STATEMENT OF BASIS

For

PROPOSED CLEAN AIR ACT PERMIT
NORTHEAST GATEWAY ENERGY BRIDGE 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	Northeast Gateway Energy Bridge LLC, the applicant for the deepwater port license application
Application	Minor Source Preconstruction Air Permit Application submitted by the applicant on February 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
DW	dual fuel
DPA	Deepwater Port Act
DWP	Deepwater port
EBRV	Energy Bridge Regasification Vessels
EPA	United States Environmental Protection Agency
FGD	flue gas desulfurization
FGR	flue gas recirculation
g	gram(s)
Gateway	the proposed deepwater port
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)
MHI	
mmBtu	million British thermal units
MMS	Minerals Management Service
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
NESHAP	National Emission Standards for Hazardous Air Pollutants
NH3	ammonia
Nm3	normal cubic meter
NO2	nitrogen dioxide
NOX	oxides of nitrogen
NSCR	non-selective catalytic reduction
NSPS	New Source Performance Standards
NSR	New Source Review
O_2	oxygen
O_3	ozone
OCD	Offshore and Coastal Dispersion (Model)
OCS	Outer Continental Shelf
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
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 February 21 2006, Northeast Gateway Energy Bridge, L.L.C., (The Applicant or Gateway) 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 Gateway's application submitted in June 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 Gateway'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 Gateway'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 Neptune LLC (Neptune) 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

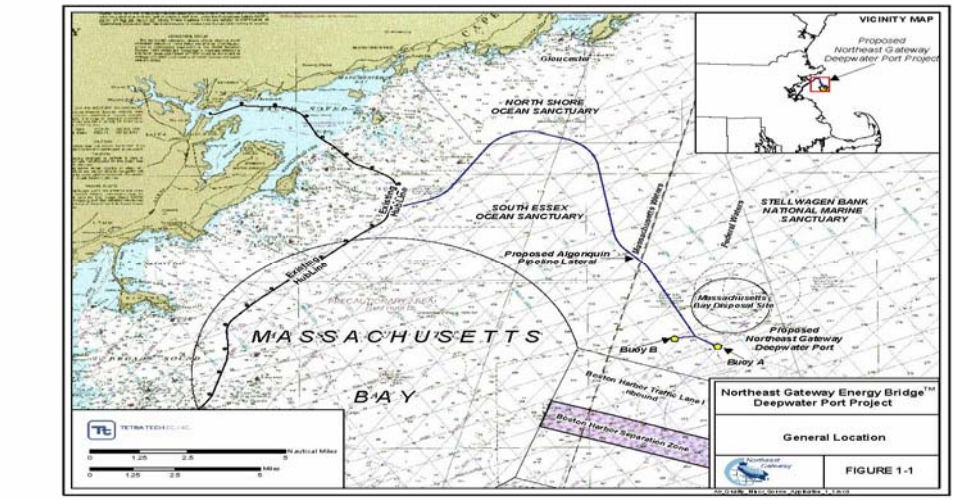
II.A Applicant

Northeast Gateway, L.L.C.
1330 Lake Robbins Drive, Suite 270
The Woodlands, TX 77380

II.B Location

Gateway is proposing to locate the DWP in Massachusetts Bay approximately 13 miles (21 kilometers) offshore in federal waters (see Figure 1).

Figure 1



II.C Permitting Authority

Gateway 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. Gateway'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, Gateway 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 Gateway 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, referred to as Plan Approvals, and other emission control strategies for the control of stationary source air pollution. EPA has determined that the Commonwealth's plan approval rules and other provisions for the control of air pollution that are incorporated into the SIP and applicable to Gateway's project are consistent with the DPA and the CAA. Therefore, Gateway will comply with these applicable state air quality control requirements.

II.D Description of Project

Gateway is proposing to construct, own, and operate the DWP to import LNG into the New England region. This facility will deliver natural gas to onshore markets via pipeline facilities owned and operated by Algonquin Gas Transmission, LLC (Algonquin). Algonquin will build and operate a pipeline lateral (Pipeline Lateral) to interconnect the Port to Algonquin's existing offshore pipeline system called the HubLine.

The proposed facility includes the following:

- two subsea Submerged Turret Loading™ (STL™) buoys, each with a flexible riser assembly and a manifold connecting the riser assembly, via a flow line, to the subsea Pipeline Lateral; and
- a fleet of specially designed Energy Bridge™ Regasification Vessels (EBRVs) to deliver LNG to the Port.

EBRVs are purpose-built LNG tankers that incorporate onboard equipment for the vaporization of LNG and delivery of high-pressure natural gas. Gateway currently operates two EBRVs (Excelsior and Excellence) at the Gulf Gateway facility located in the Gulf of Mexico and intends to operate a third EBVR (Excelerate) later this year. Each of these "first generation" vessels is capable of transporting approximately 2.9 billion cubic feet of natural gas condensed to approximately 4.9 million cubic feet (approximately 138,000 cubic meters) of LNG. The first generation EBRVs are equipped with two main boilers, each with a heat input capacity of 224 MMBtu per hour, and a 3650 kW auxiliary generator to provide energy for the regasification process. During transport, the main boilers produce steam for the steam turbines that propel the vessels through the water. While moored at the DWP, the boilers provide steam used to regasify the LNG. Gateway intends to use the auxiliary generator for backup power when one or more of the steam turbines are out of service

Gateway has ordered the first of the new second generation vessels, the Explorer, scheduled for commissioning in March 2008. The second generation vessels will have additional transport capacity of approximately 3.2 billion cubic feet of natural gas condensed to approximately 5.4 million cubic feet (approximately 151,000 cubic meters) of LNG. In addition to the two main boilers, the second generation vessels are equipped with an additional 100 MMBtu per hour auxiliary boiler to allow for an increased regasification rate. All EBRVs will retain the flexibility to discharge liquid at conventional onshore LNG receiving terminals.

The on-board regasification process will use a freshwater-based, closed-loop warming system to vaporize the LNG. As part of the vessel's normal propulsion and auxiliary systems, Gateway will use seawater for condensing the exhaust steam in the main condenser and for a variety of cooling water functions. The typical seawater demand required by the EBRVs to operate these systems, plus ballast water intake, is approximately 56 million gallons per day (mgd). This seawater demand is typical of

most LNG vessels and most large crude carriers (oil tankers over 200,000 dead weight tons [dwt]) that are currently in service today. However, while the EBRV is in regasification mode at the DWP, Gateway proposes to significantly reduce the amount of seawater by using seawater heat exchangers in the vessel seawater piping system. The seawater heat exchangers will enable the vessel to operate under the innovative closed-loop heat recovery and exchange mode during the regasification process. While operating under the closed-loop heat recovery and exchange mode, Gateway expects to reduce average daily water use while at a steady-state send-out of LNG from approximately 56 mgd to only 2.77 mgd.

The regasification system is designed to deliver approximately 400 million cubic feet per day (MMcfd) (11 million cubic meters per day) of natural gas at pipeline pressure. Gateway expects to achieve higher rates, particularly on the second generation EBRVs. To deliver a continuous base load supply of natural gas into the natural gas grid, Gateway proposes to continuously operate at least one EBRV on location to regasify and deliver LNG into the pipeline system. Gateway expects to deliver a new cargo of LNG approximately every 6 to 7 days.

When arriving at the DWP, the EBRV will retrieve one of the two permanently anchored submerged STL™ buoys. Once moored at the buoy, the EBRV will use the onboard regasification system to vaporize the LNG into its gaseous state. Gateway then transfers the natural gas at high pressure through the STL™ buoy and flexible riser into a subsea flow line that connects to the Pipeline Lateral. A fully loaded vessel will be able to discharge its cargo in about 7 days, depending on operating conditions.

All EBRVs carry an auxiliary diesel generator (3650 kilowatts) that is available when one of the turbine generators is off line for maintenance or repair. Gateway is proposing to use 0.5% sulfur diesel for the first generation EBRVs' auxiliary generator. Gateway's second generation EBRVs are designed with dual-fired engines that use boil off gas with a small percentage of diesel oil. Performance data for the boilers are included in Appendix B of the Application.

Gateway will need to modify the onshore metering facility to properly measure the delivered volumes of natural gas as described in the DWP application. Other than the connecting Pipeline Lateral and modified metering facility, the project does not require any other pipeline, storage, or related ancillary facilities to deliver the natural gas. Figure 2 illustrates the Port's dual buoy system concept.

Figure 2

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 the DWP's Nitrogen Oxides (NOx) and Carbon Monoxide (CO) facility-wide emissions to less than 49 and 99 tons, respectively, during any 12-month period. EPA is proposing to enforce the 12-month NOx and CO emission limits through the following operations restrictions:

- A fuel limit on the main boilers and auxiliary boiler for any 12-month period for any combination of main and auxiliary boilers.
- An electrical output limit on the auxiliary generators for any 12-month period for

any combination of generators plus certain fuel restrictions.

EPA is also proposing additional restrictions on several minor emission units on the EBVRs. These restriction are further discusses in Section VI and VII of the SOB.

EPA required Gateway to conduct air impact modeling to determine if emissions cause or contribute to a violation of a National Ambient Air Quality Standard (NAAQS). Gateway used maximum short term emission estimates based on two EBRVs operating their boilers and generators at maximum levels simultaneously. The models demonstrated that air impacts from Gateway's maximum emissions 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 Emissions Generating Equipment

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

- 1st and 2nd generation EBVR main boilers: Two identical Mitsubishi Heavy Industries (MHI) marine boilers, each with a maximum heat input rate of approximately 224 MMBtu/hr.
- 2nd generation EBVR auxiliary boiler: An auxiliary boiler with maximum heat input rate of approximately 100 MMBtu/hr.
- 1st generation EBRV generator: Auxiliary generator driven by a MAN/B&W 8L32/40 diesel engine, firing marine fuel oil.
- 2nd generation EBRV generator: Auxiliary generator driven by a Wärtsilä 12V32DF dual-fueled engine, fueled primarily with boil-off gas or regasified LNG (marine fuel is needed to start the dual-fueled engine—i.e., for approximately 5-10 minutes—but is less than 1% of the fuel mixture thereafter, when it is needed solely for ignition purposes).
- 1st and 2nd generation EBVR: Minor emission units including a small incinerator, small lifeboat and rescue boat engines and an inert gas generator.

The applicant for the other DWP, Neptune, included a thermal oxidizer (TO) in its vessel design. Neptune stated that the TO is a safety device that will oxidize excess BOG

during periods when Neptune has shut down its boilers while moored at the DWP. Without the TO, Neptune indicated that excess BOG that is normally burned in the boilers could build up around the vessel creating a safety concern. In conversations with EPA, Gateway represented that its vessels did not need a TO. Gateway explained that its boilers are always operating and will oxidize all BOG from the EBVRs for all possible operation scenarios.

III.B EBVR Main Boiler Operations and Emission Rates

The two identical MHI marine boilers, each with a maximum heat input rate of approximately 224 MMBtu/hr, provide steam for the EBRVs. Gateway can fire any combination of marine fuel oil, LNG boil-off gas (BOG) or regasified LNG in the main boilers while under way. BOG is natural gas that builds up in storage tanks of the EBRVs. While moored at the DWP, Gateway's main boilers are limited to firing BOG or regasified LNG.

Gateway will retrofit all 1st generation EBRVs that use the DWP with selective catalytic reduction (SCR) technology for reducing NOx emissions during regasification operations. Gateway is also proposing to design all second-generation EBRVs (and beyond) with new low-NOx "Volcano" burners in addition to SCR. Gateway believes the lower NOx emissions from the new burners will improve the performance and compliance of its 2nd generation vessels. However, since the manufacturer of the new burners is not certain of the degree of emission reductions, Gateway proposed the same NOx emission rate for the 1st and 2nd generation vessels.

As represented by Gateway, the EBRVs' SCR system will be the first installation of SCR on marine boilers. Since exhaust temperatures from the boilers are relatively low, Gateway will install the SCR systems upstream of the boilers' economizers. Gateway has selected Argillon LLC (Argillon) to provide the SCR systems for the project. Argillon has extensive experience applying the proprietary SINOx® SCR technology (developed by Siemens) to marine vessel diesel engines in Europe. For this project, Argillon provided an exhaust emissions guarantee of 15 ppmvd NOx at 3% (dry) O_2 for the EBVR's main and auxiliary boilers. This emission rate equates to approximately a 90% reduction in NOx emissions from the boilers.

During regasification activities, Gateway intends to operate the main boilers at 40% to

100% of the boiler's maximum load. The main boilers can meet the project's baseload design criteria discharge rate of 400 MMscfd at approximately 88% of maximum load (i.e., a heat input rate of approximately 197 MMBtu/hr in each of the two main boilers). Table 1 identifies the hourly emissions for the 1st and 2nd generation main boilers at 40%, 88% and 100% loads. The 2nd generation EBRV will also be equipped with an auxiliary 100 MMBtu/hr boiler—fired only with boil-off gas or regasified LNG—that will enable the vessels to regasify LNG at a higher discharge rate when such rates are required. While the auxiliary boiler is smaller than the main boilers and has lower emissions, Gateway will still control emissions with SCR. Table 2 summarizes the hourly emissions from the auxiliary boiler.

Appendix B of the Application includes specification sheets for the 1st and 2nd generation EBRVs' main and auxiliary boilers, a list of Argillon's experiences applying SINOx® SCR technology to marine diesels, and a copy of Argillon's proposal to apply SINOx® SCR technology to Gateway's main and auxiliary boilers. Appendix C of the Application provides the detailed calculations of the values shown in Table 1 and Table 2.

Table 1. Hourly Emissions from Each Main Boiler.
(All values expressed in lb/hr)

	Minimum Load (40% of maximum)	Base Load (88% of maximum)	Maximum Load (100%)
NO_x (as NO_2)	1.6	3.6	4.0
CO	3.9	8.7	9.8
VOC	0.5	1.1	1.2
PM	0.7	1.5	1.7
SO_2	0.05	0.12	0.13
Total HAP	0.17	0.37	0.41

Table 2. Hourly Emissions from Second-Generation EBRV Auxiliary Boiler.
(All values expressed in lb/hr)

	Maximum Load (100%)
NO_x (as NO_2)	1.8
CO	4.4
VOC	0.5
PM	0.7
SO_2	0.06
Total HAP	0.19

III.C Auxiliary Generators Operations and Emission Rates

The auxiliary generators are rated at 3650 kW and are driven by compression-ignition reciprocating internal combustion engines. The 1st generation EBRV auxiliary generators use a MAN/B&W 8L32/40 diesel engine that fires marine fuel oil. The 2nd generation EBRV auxiliary generators will use the Wärtsilä 12V32DF dual-fueled engine fueled primarily with BOG or regasified LNG and 1% of the fuel oil. The fuel oil will contain no more than 0.5% sulfur by weight. Gateway will separate the fuel oil used by the auxiliary generators during regasification from other fuel oil used for transoceanic travel. Table 3 summarizes the hourly emissions from the engines at 75% and 100% loads. Appendix B of the Application contains the specification sheets for each of these engines. Appendix C of the Application provides the detailed calculations of the values in Table 3.

Table 3. Hourly Emissions from Each Auxiliary Generator.
(All values expressed in lb/hr)

	1st Generation EBRV		2nd Generation EBRV	
	Base Load (75% of maximum)	**Maximum Load**	**Base Load (75% of maximum)**	**Maximum Load**
NO_x (as NO_2)	76.8	97.4	10.2	10.5
CO	21.2	26.9	13.3	15.3
VOC	8.0	10.2	5.1	6.5
PM	2.7	3.4	Negligible[a]	Negligible[a]
SO_2	15.6	19.8	0.8	1.0
Total HAP	0.09	0.12	0.09	0.11

IV REGULATORY ANALYSIS

IV.A Overview of Review

This section identifies the federal regulations that apply or that may apply to Gateway's DWP and how Gateway expects to comply with the regulation. As stated previously, the project is not located within state territorial waters. However, the Deepwater Port Act states that "[t]he 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 Gateway expects

to comply with these regulations.

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

- two subsea STL™ 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 the EBRVs while moored to the STL™ buoys.

In addition, Gateway 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 13 miles off the Massachusetts coast, 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 Gateway's application describes how the 1st and 2nd generation vessels will meet the applicable air permit requirements, Gateway has designed the mooring system to handle other and potentially larger LNG vessels that may come into service in the future. However, 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 4.

TABLE 4

National and Massachusetts Ambient Air Quality Standards

			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.

The State Implementation Plan (SIP) provides the regulatory framework for a state to follow to demonstrate it will achieve and maintain the NAAQS. The State and federal permitting programs require new sources to demonstrate that emissions do not cause or contribute to a violation of a NAAQS. Gateway's impact analysis shows that the emissions from the DWP will comply with all applicable NAAQS, MAAQS and PSD increments. The analysis also shows that maximum impacts are less than significance

impact levels (SILs) for all pollutants modeled except PM_{10}. The analysis is discussed in section IX of this SOB.

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 PM_{10} as a surrogate $PM_{2.5}$ for 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, Gateway 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. Gateway 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 Nonattainment 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, Gateway is not subject to either program. Table 5 shows the nonattainment NSR and PSD major source threshold and the proposed annual emission limits for Gateway.

Table 5. Comparison of Potential Emissions from Moored EBRVs to NSR/PSD Permit Thresholds

(All values expressed in TPY)

	PTE from moored EBRVs	NSR Major Source Threshold[a]	PSD Major Source Threshold[b]
NO_x	49	50	100
CO	99	NA (attainment area)	100
VOC	16.1	50	NA (nonattainment area)
SO_2	4.9	NA (attainment area)	100
PM_{10}	20.6	NA (attainment area)	100
$PM_{2.5}$	20.6	NA (attainment area)	100

[a]From 310 CMR 7.00, Appendix A.

[b]From 40 CFR 52.21(b)(1)(i); these thresholds apply to fossil-fuel boilers (or combinations thereof) totaling more than 250 MMBtu/hr heat input.

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.

IV.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 Gateway 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 requires 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. Gateway'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, Gateway 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.3 310 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 DWP act defines the source as those activities below the high water mark. Any construction activity on land above the high water mark is therefore not covered by this permit. Nevertheless, Gateway represents that all land-based construction lay-down areas will be

managed to prevent fugitive dust emissions.

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.4 310 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." The Applicant represents that the Port will comply with this regulation.

IV.D.5 310 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. Gateway's DWP expects to comply with actions required by the DEP in the case of an air pollution emergency.

IV.E Regulatory Review Summary

In summary, Gateway 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 limit Gateway's facility-wide NOx emissions to 49 tpy and CO emissions to 99 tpy on a 12-month rolling average. These limits will make Gateway a minor source that is not subject to the Massachusetts nonattainment NSR rules at 310

CMR 7.00-Appendix A or the federal PSD program at 40 CFR 52.21.

V FACILITY-WIDE NOX EMISSION LIMIT

This section describes EPA's proposed operational restrictions and emission rates used to limit Gateway's facility–wide NOx emission limit to below 49 tpy. Gateway'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 final permit to make the facility-wide NOx limit practically enforceable.

V.A Emissions from Boilers

Gateway is proposing a NOx emission rate for the main boilers and auxiliary boiler of 0.018 lb/MMBtu which Gateway expects to achieve using SCR. To comply with the facility-wide emission limit, Gateway will generally 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 Emissions from Auxiliary Generators

As described in Section III, Gateway's 1st generation EBVRs use diesel-fired auxiliary generator engines. The 2nd generation EBRVs use dual-fuel generator engines that are capable of firing either primarily natural gas (i.e., at least 99% gas and no more than 1% oil, after startup) or oil and produce substantially lower emissions.

Gateway is proposing a NOx limit of 12.1 g/kW-hr for the 1st generation diesel generator and 1.3 g/kW-hr for the 2nd generation dual-fueled generator. EPA is proposing to restrict the 2nd generation EBVR's auxiliary engines to firing primarily gas when moored at the DWP. In addition, EPA proposes to limit generator operation at the facility to a combined total of 370 hr/yr of operation.

For the purpose of determining compliance with the facility wide emission limit, Gateway will generally determine monthly emissions by multiplying total monthly kW output times the emission rate.

V.C Other Emission Units

In addition to the boilers and auxiliary generators mentioned above, each EBRV (first generation and second generation) includes the following minor emissions sources:

- a small incinerator used for routine disposal of trash and sludge, rated for 730,000 kcal/hr (2.9 MMBtu/hr), that would run for approximately 60 minutes each day;
- a small (620 kW) emergency generator, fueled with marine fuel oil, that is tested once per week for approximately 30 minutes but otherwise only started if power is lost;
- a lifeboat (two 29 hp engines) and rescue boat (one 144 hp engine), each of which is fueled with marine fuel oil and that needs to have its engines tested once per week for approximately 30 minutes;
- an inert gas generator, which is only used for approximately one (1) hour per month for training, maintenance or emergency operations, and would only be used at the Northeast Gateway DWP if such training and maintenance had not been done at sea; and
- ten storage tanks (including overflow, sludge, and drain tanks) for marine fuel oil and waste oil, with a combined storage volume of 8,344 m3 (approximately 1.1 million gallons); the only emissions from these tanks are those associated with volatization during tank breathing, and the volatility of the marine (residual) fuel oil is low (the EPA/API emissions model TANKS4.0 identifies a vapor pressure of approximately 0.000035 psia at the average liquid surface temperature of 55^{o}F).

Gateway calculated that the total NOx emissions from this list of emission units at 0.69 tpy. This calculation assumes the units operate within the listed operational restrictions. EPA believes that emissions are very minor provided that the units operate within the listed restrictions.

EPA proposes to include the emission units under the 49 tpy facility-wide NOx emission limit without additional analysis. In addition, EPA proposes that Gateway track operations of these units while moored at the DWP. If operations exceed the limits listed above while moored, Gateway will determine the total emissions from all minor units and subtract the total from the 49 tpy limit for that time period. Gateway acknowledges that increased operations of these units while the EBVRs are moored at the DWP could decrease total LNG operations at the DWP.

EPA notes that the Neptune permit includes provisions for Neptune to determine cold startup emission rates from its boilers and to include those emissions in a similar facility-wide NOx emission limit. Neptune noted that its boilers may need to shutdown when the gas pipeline can not accept gas and to restart once the pipeline is ready. However, Gateway has represented that its boilers will operate at all times regardless of whether the pipeline can accept gas. Unlike Neptune's boilers that are only used during regasification, Gateway's boilers always remain online to provide electrical power to the vessel and to combust any excess BOG. EPA is therefore not requiring a provision for measuring startup emissions in the permit.

VI FACILITY-WIDE CO LIMIT

This section describes EPA's proposed operational restrictions and emission rates used to limit Gateway's annual facility–wide CO emission limit to below 99 tpy. Gateway's application proposed a CO emission limit of 0.044 lb/MMBtu for the main boilers and auxiliary boiler. EPA will use this limit in the permit to make the CO annual emission limit practically enforceable.

To comply with the facility-wide emission limit, Gateway will determine monthly emissions by multiplying total heat input (i.e., fuel usage) times the emission rate. Based on a comparison of emission factors, EPA expects that NOx emissions will be the limiting factor for most operations at the DWP. However, since the annual CO emission rate is near the PSD major source threshold level of 100 tpy, EPA proposes to require Gateway to monitor CO emissions and to calculate total CO emissions based on the boilers' emission rate and fuel usage.

VII ANNUAL EMISSIONS FOR OTHER CRITERIA POLLUTANTS AND HAPS

Gateway evaluated the annual emissions of all criteria pollutants and HAPs based on the operational restriction required to maintain emissions below the facility-wide NOx and CO 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 and CO 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).

VIII EMISSIONS COMPLIANCE

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

VIII.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, EPA is proposing facility-wide NOx and CO annual emission limits so the nonattainment NSR and PSD programs will not apply to the DWP. As such, EPA needs reliable emissions data to ensure that Gateway is complying with its emission rates at all times.

Upon request from Region 1, Gateway submitted a proposal for a compliance monitoring program for its project. The proposal raised several concerns regarding installation of CEMs instrumentation on the EBVRs. Gateway noted that federal performance standards at 40 CFR, Appendix F require quarterly quality assurance test audits and yearly annual relative accuracy test audits (RATA) for each CEM to ensure recorded emissions data is accurate. These audits pose significant logistic issues for a project located several miles off the coast of Massachusetts. Gateway would need to schedule and transport stack testing personnel and their equipment to the vessels. Transport could be delayed or cancelled due to bad weather resulting in missed audits. In addition, the EBVR's do not have the space required to accommodate the air-conditioned trailers that hold the test equipment.

As an alternative to CEMs, Gateway proposed using the SCR system's quality control analyzer to monitor NOx and CO emissions. Gateway noted several advantages of using the analyzer, the Siemans Ultramat 23. Based on information from the manufacturer, the Ultramat 23 will provide accurate measurements of NOx and CO concentration levels similar to CEMs. Unlike the CEMs, the Ultramat 23 includes built-in automatic recalibration capabilities that reduce the need for calibration audits. The manufacturer also has extensive experience applying Ultramat 23 to marine vessels. EPA's review of the manufacturer's information confirmed that the Ultramat has performance

specifications generally similar to the CEMs. The manufacturer's specification sheet of the Ultramat 23 is part of the permit record.

Considering the unique challenges to installing and operating a CEMs system on Gateway, EPA concludes that the Ultramat 23 (or equivalent) analyzer is acceptable to demonstrate compliance with the NOx and CO emission limits.

EPA proposes the following compliance requirements:

- Record the date and time of arrival and departure for each EBVR at the DWP;
- Record the amount of fuel combusted each day in the boilers while operating in the regasification mode;
- Record the hours of operation of the auxiliary generators each day;
- Record the electrical output in kw from the auxiliary generators each day;
- Record the hours of operation of the emission units listed in section V.C 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 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 proceeding 30 days;
- Record explanations for any calibration problems, and/or modifications to the Ultramat;
- Provide semiannual reports that contain recorded emissions information while in regasification mode 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, Gateway will generally determine compliance with its NOx and CO emissions limits using the procedures described in Section V and VI. However, in the event any of the emissions or parameter monitors indicate that Gateway is not meeting

the emission limits, EPA may require a reevaluation of the NOx and CO emissions based on the best evidence of the actual emissions.

VIII.B Vessel Access

As part of the monitoring plan, EPA personnel will need periodic access to the vessel 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 U.S. Coast Guard to coordinate visits to reduce, to the extent possible, any conflicts with Gateway's operations. EPA is proposing to make its authority to board the EBVRs and to carry out inspections a condition of the permit.

VIII.C Recordkeeping

Gateway 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. Gateway will store such records in a location reasonably accessible to EPA Region 1.

VIII.D Reporting

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

IX AIR IMPACT ANALYSIS

As required by the Massachusetts 310 CMR 7.02 plan approval rules, Gateway is required to conduct dispersion modeling to evaluate potential air quality impacts resulting from the proposed project. The proposed location of the DWP is an unclassified area for SO2, CO, NOx, and $PM_{10;}$ however, EPA is treating this area as attainment for these pollutants.

Section 6 of the Application presents the complete air impact analysis and the results from the analysis including:

1 An overview of the vessel emissions used in the analysis;

2 A discussion of the project site characteristics including stack heights, meteorological data and background air quality;

3 A description of the types of models used; and

4 the results from the modeling.

In brief, the results from the air quality analysis show that the emissions from the DWP would result in maximum predicted impacts below the Significant Impact Levels (SILs) for all criteria pollutants except for PM_{10}. For all pollutants except $PM_{10,}$ 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. For PM_{10}, additional analysis from Gateway showed that the predicted impacts would pose no threat to the PM_{10} NAAQS.

EPA notes that Gateway 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.

X 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 Gateway 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.

XI 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.

XII PERMITTING DOCUMENTS

- Northeast Gateway Energy Bridge, L.L.C: Minor Source Air Permit Application Northeast Gateway Deepwater Port dated February 2006
- Letter Entitled, "Air Quality Monitoring, Recordkeeping, and Reporting – Northeast Gateway Energy Bridge, LLC" dated August 1, 2006
- Ultramat 23 NDIR Gas Analyzers, One to Three IR Channels and Oxygen dated August 2004