Statement of Basis

Proposed Clean Air Act Permit
Neptune LNG LLC

Prepared by

The United States
Environmental Protection Agency
Region 1

2007

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Acronyms and Abbreviations

^{0}C	degrees Celsius
F	degrees Fahrenheit
µg	microgram(s)
Applicant	Neptune LNG LLC, the Applicant for the deepwater port license application
Application	Minor Source Preconstruction Air Permit Application submitted by the applicant on May 12, 2006
BACT	Best Available Control Technology
BOG	Boil Off Gas
Btu	British thermal unit
CAA	Clean Air Act
CEMS	continuous emissions monitoring system
CFR	Code of Federal Regulations
CMR	Code of Massachusetts Regulations
CO	carbon monoxide
CPA	Comprehensive Plan Approval
DEP	(Massachusetts) Department of Environmental Protection
DF	dual fuel
DPA	Deepwater Port Act
DWP	Deepwater Port
EPA	United States Environmental Protection Agency
FGD	flue gas desulfurization
FGR	flue gas recirculation
g	gram(s)
GEP	Good Engineering Practice
H2O	water
HAP	hazardous air pollutant
HHV	higher heating value
hr	hour(s)
HubLineSM	Algonquin HubLineSM
km	kilometer(s)
kW	kilowatt(s)
kWh	kilowatt-hour
LAER	Lowest Achievable Emission Rate

lb	pound(s)
LNG	liquefied natural gas
m3	cubic meter(s)
MARAD	U.S. Maritime Administration
mg	milligram(s)
MMBtu	million British thermal units
mmscf	million standard cubic feet
mmscfd	million standard cubic feet per day
N2	nitrogen
NAAQS	National Ambient Air Quality Standards
NANSR	Nonattainment New Source Review
Neptune LNG LLC	the Applicant
Neptune	the proposed deepwater port
NESHAP	National Emission Standards for Hazardous Air Pollutants
NH3	ammonia
Nm3	normal cubic meter
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
SNCR	Selective non-catalytic reduction
NSPS	New Source Performance Standards
NSR	New Source Review
O_2	oxygen
O_3	ozone
OCD	Offshore and Coastal Dispersion (Model)
OTR	Ozone Transport Region
OxCat	Oxidation Catalyst
Pb	lead
PCHE	printed circuit heat exchanger
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers
ppm	parts per million
ppmvd	parts per million, volumetric dry
PSD	Prevention of Significant Deterioration
RACT	Reasonably Available Control Technology
RBLC	RACT/BACT/LAER Clearinghouse

RMP	Risk Management Program
scf	standard cubic feet
SCR	selective catalytic reduction
SO_2	sulfur dioxide
SRV	shuttle and regasification vessel
TO	thermal oxidizer
tpy	tons per year
UHC	unburned hydrocarbons
U.S.C.	United States Code
USCG	United States Coast Guard
VOC	volatile organic compounds
yr	year

I INTRODUCTION

On May 12, 2006, Neptune LNG LLC (The Applicant or Neptune), a Delaware limited liability company, submitted an application for an air permit with EPA Region 1 to construct and operate a liquefied natural gas (LNG) deepwater port (DWP) off the coast of Massachusetts. This application supersedes an application submitted on September 2005. After reviewing the application, EPA Region 1 has prepared the following Statement of Basis (SOB) and proposed air permit to approve construction of air emission sources at Neptune's proposed DWP project.

The SOB documents the information and analysis EPA used to support the decisions EPA made in drafting the air permit. It includes a description of the proposed facility, the applicable air permit requirements, and an analysis showing how the applicant complied with the requirements.

EPA Region I concludes that Neptune's application is complete and provides the necessary information to demonstrate that the proposed project meets the applicable air permit regulations. EPA's conclusions rely upon information provided in the permit application, supplemental information EPA requested, an application filed by Northeast Gateway Energy Bridge (Gateway) for a similar DWP project and EPA's own technical expertise. EPA is making all this information available as part of the public record.

II PROJECT OVERVIEW

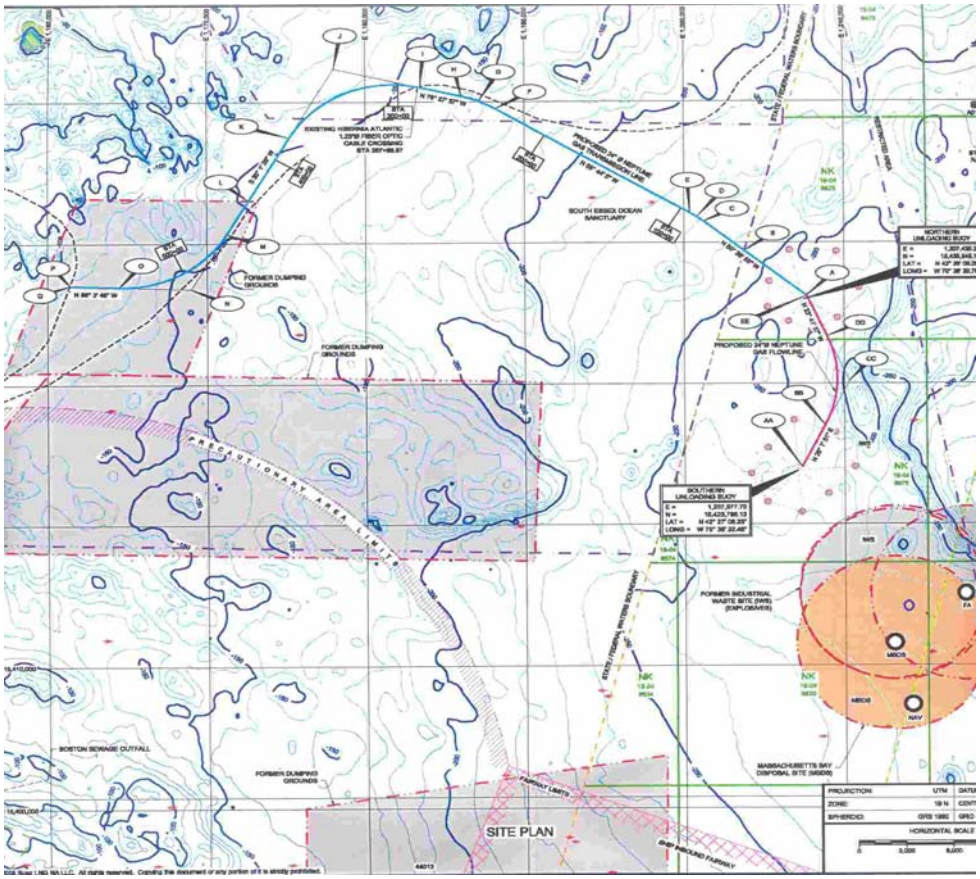
II.A Applicant

Neptune LNG LLC
1 Liberty Square
10th Floor
Boston, MA 02109

II.B: Project Location

The proposed deepwater port named *Neptune* would be located in the federal waters of the OCS blocks NK 19-04 6525 and NK 19-04 6575, approximately 22 miles northeast of Boston, Massachusetts, in a water depth of approximately 250 feet. The location is shown on Figure1.

Figure 1.
Location of Neptune DWP



II.C Permitting Authority

On January 6, 2004, Neptune filed an application for a license pursuant to the Deepwater Port Act of 1974, as amended (the DPA) and the United States Coast Guard's (USCG's) Temporary Interim Rules to construct, own, and operate a DWP. The DPA was enacted in 1975 (P.L. 93-627, §§ 3, 88 Stat. 2127). In 2002, it was amended by the Maritime Transportation Security Act to apply to natural gas ports or terminals and is now codified at 33 U.S.C. 1501 -1524. The DPA defines a "deepwater port" as "any fixed or floating

manmade structure other than a vessel, or any group of such structures, that are located beyond State seaward boundaries and that are used or intended for use as a port or terminal for the transportation, storage, or further handling of oil or natural gas for transportation to any State…." A deepwater port includes all components and equipment, including pipelines, pumping or compressor stations, service platforms, buoys, mooring lines, and similar facilities that are proposed or approved for construction and operation as part of a deepwater port, to the extent that they are located seaward of the high water mark and do not include interconnecting facilities. Neptune's proposed LNG vessels while moored will be a manmade floating structure located beyond State seaward boundaries and its intended use will be to receive, store, and process LNG for the transportation of natural gas. Consequently, Neptune is considered a deepwater port for the purposes of the DPA. See 33 U.S.C. § 1502(9).

The Constitution, laws, and treaties of the United States apply to deepwater ports, and to activities connected, associated, or potentially interfering with the use or operation of any such port, in the same manner as if such port were an area of exclusive Federal jurisdiction located within a State. See 33 U.S.C. § 1518(a)(1). Construction and operation of a deepwater port requires compliance with all applicable Federal and State environmental statutes, including the Clean Air Act (CAA). See 33 CFR 148.737. Important provisions of the CAA include regulation of criteria pollutants and hazardous air pollutants (HAPs), and the requirement that each state have a federally approved state implementation plan (SIP) for the attainment and maintenance of the national primary and secondary ambient air quality standards. The CAA also requires that new sources apply for, and obtain, permits to construct before starting construction.

In addition to the CAA requirements cited above, the DPA states that the applicable state laws of the nearest adjacent coastal state are to be administered and enforced by appropriate federal officials. Therefore, applicable laws of Massachusetts apply to Neptune to the extent such laws are not inconsistent with any provision or regulation under the DPA or other Federal laws and regulations. See 33 U.S.C. § 1518(b). The Commonwealth of Massachusetts establishes and enforces local air pollution regulations in order to attain and maintain all state and federal ambient air quality standards. These regulations include preconstruction air permits and other emission control strategies for the control of stationary source air pollution. EPA has determined that the Commonwealth's plan approval rules that are incorporated into the SIP and applicable to Neptune's project are consistent with the DPA and the CAA. Therefore, Neptune will comply with these applicable state air quality control requirements.

II.D Project Description

As described in the application, *Neptune* is a submerged unloading buoy system designed to moor LNG shuttle and regasification vessels (SRVs). Each SRV has an LNG storage capacity of approximately 140,000 cubic meters (m^3). The DWP will include two separate buoys that can moor two SRV's at any time. The two buoy system will allow Neptune to deliver natural gas in a continuous flow, without interruption, by overlapping the arriving and departing SRVs. The DWP will have an average annual throughput capacity of approximately 500 million standard cubic feet per day (mmscfd), an initial throughput of 400 mmscfd, and a peak capacity of approximately 750 mmscfd.

Neptune will design each SRV to store, transport, vaporize, odorize and meter the LNG. The DWP will include two 16-inch flexible risers and one 24-inch subsea flowline that will lead to a proposed 24-inch gas transmission pipeline. The pipeline will connect the DWP to the existing 30-inch Algonquin HubLine^{SM} (HubLine^{SM}) located approximately 9 miles west of the proposed DWP location. Neptune will design, construct, and operate the DWP in accordance with applicable codes and standards. The DWP is expected to have an operating life of approximately 20 years.

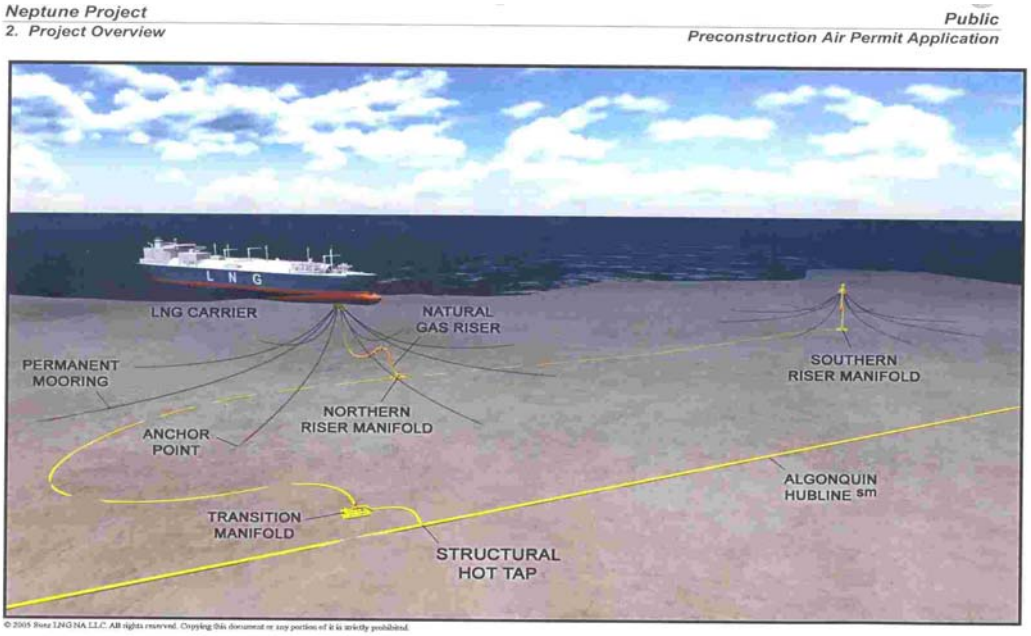
Neptune identified its affiliate companies' global portfolio of LNG locations in the Caribbean, Africa, and the Middle East as the sources for LNG delivered to this DWP. Neptune expects the construction of the DWP components (including SRVs, unloading buoy system fabrication, and offshore construction) to take 36 months. Neptune proposes to initiate on-site construction activities in Massachusetts Bay in mid-May 2009 and to complete construction in late September 2009, assuming no weather delays. Start-up of commercial operations is expected in October 2009.

Neptune intends to build three SRVs to service the DWP. The SRVs will moor at the two submerged unloading buoys using mooring lines and anchor points located on the seabed. As the first SRV finishes unloading, a second SRV (following its transit from an overseas loading point) would moor at the other unloading buoy. After vaporization of LNG and send out of natural gas, the first SRV would disconnect from the unloading buoy and proceed to an overseas loading point to reload. Meantime, a third SRV, already in transit to the deepwater port, would repeat the cycle. A single SRV can unload in six days. Neptune intends sixty-four (64) ships per year to discharge at the DWP.

For the vaporization process, Neptune proposes to equip each SRV with two natural gas-fired boilers and two power generation engines. The power generation engines are dual fuel engines that will operate in the gas mode (with less than 1% distillate fuel oil) while moored at the DWP. The boilers will provide heat for the vaporization process. The engines would provide electrical power.

Neptune will equip each SRV with three vaporization (shell and tube heat exchanger) units with a total maximum send-out capacity of 750 mmscfd. Each unit will have a capacity to vaporize 250 mmscfd (or 210 tons per hour). Under normal operations, Neptune will use two units for a combined maximum send-out capacity of up to 500 mmscfd. Neptune will install the vaporization system on the main deck in the forward part of the vessel. Each system includes three separate skid-mounted units containing the required pumps, motors, heat exchangers, and control systems. Each unit would be independent and could be disconnected for transportation to shore for maintenance and overhaul (if required). An artist's rendering of the SRV and the DWP is shown in figure 2.

Figure 2.



The SRV's tanks normally store the LNG at –160°C at approximately 5 bars pressure.

During operation, Neptune will pump LNG from the cargo tanks to a common suction drum/re-condenser tank on deck. Multistage centrifugal pumps will pressurize the LNG to 120 bars pressure. The LNG is then pumped to the vaporization shells and converted into gas. To supply heat for vaporization, Neptune will employ a closed-loop system. In the closed loop system, boilers produce steam that heats a fluid contained in a closed loop system. The heated fluid is circulated to the vaporization heat exchangers. After heating the LNG, the now cooled fluid is returned to the boilers for reheating. In the open-loop system, relatively warm seawater is circulated to the vaporization heat exchangers and then simply discharged back into sea.

Neptune has selected the closed loop system for the proposed DWP. Neptune indicates that the open-loop system would not properly operate in the northeast waters of the United States due to the low water temperatures during winter months. In addition, the closed-loop is less harmful to the marine environment.

Neptune will design its closed loop vaporization system using a water/glycol intermediate medium. The system will use a printed circuit heat exchanger (PCHE) to transfer heat from the marine boilers to the water/glycol fluid. The heated water/glycol is circulated into the LNG shell at approximately 90 degrees Celsius (°C). After warming and vaporizing the LNG, the now cooled fluid (approximately 20°C) is circulated back to the PCHE where the process is repeated

In addition to the main vaporization system, Neptune will install a separate low-pressure vaporization system that will generate natural gas for use as supplemental fuel for the marine boilers and power generation engines. Normally, the marine boilers would run on boil-off gas (BOG). The low pressure system will provide supplemental fuel (forced boil-off gas) when insufficient BOG is available. Insufficient BOG may occur when LNG levels in the SRV tanks are low, such as near the end of the regasification period.

II.E Summary of EPA's Actions

The DWP is subject to the state and federal requirements identified in Sections IV of the SOB. In addition, EPA is proposing to limit Neptune's NOx facility-wide emissions to less than 45 tons during any 12-month period. EPA is proposing to enforce the 12-month nitrogen oxide (NOx) emission limits through the following operations restrictions:

- A fuel limit on the boilers for any 12-month period.

- An electrical output limit on the power generators for any 12-month period plus certain fuel restrictions.

EPA has also required Neptune to conduct air impact modeling to determine if emissions cause or contribute to a violation of a National Ambient Air Quality Standards (NAAQS). Neptune used maximum short term emission estimates based on two SVRs operating their boilers and generators at maximum levels simultaneously in the air impact modeling. The impact models demonstrated that air impacts from Neptune are negligible and do not significantly impact NAAQS. The air impact analysis is further described in Section IX of the SOB.

III SOURCES OF AIR EMISSIONS

III.A Summary of Emission Generating Equipment

Each SRV while moored at the unloading buoy(s) will include the following emission-generating equipment:

- Two vaporization natural gas-fired marine boilers using BOG, each with a heat input capacity of approximately 312 million British thermal units per hour (MMBtu/hr) operating at 90% load (i.e., 281 MMBtu/hr).
- Two power generation engines. While at the unloading buoy, the low-pressure dual fired diesel engines will use either BOG or forced vaporized gas (99%) with low sulfur distillate fuel oil (maximum sulfur content of 0.05% wt.) as pilot fuel (<1%). The engines will use low sulfur distillate fuel oil (100%) for startup. Each power generation engine has a maximum output capacity of 11,400 kilowatts (kW) but will be limited to 90% load (10,260 kW).
- A thermal oxidizer (TO). The TO will oxidize excess BOG during periods of low or no LNG send out.

III.B SRV Vaporization Boilers

Neptune proposes to equip each SRV with two 312 MMBtu/hr (562 MMBtu/hr total at 90% load) natural gas-fired marine boilers. Neptune will use Aalborg Industries, Mission 120 (or equivalent) gas-fired marine boilers equipped with low-NO_X burners and SCR. The boilers will achieve a NOx emission limit of 10 parts per million (ppm) and a carbon monoxide (CO) emission limit of 20 ppm. Emissions specifications for the boilers are

presented in Appendix B of the Application.

III.C Power Generation Engines

Neptune proposes to equip each SRV with two (2) 12-cylinder Wartsila 50DF (or equivalent) power generation engines with a capacity of 11,400 kW each. The engines will generate power for regasification and for ship hoteling. While at the unloading buoy, Neptune proposes to operate the dual fuel engines using either BOG or forced vaporized gas (99%) with low sulfur distillate fuel oil (maximum sulfur content of 0.05% wt.) as pilot fuel (<1%). To limit the engines potential to emit (PTE) for NOx, Neptune proposes to equip the engines with SCR and oxidation catalysts. The SCR will limit NO_X emission to 0.2 grams per kilowatt hour [g/kWh]. The oxidation catalyst will limit CO emissions to 0.17 g/kWh.

III.D Thermal Oxidizer

Neptune proposes to install a TO on each SRV to combust excess boil off gas as a precautionary measure while the SRV is moored at the DWP. The SRV vaporization boilers and engines normally use all excess BOG at send-out rates above approximately 160 mmscfd. However, for a short period upon initial arrival at the deepwater port and during periods of no or low gas send-out rates, the boilers and engines may not use all excess the BOG. Any excess BOG will be sent to the TO and oxidized to avoid venting natural gas to the atmosphere and creating a safety hazard.

IV REGULATORY ANALYSIS

IV.A Overview of Review

This section identifies the federal regulations that apply or that may apply to Neptune's DWP and how Neptune expects to comply with the regulation. In addition, as stated previously, the project is not located within state territorial waters. However, the Deepwater Port Act requires that "The law of the nearest adjacent coastal state...is declared to be the law of the United States, and shall apply to any deepwater port...to the extent applicable and not inconsistent with any provision or regulation under this Act or other Federal laws and regulations" [§19(b)]. Therefore, this section also identifies the state regulations not inconsistent with federal law that apply to the proposed project and how Neptune expects to comply with the regulations.

With respect to identifying the regulations, EPA determined that the proposed Neptune DWP includes the following:

- two subsea buoys, each with a flexible riser assembly and a manifold connecting the riser assembly, via a flow line, to the subsea Pipeline Lateral and;
- the emissions from each SRV while moored to the STL™ buoys.

In addition, Neptune must demonstrate that emissions will not cause or contribute to a violation of a National Ambient Air Quality Standard (NAAQS). The air quality at the project location—i.e., approximately 22 miles Northeast of Boston, Massachusetts, outside the state territorial boundary—has not been classified. Counties along the Massachusetts coast are in attainment with all ambient air quality standards except for ground level ozone. Massachusetts is designated and classified state-wide as a moderate nonattainment area for ozone located in the Ozone Transport Region (OTR). EPA will apply those state regulations that apply to nonattainment areas in the OTR for ozone and to attainment areas for all other criteria pollutants.

In addition, while Neptune's application describes how the SRVs will meet the applicable air permit requirements, the mooring system could potentially handle other LNG vessels that may come into service in the future. EPA's permit will apply to any vessel that moors to the DWP.

IV.B NAAQS, Visibility and Conformity

IV.B.1 NAAQS Protection

40 CFR Part 50 establishes the primary and secondary National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: sulfur dioxide (SO_2), particulate matter having an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}) and particulate matter having an aerodynamic diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$), nitrogen dioxide (NO_2), CO, ozone (O_3), and lead (Pb). EPA established the primary ambient air quality standards to protect the public health. Secondary ambient air quality standards protect public welfare from any known or anticipated adverse effects of a pollutant. Massachusetts has established ambient air quality standards equal to the NAAQS. The NAAQS and Massachusetts ambient air quality standards (MAAQS) are presented in Table 1.

TABLE 1.

National and Massachusetts Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS	PSD Increments	
			Class I	Class II
PM_{10}	24-Hour	150 µg/m^3	8 µg/m^3	30 µg/m^3
	Annual	50 µg/m^3	4 µg/m^3	17 µg/m^3
$PM_{2.5}$ [a]	24-Hour	35 µg/m^3	N/A	N/A
	Annual	15 µg/m^3		
Sulfur Dioxide (SO_2)	3-Hour	.50 ppm (1300 µg/m^3) [b]	25 µg/m^3	512 µg/m^3
	24-Hour	.14 ppm (365 µg/m^3)	5 µg/m^3	91 µg/m^3
	Annual	.03 ppm (80 µg/m^3)	2 µg/m^3	20 µg/m^3
Ozone (O_3)	1-Hour [c]	0.120 ppm (235 µg/m^3)	N/A	N/A
	8-Hour [d]	0.08 ppm (157 µg/m^3)	N/A	N/A
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.053 ppm (100 µg/m^3)	2.5 µg/m^3	25 µg/m^3
Lead (Pb)	24-Hour	N/A	N/A	N/A
	Calendar Quarter	1.5 µg/m^3		
Carbon Monoxide (CO)	1-Hour	35 ppm (40 mg/m^3)	N/A	N/A
	8-Hour	9 ppm (10 mg/m^3)	N/A	N/A

[a] EPA adopted a new fine particulate standard (particulate smaller than 2.5 microns in diameter) on 7/17/97, but retained existing PM_{10} standards. This standard was not enforceable pending court challenges; however, the court upheld the standards and the State of Massachusetts has recommended that the entire State be designated Attainment/Unclassifiable.

[b] Set as a secondary standard

[c] Statistically estimated number of exceedances. The 1-hour standard is met when the daily maximum 1-hour concentration does not exceed 0.12 ppm at any one monitor on more than 3 days over any 3-year period.

[d] EPA adopted new 8-hour ozone standard on 7/17/97 and revoked the existing 1-hour standard. The 1-hour standard was re-instated in June of 2000, pending resolution of the legal challenges to the 8-hour standard. The 8-hour standard is now in effect. Compliance with the 8-hour standard is based on the 3-year average of the 4th highest daily maximum 8-hour ozone concentrations. EPA designated Massachusetts as "nonattainment" for the 8-hour ozone standard effective June 15, 2004.

EPA has classified Massachusetts a moderate nonattainment area for ozone and attainment for all other criteria pollutants (NO_2, CO, SO_2, PM_{10} and $PM_{2.5}$, and Pb). In addition, Massachusetts is located in the Ozone Transport Region (OTR). The CAA makes certain control requirements applicable uniformly across the OTR regardless of the areas classification.

EPA's review of Neptune's air quality impact analysis detailed in Section IX of the SOB demonstrates that potential emissions from operation of the proposed DWP (1) will be in

compliance with the NAAQS and MAAQS as well as the PSD increments, and (2) will have maximum impacts less than modeling significance levels for all pollutants modeled.

As of this date, EPA has yet to promulgate regulations to implement the New Source Review program for $PM_{2.5}$. In an October 23, 1997 memorandum from John Seitz, Office of Air Quality Planning and Standards, EPA addressed the interim use of PM_{10} as a surrogate for $PM_{2.5}$ in meeting NSR requirements under the CAA. EPA Region 1 is relying upon this memorandum and will use as a PM_{10} surrogate for $PM_{2.5}$ in this permit.

IV.B.2 Visibility

On July 1, 1999, EPA adopted its final regional haze regulation for protection of Class I areas. The regulations, at 40 CFR Part 51, set forth a national goal for visibility, specifically, the "prevention of any future, and the remedying of any existing, impairment to visibility in Class I areas which impairment results from manmade air pollution." The rule requires states to set goals and adopt implementation plans to reduce regional haze. However, as a minor source, Neptune is not subject to any additional requirements related to visibility protection.

IV.B.3 General Conformity with State Implementation Plans for Air Quality

For projects in nonattainment areas and maintenance areas, if air emissions exceed thresholds identified in EPA's general conformity regulations (40 CFR 51 and 40 CFR 93 Subpart B), Federal agencies must demonstrate that those emissions are generally in conformity with SIPs prior to approving those projects. For this project, the U.S. Coast Guard (USCG) is initially responsible for determining the applicability of conformity regulations and demonstrating conformity where necessary. Neptune has committed to developing a general conformity determination for approval by the USCG, and EPA expects to adopt USCG's determination once it is made.

IV.C Federal Stationary Source Regulations

IV.C.1 New Source Review (NSR)/PSD Program

The CAA requires stationary sources classified as "major" to obtain preconstruction permits in accordance with EPA regulations for non-attainment New Source Review (NSR) and/or the Prevention of Significant Deterioration (PSD), depending on whether the local air quality is classified as being "attainment" or "nonattainment" with the

NAAQS for each pollutant. EPA is proposing to limit annual emissions for all criteria pollutants to below major source classification threshold levels for nonattainment NSR and PSD. Therefore, Neptune is not subject to either program.

IV.C.2 Risk Management Program

40 CFR Part 68, Chemical Accident Prevention Provisions, is a federal regulation designed to prevent the release of hazardous materials in the event of an accident and to minimize impacts when releases do occur. The regulation contains a list of substances and threshold quantities for determining applicability of the rule to a facility. If a facility stores, handles, or processes one or more of the substances on this list at a quantity equal to or greater than specified in the regulation, the facility must prepare and submit a risk management plan as part of its overall Risk Management Program (RMP). No substances on this list would be used in the quantities described, and therefore a risk management plan is not required for the proposed project.

VI.C.3 Title V Operating Permit Program

Among other things, the Massachusetts Title V Operating Permit Program at 310 CMR 7.00, Appendix C applies to major sources subject to the nonattainment NSR/PSD program or the MACT program. Since Neptune is not a major source subject to these requirements, the Title V program does not apply at this time.

IV.D State Stationary Source Regulations

IV.D.1 310 CMR 7.02 – Minor Source Permitting Regulation (Plan Approvals)

40 CFR 51.160-164 require states to have enforceable procedures to prevent the construction of new or modified sources if the source or modification results in a violation of an applicable state control strategy or NAAQS. These procedures are commonly referred to as minor NSR. Massachusetts 310 CMR 7.02 “Plan Approval” regulations implement the minor NSR program. Among other things, the regulations require a source to obtain a comprehensive plan approval (CPA) if its potential emissions exceed 5 tpy. Neptune’s DWP will have emissions greater than 5 tpy and is therefore subject to these regulations

Among other things, the requirements for receiving a CPA include a demonstration that

emissions will comply with applicable state and federal emissions standards including NAAQS. Section IX of the SOB provides the air impact analysis that demonstrates that emissions do not cause a violation of any NAAQS, based on the emission rates provided by the applicant.

In Section 5 of the Application, Neptune submitted an analysis of the best available control technology for its boilers. As the Massachusetts SIP requires BACT on new minor sources, a number of complex issues related to our authority, and the authority of states, to directly regulate ship-based emissions are raised by this permit. EPA will not, however, address these issues as we have determined that the limits that the source has proposed as BACT, and which EPA agrees would constitute BACT, are also necessary to enforce the facility-wide emissions cap required for the source to avoid major source NSR. As EPA would require no additional control beyond that which is necessary to enforce the synthetic minor cap for the source, we need not address these authority issues.

IV.D.2 310 CMR 7.09 – Dust, Odor – Construction and Demolition

This provision prohibits the handling, storage or transportation of any material to be used in construction in a way that results in a "condition of air pollution." The DPA defines the source as those activities below the high water mark. Neptune did not identify any construction activity on land above the high water mark and is therefore not covered by this regulation.

As to construction of the port, EPA does not anticipate a dust or odor problem because the construction will take place on or under water, most of it miles off-shore.

IV.D.3 310 CMR 7.10 – Noise

This section prohibits unnecessary emissions of noise from construction equipment and other activities or operating such equipment without enclosures or methods to suppress sound in order to prevent "sound that may cause noise." Neptune did not provide any information on this requirement. However, Neptune is required to meet this regulation.

IV.D.4 310 CMR 8.00 – Prevention and Abatement of Emergency Episodes

This section provides emergency powers to the Massachusetts DEP to take actions if/or when ambient concentrations reach levels defined as presenting imminent and substantial danger to public health. The requirements specify steps for the DEP to declare an emergency and initiate actions to reduce emissions; however, since endangerment levels have never been approached, it is unlikely that this section will impact the operation of the proposed project. Neptune expects to comply with actions required by the DEP in the case of an air pollution emergency.

IV.E REGULATORY REVIEW SUMMARY

In summary, Neptune must comply with the following requirements:

1 State and federal NAAQS;

2 Conformity;

3 310 CMR 7.02: Plan Approval minor NSR program;

4 310 CMR 7.10: Noise;

5 310 CMR 8.00: Prevention and/or Abatement of Air Pollution Episode and Air Pollution Incidence Emergencies.

In addition, EPA proposes to impose a facility-wide 45 TPY NOx emission limit that keeps the emissions from the DWP below the Massachusetts nonattainment NSR rule's major source threshold level of 50 TPY as defined in 310 CMR 7.00 Appendix A.

V FACILITY-WIDE NO_X EMISSION LIMIT

This section contains the operational scenarios and emissions estimates Neptune used to determine the DWP's facility–wide NOx emission limit. Neptune's application proposed the control requirements and emission limits required to comply with the facility-wide limit. EPA will incorporate these emission limits into the permit to make the facility-wide NOx limit practically enforceable.

V.A Vaporization Boilers

Neptune is proposing a 0.012 lb/MMBtu NOx emission rate for the boilers which Neptune expects to achieve using SCR. To demonstrate compliance with the facility-

wide emission limit, Neptune will determine NOx emissions from the boilers by multiplying the total heat input (i.e., fuel usage) into the boilers on a 12-month rolling average times the NOx emission rate.

V.B Power Generation Engines

Neptune proposes to install two power generation engines on each ship to supply power for the vaporization process and ship hoteling. Each engine would have a generating capacity of 11,400 kW. During vaporization operations at the facility, the dual-fuel power generation engines will use natural gas with a small amount (less than 1%) of distillate fuel oil (maximum 0.05% S) as a pilot fuel. The engines will be limited to 90% of maximum load (10,260 kW) while moored at the DWP. Neptune proposes to equip each engine with an SCR and OxCat.

EPA proposes to include the NO_X emissions from the engines in Neptune's 45 tpy facility-wide NO_X cap. Neptune is proposing the NOx emission rate of 0.2 g/kWh for the engines. EPA is proposing to use this emissions rate to develop practically enforceable compliance requirements for the facility-wide NOx cap

V.C: Facility-Wide NOx Emission Calculations:

Neptune proposes to limit the facility-wide NOx annual emissions for the DPW at 45 tpy. The limit will apply to the combined six boilers, six power generation engines and three TOs onboard the three SRVs while moored and conducting vaporization activities at the unloading buoys. This limit accommodates the facility's annual average daily natural gas vaporization rate output of approximately 500 mmscfd. Based on the 500 mmscfd vaporization rate and ship hoteling needs, Neptune estimated the boilers' maximum annual fuel use at 3,545.7 mmscf/yr and the power generation engines' maximum annual fuel use at 628 mmscf/yr.

During a normal operating year, Neptune expects to operate only engines and boilers. Under this scenario, Neptune can meet its full LNG send-out capacity; however, Neptune may have to operate the TO. When in operation, Neptune will track emissions from the TO and these emissions will be included under the facility-wide cap. Neptune acknowledges that operation of the TO will reduce the operations of the power generation engines and boilers and consequently reduce the total amount of LNG that can be regasified under the annual NOx cap.

In addition, the limit will include emissions that may result from Neptune restarting its boilers from a cold start while moored at the DWP. Under this scenario, the SCR will be cold and will not operate until the exhaust gas brings the temperature above 600 ^{0}F. During this time, the boilers may emit NOx above its permitted lb/MMBtu emission limit. To ensure these emissions are included in the facility-wide limit, EPA proposes that Neptune determine the NOx emission limit for start-up conditions using stack test data obtained during commissioning. The permit will provide for the emission rate determined during testing to be incorporated into the NOx calculation for periods of start-up. The permit will require Neptune to monitor operations and, if a start-up occurs, track the emissions during start-up. All emissions will be counted toward compliance with the facility-wide limit. Neptune acknowledges that frequent cold starts would decrease its total LNG sendout.

VI OTHER POLLUTANTS

Neptune evaluated the annual emissions of all criteria pollutants and HAPs based on the operational restriction required to maintain emissions below the facility-wide NOx emission limits. To ensure compliance with the modeling demonstration, EPA is applying the emission rates that the applicant provided in its application. In addition, based on these limits, the annual emissions for the other criteria pollutants are below applicable CAA requirements beyond the limits required to comply with the NOx limits. Therefore, these emissions do not further restrict the operations of the DWP. In addition, potential HAP emissions do not exceed major source threshold levels for HAPs for any single HAP (10 tpy) or any combination of HAPs (25 tpy).

VII EMISSIONS COMPLIANCE

This section describes the monitoring, recordkeeping and reporting requirements Neptune will conduct as part of its permit to ensure compliance with emission limitations.

VII.A Monitoring

Typically, EPA requires applicants to install Continuous Emissions Monitoring (CEMs) instrumentation to track specific emissions if monitoring of those emissions is critical to ensure a CAA requirement is being met or to show that a requirement does not apply. In this case, Neptune is accepting a facility-wide NOx emission limit so that nonattainment

NSR will not apply to the DWP. As such, EPA needs reliable emissions data to ensure that Neptune is meeting its emission rate at all times.

However, EPA understands the unique issues involved in requiring Neptune to install CEMs on all its NOx emission units. In brief, CEMs that comply with the federal performance standards under 40 CFR part 70 and 75 need to perform quarterly quality assurance test audits and yearly annual relative accuracy test audits (RATA) for certification. Typically, EPA compliance personnel are required to witness these tests. Neptune noted the difficulties with transporting EPA personnel to the vessels operating 12 miles off the coast. Neptune also noted that 12 CEMs are required to monitor the 4 emission units on the three vessels proposed for this project. Since each CEMs requires its own yearly certification audit, EPA would need to perform four audits on three separate visits to Neptune.

EPA asked Neptune for information on how monitoring could be performed on these vessels. Neptune submitted to EPA a proposal for an emissions compliance monitoring program for its project. The proposal evaluated CEMS and parametric monitoring that relies on tracking critical operational parameters that affect emissions.

In summary, Neptune concluded that the technical issues involved in installing NOx CEMs on board marine vessels make CEMs impractical for this application. In place of CEMs, Neptune proposed using parametric monitoring.

Neptune's parametric monitoring proposal consisted of initial stack tests for NOx, CO and ammonia to confirm performance of the SCR system, maintaining records of operational parameters to confirm operations are normal and consistent with stack test parameters, and track fuel usage. A full description of the proposal can be found in the attached letter.

EPA also asked Gateway to submit a compliance program that addressed NOx emission from its project. Similar to Neptune, Gateway noted the difficulties of using NOx CEMs that meet EPA certification regulations under 40 CFR 60 Appendix F.

However, in an August 1, 2006 letter (attached), Gateway identified the SCR system's quality control analyzer as a likely alternative to the CEMs. Gateway noted several advantages of using the analyzer, the Siemans Ultramat 23. The analyzer will provide direct readings of the NOx concentrations similar to CEMs. In addition, Gateway

provided information showing that the analyzer can provide accurate reading using built in automatic recalibration technology, thus reducing test audits. Gateway's information indicated that the Ultramat is the only analyzer with proven marine SCR applications. A full discussion of the Ultramat 23 including performance specifications is found in the attached letter.

EPA's review of the instrumentation confirmed that its performance specifications are generally similar to the CEMs. The analyzer will provide greater compliance assurance than relying solely on Neptune's parametric monitoring plans. Gateway notes that the SCR vendor (Argillon GmbH) uses the Ultramat 23 exclusively for all its marine SCR applications. Neptune has confirmed that it is also installing an Argillon SCR system on its vessels and therefore, will have access to the Ultramat 23 instrumentation.

Considering the additional benefits of the Ultramat instrument, EPA proposes to use Neptune's parametric operational monitoring plan and the Ultramat instrument (or equivalent) to monitor Neptune's facility-wide NOx emission limit.

EPA is proposing the following monitoring provisions:

- Record the date and time of arrival and departure for each SRV at the DWP;
- Record the amount of fuel combusted each day in the boilers;
- Record the hours of operation of the power generation engines each day;
- Record the electrical output in kw from the power generation engines each day;
- Record the hours of operation from the TO each day;
- Record the occurrence and duration of any startup, shutdown or malfunction in the regasification operations; any malfunction of air pollution control equipment or any period when the Ultramat monitor (or equivalent) is inoperative;
- Record the following Ultramat information: all calibration checks and audits; 1-hour average data for NOx and O2 (converted to lb NOx/MMBtu); identification of the "F" factor used to calculate Ultramat readings to lb NOx/MMBtu; average NOx over the preceding 30 days;
- Record explanations for any calibration problems, and/or modifications to the Ultramat;

- Provide semiannual reports that contain recorded emissions information for the DWP and identify any times when emissions are above the applicable emission standard;
- Record flue gas temperature;
- Record pressure in the inlet and outlet ports of the SCR system.

In addition, Neptune will generally determine compliance with its NOx emissions limits using the procedures described in Section V. However, in the event any of the emissions or parameter monitors indicate that Neptune is not meeting the emission limits, EPA may require a reevaluation of the NOx emissions based on the best evidence of the actual emissions.

VII.B Vessel Access

As part of the monitoring plan, EPA personnel will need periodic access to the vessels to inspect all monitoring and emission control equipment and to witness any performance tests of any monitoring equipment including the Ultramat. These inspections will be at the discretion of EPA; however, EPA will work closely with the United States Coast Guard to coordinate visits to reduce, to the extent possible, any conflicts with Neptune's operations. EPA is proposing to make its authority to board the SRV's and to carry out inspections a condition of the permit.

VII.C Recordkeeping

Neptune will keep records of all operational parameters identified in its monitoring plan and emissions data recorded by the Ultramat 23. These records will be kept on a database specified by EPA, and will be retained for 5 years. Neptune will store such records in a location reasonably accessible to EPA Region 1.

VII.D Reporting

Neptune will supply EPA with all records upon request by EPA. In addition, Neptune will provide a semi-annual report of its emission calculations under its NOx facility-wide emission limits.

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VIII AIR IMPACT ANALYSIS

Massachusetts' 310 CMR 7.02 plan approval rules require applicants to determine if potential emissions from a new source would cause or contribute to a violation of a NAAQS. To meet the requirements, Neptune conducted a dispersion modeling to evaluate potential air quality impacts resulting from the proposed project. Section 6 of the Application includes the complete air impact analysis and the results from the analysis.

Neptune's air impact analysis included the following:

- An overview of the vessel emissions used in the analysis;
- A discussion of the project site characteristics including stack heights, meteorological data and background air quality;
- A description of the types of models used; and
- the results from the modeling.

In brief, the results from the air quality analysis show that the emissions from the DWP result in maximum predicted impacts below the Significant Impact Levels (SILs) for all criteria pollutants. EPA modeling regulations assume that modeled impacts below the SILs are negligible and do not significantly impact the maintenance or attainment of a NAAQS. Therefore, EPA does not require interactive NAAQS analyses.

EPA notes that Neptune has submitted to EPA supplemental information to address EPA's questions about how mixing heights were determined in the modeling completed for the Final Environmental Impact Statement for the project.

EPA has reviewed and proposes to approve all aspects of the analysis and conclusions.

IX ENDANGERED SPECIES ACT AND MARINE MAMMALS PROTECTION ACT

Pursuant to Section 7 of the Endangered Species Act (ESA), 16 U.S.C. § 1536, and its implementing regulations at 50 C.F.R. Part 402, EPA is required to ensure that any action authorized, funded, or carried out by the Agency is not likely to jeopardize the continued existence of any endangered species or threatened species, or result in the destruction or adverse modification of such species' designated critical habitat. This DWP project involves several federal agencies whose actions are subject to the ESA. The USCG and

MARAD have agreed, in a letter dated October 5, 2006 to be the lead agency for the purpose of conducting a consultation with the National Oceanic and Atmospheric Administration (NOAA) concerning the potential impacts from this project. In addition, EPA understands that Neptune has applied for a permit to address project impacts governed by the Marine Mammals Protection Act (MMPA). To the extent that air emissions from this project need to be addressed under these authorities, EPA will largely rely on the results of the USCG and MARAD consultations to address any ESA and MMPA requirements for this project.

X NATIONAL MARINE SANCTUARIES ACT

EPA has reviewed the July 3, 2006 letter from the U.S. National Oceanic and Atmospheric Administration (NOAA) presenting recommendations under section 304(d) of the National Marine Sanctuaries Act (NMSA). NOAA's letter indicates that the consultation pursuant to NMSA Section 304(d) did not result in any recommendations relevant to the air emissions from the project or the terms of any permit EPA would issue under the CAA.

XI PERMITTING DOCUMENTS

- Neptune LNG LLC Minor Source Preconstruction Air Permit Application for a Liquefied Natural Gas (LNG) Deepwater Port dated May 2006
- Emissions Compliance Monitoring Program Neptune LNG Deepwater Port submitted dated July 2006
- Ultramat 23 NDIR Gas Analyzers, One to Three IR Channels and Oxygen dated August 2004