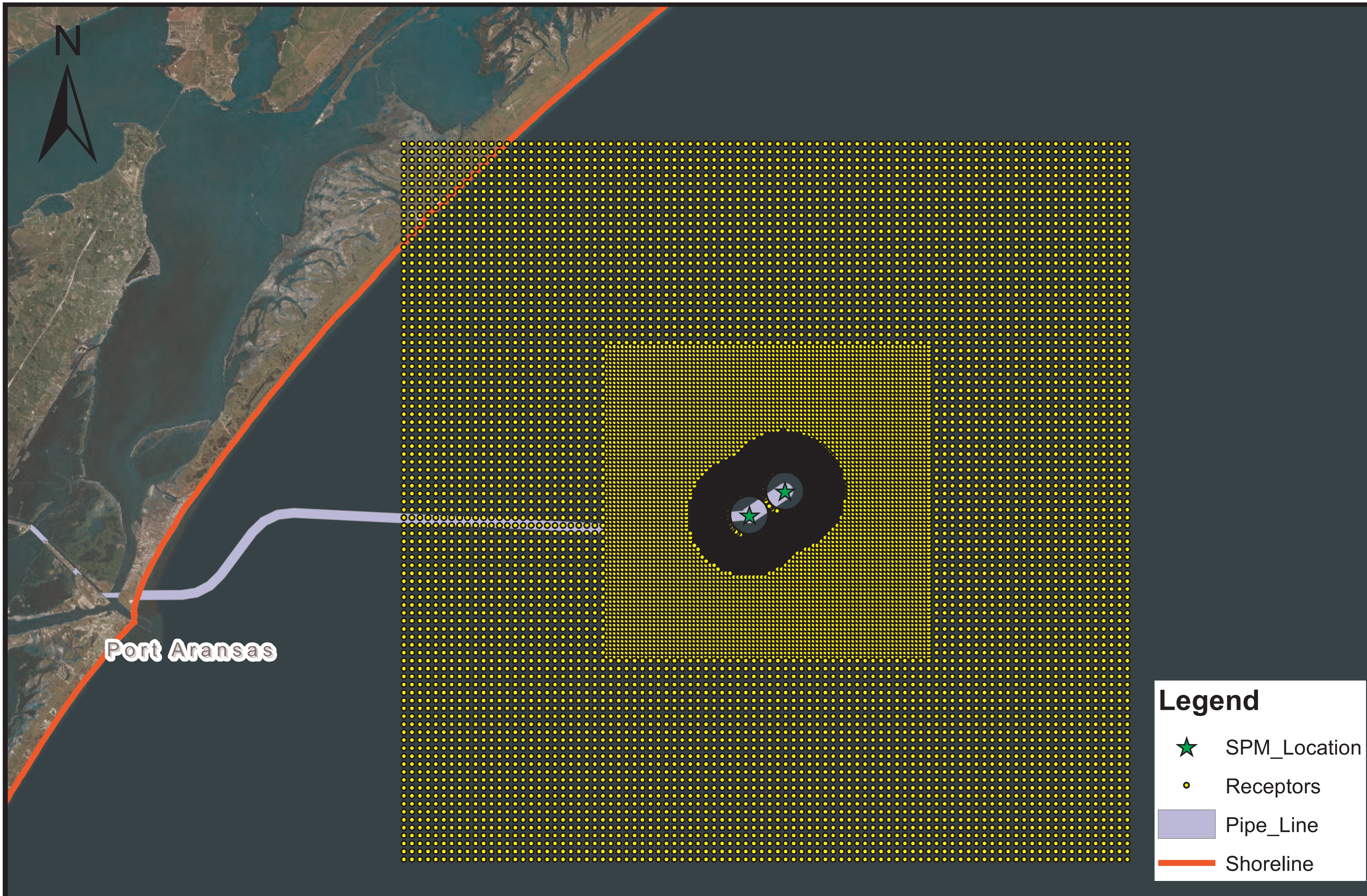

Figure 3-2 Modeled Receptors

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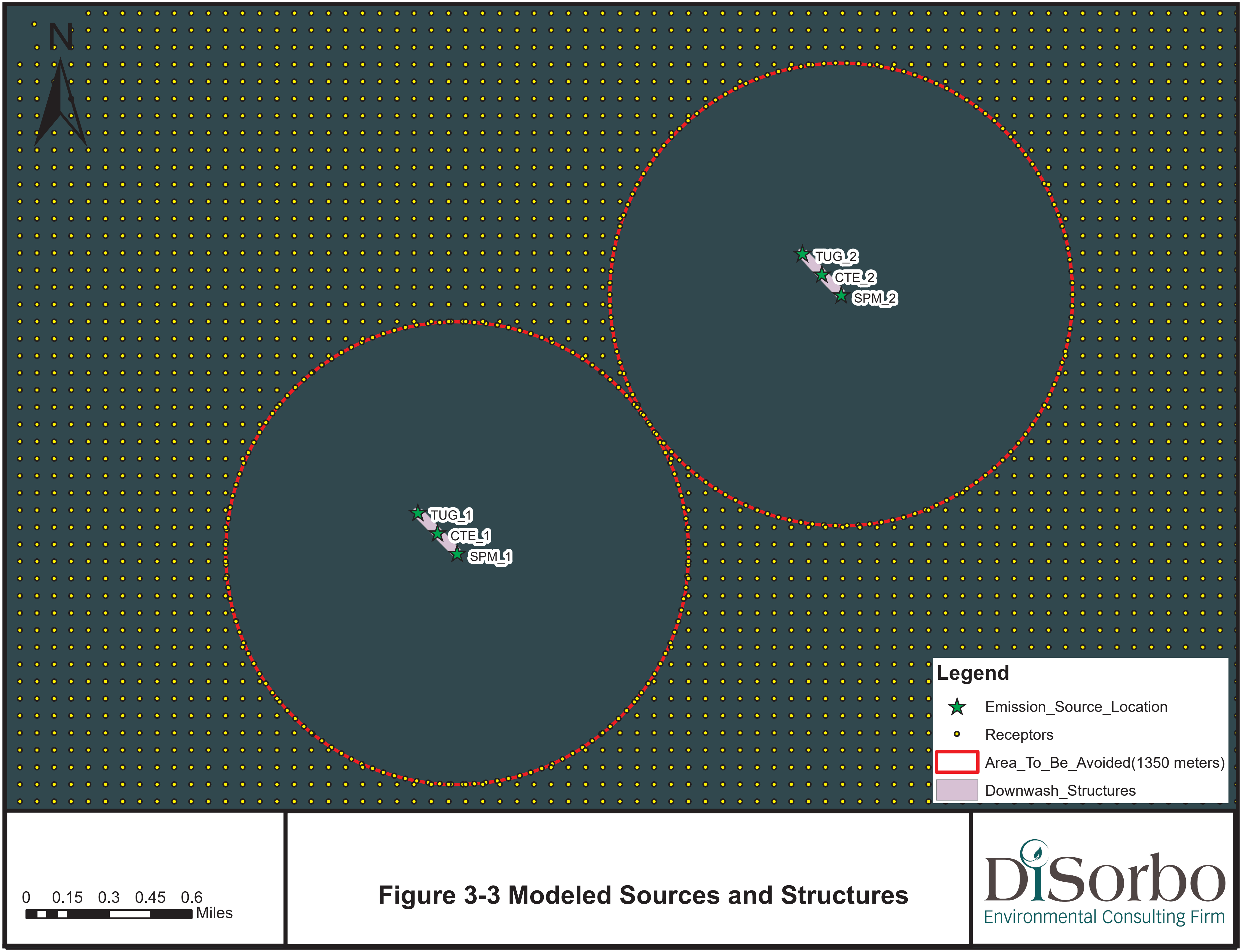

Figure 3-3 Modeled Sources and Structures

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3.8 Meteorological Data

Overwater hourly meteorological data, as obtained from the National Oceanic and Atmospheric Administration (NOAA) National Data Buoy Center and the National Solar Radiation Database (NSRDB) for 2013 through 2017 were used in the analysis. AERCOARE requires measurements of wind speed, wind direction, air and sea temperature, atmospheric pressure, and relative humidity. These data were obtained from the NOAA website except for relative humidity. The required relative humidity values were obtained from NSRDB website based on the coordinates of SPM locations. The closest buoy with sufficient, current meteorological measurements is Buoy 42019 and Station PTAT2. Other nearby buoys either did not monitor all the required meteorological parameters, did not have historical measurements, or the data records did not meet the 90% by quarter completeness criterion of the USEPA's Meteorological Monitoring Guidance.

Buoy 42019 is located on the shore of Port Aransas, which is 20 nautical miles (23 statute miles, or 37 kilometers) northeast of Corpus Christi, Texas, and 21 nautical miles (24.1 statute miles, or 38.9 kilometers) southwest of the SPM. Station PTAT2 is located 101 nautical miles (116.2 statute miles, or 187 kilometers) east of Corpus Christi, Texas, and 69 nautical miles (79.4 statute miles, or 127.8 kilometers) northeast of the SPM as shown in Figure 3-2. Prior to substitution, the data from this buoy met the 90% by quarter completeness criterion for all required meteorological parameters (See Table 3-4 Data Completeness). The initial approach to relative humidity was calculated based on the dew point. However, all nearby buoys are missing dew point temperature for more than one month. For this reason, the relative humidity values were obtained from NSRDB website based on the coordinates of SPM locations.

AERCOARE writes AERMOD-ready "SFC" and "PFL" input files using output from the COARE algorithm and data from the overwater meteorological input file. Mixing heights are not predicted by AERCOARE; however, AERCOARE provides an option for the calculation of mechanical mixing heights using the same method employed by AERMET. MIXOPT 1 was employed. In this method, the mechanical mixing height is calculated from the friction velocity using the Venketram Method and the convective mixing height is assumed equal to the mechanical mixing height. The AERCOARE input file for 2013 is shown in Figure 3-4. A wind rose of the 5-year overwater meteorological dataset is provided in Figure 3-5.

Table 3-4
Buoy Data Completeness Evaluation Results
Bluewater Texas Terminal LLC

	Buoy 42019	Station PTAT2	NSRDB
	All data except for relative humidity		relative humidity
2013	**99.90%**	99.90%	**100%**
2014	56.30%	**99.90%**	**100%**
2015	86.40%	**99.90%**	**100%**
2016	98.30%	**99.90%**	**100%**
2017	**99.20%**	78.50%	**100%**

Note: Data bolded has been used in AERCOARE

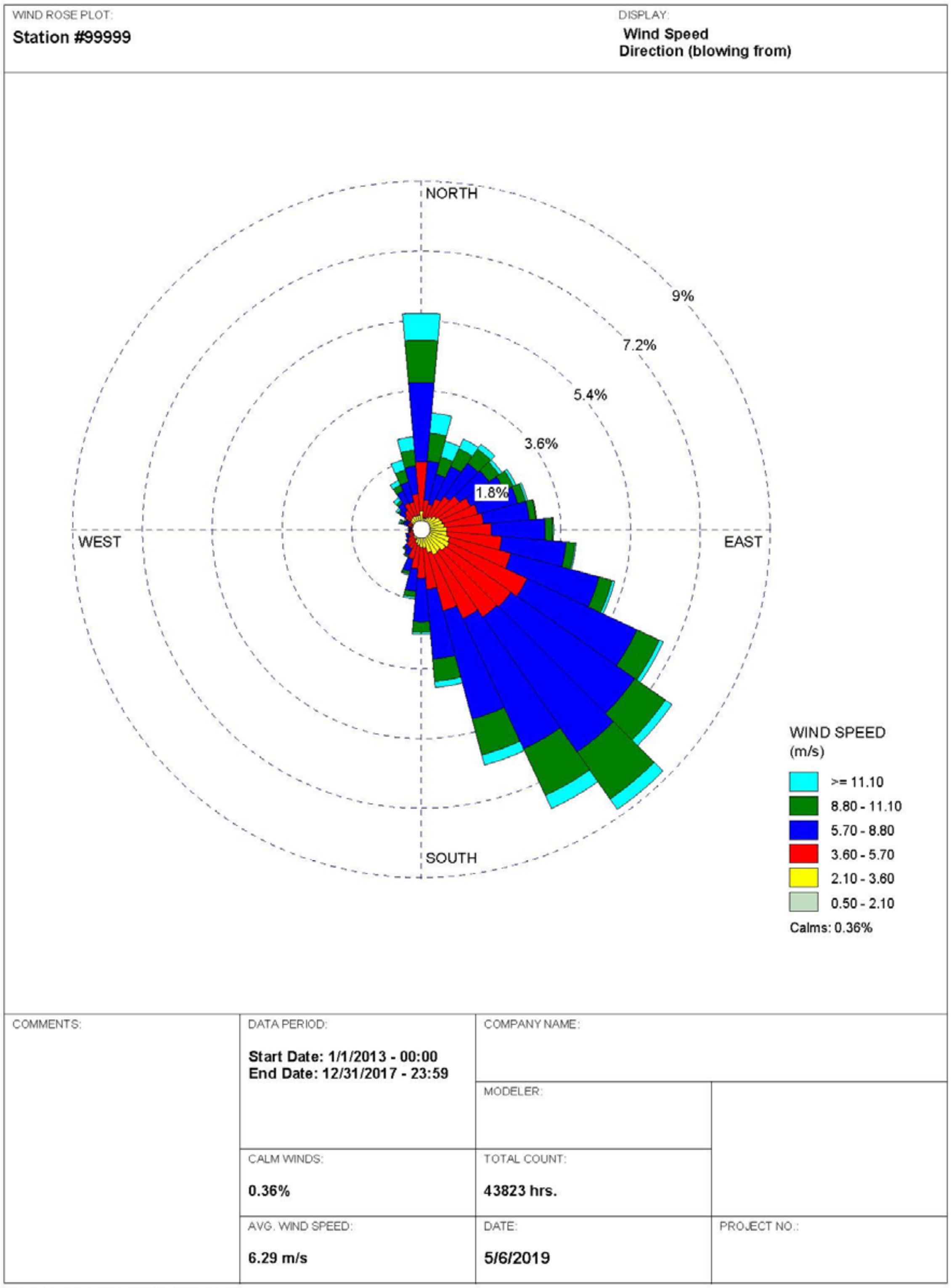
Figure 3-4

Sample AERCOARE Input File

```
'2013.csv'       / input met file (up to 80 characters); def 'aercoare.in'
'2013.sfc'       / output sfc file with for AERMOD (up to 80 characters); def 'aercoare'sfc'
'2013.pfl'       / output pfl file for AERMOD (up to 80 characters); 'aercoare.pfl'
'2013.out'       / output listing & debug file (up to 80 characters); 'aercoare.out'
27.906                 / lat (degN)  no def
-95.35                / long (degW) no def
6                    / met data time zone (0-GMT .. 5-EST .. 8-PST) (def 0)
600.                  / mix height for COARE gustiness calc (if<0 use 600m) (m); def (600m)
25.                   / min mix ht (m); def 25 m
5.                    / min abs(L)(m); def 5 m
.5                    / calms threshold, winds lt this value are calm (m/s); def 0.5 m
.01                   / def vert pot temp gradient (degC/m; def 0.01 DegC/m
4.0                  / def buoy wind measurement height (m); def 3.5 m
4.0                  / def buoy temp measurement height (m); def 3.5 m
4.0                  / def buoy RH measurement height (m); def 3.5 m
0.05                  / def buoy water temp depth (m); def 0.5m
2                     / mix ht opt (0-obs for zic & zim),1-obs for zic, venk zim; 2-venk zi for zic & zim); def 0
0                     / warm layer (1-yes, 0-no); def 0
0                     / cool skin (1-yes, 0-no); def 0
0                     / 0=Charnock,1=Oost et al,2=Taylor and Yelland; def 0
'end',1,0,0           / 'variable', scale, min, max (as many as needed)
```

Figure 3-5

Windrose for Overwater Meteorology



Section 4
Modeling Methodology

4.1 Pollutants and Operational Scenario Evaluated

Pollutants assessed include emissions from stationary source crude oil loading operations (H_2S and crude oil vapors) as well as criteria pollutants other than ozone (NO_2, CO, PM_{10}, $PM_{2.5}$, and SO_2), which are emitted from mobile sources: VLCCs, tugboats, and workboats.

The worst-case scenario is one where there are two VLCC's present at the facility, and both are undergoing loading operations. During loading, the VLCC propulsion system is on standby, but its ballast pumps will be operating at near full capacity. It is assumed that the VLCC's onboard diesel generators are operating at a peak load during this operation, and this is estimated as equivalent to power consumption at 10% load for the propulsion system. The tug is moored to the VLCC stern and applies assist when necessary to prevent the VLCC from riding up on the SPM. Since the wind and weather often provides the necessary force to keep the VLCC the proper distance from the SPM, the tug is not continually applying thrust, and its representative load is assumed to be 25%. The smaller workboat assists with hose handling and other light duty assist operations, and is also modeled as having a 25% load.

For crude oil vapor and H_2S the worst-case scenario will occur when loading operations occur at only one SPM location (rather than splitting the emissions between the two SPM locations. However, the worst-case scenario for NO_2, CO, PM_{10}, $PM_{2.5}$, and SO_2 occur when a VLCC and supporting tugs and workboats are operating at both SPM locations concurrently.

4.2 Nearby Source Inventory

Off-site sources were included in the NAAQS analysis. A 15.5-mile (25-kilometer) radius was used to define the screening area. The screening area is located entirely offshore. A list of offshore platforms located within the screening area was obtained from the 2014 BOEM Gulf-wide Emissions Inventory. So as not to exclude overwater sources just beyond the 25-kilometer screening area, all overwater sources within 35 kilometers to the project location were included in the NAAQS modeling. Onshore sources beyond the 25-kilometer screening area were not included. Table 4-1 lists all modeled nearby sources including release parameters and emission rates.

4.3 NAAQS Analysis

A refined air quality analysis to determine compliance with the NAAQS for NEPA purposes was conducted for all pollutants. Five years of meteorological data were used in this analysis.

The pollutant concentrations from the BWTT Project sources only were compared to the Significant Impact Levels (SILs). Predicted project-level concentrations of NOx exceeded the SIL for both the 1-hour and annual averaging period. Therefore, a sitewide cumulative NAAQS analysis was conducted for both NO_2 averaging periods. All BWTT Project sources and nearby sources were included in the NAAQS analysis. Impacts calculated by AERMOD were added to concentrations from a representative, onshore monitor and the resultant concentration compared to the NAAQS.

The SILs and NAAQS, along with all other applicable ambient air quality standards are shown in Table 4-2.

4.3.1 NO_2 Modeling

The Tier II ozone limiting option known as the Ambient Ratio Method 2 (ARM2) was used to estimate the fraction of NO_X that converts to NO_2 in the atmosphere. The default minimum and maximum ratios of 0.5 and 0.9 were used, respectively.

4.4 Secondary $PM_{2.5}$ Analyses

$PM_{2.5}$ is either directly emitted from a source (primary emissions) or formed through chemical reactions with SO_2 and NO_X in the atmosphere (secondary formation). EPA has not developed and/or formally recommended a near field model that includes the necessary chemistry algorithms to estimate secondary $PM_{2.5}$ impacts in an ambient air quality analysis. However, per EPA[2] and TCEQ[3] guidance, secondary formation of $PM_{2.5}$ needs to be addressed in a NAAQS evaluation.

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[2] *https://www3.epa.gov/ttn/scram/2018_RSL/Presentations/1-20_2018_RSL-O3_PM25_Modeling_Guidance.pdf.*

[3] *https://www.tceq.texas.gov/assets/public/permitting/air/Modeling/guidance/merps-6443.pdf*

Table 4-1
Off-Property NOx Emission Rates
Bluewater Texas Terminal LLC

Model Id	Source Description	Easting (X)	Northing (Y)	Stack Height	Temperature	Exit Velocity	Stack Diameter	Short-term Emission Rates NOx
		(m)	(m)	(m)	(K)	(m/s)	(m)	lb/hr
OP_0	Diesel or Gasoline Engine	757308.1	3111248.0	21.33	755.37	23.16	0.15	0.00084
OP_1	Diesel or Gasoline Engine	757308.1	3111248.0	21.33	755.37	23.16	0.15	0.00430
OP_2	Diesel or Gasoline Engine	757308.1	3111248.0	21.33	755.37	23.16	0.15	0.00512
OP_3	Diesel or Gasoline Engine	757308.1	3111248.0	21.33	755.37	23.16	0.15	0.00490
OP_4	Diesel or Gasoline Engine	757308.1	3111248.0	21.33	755.37	23.16	0.15	0.00418
OP_5	Diesel or Gasoline Engine	757308.1	3111248.0	21.33	755.37	23.16	0.15	0.00512
OP_6	Diesel or Gasoline Engine	757308.1	3111248.0	21.33	755.37	23.16	0.15	0.00248
OP_7	Diesel or Gasoline Engine	757308.1	3111248.0	21.33	755.37	23.16	0.15	0.00459
OP_8	Diesel or Gasoline Engine	757308.1	3111248.0	21.33	755.37	23.16	0.15	0.00445
OP_9	Diesel or Gasoline Engine	757308.1	3111248.0	21.33	755.37	23.16	0.15	0.00645
OP_10	Diesel or Gasoline Engine	757308.1	3111248.0	21.33	755.37	23.16	0.15	0.00205
OP_11	Diesel or Gasoline Engine	757308.1	3111248.0	21.33	755.37	23.16	0.15	0.00442
OP_12	Diesel or Gasoline Engine	757276.7	3111209.9	21.33	755.37	23.16	0.15	0.00038
OP_13	Diesel or Gasoline Engine	757276.7	3111209.9	21.33	755.37	23.16	0.15	0.00054
OP_14	Diesel or Gasoline Engine	757276.7	3111209.9	21.33	755.37	23.16	0.15	0.00081
OP_15	Diesel or Gasoline Engine	757276.7	3111209.9	21.33	755.37	23.16	0.15	0.00023
OP_16	Diesel or Gasoline Engine	757276.7	3111209.9	21.33	755.37	23.16	0.15	0.00027
OP_17	Diesel or Gasoline Engine	757276.7	3111209.9	21.33	755.37	23.16	0.15	0.00027
OP_18	Diesel or Gasoline Engine	757276.7	3111209.9	21.33	755.37	23.16	0.15	0.00140
OP_19	Diesel or Gasoline Engine	757276.7	3111209.9	21.33	755.37	23.16	0.15	0.00518
OP_20	Diesel or Gasoline Engine	757276.7	3111209.9	21.33	755.37	23.16	0.15	0.00129
OP_21	Diesel or Gasoline Engine	757276.7	3111209.9	21.33	755.37	23.16	0.15	0.00248
OP_22	Boiler/Heater/Burner	752496.2	3111679.1	30.48	477.59	7.92	0.30	0.01011
OP_23	Boiler/Heater/Burner	752496.2	3111679.1	30.48	477.59	7.92	0.30	0.00913
OP_24	Boiler/Heater/Burner	752496.2	3111679.1	30.48	477.59	7.92	0.30	0.01010
OP_25	Boiler/Heater/Burner	752496.2	3111679.1	30.48	477.59	7.92	0.30	0.00978
OP_26	Boiler/Heater/Burner	752496.2	3111679.1	30.48	477.59	7.92	0.30	0.01008
OP_27	Boiler/Heater/Burner	752496.2	3111679.1	30.48	477.59	7.92	0.30	0.00915
OP_28	Boiler/Heater/Burner	752496.2	3111679.1	30.48	477.59	7.92	0.30	0.01011
OP_29	Boiler/Heater/Burner	752496.2	3111679.1	30.48	477.59	7.92	0.30	0.01011
OP_30	Boiler/Heater/Burner	752496.2	3111679.1	30.48	477.59	7.92	0.30	0.00978
OP_31	Boiler/Heater/Burner	752496.2	3111679.1	30.48	477.59	7.92	0.30	0.01011
OP_32	Boiler/Heater/Burner	752496.2	3111679.1	30.48	477.59	7.92	0.30	0.00978
OP_33	Boiler/Heater/Burner	752496.2	3111679.1	30.48	477.59	7.92	0.30	0.00964
OP_34	Diesel or Gasoline Engine	752496.2	3111679.1	29.56	755.37	4.88	0.30	0.00009
OP_35	Diesel or Gasoline Engine	752496.2	3111679.1	29.56	755.37	4.88	0.30	0.00066
OP_36	Diesel or Gasoline Engine	752496.2	3111679.1	29.56	755.37	4.88	0.30	0.00088
OP_37	Diesel or Gasoline Engine	752496.2	3111679.1	29.56	755.37	4.88	0.30	0.00044
OP_38	Diesel or Gasoline Engine	752496.2	3111679.1	29.56	755.37	4.88	0.30	0.00022
OP_39	Diesel or Gasoline Engine	752496.2	3111679.1	29.56	755.37	4.88	0.30	0.00293
OP_40	Diesel or Gasoline Engine	752496.2	3111679.1	29.56	755.37	4.88	0.30	0.00070
OP_41	Diesel or Gasoline Engine	752496.2	3111679.1	29.56	755.37	4.88	0.30	0.00033
OP_42	Diesel or Gasoline Engine	752496.2	3111679.1	29.56	755.37	4.88	0.30	0.00095
OP_43	Diesel or Gasoline Engine	752496.2	3111679.1	29.56	755.37	4.88	0.30	0.00051
OP_44	Diesel or Gasoline Engine	752496.2	3111679.1	29.56	755.37	4.88	0.30	0.00044
OP_45	Diesel or Gasoline Engine	752496.2	3111679.1	26.52	755.37	25.91	0.30	0.06245
OP_46	Diesel or Gasoline Engine	752496.2	3111679.1	26.52	755.37	25.91	0.30	0.07286
OP_47	Diesel or Gasoline Engine	752496.2	3111679.1	26.52	755.37	25.91	0.30	0.00520
OP_48	Diesel or Gasoline Engine	752496.2	3111679.1	26.52	755.37	25.91	0.30	0.10755
OP_49	Diesel or Gasoline Engine	752496.2	3111679.1	26.52	755.37	25.91	0.30	0.01214
OP_50	Diesel or Gasoline Engine	752496.2	3111679.1	26.52	755.37	25.91	0.30	0.03643
OP_51	Natural Gas Engine	752496.2	3111679.1	30.48	866.48	20.73	0.30	0.86005
OP_52	Natural Gas Engine	752496.2	3111679.1	30.48	866.48	20.73	0.30	1.08006
OP_53	Natural Gas Engine	752496.2	3111679.1	30.48	866.48	20.73	0.30	1.24007
OP_54	Natural Gas Engine	752496.2	3111679.1	30.48	866.48	20.73	0.30	1.20007
OP_55	Natural Gas Engine	752496.2	3111679.1	30.48	866.48	20.73	0.30	1.24007
OP_56	Natural Gas Engine	752496.2	3111679.1	30.48	866.48	20.73	0.30	1.13007
OP_57	Natural Gas Engine	752496.2	3111679.1	30.48	866.48	20.73	0.30	1.24007

Model Id	Source Description	Easting (X)	Northing (Y)	Stack Height	Temperature	Exit Velocity	Stack Diameter	Short-term Emission Rates NOx
		(m)	(m)	(m)	(K)	(m/s)	(m)	lb/hr
OP_58	Natural Gas Engine	752496.2	3111679.1	30.48	866.48	20.73	0.30	1.24007
OP_59	Natural Gas Engine	752496.2	3111679.1	30.48	866.48	20.73	0.30	1.20007
OP_60	Natural Gas Engine	752496.2	3111679.1	30.48	866.48	20.73	0.30	1.13674
OP_61	Natural Gas Engine	752496.2	3111679.1	30.48	866.48	20.73	0.30	1.19007
OP_62	Natural Gas Engine	752496.2	3111679.1	30.48	866.48	20.73	0.30	1.17840
OP_63	Diesel or Gasoline Engine	757271.1	3111365.2	30.48	755.37	8.53	0.30	0.00179
OP_64	Diesel or Gasoline Engine	757271.1	3111365.2	30.48	755.37	8.53	0.30	0.00179
OP_65	Diesel or Gasoline Engine	757271.1	3111365.2	30.48	755.37	8.53	0.30	0.00040
OP_66	Diesel or Gasoline Engine	757271.1	3111365.2	30.48	755.37	8.53	0.30	0.00014
OP_67	Diesel or Gasoline Engine	757271.1	3111365.2	30.48	755.37	8.53	0.30	0.00040
OP_68	Diesel or Gasoline Engine	757271.1	3111365.2	30.48	755.37	8.53	0.30	0.00099
OP_69	Diesel or Gasoline Engine	757271.1	3111365.2	30.48	755.37	8.53	0.30	0.00040
OP_70	Diesel or Gasoline Engine	757271.1	3111365.2	30.48	755.37	8.53	0.30	0.00119
OP_71	Diesel or Gasoline Engine	757271.1	3111365.2	30.48	755.37	8.53	0.30	0.00159
OP_72	Diesel or Gasoline Engine	757271.1	3111365.2	30.48	755.37	8.53	0.30	0.00413
OP_73	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	0.30334
OP_74	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	0.22061
OP_75	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	1.31907
OP_76	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	1.65458
OP_77	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	0.11720
OP_78	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	0.46880
OP_79	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	1.70973
OP_80	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	1.70973
OP_81	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	0.89163
OP_82	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	0.33091
OP_83	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	0.89163
OP_84	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	0.96517
OP_85	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	1.21336
OP_86	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	0.39066
OP_87	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	1.59253
OP_88	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	1.16510
OP_89	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	0.76294
OP_90	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	1.29609
OP_91	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	1.65458
OP_92	Natural Gas Engine	757271.1	3111365.2	30.48	866.48	28.65	0.30	0.80201
OP_93	Natural Gas, Diesel, or Dual Fuel Turbine	757271.1	3111365.2	30.48	810.93	58.82	0.91	0.92567
OP_94	Natural Gas, Diesel, or Dual Fuel Turbine	757271.1	3111365.2	30.48	810.93	58.82	0.91	1.18311
OP_95	Natural Gas, Diesel, or Dual Fuel Turbine	757271.1	3111365.2	30.48	810.93	58.82	0.91	1.34378
OP_96	Natural Gas, Diesel, or Dual Fuel Turbine	757271.1	3111365.2	30.48	810.93	58.82	0.91	1.27257
OP_97	Natural Gas, Diesel, or Dual Fuel Turbine	757271.1	3111365.2	30.48	810.93	58.82	0.91	1.35473
OP_98	Natural Gas, Diesel, or Dual Fuel Turbine	757271.1	3111365.2	30.48	810.93	58.82	0.91	1.21780
OP_99	Natural Gas, Diesel, or Dual Fuel Turbine	757271.1	3111365.2	30.48	810.93	58.82	0.91	1.35838
OP_100	Natural Gas, Diesel, or Dual Fuel Turbine	757271.1	3111365.2	30.48	810.93	58.82	0.91	1.35838
OP_101	Natural Gas, Diesel, or Dual Fuel Turbine	757271.1	3111365.2	30.48	810.93	58.82	0.91	0.60981
OP_102	Diesel or Gasoline Engine	752495.5	3111678.0	32.61	755.37	21.33	0.15	0.00037
OP_103	Diesel or Gasoline Engine	752495.5	3111678.0	32.61	755.37	21.33	0.15	0.00037
OP_104	Diesel or Gasoline Engine	752495.5	3111678.0	32.61	755.37	21.33	0.15	0.00062
OP_105	Diesel or Gasoline Engine	752495.5	3111678.0	32.61	755.37	21.33	0.15	0.00041
OP_106	Diesel or Gasoline Engine	752495.5	3111678.0	32.61	755.37	21.33	0.15	0.00008
OP_107	Diesel or Gasoline Engine	752495.5	3111678.0	32.61	755.37	21.33	0.15	0.00199
OP_108	Diesel or Gasoline Engine	752495.5	3111678.0	32.61	755.37	21.33	0.15	0.00116
OP_109	Diesel or Gasoline Engine	752495.5	3111678.0	32.61	755.37	21.33	0.15	0.00043
OP_110	Diesel or Gasoline Engine	752495.5	3111678.0	32.61	755.37	21.33	0.15	0.00058
OP_111	Diesel or Gasoline Engine	752495.5	3111678.0	32.61	755.37	21.33	0.15	0.00091
OP_112	Diesel or Gasoline Engine	752495.5	3111678.0	32.61	755.37	21.33	0.15	0.00070
OP_113	Diesel or Gasoline Engine	752495.5	3111678.0	32.61	755.37	21.33	0.15	0.00033
OP_114	Diesel or Gasoline Engine	752464.7	3111640.8	30.48	755.37	5.49	0.30	0.00017
OP_115	Diesel or Gasoline Engine	752464.7	3111640.8	30.48	755.37	5.49	0.30	0.00033
OP_116	Diesel or Gasoline Engine	752464.7	3111640.8	30.48	755.37	5.49	0.30	0.00050
OP_117	Diesel or Gasoline Engine	752464.7	3111640.8	30.48	755.37	5.49	0.30	0.00004
OP_118	Diesel or Gasoline Engine	752464.7	3111640.8	30.48	755.37	5.49	0.30	0.00012
OP_119	Diesel or Gasoline Engine	752464.7	3111640.8	30.48	755.37	5.49	0.30	0.00021
OP_120	Diesel or Gasoline Engine	752464.7	3111640.8	30.48	755.37	5.49	0.30	0.00008
OP_121	Diesel or Gasoline Engine	752464.7	3111640.8	30.48	755.37	5.49	0.30	0.00008

Model Id	Source Description	Easting (X)	Northing (Y)	Stack Height	Temperature	Exit Velocity	Stack Diameter	Short-term Emission Rates NOx
		(m)	(m)	(m)	(K)	(m/s)	(m)	lb/hr
OP_122	Diesel or Gasoline Engine	752464.7	3111640.8	30.48	755.37	5.49	0.30	0.00017
OP_123	Diesel or Gasoline Engine	752464.7	3111640.8	30.48	755.37	5.49	0.30	0.00017
OP_124	Diesel or Gasoline Engine	752464.7	3111640.8	28.35	755.37	7.01	0.30	0.00129
OP_125	Diesel or Gasoline Engine	752464.7	3111640.8	28.35	755.37	7.01	0.30	0.00259
OP_126	Diesel or Gasoline Engine	752464.7	3111640.8	28.35	755.37	7.01	0.30	0.02330
OP_127	Diesel or Gasoline Engine	752464.7	3111640.8	28.35	755.37	7.01	0.30	0.00259
OP_128	Diesel or Gasoline Engine	752464.7	3111640.8	28.35	755.37	7.01	0.30	0.20715
OP_129	Diesel or Gasoline Engine	752464.7	3111640.8	28.35	755.37	7.01	0.30	0.00065
OP_130	Diesel or Gasoline Engine	752464.7	3111640.8	28.35	755.37	7.01	0.30	0.01554
OP_131	Diesel or Gasoline Engine	752464.7	3111640.8	28.35	755.37	7.01	0.30	0.00388
OP_132	Diesel or Gasoline Engine	752464.7	3111640.8	28.35	755.37	7.01	0.30	0.06214
OP_133	Natural Gas Engine	752464.7	3111640.8	31.09	866.48	6.71	0.25	0.27111
OP_134	Natural Gas Engine	752464.7	3111640.8	31.09	866.48	6.71	0.25	0.24408
OP_135	Natural Gas Engine	752464.7	3111640.8	31.09	866.48	6.71	0.25	0.25723
OP_136	Natural Gas Engine	752464.7	3111640.8	31.09	866.48	6.71	0.25	0.25759
OP_137	Natural Gas Engine	752464.7	3111640.8	31.09	866.48	6.71	0.25	0.15492
OP_138	Natural Gas Engine	752464.7	3111640.8	31.09	866.48	6.71	0.25	0.26308
OP_139	Natural Gas Engine	752464.7	3111640.8	31.09	866.48	6.71	0.25	0.27148
OP_140	Natural Gas Engine	752464.7	3111640.8	31.09	866.48	6.71	0.25	0.27185
OP_141	Natural Gas Engine	752464.7	3111640.8	31.09	866.48	6.71	0.25	0.26308
OP_142	Natural Gas Engine	752464.7	3111640.8	31.09	866.48	6.71	0.25	0.26308
OP_143	Natural Gas Engine	752464.7	3111640.8	31.09	866.48	6.71	0.25	0.26088
OP_144	Natural Gas Engine	752464.7	3111640.8	31.09	866.48	6.71	0.25	0.23677
OP_145	Natural Gas Engine	746361.9	3107986.3	24.38	866.48	3.96	0.30	0.14914
OP_146	Natural Gas Engine	746361.9	3107986.3	24.38	866.48	3.96	0.30	0.14710
OP_147	Natural Gas Engine	746361.9	3107986.3	24.38	866.48	3.96	0.30	0.03203
OP_148	Natural Gas Engine	746361.9	3107986.3	24.38	866.48	3.96	0.30	0.02631
OP_149	Natural Gas Engine	746361.9	3107986.3	24.38	866.48	3.96	0.30	0.02332
OP_150	Natural Gas Engine	746361.9	3107986.3	24.38	866.48	3.96	0.30	0.03280
OP_151	Natural Gas Engine	746361.9	3107986.3	24.38	866.48	3.96	0.30	0.18452
OP_152	Natural Gas Engine	746361.9	3107986.3	24.38	866.48	3.96	0.30	0.12418
OP_153	Natural Gas Engine	746361.9	3107986.3	24.38	866.48	3.96	0.30	0.09599
OP_154	Diesel or Gasoline Engine	756294.9	3109902.4	21.33	755.37	27.74	0.10	0.00012
OP_155	Boiler/Heater/Burner	740118.6	3094864.6	29.26	477.59	0.91	0.46	0.00203
OP_156	Boiler/Heater/Burner	740118.6	3094864.6	29.26	477.59	0.91	0.46	0.00193
OP_157	Boiler/Heater/Burner	740118.6	3094864.6	29.26	477.59	0.91	0.46	0.00210
OP_158	Boiler/Heater/Burner	740118.6	3094864.6	29.26	477.59	0.91	0.46	0.00208
OP_159	Boiler/Heater/Burner	740118.6	3094864.6	29.26	477.59	0.91	0.46	0.00240
OP_160	Diesel or Gasoline Engine	740118.6	3094864.6	26.21	755.37	48.16	0.10	0.00244
OP_161	Diesel or Gasoline Engine	740118.6	3094864.6	26.21	755.37	48.16	0.10	0.00108
OP_162	Diesel or Gasoline Engine	740118.6	3094864.6	26.21	755.37	48.16	0.10	0.00046
OP_163	Diesel or Gasoline Engine	740118.6	3094864.6	26.21	755.37	32.92	0.10	0.00051
OP_164	Diesel or Gasoline Engine	740118.6	3094864.6	26.21	755.37	32.92	0.10	0.00034
OP_165	Diesel or Gasoline Engine	740118.6	3094864.6	26.21	755.37	32.92	0.10	0.00017
OP_166	Natural Gas Engine	740118.6	3094864.6	26.21	866.48	7.31	0.20	0.00039
OP_167	Natural Gas Engine	740118.6	3094864.6	26.21	866.48	7.31	0.20	0.11850
OP_168	Natural Gas Engine	740118.6	3094864.6	26.21	866.48	7.31	0.20	0.05238
OP_169	Natural Gas Engine	740118.6	3094864.6	26.21	866.48	7.31	0.20	0.13147
OP_170	Natural Gas Engine	740118.6	3094864.6	26.21	866.48	7.31	0.20	0.19458
OP_171	Natural Gas Engine	740118.6	3094864.6	26.21	866.48	7.31	0.20	0.05762
OP_172	Natural Gas Engine	740118.6	3094864.6	26.21	866.48	7.31	0.20	0.13618
OP_173	Natural Gas Engine	740118.6	3094864.6	26.21	866.48	7.31	0.20	0.05041
OP_174	Natural Gas Engine	740118.6	3094864.6	26.21	866.48	7.31	0.20	0.19485
OP_175	Diesel or Gasoline Engine	753178.5	3088291.6	32.61	755.37	7.01	0.30	0.00033
OP_176	Diesel or Gasoline Engine	753178.5	3088291.6	32.61	755.37	7.01	0.30	0.00065
OP_177	Diesel or Gasoline Engine	753178.5	3088291.6	32.61	755.37	7.01	0.30	0.00018
OP_178	Diesel or Gasoline Engine	753178.5	3088291.6	25.91	755.37	13.11	0.30	0.00965
OP_179	Diesel or Gasoline Engine	718614.2	3078062.7	26.52	755.37	0.91	0.30	0.00084
OP_180	Diesel or Gasoline Engine	718614.2	3078062.7	26.52	755.37	0.91	0.30	0.00126
OP_181	Diesel or Gasoline Engine	718614.2	3078062.7	26.52	755.37	0.91	0.30	0.00084
OP_182	Diesel or Gasoline Engine	718614.2	3078062.7	18.90	755.37	0.61	0.30	0.00050
OP_183	Diesel or Gasoline Engine	718614.2	3078062.7	18.90	755.37	0.61	0.30	0.00050
OP_184	Diesel or Gasoline Engine	718614.2	3078062.7	18.90	755.37	0.61	0.30	0.00050
OP_185	Diesel or Gasoline Engine	718614.2	3078062.7	26.21	755.37	6.71	0.30	0.17964

Model Id	Source Description	Easting (X)	Northing (Y)	Stack Height	Temperature	Exit Velocity	Stack Diameter	Short-term Emission Rates NOx
		(m)	(m)	(m)	(K)	(m/s)	(m)	lb/hr
OP_186	Diesel or Gasoline Engine	718614.2	3078062.7	26.21	755.37	6.71	0.30	0.17384
OP_187	Diesel or Gasoline Engine	718614.2	3078062.7	26.21	755.37	6.71	0.30	0.17964
OP_188	Natural Gas Engine	718614.2	3078062.7	30.48	731.48	10.97	0.30	0.02588
OP_189	Natural Gas Engine	718614.2	3078062.7	30.48	731.48	10.97	0.30	0.05365
OP_190	Natural Gas Engine	718614.2	3078062.7	30.48	731.48	10.97	0.30	0.06643

Table 4-2
Applicable Standards
Bluewater Texas Terminal LLC

Constituent Name	CAS No.	Averaging Period	SIL (De minimis)	NAAQS	State Property Line	ESL
			μg/m 3	μg/m 3	μg/m 3	μg/m 3
Nitrogen Dioxide (NO_2)	10102-44-0	1-Hour	7.5	188	188	
		Annual	1	100	100	
Carbon Monoxide (CO)	630-08-0	1-Hour	2,000	40,000	40,000	
		8-Hour	500	10,000	10,000	
PM_{10}	na	24-Hour	5	150	150	
		Annual	1	--	--	
$PM_{2.5}$	na	24-Hour	1.2	35	35	
		Annual	0.3	12	12	
Sulfur Dioxide (SO_2)	7446-09-5	30-min	20.4	1,021	1,021	
		1-Hour	7.8	196	196	
		3-Hour	25	1,300	1,300	
		24-Hour	5	365	365	
		Annual	1	80	80	
Hydrogen Sulfide (H_2S)	7783-06-4	30-min (non-industrial)	--	--	108	
		30-min (industrial)	--	--	162	
Crude Oil Vapor (<1% Benzene)	na	1-Hour				3,500
		Annual				350

The guidance presents specific evaluation steps which are based on the amount of the project emissions. The TCEQ recently provided a tool and guidance on the use of Modeled Emission Rates for Precursors (MERPs) to address the contribution of secondary ozone and $PM_{2.5}$ impacts. TCEQ guidance document APDG 6443v3, Revised 09/18 is a simplified and state-specific version of EPA's memorandum from EPA dated December 2, 2016, with a subject, "Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program." MERPs are used during the preliminary impact determination to demonstrate that projected impacts from a proposed source are less than a SIL value and would not cause or contribute to a violation of a NAAQS.

The MERP values used in the analysis on Table 4-3 are the Worst-case MERPS for Hypothetical Sources in Texas as described in Table 1 of the TCEQ MERP guidance.

The following equation was used to evaluate the worst case combined primary and secondary $PM_{2.5}$ concentration due to the proposed project.

$$\frac{Preliminary\ Direct\ PM_{2.5}\ Impact\ (ug/m3)}{PM_{2.5}\ SIL\ (ug/m3)} + \frac{NOx\ Increase\ (tpy)}{NOx\ MERP\ (tpy)} + \frac{SO2\ Increase\ (tpy)}{SO2\ MERP\ (tpy)} < 1$$

4.5 State Property Line Analysis

The modeled concentrations of hydrogen sulfide (H_2S) were compared to the State Property Line Standards as shown in Table 4-2.

4.6 State Health Effects Analysis

The applicable pollutant evaluated in this analysis is defined by TCEQ as "crude oil with a benzene concentration of less than 1 percent". Modeled concentrations of this pollutant were compared to the ESLs shown in Table 4-2.

Table 4-3

Worst-case MERPs for the Hypothetical Texas Sources

Bluewater Texas Terminal LLC

From Table 1 of TCEQ "Guidance on the EPA MERP" 2018 APDG 6443v3

https://www.tceq.texas.gov/assets/public/permitting/air/Modeling/guidance/merps-6443.pdf

Precursor	24-hour $PM_{2.5}$	Annual $PM_{2.5}$
NOx	2500	10000
SO2	343	1801

Section 5
Model Results

5.1 NAAQS Analysis Results

The results of the Project only SIL evaluation are presented in Table 5-1 and the full sitewide cumulative evaluation for NO_X is presented in Table 5-2.

As shown, the model demonstrates that project level impacts are insignificant (below the SILs) for all pollutants except for NOx. Therefore, compliance with the NAAQS is demonstrated for these pollutants at the project-only Significant Impact analysis.

Both 1-hour and annual sitewide NOx impacts, including off property sources and an ambient background concentration, are below the NAAQS. Therefore, compliance with the NAAQS has been demonstrated for all pollutants.

5.2 Secondary $PM_{2.5}$ Analysis Results

A summary of the predicted secondary $PM_{2.5}$ concentrations using the MERP approach is provided in the previous section. As shown on Table 5-3, both the 24-hour and annual $PM_{2.5}$ preliminary impacts for the project area are less than 1, which indicates that the SILs for $PM_{2.5}$ will not be exceeded; therefore, a cumulative analysis for $PM_{2.5}$ is not required

5.3 State Property Line Analysis Results

The results of the State Property Line modeling is shown in Table 5-4. As shown, modeled impacts are acceptable.

Table 5-1
SIL Evaluation – Project Sources
Bluewater Texas Terminal LLC

Constituent	CAS No.	Averaging Period	SIL (Deminimis)	Project Maximum Concentration	Is Project Greater than SIL?
			µg/m³	µg/m³	
Nitrogen Dioxide (NO_2)	10102-44-0	1-Hour	7.5	147.1	Yes
		Annual	1	9.5	Yes
Carbon Monoxide (CO)	630-08-0	1-Hour	2,000	34.3	No
		8-Hour	500	7.6	No
PM_{10}	na	24-Hour	5	0.54	No
$PM_{2.5}$	na	24-Hour	1.2	0.38	No
		Annual	0.3	0.06	No
Sulfur Dioxide (SO_2)	7446-09-5	1-Hour	7.8	3.43	No
		3-Hour	25	2.7	No
		24-Hour	5	0.72	No
		Annual	1	0.09	No

Table 5-2
NAAQS Evaluation – Sitewide Cumulative
Bluewater Texas Terminal LLC

Constituent	CAS No.	Averaging Period	Modeled Site-wide Cumulative Concentration	Background Concentration	Site-wide and Off-Property GLCmax	NAAQS	Is Project Greater than NAAQS?
			µg/m³	µg/m³	µg/m³	µg/m³	
Nitrogen Dioxide (NO_2)	10102-44-0	1-Hour	121.5	53.3	174.8	188	no
		Annual	9.5	4.5	14.0	100	no

Table 5-3
Secondary Impacts - Project Sources
Bluewater Texas Terminal LLC

Preliminary Impact Determination

PM2.5

Averaging Period	Direct $PM_{2.5}$ Impact (µg/m^3)		$PM_{2.5}$ SIL (µg/m^3)		$PM_{2.5}$		NO_X Increase (tpy)		NO_X MERP (tpy)		NO_X		SO_2 Increase (tpy)		SO_2 MERP (tpy)		SO_2		Preliminary Impact
24-Hour	0.378	/	1.2	=	0.315	+	13.296	/	2500	=	0.005	+	0.012	/	343	=	0.000	=	0.32
Annual	0.059	/	0.2	=	0.294	+	13.296	/	10000	=	0.001	+	0.012	/	1801	=	0.000	=	0.30

	Preliminary Impact	
24-Hour	**0.32**	Result is less than 1 - No cumulative impact is required
Annual	**0.30**	Result is less than 1 - No cumulative impact is required

Table 5-4

Texas State Property Line Evaluation – Sitewide

Bluewater Texas Terminal LLC

Constituent	CAS No.	Averaging Period	Modeled Site-wide Concentration	State Property Line Standard	Is Impact Greater than Standard?
			μg/m³	μg/m³	
Hydrogen Sulfide (H_2S)	7783-06-4	30-min (residential)	21.93	108	---
		30-min (non-residential)	21.93	162	---

5.4 State Health Effects Review Analysis Results

The results of the State Health Effects Review modeling is shown in Table 5-5. Although there are exceedances of the ESLs, they occur at industrial receptors over water. Published TCEQ guidelines specify that in the case of receptors over industrial waters, 24 exceedances of 10 times the applicable ESL and 10 exceedances of 20 times the ESL at these receptor types are allowable if the GLC_{MAX} does not exceed 25 times the ESL.[4] Predicted crude oil concentrations do not exceed 10 times the ESL. Therefore, the modeled magnitudes of impacts and frequency of exceedance is acceptable.

5.5 Model Input and Output Files

The modeling input and output files are provided electronically and can be downloaded using the link below.

https://disorboconsult.box.com/v/NEPA-Modeling

[4] Alan Thomas and Zarena Post (TNRCC) to Interested Parties. August 2001 (DRAFT). Effects Evaluation Procedure: Marine Vessels. https://www.tceq.texas.gov/assets/public/permitting/air/memos/effeval.pdf

Table 5-5

Texas State Health Effect Review Evaluation – Sitewide

Bluewater Texas Terminal LLC

Constituent	CAS No.	Averaging Period	ESL	GLCmax[1]	Multiple of ESL	Is GLCmax Greater than ESL?	Hours over 10x ESL[2]	Hours over 20x ESL[2]
			µg/m³	µg/m³				
Crude Oil Vapor (<1% Benzene)	NA	1-Hour	3500	33774	9.6	Yes	0	0
		Annual	350	319	0.91	No		

(1) The "GLCmax" is the maximum concentration predicted by the model. The GLCmax receptor is an industrial receptors over water. There are no applicable GLCni receptors due to the offshore location of the project.

(2) Table 1 of TNRCC Memo "Effects Evaluation Procedure: Marine Vessels" 2001 allows impacts above the ESL at industrial receptors over water so long as the frequency of occurance is no more than 24 hours per year over 10X the ESL and 10 hours per year over 20X the ESL.

Section 6
References

Texas Commission on Environmental Quality (TCEQ), Air Permits Division. 2018. Guidance on the Use of EPA MERP. APDG 6443v3. Revised September 2018.

Texas Commission on Environmental Quality (TCEQ), Air Permits Division. 2018. Modeling and Effects Review Applicability (MERA). APDG 5874. March 2018.

U.S. Environmental Protection Agency (USEPA), Office of Air Quality Planning and Standards 2017. Guidelines on Air Quality Models, (Revised). Appendix W of 40 CFR 51. November 9, 2005. Update with Appendix W, January 27, 2017.

U.S. Bureau of Ocean Energy Management. 2018. GOMR Air Dispersion Modeling Guidelines. January 2018.

U.S. Environmental Protection Agency (USEPA), Region 10. 2012. User's Manual AERCOARE Version 1.0. EPA 910-R-12-008. October 2012.

U.S. Environmental Protection Agency (USEPA). 2000, Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-0005. February 2000.

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