AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Clean Water Act as amended, 33 U.S.C. §§ 1251 et seq., the "CWA,"

Northeast Gateway Energy Bridge, LP
1450 Lake Robbins Drive, Suite 200
The Woodlands, TX 77380

is authorized to discharge from a facility located at

Northeast Gateway Energy Bridge
Massachusetts Bay

to receiving waters named

Massachusetts Bay

In accordance with effluent limitations, other limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on the date of signature.

This permit and the authorization to discharge shall expire at midnight five (5) years from the last day of the calendar month preceding the date of signature.

The authorization to discharge contained in this permit shall be effective only during time periods when a National Oceanic and Atmospheric Administration Incidental Take Statement is in effect that exempts the U.S. Environmental Protection Agency from the take prohibitions of the Endangered Species Act for the Northeast Gateway Energy Bridge Project.

This permit consists of 10 pages in Part I including effluent limitations, other limitations, monitoring requirements, etc., 25 pages in Part II including Standard Conditions and Definitions, 3 pages in Attachment A, Biological and Thermal Monitoring Study Requirements, and 1 page in Attachment B, Monthly Natural Gas Sales Reporting Form.

Signed this 23rd day of December, 2014

/S/SIGNATURE ON FILE
Ken Moraff, Director
Office of Ecosystem Protection
Environmental Protection Agency
Boston, MA

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning on the effective date of the permit and lasting through expiration, the permittee is authorized to discharge from a regasification vessel moored at the deepwater port through **outfall serial numbers 001A and 001B: Main Condenser Cooling Water**.[1] Discharges shall be limited and monitored by the permittee as specified below:

OUTFALL 001A- Buoy A (Latitude 42° 23' 38.46" Longitude 70° 35' 31.02")
OUTFALL 001B- Buoy B (Latitude 42° 23' 56.40" Longitude 70° 37' 0.36")

Parameter (units)	Discharge Limitations				Monitoring Requirements	
	Annual Total	Monthly Average	Maximum Daily	Maximum Hourly	Measurement Frequency	Sample Type
Total Discharge Time (hours)[2,3] (Dec 1 to Feb 28)	2,160	----	----	----	Continuous	Estimate
Total Discharge Time (hours)[2,3] (Mar 1 to Nov 30)	528	----	----	----	Continuous	Estimate
Flow rate (MGH)[4]	----	Report	----	1.96	Continuous	Estimate
Temperature Rise, ΔT (°C)[5]	----	Report	12	----	Hourly	Calculation

1 The permittee shall operate the heat recovery system (HRS) during any period when the nominal delivery send-out rate is 200 million standard cubic feet per day (mmcsfd) or more.

2 Total Discharge Time equals the sum of the total discharge time from outfalls 001A and 001B.

3 Total Discharge Time between December 1 and February 28 shall be limited to 2,160 hours. Total Discharge Time between March 1 and November 30 shall be limited to 528 hours. Annual total will be based on the calendar year and year-to-date totals for each outfall shall be reported on monthly discharge monitoring reports.

4 Flow rate is the flow from each outfall (001A and 001B). The maximum hourly flow rate is based on a maximum flow rate of 32,700 gallons per minute (gpm) (1.96 million gallons per hour (MGH)). The hourly flow rate shall be calculated based upon the pump curve values.

5 The maximum rise in temperature (ΔT) shall be calculated as an hourly average, based on the hourly average intake temperature and the hourly average discharge temperature measured during the same hour. Intake and discharge temperatures shall be continuously measured and recorded by instruments or computers (thermistors) which record a minimum of 12 times per hour. The intake temperature shall be monitored at the sea chests of each vessel that is operating.

2. During the period beginning on the effective date of the permit and lasting through expiration, the permittee is authorized to discharge from a regasification vessel moored at the deepwater port through **outfall serial numbers 002A and 002B: Auxiliary Seawater Service Cooling**.[1] Discharges shall be limited and monitored by the permittee as specified below:

OUTFALL 002A- Buoy A (Latitude 42° 23' 38.46" Longitude 70° 35' 31.02")

OUTFALL 002B- Buoy B (Latitude 42° 23' 56.40" Longitude 70° 37' 0.36")

Parameter (units)	Discharge Limitations				Monitoring Requirements	
	Annual Total	Monthly Average	Maximum Daily	Maximum Hourly	Measurement Frequency	Sample Type
Discharge Time (hours)[2,3] (Dec 1 to Feb 28)	2,160	Report	----	----	Continuous	Estimate
Total Discharge Time (hours)[2,3] (Mar 1 to Nov 30)	528	----	----	----	Continuous	Estimate[3]
Flow rate (MGH)[4]	----	Report	----	0.25	Continuous	Estimate
Temperature Rise, ΔT, (°C)[5]	----	Report	5.5	----	Hourly	Calculation

1 The permittee shall operate the heat recovery system (HRS) during any period when the nominal delivery send-out rate is 200 million standard cubic feet per day (mmcsfd) or more.

2 Total Discharge Time equals the sum of the total discharge time from outfalls 002A and 002B.

3 Total Discharge Time between December 1 and February 28 shall be limited to 2,160 hours. Total Discharge Time between March 1 and November 30 shall be limited to 528 hours. Annual total will be based on the calendar year and year-to-date totals for each outfall shall be reported on monthly discharge monitoring reports.

4 Flow rate is the flow from each outfall (002A and 002B). The hourly flow rate is based on a maximum flow rate of 4,200 gallons per minute (gpm) (0.25 million gallons per hour (MGH)). The flow rate shall be calculated based upon the pump curve values.

5 The maximum rise in temperature (ΔT) shall be calculated as an hourly average, based on the hourly average intake temperature and the hourly average discharge temperature measured during the same hour. Intake and discharge temperatures shall be continuously measured and recorded by instruments or computers (thermistors) which record a minimum of 12 times per hour. The intake temperature shall be monitored at the sea chests of each vessel that is operating.

3. During the period beginning on the effective date of the permit and lasting through expiration, the permittee is authorized to discharge from a regasification vessel moored at the deepwater port through outfall **serial numbers 003A and 003B: Water Curtain**. Discharges shall be limited and monitored by the permittee as specified below:

OUTFALL 003A- Buoy A (Latitude 42° 23' 38.46" Longitude 70° 35' 31.02")
OUTFALL 003B- Buoy B (Latitude 42° 23' 56.40" Longitude 70° 37' 0.36")

	Discharge Limitations			Monitoring Requirements	
Effluent Characteristic (units)	**Annual Total**	**Monthly Average**	**Maximum Daily**	**Measurement Frequency**	**Sample Type**
Total Discharge Time (hours)[1]	8,496	Report	----	Continuous	Estimate
Flow rate (MGD)[2]	----	----	0.6	Continuous	Estimate

[1] Total Discharge Time equals the sum of the discharge time from outfalls 003A and 003B. Annual total will be based on the calendar year. Report year-to-date totals for each outfall on monthly discharge monitoring reports.

2 Flow rate is the flow from each outfall (003A and 003B) based on a maximum flow rate of 400 gallons per minute (gpm) (0.025 million gallons per hour (MGH)). The daily flow rate shall be calculated based upon the pump curve values.

4. During the period beginning on the effective date of the permit and lasting through expiration, the permittee is authorized to discharge from a regasification vessel moored at the deepwater port through outfall **serial numbers 004A and 004B: Freshwater Generator Reject**. Discharges shall be limited and monitored by the permittee as specified below:

OUTFALL 004A- Buoy A (Latitude 42° 23' 38.46" Longitude 70° 35' 31.02")
OUTFALL 004B- Buoy B (Latitude 42° 23' 56.40" Longitude 70° 37' 0.36")

	Discharge Limitations			Monitoring Requirements	
Effluent Characteristic (units)	**Annual Total**	**Monthly Average**	**Maximum Daily**	**Measurement Frequency**	**Sample Type**
Total Discharge Time (hours)[1]	8,496	Report	----	Continuous	Estimate
Flow rate (MGD)[2]	----	----	0.27	Continuous	Estimate

[1] Total Discharge Time equals the sum of the discharge time from outfalls 004A and 004B. Annual total will be based on the calendar year. Report year-to-date totals for each outfall on monthly discharge monitoring reports.

2 Flow rate is the flow from each outfall (004A and 004B) based on a maximum flow rate of 188 gallons per minute (gpm) (0.011 million gallons per hour (MGH)). The daily flow rate shall be calculated based upon the pump curve values.

Part I.A (continued)

5. In addition to any other grounds specified herein, this permit shall be modified or revoked at any time if, on the basis of any new data, the Director determines that continued discharges may cause unreasonable degradation of the marine environment.
6. The permittee shall report the total number of days of natural gas sales for each month as well as the average monthly and maximum daily send-out rate (million standard cubic foot per day) achieved during delivery of natural gas. The permittee shall also report the total number of hours operating in the heat recovery system (HRS) mode for each outfall. Reported values shall be included as an attachment each month's discharge monitoring report as specified in Part I.D.3. A monthly natural gas sales reporting form is included as Attachment B to the permit.
7. The discharge shall not cause objectionable discoloration of the receiving waters.
8. The effluent shall not contain visible oil sheen, foam, or floating solids at any time.
9. The discharge shall not contain materials in concentrations or combinations which are hazardous or toxic to human health or the aquatic life of the receiving waters.
10. The permittee shall identify potential sources of pollution that may reasonably be expected to affect the quality of the curtain water discharges, and ensure implementation of best management practices (BMPs) which will be used to eliminate or minimize any exposure of the curtain water to pollutants. BMPs must include good housekeeping measures, preventative maintenance programs, spill prevention and response procedures, and runoff management practices. All BMPs shall be properly maintained and be in effective operating condition.
11. All existing manufacturing, commercial, mining, and silvicultural dischargers must notify the Director as soon as they know or have reason to believe:
    a. That any activity has occurred or will occur which would result in the discharge, on a routine basis, of any toxic pollutant as defined at 40 C.F.R. §122.2 which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:"
        i. One hundred micrograms per liter (100 µg/L);
        ii. Two hundred micrograms per liter (200 µg/L)for acrolein and acrylonitrite; five hundred micrograms per liter (500 µg/l) for 2,4-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;
        iii. Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 C.F.R. §122.21(g)(7); or
        iv. Any other notification level established by the Director in accordance with 40 C.F.R. §122.44(f)
    b. That any activity has occurred or will occur which would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant as defined at 40 C.F.R. §122.2 which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:"
        i. Five hundred micrograms per liter (500 µg/L);
        ii. One milligram per liter (1 mg/L) for antimony;
        iii. Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 C.F.R. §122.21(g)(7).

iv. Any other notification level established by the Director in accordance with 40 C.F.R. §122.44(f).

c. That they have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the permit application.

12. The discharge shall comply with any applicable regulations promulgated by the Secretary of the department in which the Coast Guard is operating, that establish specifications for safe transportation, handling, carriage, and storage of pollutants and which are then in effect.

B. COOLING WATER INTAKE REQUIREMENTS

1. Regasification vessels that use the Northeast Gateway Energy Bridge deepwater port shall be constructed, maintained and operated to ensure compliance with the following cooling water intake structure (CWIS) location, design, construction and capacity criteria:

   a. CWISs (including the structure and associated intake pumps) maintain a controlled intake velocity no greater than 0.5 feet per second,

   b. CWISs maintain screen openings no greater than 0.83 inches,

   c. Energy Bridge Regasification Vessels shall only use closed loop shell-and-tube vaporization technology to regasify LNG,

   d. The Heat Recovery System (HRS) shall be engaged whenever the nominal gas delivery send-out rate is 200 million standard cubic feet per day (mmscfd) or more, and

   e. The total duration of cooling water intake from March 1 through November 30 shall be limited to 528 hours.

2. No regasification vessel that utilizes the Northeast Gateway Energy Bridge deepwater port may vary from the criteria specified in paragraph I.B.1 above unless the permittee first applies for and obtains a permit modification under 40 C.F.R. §122.62.

C. BIOLOGICAL AND THERMAL MONITORING REQUIREMENTS

1. Ichthyoplankton Monitoring

   The permittee must conduct ichthyoplankton monitoring in accordance with requirements in the monitoring program specified in Attachment A to this permit. Ichythoplankton monitoring must be conducted two (2) times per month in December, January, and February, and one (1) time per month from March through November. Sampling must begin during the calendar month of the effective date of the permit and continue for five years. Following a request by the permittee, authorization to discontinue or modify portions of the ichthyoplankton monitoring program may be granted by the Regional Administrator.

2. Thermal Monitoring

The permittee must monitor its thermal discharges in accordance with requirements in the monitoring program specified in Attachment A to this permit. Thermal monitoring must be conducted whenever a vessel is at the port, but no more than two (2) times per month in December, January, and February, and one (1) time per month from March through November. If no vessel visits the port during a calendar month the permittee will report "no discharge" on the discharge monitoring report for that month and no thermal monitoring is required. Sampling must begin during the first visit following the effective date of the permit and continue for five years. Following a request by the permittee, authorization to discontinue or modify portions of the thermal monitoring program may be granted by the Regional Administrator.

If, during thermal monitoring, measured temperatures at the 100 meter sampling location exceed ambient temperatures, the permittee must measure water temperatures every 10 meters from the 100 meter sampling location until the measured temperature in the plume is within 0.15°C of the ambient temperature. The permittee must record and report this final distance.

3. The permittee shall submit an annual report detailing the results of this monitoring effort no later than March 1 of the following year. This report shall also state the following information for the year: total number of hours during which both outfall 001A and 001B discharged simultaneously; a summary of potential sources of pollution identified and BMPs implemented pursuant to paragraph I.A.10; a narrative description of any malfunctions, operator or equipment failures, or unusual events, including natural events, that occurred during the year; for any such malfunction, failure, or unusual event, a detailed description of any discharges to waters of the United States that may have occurred as a result of such event; and a description of how, if at all, the facility's operations (including number and duration of Port visits) differed from the plans stated in the NPDES permit application, and if so, why. The permittee must submit copies of this report as provided in I.D.3. In addition, electronic copies of this report must be submitted to the following individuals:

Danielle Gaito, Environmental Protection Agency
gaito.danielle@epa.gov

Christopher Boelke, National Marine Fisheries Service
christopher.boelke@noaa.gov

Leila Hatch, Stellwagen Bank National Marine Sanctuary Office
leila.hatch@noaa.gov

D. MONITORING AND REPORTING

Unless otherwise specified in this permit, the permittee shall submit reports, requests, and information and provide notices in the manner described in this section.

1. The permittee shall notify EPA at least 48 hours prior to any regasification vessel's arrival at the Northeast Gateway Energy Bridge Deepwater Port, by calling George Harding, EPA (617-918-1870), or another person designated by EPA. The permittee shall provide transportation for inspectors by appointment, as requested by EPA, from a coastal port location to, and from, the regasification vessel.

2. Submittal of DMRs and the Use of NetDMR

   Beginning the effective date of the permit the permittee must submit its monthly monitoring data in discharge monitoring reports (DMRs) to EPA no later than the 15th day of the month following the completed reporting period. For a period of six months from the effective date of the permit, the permittee may submit its monthly monitoring data in DMRs to EPA either in hard copy form, as described in Part I.C.5, or in DMRs electronically submitted using NetDMR.

   NetDMR is a web-based tool that allows permittees to electronically submit DMRs and other required reports via a secure internet connection. NetDMR is accessed from: http://www.epa.gov/netdmr. Beginning no later than six months after the effective date of the permit, the permittee shall begin reporting monthly monitoring data using NetDMR, unless, in accordance with Part I.C.7, the facility is able to demonstrate a reasonable basis, such as technical or administrative infeasibility, that precludes the use of NetDMR for submitting DMRs. The permittee must continue to use the NetDMR after the permittee begins to do so. When a permittee begins submitting reports using NetDMR, it will no longer be required to submit hard copies of DMRs to EPA.

3. Submittal of Reports as NetDMR Attachments

   After the permittee begins submitting DMR reports to EPA electronically using NetDMR, the permittee shall electronically submit all reports to EPA as NetDMR attachments rather than as hard copies, unless otherwise specified in this permit. Because the due dates for reports described in this permit may not coincide with the due date for submitting DMRs (which is no later than the 15th day of the month), a report submitted electronically as a NetDMR attachment shall be considered timely if it is electronically submitted to EPA using NetDMR with the next DMR due following the particular report due date specified in this permit.

4. Submittal of Requests and Reports to EPA/OEP

   The following requests, reports, and information described in this permit shall be submitted to the EPA/OEP NPDES Applications Coordinator in the EPA Office Ecosystem

Protection (OEP).

- Transfer of Permit notice
- Request for changes in sampling location
- Request for reduction in testing frequency
- Change in location, design or capacity of cooling water intake structure
- Notification of proposal to add or replace chemicals and bio-remedial agents including microbes

These reports, information, and requests shall be submitted to EPA/OEP electronically at R1NPDES.Notices.OEP@epa.gov or by hard copy mail to the following address:

U.S. Environmental Protection Agency
Office of Ecosystem Protection
EPA/OEP NPDES Applications Coordinator
5 Post Office Square - Suite 100 (OEP06-03)
Boston, MA 02109-3912

5. Submittal of Reports in Hard Copy Form

The following notifications and reports shall be submitted as hard copy with a cover letter describing the submission. These reports shall be signed and dated originals submitted to EPA.

- Written notifications required under Part II
- Reports and DMRs submitted prior to the use of NetDMR

This information shall be submitted to EPA/OES at the following address:

U.S. Environmental Protection Agency
Office or Environmental Stewardship (OES)
Water Technical Unit
5 Post Office Square, Suite 100 (OES04-4)
Boston, MA 02109-3912

6. Submittal of NetDMR Opt-Out Requests

NetDMR opt-out requests must be submitted in writing to EPA for written approval at least sixty (60) days prior to the date a facility would be required under this permit to begin using NetDMR. This demonstration shall be valid for twelve (12) months from the date of EPA approval and shall thereupon expire. At such time, DMRs and reports shall be submitted electronically to EPA unless the permittee submits a renewed opt-out request and such request is approved by EPA. All opt-out requests should be sent to the following addresses:

Attn: NetDMR Coordinator
U.S. Environmental Protection Agency,
Water Technical Unit
5 Post Office Square, Suite 100 (OES04-4)
Boston, MA 02109-3912

7. Verbal Reports and Verbal Notifications

Any verbal reports or verbal notifications, if required in Parts I and/or II of this permit, shall be made to EPA. This includes verbal reports and notifications which require reporting within 24 hours. (As examples, see Part II.B.4.c. (2), Part II.B.5.c. (3), and Part II.D.1.e.) Verbal reports and verbal notifications shall be made to EPA's Office of Environmental Stewardship at:

U.S. Environmental Protection Agency
Office of Environmental Stewardship
5 Post Office Square, Suite 100 (OES04-4)
Boston, MA 02109-3912
617-918-1510

ATTACHMENT A
BIOLOGICAL AND THERMAL MONITORING STUDY REQUIREMENTS

1.0 ICHTHYOPLANKTON MONITORING STUDY DESIGN

Ichthyoplankton monitoring will be conducted as specified in Part I.C.1 of the permit with the primary purpose of documenting the extent of impacts from entrainment due to water usage at the port.

1.1 Study Location

One general survey area was used to represent the two buoy sites during preconstruction sampling and the same area will be used during operational monitoring. The sampling location was defined as a polygon encompassing the three alternative buoy locations analyzed during the licensing process. The polygon extends 0.5 nmi east and south of Buoy A and 0.5 nmi north and west of buoy C. Coordinates for the corners of the polygon are:

Corner	Longitude	Latitude
1 NW	70.6453°	42.4154°
2 SW	70.6457°	42.3872°
3 SE	70.5823°	42.3867°
4 NE	70.5819°	42.4149°

1.2 Field Methods

Sampling will be conducted twice monthly during the months of January, February, and December, and once per month from March through November. Sampling will include two depth regimes: the depth zone (approximately 20-40 feet) where the intakes are located and the full water column (within about 15 feet of the bottom). The collection gear will be towed in an oblique manner through the depth zone. Three pseudo-replicate (sequential) samples will be taken in each depth zone (i.e., intake and full water column), each with a target volume of 300 m^3. Sampling will be conducted during daylight hours as well as at night. Night is defined as the period from 2+ hours after sunset to 2+ hours before sunrise. Daylight is defined as 2+ hours after sunrise to 2+ hours before sunset.

Collection gear will be a 1.0 m^2 Tucker trawl, or a similar plankton net that can be opened or closed at depth, equipped with a 0.330 mm mesh net and a calibrated flowmeter. The net will be lowered to the target depth in a closed position and then opened with a messenger activating a double trip release mechanism (DTRM). At the end of the approximate 10- minute tow a second messenger will be sent down the wire to close the net. Pre- and post-deployment flowmeter readings will be recorded. The nets will be washed down using filtered seawater and the contents preserved in 5 to 10 percent buffered formalin. Preserved samples will be transported to the Biological Laboratory for analysis.

1.3 Laboratory Methods

In the laboratory, all eggs and larvae will be identified to the lowest practical taxon. Subsampling will be allowed so that a minimum of 200 eggs and 100 larvae are identified. For eggs it may be necessary to group some taxa due to similarities in morphology and spawning season. Larvae are typically identified to the species level. For species that have clearly defined larval life stages (e.g., yolk sac, post-yolk sac, etc.), individuals will be assigned to the appropriate life stage. During the initial permitting process, 12 species of commercial or ecological importance (Table 1) were identified for impact assessment using Equivalent Adult Loss modeling techniques. Laboratory analysis will include length measurement to the

nearest 0.5 mm will be made for these species, and any other abundant species, because length is a necessary parameter for estimating mortality rates for larvae. In addition, if lobster larvae are present in the samples, they will be enumerated by life stage.

Table 1. Fish species for which the Port area has been designated Essential Fish Habitat for larvae.

Common Name	Scientific Name
Atlantic cod	*Gadus morhua*
Atlantic herring	*Clupea harengus*
Atlantic mackerel	*Scomer scombrus*
Butterfish	*Peprilus triacanthus*
Cunner	*Tautogolabrus adspersus*
Haddock	*Melanogrammus aeglefinus*
Hake	*Urophycis spp.*
Pollock	*Pollachius virens*
Sand lance	*Ammodytes spp.*
Silver hake	*Merlucccius bilinearis*
Winter flounder	*Pseudopleuronectes americanus*
Yellowtail flounder	*Limanda ferruginea*

Laboratory methods will employ a quality control program in which 10% of each sorter's samples (randomly selected out of batches of 10 samples) are reexamined by a qualified supervisor to ensure a minimum of 95% of the ichthyoplankton individuals have been removed. Sorting efficiency (%) will be calculated as:

$$\frac{\text{QC count} - \text{original count}}{\text{QC count}} \times 100$$

In addition, a randomly selected 10% of each taxonomist's samples will be reanalyzed by a senior taxonomist to ensure a minimum taxonomic efficiency of 95%. Accuracy is calculated by species and lifestage as:

$$\frac{\text{QC count} - \text{original count}}{\text{QC count}} \times 100$$

1.4 Entrainment Analysis

Monthly mean abundances will be used to calculate the number of individuals (by species, life stage, and size class) that are vulnerable to entrainment by multiplying abundance by 1) maximum permitted intake volume, and 2) actual intake volume. Study parameters therefore include time of year and abundance by species of all identifiable finfish and lobster eggs and larvae. Densities of ichthyoplankton in the Port (no./1000 m^3) will be multiplied by estimated volume of water withdrawn (m^3) to estimate the number of ichthyoplankton entrained at the EBRVs. The analysis will include a discussion of the variability in sampling depths, time of day and time of year of the sampling events and the potential effects of these variables on entrainment losses estimated for American sand lance and Atlantic cod. Sampling data, including the results of the genetic identification (below), shall be made available to EPA and/or the Stellwagen Bank National Marine Sanctuary office upon request.

For the EFH species identified in Table 1 and American lobster, entrainment losses will be converted to Age-1 Equivalent Adult losses. The term Equivalent Adults reflects the number of fish that would survive to adulthood (at a defined age) assuming natural mortality rates. Length measurements obtained during sample analysis will be used to develop regressions of density versus length with the slope of this line representing the mortality rate. If the site-specific samples do not provide sufficient data to estimate mortality rates for each species, values will be derived from the literature.

In addition to Equivalent Adult losses, entrainment losses for Atlantic cod will be evaluated using Fecundity Hindcasting. Fecundity Hindcasting provides an estimate of the number of adult females required to produce the equivalent number of organisms lost to entrainment (*i.e.*, "equivalent spawners").

The permittee will include a sensitivity analysis for Equivalent Adults estimates for Atlantic cod and American sand lance and for Fecundity Hindcasting estimates for Atlantic cod, to systematically investigate how the models are affected by variability in model inputs. The analysis will consider how varying a particular input parameter will affect the output of the model (*e.g.*, number of adult equivalent or equivalent spawners). The analysis will include an evaluation of the age composition of samples (*i.e.*, relative abundance of each life stage within the sample), life stage duration, lifetime fecundity, and natural mortality rates.

Genetic Identification of Atlantic Cod (*Gadus morhua*)

A random sample of a maximum of 100 eggs positively identified as Atlantic cod will be genetically identified using DNA sequencing (*e.g.*, BarCode of Life). In addition, a random sample of a maximum of 500 eggs collected during each sampling event and identified as Atlantic cod/haddock and Atlantic cod/haddock/witch flounder will be genetically identified using DNA sequencing (*e.g.*, BarCode of Life). The estimate of total entrainment of Atlantic cod will be adjusted based on the percentage of eggs in the random samples positively identified as Atlantic cod.

2.0 THERMAL MONITORING STUDY DESIGN

Water quality monitoring will be conducted as specified in Part I.C.2 of the permit with the primary purpose of documenting the extent of the thermal plume. Additional parameters that will be measured are salinity, dissolved oxygen, and current direction.

2.1 Field Methods

At a distance of up to 3000 feet (1000 meters) from an EBRV in the first or last day of operation (highest discharge volume), average current direction of the uppermost 30 feet (10 meters) of the water column will be measured using an Acoustic Doppler Current Profiler (ADCP). This information will be used to determine the orientation of the sampling transect. The sampling vessel will maneuver as close to the EBRV's discharge as possible. Operating along a downcurrent transect, the field crew will collect temperature, salinity, and dissolved oxygen profiles at 30 foot (10 meter) intervals. The length of the transect will be a minimum of 300 feet (100 meters) and extend until two adjacent sampling points have surface temperatures within 0.15°C of each other. At each sampling location, measurements will be made at 3-foot (1-meter) intervals using appropriate probes along a vertical profile through the uppermost 30 feet (10 meters) of the water column.

2.2 Data Analysis

Geo-referenced data from the quarterly water column sampling will be plotted to document the two-dimensional behavior of the discharge plume.

ATTACHMENT B
MONTHLY NATURAL GAS SALES REPORTING FORM

Parameter	Monthly Total	Maximum Daily	Annual Total
Natural Gas Sales (days)	Report	----	Report
Nominal Delivery Send-out Rate (mmscfd)	Report Average Monthly	Report	----
Operation in HRS mode (days)	Report	----	Report

In compliance with Part I.A.5 of the permit, the permittee shall report the above values for each month. Report shall be attached to the monthly discharge monitoring report as provided in Part I.D.3 of the permit.

NPDES PART II STANDARD CONDITIONS
(January, 2007)

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PART II. A. GENERAL REQUIREMENTS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

a. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirements.

b. The CWA provides that any person who violates Section 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any of such sections in a permit issued under Section 402, or any requirement imposed in a pretreatment program approved under Section 402 (a)(3) or 402 (b)(8) of the CWA is subject to a civil penalty not to exceed $25,000 per day for each violation. Any person who negligently violates such requirements is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than 1 year, or both. Any person who knowingly violates such requirements is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than 3 years, or both.

c. Any person may be assessed an administrative penalty by the Administrator for violating Section 301, 302, 306, 307, 308, 318, or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

Note: See 40 CFR §122.41(a)(2) for complete “Duty to Comply” regulations.

2. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or notifications of planned changes or anticipated noncompliance does not stay any permit condition.

3. Duty to Provide Information

The permittee shall furnish to the Regional Administrator, within a reasonable time, any information which the Regional Administrator may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Regional Administrator, upon request, copies of records required to be kept by this permit.

4. Reopener Clause

The Regional Administrator reserves the right to make appropriate revisions to this permit in order to establish any appropriate effluent limitations, schedules of compliance, or other provisions which may be authorized under the CWA in order to bring all discharges into compliance with the CWA.

For any permit issued to a treatment works treating domestic sewage (including "sludge-only facilities"), the Regional Administrator or Director shall include a reopener clause to incorporate any applicable standard for sewage sludge use or disposal promulgated under Section 405 (d) of the CWA. The Regional Administrator or Director may promptly modify or revoke and reissue any permit containing the reopener clause required by this paragraph if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or contains a pollutant or practice not limited in the permit.

Federal regulations pertaining to permit modification, revocation and reissuance, and termination are found at 40 CFR §122.62, 122.63, 122.64, and 124.5.

5. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from responsibilities, liabilities or penalties to which the permittee is or may be subject under Section 311 of the CWA, or Section 106 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA).

6. Property Rights

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges.

7. Confidentiality of Information

a. In accordance with 40 CFR Part 2, any information submitted to EPA pursuant to these regulations may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the application form or instructions or, in the case of other submissions, by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR Part 2 (Public Information).

b. Claims of confidentiality for the following information will be denied:

(1) The name and address of any permit applicant or permittee;
(2) Permit applications, permits, and effluent data as defined in 40 CFR §2.302(a)(2).

c. Information required by NPDES application forms provided by the Regional Administrator under 40 CFR §122.21 may not be claimed confidential. This includes information submitted on the forms themselves and any attachments used to supply information required by the forms.

8. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after its expiration date, the permittee must apply for and obtain a new permit. The permittee shall submit a new application at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Regional Administrator. (The Regional Administrator shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)

9. State Authorities

Nothing in Part 122, 123, or 124 precludes more stringent State regulation of any activity covered by these regulations, whether or not under an approved State program.

10. Other Laws

The issuance of a permit does not authorize any injury to persons or property or invasion of other private rights, nor does it relieve the permittee of its obligation to comply with any other applicable Federal, State, or local laws and regulations.

PART II. B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit and with the requirements of storm water pollution prevention plans. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of the permit.

2. Need to Halt or Reduce Not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

4. Bypass

a. Definitions

(1) *Bypass* means the intentional diversion of waste streams from any portion of a treatment facility.

(2) *Severe property damage* means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can be reasonably expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Bypass not exceeding limitations

The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provision of Paragraphs B.4.c. and 4.d. of this section.

c. Notice

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.
(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in paragraph D.1.e. of this part (Twenty-four hour reporting).

d. Prohibition of bypass

Bypass is prohibited, and the Regional Administrator may take enforcement action against a permittee for bypass, unless:

(1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
(2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and
(3) i) The permittee submitted notices as required under Paragraph 4.c. of this section.
ii) The Regional Administrator may approve an anticipated bypass, after considering its adverse effects, if the Regional Administrator determines that it will meet the three conditions listed above in paragraph 4.d. of this section.

5. Upset

a. Definition. *Upset* means an exceptional incident in which there is an unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of paragraph B.5.c. of this section are met. No determination made during

administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the cause(s) of the upset;
(2) The permitted facility was at the time being properly operated;
(3) The permittee submitted notice of the upset as required in paragraphs D.1.a. and 1.e. (Twenty-four hour notice); and
(4) The permittee complied with any remedial measures required under B.3. above.

d. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

PART II. C. MONITORING REQUIREMENTS

1. Monitoring and Records

a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

b. Except for records for monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application except for the information concerning storm water discharges which must be retained for a total of 6 years. This retention period may be extended by request of the Regional Administrator at any time.

c. Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;
(2) The individual(s) who performed the sampling or measurements;
(3) The date(s) analyses were performed;
(4) The individual(s) who performed the analyses;
(5) The analytical techniques or methods used; and
(6) The results of such analyses.

d. Monitoring results must be conducted according to test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, unless other test procedures have been specified in the permit.

e. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by

imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

2. Inspection and Entry

The permittee shall allow the Regional Administrator or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the CWA, any substances or parameters at any location.

PART II. D. REPORTING REQUIREMENTS

1. Reporting Requirements

a. Planned Changes. The permittee shall give notice to the Regional Administrator as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is only required when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR§122.29(b); or
(2) The alteration or addition could significantly change the nature or increase the quantities of the pollutants discharged. This notification applies to pollutants which are subject neither to the effluent limitations in the permit, nor to the notification requirements at 40 CFR§122.42(a)(1).
(3) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition or change may justify the application of permit conditions different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

b. Anticipated noncompliance. The permittee shall give advance notice to the Regional Administrator of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

c. Transfers. This permit is not transferable to any person except after notice to the Regional Administrator. The Regional Administrator may require modification or revocation and reissuance of the permit to change the name of the permittee and

incorporate such other requirements as may be necessary under the CWA. (See 40 CFR Part 122.61; in some cases, modification or revocation and reissuance is mandatory.)

d. Monitoring reports. Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(1) Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Director for reporting results of monitoring of sludge use or disposal practices.

(2) If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in the permit, the results of the monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Director.

(3) Calculations for all limitations which require averaging or measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

e. Twenty-four hour reporting.

(1) The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances.

A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

(2) The following shall be included as information which must be reported within 24 hours under this paragraph.

(a) Any unanticipated bypass which exceeds any effluent limitation in the permit. (See 40 CFR §122.41(g).)
(b) Any upset which exceeds any effluent limitation in the permit.
(c) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Regional Administrator in the permit to be reported within 24 hours. (See 40 CFR §122.44(g).)

(3) The Regional Administrator may waive the written report on a case-by-case basis for reports under Paragraph D.1.e. if the oral report has been received within 24 hours.

f. Compliance Schedules. Reports of compliance or noncompliance with, any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

g. Other noncompliance. The permittee shall report all instances of noncompliance not reported under Paragraphs D.1.d., D.1.e., and D.1.f. of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in Paragraph D.1.e. of this section.

h. Other information. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Administrator, it shall promptly submit such facts or information.

2. Signatory Requirement

a. All applications, reports, or information submitted to the Regional Administrator shall be signed and certified. (See 40 CFR §122.22)

b. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 2 years per violation, or by both.

3. Availability of Reports.

Except for data determined to be confidential under Paragraph A.8. above, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the State water pollution control agency and the Regional Administrator. As required by the CWA, effluent data shall not be considered confidential. Knowingly making any false statements on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the CWA.

PART II. E. DEFINITIONS AND ABBREVIATIONS

1. Definitions for Individual NPDES Permits including Storm Water Requirements

Administrator means the Administrator of the United States Environmental Protection Agency, or an authorized representative.

Applicable standards and limitations means all, State, interstate, and Federal standards and limitations to which a “discharge”, a “sewage sludge use or disposal practice”, or a related activity is subject to, including “effluent limitations”, water quality standards, standards of performance, toxic effluent standards or prohibitions, “best management practices”, pretreatment standards, and “standards for sewage sludge use and disposal” under Sections 301, 302, 303, 304, 306, 307, 308, 403, and 405 of the CWA.

Application means the EPA standard national forms for applying for a permit, including any additions, revisions, or modifications to the forms; or forms approved by EPA for use in "approved States", including any approved modifications or revisions.

Average means the arithmetic mean of values taken at the frequency required for each parameter over the specified period. For total and/or fecal coliforms and Escherichia coli, the average shall be the geometric mean.

Average monthly discharge limitation means the highest allowable average of "daily discharges" over a calendar month calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

Average weekly discharge limitation means the highest allowable average of "daily discharges" measured during the calendar week divided by the number of "daily discharges" measured during the week.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of "waters of the United States." BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Best Professional Judgment (BPJ) means a case-by-case determination of Best Practicable Treatment (BPT), Best Available Treatment (BAT), or other appropriate technology-based standard based on an evaluation of the available technology to achieve a particular pollutant reduction and other factors set forth in 40 CFR §125.3 (d).

Coal Pile Runoff means the rainfall runoff from or through any coal storage pile.

Composite Sample means a sample consisting of a minimum of eight grab samples of equal volume collected at equal intervals during a 24-hour period (or lesser period as specified in the section on Monitoring and Reporting) and combined proportional to flow, or a sample consisting of the same number of grab samples, or greater, collected proportionally to flow over that same time period.

Construction Activities - The following definitions apply to construction activities:

(a) Commencement of Construction is the initial disturbance of soils associated with clearing, grading, or excavating activities or other construction activities.

(b) Dedicated portable asphalt plant is a portable asphalt plant located on or contiguous to a construction site and that provides asphalt only to the construction site that the plant is located on or adjacent to. The term dedicated portable asphalt plant does not include facilities that are subject to the asphalt emulsion effluent limitation guideline at 40 CFR Part 443.

(c) Dedicated portable concrete plant is a portable concrete plant located on or contiguous to a construction site and that provides concrete only to the construction site that the plant is located on or adjacent to.

(d) Final Stabilization means that all soil disturbing activities at the site have been complete, and that a uniform perennial vegetative cover with a density of 70% of the cover for unpaved areas and areas not covered by permanent structures has been established or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.

(e) Runoff coefficient means the fraction of total rainfall that will appear at the conveyance as runoff.

Contiguous zone means the entire zone established by the United States under Article 24 of the Convention on the Territorial Sea and the Contiguous Zone.

Continuous discharge means a "discharge" which occurs without interruption throughout the operating hours of the facility except for infrequent shutdowns for maintenance, process changes, or similar activities.

CWA means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub. L. 92-500, as amended by Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483, and Pub. L. 97-117; 33 USC §§1251 et seq.

Daily Discharge means the discharge of a pollutant measured during the calendar day or any other 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurements, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Director normally means the person authorized to sign NPDES permits by EPA or the State or an authorized representative. Conversely, it also could mean the Regional Administrator or the State Director as the context requires.

Discharge Monitoring Report Form (DMR) means the EPA standard national form, including any subsequent additions, revisions, or modifications for the reporting of self-monitoring results by permittees. DMRs must be used by "approved States" as well as by EPA. EPA will supply DMRs to any approved State upon request. The EPA national forms may be modified to substitute the State Agency name, address, logo, and other similar information, as appropriate, in place of EPA's.

Discharge of a pollutant means:

(a) Any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source", or

(b) Any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation (See "Point Source" definition).

This definition includes additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which do not lead

to a treatment works; and discharges through pipes, sewers, or other conveyances leading into privately owned treatment works.

This term does not include an addition of pollutants by any "indirect discharger."

Effluent limitation means any restriction imposed by the Regional Administrator on quantities, discharge rates, and concentrations of "pollutants" which are "discharged" from "point sources" into "waters of the United States", the waters of the "contiguous zone", or the ocean.

Effluent limitation guidelines means a regulation published by the Administrator under Section 304(b) of CWA to adopt or revise "effluent limitations".

EPA means the United States "Environmental Protection Agency".

Flow-weighted composite sample means a composite sample consisting of a mixture of aliquots where the volume of each aliquot is proportional to the flow rate of the discharge.

Grab Sample – An individual sample collected in a period of less than 15 minutes.

Hazardous Substance means any substance designated under 40 CFR Part 116 pursuant to Section 311 of the CWA.

Indirect Discharger means a non-domestic discharger introducing pollutants to a publicly owned treatment works.

Interference means a discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

(a) Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and

(b) Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act (CWA), the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resources Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to Subtitle D of the SDWA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection Research and Sanctuaries Act.

Landfill means an area of land or an excavation in which wastes are placed for permanent disposal, and which is not a land application unit, surface impoundment, injection well, or waste pile.

Land application unit means an area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for treatment or disposal.

Large and Medium municipal separate storm sewer system means all municipal separate storm sewers that are either: (i) located in an incorporated place (city) with a population of 100,000 or more as determined by the latest Decennial Census by the Bureau of Census (these cities are listed in Appendices F and 40 CFR Part 122); or (ii) located in the counties with unincorporated urbanized

populations of 100,000 or more, except municipal separate storm sewers that are located in the incorporated places, townships, or towns within such counties (these counties are listed in Appendices H and I of 40 CFR 122); or (iii) owned or operated by a municipality other than those described in Paragraph (i) or (ii) and that are designated by the Regional Administrator as part of the large or medium municipal separate storm sewer system.

Maximum daily discharge limitation means the highest allowable "daily discharge" concentration that occurs only during a normal day (24-hour duration).

Maximum daily discharge limitation (as defined for the Steam Electric Power Plants only) when applied to Total Residual Chlorine (TRC) or Total Residual Oxidant (TRO) is defined as "maximum concentration" or "Instantaneous Maximum Concentration" during the two hours of a chlorination cycle (or fraction thereof) prescribed in the Steam Electric Guidelines, 40 CFR Part 423. These three synonymous terms all mean "a value that shall not be exceeded" during the two-hour chlorination cycle. This interpretation differs from the specified NPDES Permit requirement, 40 CFR § 122.2, where the two terms of "Maximum Daily Discharge" and "Average Daily Discharge" concentrations are specifically limited to the daily (24-hour duration) values.

Municipality means a city, town, borough, county, parish, district, association, or other public body created by or under State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribe organization, or a designated and approved management agency under Section 208 of the CWA.

National Pollutant Discharge Elimination System means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318, and 405 of the CWA. The term includes an "approved program".

New Discharger means any building, structure, facility, or installation:

(a) From which there is or may be a "discharge of pollutants";

(b) That did not commence the "discharge of pollutants" at a particular "site" prior to August 13, 1979;

(c) Which is not a "new source"; and

(d) Which has never received a finally effective NPDES permit for discharges at that "site".

This definition includes an "indirect discharger" which commences discharging into "waters of the United States" after August 13, 1979. It also includes any existing mobile point source (other than an offshore or coastal oil and gas exploratory drilling rig or a coastal oil and gas exploratory drilling rig or a coastal oil and gas developmental drilling rig) such as a seafood processing rig, seafood processing vessel, or aggregate plant, that begins discharging at a "site" for which it does not have a permit; and any offshore rig or coastal mobile oil and gas exploratory drilling rig or coastal mobile oil and gas developmental drilling rig that commences the discharge of pollutants after August 13, 1979, at a "site" under EPA's permitting jurisdiction for which it is not covered by an individual or general permit and which is located in an area determined by the Regional Administrator in the issuance of a final permit to be in an area of biological concern. In determining whether an area is an area of biological concern, the Regional Administrator shall consider the factors specified in 40 CFR §§125.122 (a) (1) through (10).

An offshore or coastal mobile exploratory drilling rig or coastal mobile developmental drilling rig will be considered a "new discharger" only for the duration of its discharge in an area of biological concern.

New source means any building, structure, facility, or installation from which there is or may be a "discharge of pollutants", the construction of which commenced:

(a) After promulgation of standards of performance under Section 306 of CWA which are applicable to such source, or

(b) After proposal of standards of performance in accordance with Section 306 of CWA which are applicable to such source, but only if the standards are promulgated in accordance with Section 306 within 120 days of their proposal.

NPDES means "National Pollutant Discharge Elimination System".

Owner or operator means the owner or operator of any "facility or activity" subject to regulation under the NPDES programs.

Pass through means a Discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

Permit means an authorization, license, or equivalent control document issued by EPA or an "approved" State.

Person means an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof.

Point Source means any discernible, confined, and discrete conveyance, including but not limited to any pipe ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff (see 40 CFR §122.2).

Pollutant means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. §§2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. It does not mean:

(a) Sewage from vessels; or

(b) Water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well, if the well is used either to facilitate production or for disposal purposes is approved by the authority of the State in which the well is located, and if the State determines that the injection or disposal will not result in the degradation of ground or surface water resources.

Primary industry category means any industry category listed in the NRDC settlement agreement (Natural Resources Defense Council et al. v. Train, 8 E.R.C. 2120 (D.D.C. 1976), modified 12 E.R.C. 1833 (D. D.C. 1979)); also listed in Appendix A of 40 CFR Part 122.

Privately owned treatment works means any device or system which is (a) used to treat wastes from any facility whose operation is not the operator of the treatment works or (b) not a "POTW".

Process wastewater means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

Publicly Owned Treatment Works (POTW) means any facility or system used in the treatment (including recycling and reclamation) of municipal sewage or industrial wastes of a liquid nature which is owned by a "State" or "municipality".

This definition includes sewers, pipes, or other conveyances only if they convey wastewater to a POTW providing treatment.

Regional Administrator means the Regional Administrator, EPA, Region I, Boston, Massachusetts.

Secondary Industry Category means any industry which is not a "primary industry category".

Section 313 water priority chemical means a chemical or chemical category which:

(1) is listed at 40 CFR §372.65 pursuant to Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) (also known as Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986);

(2) is present at or above threshold levels at a facility subject to EPCRA Section 313 reporting requirements; and

(3) satisfies at least one of the following criteria:

(i) are listed in Appendix D of 40 CFR Part 122 on either Table II (organic priority pollutants), Table III (certain metals, cyanides, and phenols), or Table V (certain toxic pollutants and hazardous substances);
(ii) are listed as a hazardous substance pursuant to Section 311(b)(2)(A) of the CWA at 40 CFR §116.4; or
(iii) are pollutants for which EPA has published acute or chronic water quality criteria.

Septage means the liquid and solid material pumped from a septic tank, cesspool, or similar domestic sewage treatment system, or a holding tank when the system is cleaned or maintained.

Sewage Sludge means any solid, semisolid, or liquid residue removed during the treatment of municipal wastewater or domestic sewage. Sewage sludge includes, but is not limited to, solids removed during primary, secondary, or advanced wastewater treatment, scum, septage, portable toilet pumpings, Type III Marine Sanitation Device pumpings (33 CFR Part 159), and sewage sludge products. Sewage sludge does not include grit or screenings, or ash generated during the incineration of sewage sludge.

Sewage sludge use or disposal practice means the collection, storage, treatment, transportation, processing, monitoring, use, or disposal of sewage sludge.

Significant materials includes, but is not limited to: raw materials, fuels, materials such as solvents, detergents, and plastic pellets, raw materials used in food processing or production, hazardous substance designated under section 101(14) of CERCLA, any chemical the facility is required to report pursuant to EPCRA Section 313, fertilizers, pesticides, and waste products such as ashes, slag, and sludge that have the potential to be released with storm water discharges.

Significant spills includes, but is not limited to, releases of oil or hazardous substances in excess of reportable quantities under Section 311 of the CWA (see 40 CFR §110.10 and §117.21) or Section 102 of CERCLA (see 40 CFR § 302.4).

Sludge-only facility means any "treatment works treating domestic sewage" whose methods of sewage sludge use or disposal are subject to regulations promulgated pursuant to Section 405(d) of the CWA, and is required to obtain a permit under 40 CFR §122.1(b)(3).

State means any of the 50 States, the District of Columbia, Guam, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, the Trust Territory of the Pacific Islands.

Storm Water means storm water runoff, snow melt runoff, and surface runoff and drainage.

Storm water discharge associated with industrial activity means the discharge from any conveyance which is used for collecting and conveying storm water and which is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant. (See 40 CFR §122.26 (b)(14) for specifics of this definition.

Time-weighted composite means a composite sample consisting of a mixture of equal volume aliquots collected at a constant time interval.

Toxic pollutants means any pollutant listed as toxic under Section 307 (a)(1) or, in the case of "sludge use or disposal practices" any pollutant identified in regulations implementing Section 405(d) of the CWA.

Treatment works treating domestic sewage means a POTW or any other sewage sludge or wastewater treatment devices or systems, regardless of ownership (including federal facilities), used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated for the disposal of sewage sludge. This definition does not include septic tanks or similar devices.

For purposes of this definition, "domestic sewage" includes waste and wastewater from humans or household operations that are discharged to or otherwise enter a treatment works. In States where there is no approved State sludge management program under Section 405(f) of the CWA, the Regional Administrator may designate any person subject to the standards for sewage sludge use and disposal in 40 CFR Part 503 as a "treatment works treating domestic sewage", where he or she finds that there is a potential for adverse effects on public health and the environment from poor sludge quality or poor sludge handling, use or disposal practices, or where he or she finds that such designation is necessary to ensure that such person is in compliance with 40 CFR Part 503.

Waste Pile means any non-containerized accumulation of solid, non-flowing waste that is used for treatment or storage.

Waters of the United States means:

(a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of tide;

(b) All interstate waters, including interstate "wetlands";

(c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands", sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

(1) Which are or could be used by interstate or foreign travelers for recreational or other purpose;

(2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

(3) Which are used or could be used for industrial purposes by industries in interstate commerce;

(d) All impoundments of waters otherwise defined as waters of the United States under this definition;

(e) Tributaries of waters identified in Paragraphs (a) through (d) of this definition;

(f) The territorial sea; and

(g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in Paragraphs (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA (other than cooling ponds as defined in 40 CFR §423.11(m) which also meet the criteria of this definition) are not waters of the United States.

Wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Whole Effluent Toxicity (WET) means the aggregate toxic effect of an effluent measured directly by a toxicity test. (See Abbreviations Section, following, for additional information.)

2. Definitions for NPDES Permit Sludge Use and Disposal Requirements.

Active sewage sludge unit is a sewage sludge unit that has not closed.

Aerobic Digestion is the biochemical decomposition of organic matter in sewage sludge into carbon dioxide and water by microorganisms in the presence of air.

Agricultural Land is land on which a food crop, a feed crop, or a fiber crop is grown. This includes range land and land used as pasture.

Agronomic rate is the whole sludge application rate (dry weight basis) designed:

(1) To provide the amount of nitrogen needed by the food crop, feed crop, fiber crop, cover crop, or vegetation grown on the land; and

(2) To minimize the amount of nitrogen in the sewage sludge that passes below the root zone of the crop or vegetation grown on the land to the ground water.

Air pollution control device is one or more processes used to treat the exit gas from a sewage sludge incinerator stack.

Anaerobic digestion is the biochemical decomposition of organic matter in sewage sludge into methane gas and carbon dioxide by microorganisms in the absence of air.

Annual pollutant loading rate is the maximum amount of a pollutant that can be applied to a unit area of land during a 365 day period.

Annual whole sludge application rate is the maximum amount of sewage sludge (dry weight basis) that can be applied to a unit area of land during a 365 day period.

Apply sewage sludge or sewage sludge applied to the land means land application of sewage sludge.

Aquifer is a geologic formation, group of geologic formations, or a portion of a geologic formation capable of yielding ground water to wells or springs.

Auxiliary fuel is fuel used to augment the fuel value of sewage sludge. This includes, but is not limited to, natural gas, fuel oil, coal, gas generated during anaerobic digestion of sewage sludge, and municipal solid waste (not to exceed 30 percent of the dry weight of the sewage sludge and auxiliary fuel together). Hazardous wastes are not auxiliary fuel.

Base flood is a flood that has a one percent chance of occurring in any given year (i.e. a flood with a magnitude equaled once in 100 years).

Bulk sewage sludge is sewage sludge that is not sold or given away in a bag or other container for application to the land.

Contaminate an aquifer means to introduce a substance that causes the maximum contaminant level for nitrate in 40 CFR §141.11 to be exceeded in ground water or that causes the existing concentration of nitrate in the ground water to increase when the existing concentration of nitrate in the ground water exceeds the maximum contaminant level for nitrate in 40 CFR §141.11.

Class I sludge management facility is any publicly owned treatment works (POTW), as defined in 40 CFR §501.2, required to have an approved pretreatment program under 40 CFR §403.8 (a) (including any POTW located in a state that has elected to assume local program responsibilities pursuant to 40 CFR §403.10 (e) and any treatment works treating domestic sewage, as defined in 40 CFR § 122.2,

classified as a Class I sludge management facility by the EPA Regional Administrator, or, in the case of approved state programs, the Regional Administrator in conjunction with the State Director, because of the potential for sewage sludge use or disposal practice to affect public health and the environment adversely.

Control efficiency is the mass of a pollutant in the sewage sludge fed to an incinerator minus the mass of that pollutant in the exit gas from the incinerator stack divided by the mass of the pollutant in the sewage sludge fed to the incinerator.

Cover is soil or other material used to cover sewage sludge placed on an active sewage sludge unit.

Cover crop is a small grain crop, such as oats, wheat, or barley, not grown for harvest.

Cumulative pollutant loading rate is the maximum amount of inorganic pollutant that can be applied to an area of land.

Density of microorganisms is the number of microorganisms per unit mass of total solids (dry weight) in the sewage sludge.

Dispersion factor is the ratio of the increase in the ground level ambient air concentration for a pollutant at or beyond the property line of the site where the sewage sludge incinerator is located to the mass emission rate for the pollutant from the incinerator stack.

Displacement is the relative movement of any two sides of a fault measured in any direction.

Domestic septage is either liquid or solid material removed from a septic tank, cesspool, portable toilet, Type III marine sanitation device, or similar treatment works that receives only domestic sewage. Domestic septage does not include liquid or solid material removed from a septic tank, cesspool, or similar treatment works that receives either commercial wastewater or industrial wastewater and does not include grease removed from a grease trap at a restaurant.

Domestic sewage is waste and wastewater from humans or household operations that is discharged to or otherwise enters a treatment works.

Dry weight basis means calculated on the basis of having been dried at 105 degrees Celsius (°C) until reaching a constant mass (i.e. essentially 100 percent solids content).

Fault is a fracture or zone of fractures in any materials along which strata on one side are displaced with respect to the strata on the other side.

Feed crops are crops produced primarily for consumption by animals.

Fiber crops are crops such as flax and cotton.

Final cover is the last layer of soil or other material placed on a sewage sludge unit at closure.

Fluidized bed incinerator is an enclosed device in which organic matter and inorganic matter in sewage sludge are combusted in a bed of particles suspended in the combustion chamber gas.

Food crops are crops consumed by humans. These include, but are not limited to, fruits, vegetables, and tobacco.

Forest is a tract of land thick with trees and underbrush.

Ground water is water below the land surface in the saturated zone.

Holocene time is the most recent epoch of the Quaternary period, extending from the end of the Pleistocene epoch to the present.

Hourly average is the arithmetic mean of all the measurements taken during an hour. At least two measurements must be taken during the hour.

Incineration is the combustion of organic matter and inorganic matter in sewage sludge by high temperatures in an enclosed device.

Industrial wastewater is wastewater generated in a commercial or industrial process.

Land application is the spraying or spreading of sewage sludge onto the land surface; the injection of sewage sludge below the land surface; or the incorporation of sewage sludge into the soil so that the sewage sludge can either condition the soil or fertilize crops or vegetation grown in the soil.

Land with a high potential for public exposure is land that the public uses frequently. This includes, but is not limited to, a public contact site and reclamation site located in a populated area (e.g., a construction site located in a city).

Land with low potential for public exposure is land that the public uses infrequently. This includes, but is not limited to, agricultural land, forest and a reclamation site located in an unpopulated area (e.g., a strip mine located in a rural area).

Leachate collection system is a system or device installed immediately above a liner that is designed, constructed, maintained, and operated to collect and remove leachate from a sewage sludge unit.

Liner is soil or synthetic material that has a hydraulic conductivity of 1×10^{-7} centimeters per second or less.

Lower explosive limit for methane gas is the lowest percentage of methane gas in air, by volume, that propagates a flame at 25 degrees Celsius and atmospheric pressure.

Monthly average (Incineration) is the arithmetic mean of the hourly averages for the hours a sewage sludge incinerator operates during the month.

Monthly average (Land Application) is the arithmetic mean of all measurements taken during the month.

Municipality means a city, town, borough, county, parish, district, association, or other public body (including an intermunicipal agency of two or more of the foregoing entities) created by or under State law; an Indian tribe or an authorized Indian tribal organization having jurisdiction over sewage sludge management; or a designated and approved management agency under section 208 of the CWA, as amended. The definition includes a special district created under state law, such as a water district, sewer district, sanitary district, utility district, drainage district, or similar entity, or an integrated waste management facility as defined in section 201 (e) of the CWA, as amended, that has as one of its principal responsibilities the treatment, transport, use or disposal of sewage sludge.

Other container is either an open or closed receptacle. This includes, but is not limited to, a bucket, a box, a carton, and a vehicle or trailer with a load capacity of one metric ton or less.

Pasture is land on which animals feed directly on feed crops such as legumes, grasses, grain stubble, or stover.

Pathogenic organisms are disease-causing organisms. These include, but are not limited to, certain bacteria, protozoa, viruses, and viable helminth ova.

Permitting authority is either EPA or a State with an EPA-approved sludge management program.

Person is an individual, association, partnership, corporation, municipality, State or Federal Agency, or an agent or employee thereof.

Person who prepares sewage sludge is either the person who generates sewage sludge during the treatment of domestic sewage in a treatment works or the person who derives a material from sewage sludge.

pH means the logarithm of the reciprocal of the hydrogen ion concentration; a measure of the acidity or alkalinity of a liquid or solid material.

Place sewage sludge or sewage sludge placed means disposal of sewage sludge on a surface disposal site.

Pollutant (as defined in sludge disposal requirements) is an organic substance, an inorganic substance, a combination or organic and inorganic substances, or pathogenic organism that, after discharge and upon exposure, ingestion, inhalation, or assimilation into an organism either directly from the environment or indirectly by ingestion through the food chain, could on the basis on information available to the Administrator of EPA, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunction in reproduction) or physical deformations in either organisms or offspring of the organisms.

Pollutant limit (for sludge disposal requirements) is a numerical value that describes the amount of a pollutant allowed per unit amount of sewage sludge (e.g., milligrams per kilogram of total solids); the amount of pollutant that can be applied to a unit of land (e.g., kilograms per hectare); or the volume of the material that can be applied to the land (e.g., gallons per acre).

Public contact site is a land with a high potential for contact by the public. This includes, but is not limited to, public parks, ball fields, cemeteries, plant nurseries, turf farms, and golf courses.

Qualified ground water scientist is an individual with a baccalaureate or post-graduate degree in the natural sciences or engineering who has sufficient training and experience in ground water hydrology and related fields, as may be demonstrated by State registration, professional certification, or completion of accredited university programs, to make sound professional judgments regarding ground water monitoring, pollutant fate and transport, and corrective action.

Range land is open land with indigenous vegetation.

Reclamation site is drastically disturbed land that is reclaimed using sewage sludge. This includes, but is not limited to, strip mines and construction sites.

Risk specific concentration is the allowable increase in the average daily ground level ambient air concentration for a pollutant from the incineration of sewage sludge at or beyond the property line of a site where the sewage sludge incinerator is located.

Runoff is rainwater, leachate, or other liquid that drains overland on any part of a land surface and runs off the land surface.

Seismic impact zone is an area that has 10 percent or greater probability that the horizontal ground level acceleration to the rock in the area exceeds 0.10 gravity once in 250 years.

Sewage sludge is a solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to:, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in treatment works.

Sewage sludge feed rate is either the average daily amount of sewage sludge fired in all sewage sludge incinerators within the property line of the site where the sewage sludge incinerators are located for the number of days in a 365 day period that each sewage sludge incinerator operates, or the average daily design capacity for all sewage sludge incinerators within the property line of the site where the sewage sludge incinerators are located.

Sewage sludge incinerator is an enclosed device in which only sewage sludge and auxiliary fuel are fired.

Sewage sludge unit is land on which only sewage sludge is placed for final disposal. This does not include land on which sewage sludge is either stored or treated. Land does not include waters of the United States, as defined in 40 CFR §122.2.

Sewage sludge unit boundary is the outermost perimeter of an active sewage sludge unit.

Specific oxygen uptake rate (SOUR) is the mass of oxygen consumed per unit time per unit mass of total solids (dry weight basis) in sewage sludge.

Stack height is the difference between the elevation of the top of a sewage sludge incinerator stack and the elevation of the ground at the base of the stack when the difference is equal to or less than 65 meters. When the difference is greater than 65 meters, stack height is the creditable stack height determined in accordance with 40 CFR §51.100 (ii).

State is one of the United States of America, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Trust Territory of the Pacific Islands, the Commonwealth of the Northern Mariana Islands, and an Indian tribe eligible for treatment as a State pursuant to regulations promulgated under the authority of section 518(e) of the CWA.

Store or storage of sewage sludge is the placement of sewage sludge on land on which the sewage sludge remains for two years or less. This does not include the placement of sewage sludge on land for treatment.

Surface disposal site is an area of land that contains one or more active sewage sludge units.

Total hydrocarbons means the organic compounds in the exit gas from a sewage sludge incinerator stack measured using a flame ionization detection instrument referenced to propane.

Total solids are the materials in sewage sludge that remain as residue when the sewage sludge is dried at 103 to 105 degrees Celsius.

Treat or treatment of sewage sludge is the preparation of sewage sludge for final use or disposal. This includes, but is not limited to, thickening, stabilization, and dewatering of sewage sludge. This does not include storage of sewage sludge.

Treatment works is either a federally owned, publicly owned, or privately owned device or system used to treat (including recycle and reclaim) either domestic sewage or a combination of domestic sewage and industrial waste of a liquid nature.

Unstable area is land subject to natural or human-induced forces that may damage the structural components of an active sewage sludge unit. This includes, but is not limited to, land on which the soils are subject to mass movement.

Unstabilized solids are organic materials in sewage sludge that have not been treated in either an aerobic or anaerobic treatment process.

Vector attraction is the characteristic of sewage sludge that attracts rodents, flies, mosquitoes, or other organisms capable of transporting infectious agents.

Volatile solids is the amount of the total solids in sewage sludge lost when the sewage sludge is combusted at 550 degrees Celsius in the presence of excess air.

Wet electrostatic precipitator is an air pollution control device that uses both electrical forces and water to remove pollutants in the exit gas from a sewage sludge incinerator stack.

Wet scrubber is an air pollution control device that uses water to remove pollutants in the exit gas from a sewage sludge incinerator stack.

3. Commonly Used Abbreviations

BOD	Five-day biochemical oxygen demand unless otherwise specified
CBOD	Carbonaceous BOD
CFS	Cubic feet per second
COD	Chemical oxygen demand
Chlorine	
Cl_2	Total residual chlorine
TRC	Total residual chlorine which is a combination of free available chlorine (FAC, see below) and combined chlorine (chloramines, etc.)

TRO	Total residual chlorine in marine waters where halogen compounds are present
FAC	Free available chlorine (aqueous molecular chlorine, hypochlorous acid, and hypochlorite ion)
Coliform	
Coliform, Fecal	Total fecal coliform bacteria
Coliform, Total	Total coliform bacteria
Cont. (Continuous)	Continuous recording of the parameter being monitored, i.e. flow, temperature, pH, etc.
Cu. M/day or M^3/day	Cubic meters per day
DO	Dissolved oxygen
kg/day	Kilograms per day
lbs/day	Pounds per day
mg/l	Milligram(s) per liter
ml/l	Milliliters per liter
MGD	Million gallons per day
Nitrogen	
Total N	Total nitrogen
NH_3-N	Ammonia nitrogen as nitrogen
NO_3-N	Nitrate as nitrogen
NO_2-N	Nitrite as nitrogen
NO_3-NO_2	Combined nitrate and nitrite nitrogen as nitrogen
TKN	Total Kjeldahl nitrogen as nitrogen
Oil & Grease	Freon extractable material
PCB	Polychlorinated biphenyl
pH	A measure of the hydrogen ion concentration. A measure of the acidity or alkalinity of a liquid or material
Surfactant	Surface-active agent

Temp. °C	Temperature in degrees Centigrade
Temp. °F	Temperature in degrees Fahrenheit
TOC	Total organic carbon
Total P	Total phosphorus
TSS or NFR	Total suspended solids or total nonfilterable residue
Turb. or Turbidity	Turbidity measured by the Nephelometric Method (NTU)
ug/l	Microgram(s) per liter
WET	"Whole effluent toxicity" is the total effect of an effluent measured directly with a toxicity test.
C-NOEC	"Chronic (Long-term Exposure Test) – No Observed Effect Concentration". The highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the aquatic test organisms at a specified time of observation.
A-NOEC	"Acute (Short-term Exposure Test) – No Observed Effect Concentration" (see C-NOEC definition).
LC_{50}	LC_{50} is the concentration of a sample that causes mortality of 50% of the test population at a specific time of observation. The LC_{50} = 100% is defined as a sample of undiluted effluent.
ZID	Zone of Initial Dilution means the region of initial mixing surrounding or adjacent to the end of the outfall pipe or diffuser ports.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND - REGION I
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FACT SHEET

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES PURSUANT TO THE CLEAN WATER ACT (CWA)

NPDES PERMIT NUMBER: MA0040266

PUBLIC NOTICE START AND END DATES: November 20, 2014 - December 19, 2014

NAME AND MAILING ADDRESS OF APPLICANT:

Northeast Gateway Energy Bridge, Limited Partnership
1450 Lake Robbins Drive, Suite 200
The Woodlands, TX 77380

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Northeast Gateway Energy Bridge Deepwater Port
Massachusetts Bay

RECEIVING WATER(S):

Massachusetts Bay

SIC CODE: 4491

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1.0 Proposed Action, Type of Facility, and Discharge Location

Northeast Gateway Energy Bridge (NEG or the permittee) has applied to the U.S. Environmental Protection Agency (EPA) for reissuance and modification of its deepwater port Clean Water Act National Pollutant Discharge Elimination System (NPDES) permit authorizing the intake and discharge of seawater to Massachusetts Bay. Specialized vessels, called Energy Bridge Regasification Vessels (EBRVs) transport liquified natural gas (LNG), dock at the port, and attach to two "submerged turret loading" (STL) buoys. Once docked and attached to the buoys, the EBRVs can then proceed to regasify the LNG for subsequent transmission into the Algonquin Gas Transmission LLC pipeline (Algonquin).

On June 13, 2005, Excelerate Energy filed an application for construction and operation of a deepwater port terminal to be located in Massachusetts Bay, approximately 13 miles south-southeast of the City of Gloucester, Massachusetts and in federal waters approximately 270 feetdeep. On February 7, 2007, the Maritime Administrator signed the Record of Decision for the Northeast Gateway Deepwater Port project, contingent upon the applicant's commitment to employ U.S. mariners aboard its vessels servicing the facility. On May 14, 2007, the Maritime Administrator signed the license for Excelerate to own, operate and construct the Northeast Gateway Deepwater Port.

The current NPDES permit was issued to NEG on October 27, 2007 and expired on September 30, 2012. EPA received a permit renewal application from the applicant dated February 21, 2012. The permittee also had previously submitted a request for modification of its permit on October 5, 2010. Because EPA deemed the renewal application as timely, the permit has been administratively continued pursuant to 40 CFR § 122.6.

2.0 Facility Information

The NEG Deepwater Port is located in federal waters 13 miles south-southeast of Gloucester, Massachusetts (see site map in Attachment A). The port consists of two LNG regasification and

transmission units, each consisting of an STL Buoy systems (referred to here at Buoy A and Buoy B). EBRVs connect to the STL buoys when in port for regasification of LNG. The approximate latitude and longitude of each buoy is provided in Table 1. The Port is located outside of, but in the vicinity of, federal and state waters designated as marine sanctuaries and the Boston Harbor traffic lanes.

Table 1. Location of STL Buoys

	Latitude	Longitude
Buoy A	42° 23′ 38.46″	70° 35′ 31.02″
Buoy B	42° 23′ 56.40″	70° 37′ 0.36″

NEG is engaged in the regasification and delivery of LNG via STL buoys at its Port using EBRVs, which are vessels specially designed and constructed for this purpose. The two STL buoy systems consist of a flexible riser, pipeline end manifold, and flowline. The buoys serve as a single-point mooring system for the EBRVs and as the delivery conduit for natural gas. The STL buoy flowlines are connected to an offshore pipeline system (Hubline) owned and operated by Algonquin. The intake and discharge of seawater will be from the Port's EBRVs connected with the two STL buoys. The buoys are separated by one nautical mile, which allows two vessels to be simultaneously connected to the two buoys and move around their anchoring points with the currents ("weathervane").

EBRVs incorporate specialized onboard equipment for vaporization and delivery of natural gas, including high pressure pumps and vaporizers, boilers capable of burning either natural gas or fuel oil, a specialized buoy compartment to accommodate the STL buoy system, and reinforced LNG containment system. Each delivery can take a maximum of 8 days to re-gasify the entire cargo of LNG and pump the gas into the pipeline.

EBRVs at the Port use a "closed-loop" shell and tube vaporization (STV) system for regasification of LNG as follows: 1) steam generated in the engine's boilers is piped to steam heaters within the regasification plant; 2) the "steam heaters" transfer heat from the steam to the fresh water circulated through closed-loop shell-and-tube vaporizers; 3) LNG is injected into the vaporizers by high pressure LNG pumps; 4) the LNG is heated and returns to a gaseous state. In this system, heat has been transferred from the steam to the fresh water circulating system, and then from the fresh water system to the natural gas. Therefore, the fresh water has been cooled such that it can be re-used to satisfy the ship's cooling water needs (*i.e.*, used in the ship's main condenser and for cooling miscellaneous equipment (auxiliary cooling)). When operating in this mode (referred to as Heat Recovery System), the ship does not need to withdraw any seawater for cooling. However, as discussed further in this fact sheet, this system cannot satisfy the ship's cooling needs unless LNG is regasified at a certain rate. Therefore, under some conditions, an EBRV does need to withdraw seawater to satisfy its cooling needs.

2.1.1 Description of Water Intake

While seawater is not used for regasification of LNG, it is required to support standard vessel operating requirements, including for ballast water, the safety water curtain, fire systems, and

crew sanitary and potable water needs. Under some conditions, the ship may need seawater for cooling, and that is discharged as heated effluent. The maximum design intake is 55.8 MGD and the maximum design discharge is 53.9 MGD. Withdrawal of seawater for ballast (approximately 1.9 MGD) is not discharged at the NEG port, and there is some loss of seawater withdrawn for the freshwater generator.

As stated above, as the heated freshwater circulates through the vaporizers to warm the LNG, its temperature drops such that it can be re-used in the ship's main condenser and for auxiliary engine cooling. When EBRVs are engaged in regasification and natural gas delivery reaches a minimum natural send-out rate of 200 million standard cubic feet per day (mmscfd), EBRVs reduce water use by operating in heat recovery mode (also called heat recovery exchange system (HRS)).[1] At this send-out rate, water flows through the LNG vaporizers at a rate and temperature sufficient to support the cooling needs of the ship's main condenser and auxiliary cooling. While operating in HRS mode, water intake at the port is reduced from 55.8 MGD to 2.77 MGD. In other words, while in heat recovery mode, the process of transferring heat in the closed-loop shell-and-tube for warming LNG provides all of the cooling water for the vessel's needs. The remaining 2.77 MGD of seawater withdrawn is used for ballast (1.87 MGD), the safety water curtain (0.6 MGD), and the on-board freshwater generator (0.3 MGD).

All water used in support of EBRV operations is drawn through a total of four sea chests (cavities in the hull of a vessel which are exposed to the ocean; water is drawn into the vessel through the cavity): starboard high, starboard low, port high, and port low. See Section 6.6.2 of this fact sheet for a discussion of the sea chests.

2.1.2 Description of Discharge

The 2007 permit authorized the discharge of cooling water and safety curtain water from three outfalls while an ERRV is moored at each buoy. As described below, that authorization is continued in the draft permit. Outfalls designated "A" represent outfalls of an EBRV connected to Buoy A and outfalls designated as "B" represent outfalls of an EBRV connected to Buoy B. Outfalls are located approximately 17 to 28 feet deep (5 to 8 meters). Outfalls 001A/B consist of cooling water associated with the main condenser, Outfalls 002A/B consist of auxiliary seawater cooling, Outfalls 003A/B consist of safety water curtain, and Outfalls 004A/B consist of discharge of brine water from the freshwater generator system. Only safety curtain and freshwater generator reject is discharged when operating in HRS mode. More discussion of the source and characteristics of the discharge from each outfall is provided in Section 6 of this fact sheet.

3.0 Receiving Water Description

[1] The 2006 EIS and the 2007 NPDES permit were based on the permittee's expectation that a send-out rate of 150 mmscfd would be adequate to engage in HRS mode. However, operating experience at the Port to date has demonstrated that a send-out rate of 200 mmscfd is needed to ensure safe and efficient operation of the Port. See Section 6.1.3 of this Fact Sheet. See November 5, 2014 email from Mike Trammel of Excelerate Energy to Scott Wilson of EPA.

The NEG Deepwater Port is located in Massachusetts Bay which is in the southwest corner of the Gulf of Maine and is bordered on the north by Cape Ann Bay and on the south by Cape Cod Bay, which are approximately 42 miles apart. Stellwagen Bank National Marine Sanctuary, located on the eastern edge of Massachusetts Bay, is roughly 25 miles east of Boston. As stated above, the discharge is made to Massachusetts Bay approximately 13 miles southeast of Gloucester. The water depth at the port is 80 meters (262.5 feet).

As discussed in Attachment B to the fact sheet, the water column in Massachusetts Bay tends to be more stratified (*i.e.*, the density, temperature, and/or salinity of the water changes from the surface to the bottom) from April through October and relatively uniform during the remainder of the year. According to the 2006 Final EIS, thermal stratification of the water column begins in April in peaks in August. A strong thermocline is typically found at approximately 20 meters depth in late summer. By October, the decreasing heat flux combined with increased mixing by storms breaks down the thermal stratification and the water column becomes well-mixed (p. 3-4). Circulation in the Bay is largely affected by the larger water flow in the Gulf of Maine and its coastal current that can enter the Massachusetts Bay south of Cape Ann and exit north of Race Point. However, winds influence circulation and connectivity with the Gulf of Maine.[2]

4.0 Limitations, Conditions and Requirements

The permit effluent limitations and conditions may be found in the Draft Permit at Part I.A – Effluent Limitations, Monitoring and Reporting Requirements. The permit intake requirements may be found in the Draft Permit at Part I.B –Cooling Water Intake Requirement. The biological and thermal monitoring requirements can be found in the Draft Permit at Part. I.C –Biological and Thermal Monitoring Requirements. The basis for these limitations and permit requirements are described below.

5.0 Permit Basis: Statutory and Regulatory Authority

CWA Section 301(a) prohibits the discharge of pollutants to waters of the United States unless such a discharge is otherwise authorized by an NPDES permit issued pursuant to section 402 of the Act. In addition, CWA section 316(b) requires that EPA to establish standards for cooling water intake structures (CWIS) that reflect the best technology available for minimizing the adverse impact of such structures. EPA's NDPES regulations require that NPDES permits must include conditions applicable to CWISs in accordance with these standards. 40 C.F.R. § 122.44(b)(3). The NPDES permit is the mechanism used to implement technology and water quality-based effluent limitations, requirements for CWISs, and other requirements including monitoring and reporting. This draft NPDES permit was developed in accordance with various statutory and regulatory requirements established pursuant to the CWA and any applicable State regulations. The regulations governing the EPA NPDES permit program are generally found at 40 CFR Parts 122, 124, 125, and 136.

When developing permit limits, EPA must consider the most recent technology-based treatment

[2] USGS OFR 2005-1250, Processes Influencing the Transport and Fate of Contaminated Sediments in the Coastal Ocean – Boston Harbor and Massachusetts Bay, available online at http://pubs.usgs.goc/of/2005/1250.html

and water quality-based requirements. As noted above, for cooling water intake structures, EPA must include conditions that implement the national standards established by EPA under CWA 316(b) in the applicable regulations. 79 Fed. Reg. 48310 (August 14, 2014) and 40 C.F.R. §125.90(b) (requiring BPJ, case-by-case determinations of CWA 316(b) requirements for facilities not within the scope of the otherwise applicable regulations.) Subpart A of 40 CFR Part 125 establishes criteria and standards for the imposition of technology-based treatment requirements in permits under Section 301(b) of the CWA, including the application of EPA-promulgated effluent limitations and case-by-case determinations of effluent limitations under Section 402(a)(1) of the CWA. EPA is required to consider technology and water quality-based requirements as well as all limitations and requirements in the existing permit when developing permit limits. The regulations at 40 C.F.R. Part 125- Subparts I, J and N establish the national standards for CWISs for new facilities, existing power plant and manufacturing facilities and offshore oil and gas facilities.

5.1 Special Considerations Regarding EBRVs and NPDES Permitting

EBRVs are ocean-going LNG tanker vessels that are specially designed to interconnect with the STL buoys for the purpose of LNG regasification and delivery to onshore markets via the Pipeline Lateral, which interconnects the NEG Port to an offshore natural gas pipeline known as the HubLine (see map in Attachment A). Once connected to the STL buoy and integrated into the port, EBRVs are essentially anchored to the seafloor and the undersea natural gas pipeline via the flexible riser and subsea flowlines. Thus, the port, including the EBRVs, is functionally equivalent to land- or marine platform-based LNG terminals.

CWA Section 502(14) states that "[t]he term 'point source' means…[among other things, a] vessel or other floating craft from which pollutants are or may be discharged." CWA Section 502(12)(B) defines "discharge of a pollutant" to mean any addition of any pollutant to waters of the contiguous zone or the ocean from any point source other than a vessel or other floating craft.

EPA has interpreted the statutory definition with respect to floating craft that are being used for industrials purposes. Longstanding EPA regulations, have interpreted the reference in CWA Section 502(12)(B) to "vessels or other floating craft" as inapposite to discharges when the vessel is operating in a capacity other than as a means of transportation. See 40 CFR §122.3. NPDES permit have been required for discharges associated with various types of vessel-based industrial facilities (*e.g.*, seafood processing vessels, offshore oil and gas extraction facilities). See Technical Development document for the Final Section 316(b) phase III Rule, p. 1-2 (EPA-821-R-06-003) (EPA, 2006).

For these reasons, EPA does not assert NPDES jurisdiction over discharges of pollutants (or cooling water withdrawals) from the EBRVs when they are in transit operating as a means of transportation. When the EBRVs are interconnected to the STL buoys and integrated into the port, however, NPDES permitting requirements do apply to the associated discharges and cooling water withdrawals. Therefore, the draft permit's discharge and intake requirements discussed below apply only when EBRVs are interconnected with the STL buoys and integrated within the port.

5.2 Technology-based Requirements for Pollutant Discharges

Technology-based effluent limits represent the minimum level of pollutant discharge control that discharges must achieve under the CWA. The CWA requires that different types of pollutant discharges be controlled to levels that reflect the capability of certain technological measures. These technology standards vary depending on the type of pollutant and facility in question. *See* 33 U.S.C. §§1311(b); 1314; 1316; 40 CFR §125.3. Sections 301(b) and 306 of the CWA (*See* 40 CFR §125 Subpart A) require that pollutant discharges be reduced to a level equivalent to using the best practicable control technology currently available (BPT), best conventional control technology (BCT) for conventional pollutants, the best available technology economically available (BAT) for toxics and non-conventional pollutants, and the best available demonstrated control technology (BADCT) for discharges from "new sources," as defined under the CWA. See 33 U.S.C. §§1316(a); 40 CFR §§122.2, 122.29. BAT limits are also supposed to "result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants." 33 U.S.C. §1311(b)(2)(A). These technology-based requirements are then to be reflected in NPDES permits issued to specific facilities. See 33 U.S.C. §§1311, 1316, 1342(a); 40 CFR §§122.29, 125.3. In general, technology-based effluent guidelines for non-POTW facilities must have been complied with as expeditiously as practicable, but not later than March 31, 1989. See 40 CFR §125.3(a)(2). Any applicable new source performance standards must be complied with when the new source commences operations. See 40 CFR §122.29(d)(4) and (5). Compliance schedules and deadlines not in accordance with the statutory deadlines of the CWA cannot be authorized by a NPDES permit.

EPA regulations found at 40 CFR Part 125, Subpart A set forth procedures, standards, and criteria for the development and imposition of technology-based requirements in NPDES permits under Section 301(b) of the CWA, including the application of EPA-promulgated National Effluent Limitations Guidelines (ELGs) (*i.e.*, technology-based effluent limitations developed for entire industrial categories which are then applied to specific facilities through NPDES permits) and, when no relevant ELGs are in effect, the development of case-by-case, Best Professional Judgment (BPJ) determinations of technology-based discharge limits under Section 402(a)(1) of the CWA. See 40 CFR §125.3.

EPA has not promulgated technology-based ELGs for pollutant discharges from LNG deepwater ports or any other type of deepwater port. Therefore, all technology-based effluent limits for NEG's draft permit have been developed on a case-by-case BPJ basis.

5.3 Clean Water Act Section 403(c) Ocean Discharge Criteria

Point source pollutant discharges to marine water are subject to the federal Ocean Discharge Criteria (ODC) under Section 403 of the CWA. 33 U.S.C. §1343. The ODC apply to NPDES permits for pollutant discharges into the territorial seas, the contiguous zone, and the ocean. EPA has promulgated guidelines for regulating discharges to satisfy the CWA Section 403 and give effect to the ODC. See 40 CFR Part 125, Subpart M.

EPA may not issue an NPDES permit to authorize any pollutant discharge that the Agency determines will cause "unreasonable degradation of the marine environment." 40 CFR § 125.123(b). EPA conducts an Ocean Discharge Criteria Evaluation (ODCE) using the guidelines in 40 CFR Part 125, Subpart M to determine whether and the extent that the discharge will cause degradation of the marine environment. 40 CFR §125.122(a). These guidelines define "unreasonable degradation of the marine environment: to mean:

- Significant adverse changes in ecosystem diversity, productivity, and stability of the biological community within the area of the discharge and surrounding biological communities;
- Threat to human health through direct exposure to pollutants or through consumption of exposed aquatic organisms; or
- Loss of aesthetic, recreational, scientific, or economic values which is unreasonable in relation to the benefit derived from the discharge.

See 40 CFR § 125.121(e). CWA Section 403(c) guidelines require that a number of factors be considered in the determination of degradation. These factors include the amount and nature of the pollutants to be discharged, the potential transport of such pollutants, the character and uses of the receiving water and its biological communities, the existence of special aquatic sites (including parks, refuges, etc.), any applicable requirements of an approved Coastal Zone Management plan, marine water quality criteria developed by EPA pursuant to the CWA Section 301(a)(1), and potential impacts on water quality, ecological health, and human health. EPA may include limits in NPDES permit in order to ensure that discharges will not result in unreasonable degradation of the marine environment and, as stated above, discharges that would cause such unreasonable degradation will not be permitted. 40 CFR §§125.123(a) and (b). If EPA has insufficient information to determine that there will be no unreasonable degradation of the marine environment, the Agency may not issue the permit unless, among other requirements, it finds that such discharge will not cause irreparable harm. 40 CFR §125.123(c).

5.4 Clean Water Act Section 316(b)

CWA Section 316(b), 33 U.S.C. §1326(b), imposes requirements for controls on CWISs at facilities with pollutant discharges subject to NPDES permitting where the CWIS will withdraw cooling water from the waters of the United States. CWA Section 316(b) requires that "the location, design, construction, and capacity of cooling water intake structures reflect the best technology available (BTA) for minimizing adverse environmental impact." 33 U.S.C. §1326(b). With any NPDES permit issuance or reissuance, EPA is also required to evaluate or re-evaluate compliance with applicable standards, including those stated in CWA § 316(b) regarding cooling water intake structures. EPA issued regulations for cooling water intake structures applicable to existing facilities on August 14, 2014 that took effect October 14, 2014. 79 Fed. Reg. 48310 (August 14, 2014) (40 C.F.R. Part 125, Subpart J). This regulation retained EPA's earlier determination that offshore LNG terminals would not be subjected to uniform national standards. EPA concluded CWA 316(b) conditions for such facilities should be decided on a BPJ, case-by-case basis. EPA had based that decision on the absence of additional technically feasible technologies for further reducing adverse environment impacts associated with CWISs at such

facilities beyond that already in use. Therefore, there are no uniformly applicable and available technologies for use at existing LNG facilities to minimize adverse environmental effects. 79 Fed. Reg. 48300, 48310. See 40 C.F.R. §125.91(d). LNG facilities continue to be subject to BPJ, case-by-by case CWA 316(b) BTA conditions as required by 40 C.F.R. § 125.90(b). Section 6.6 of this fact sheet presents the BTA determination for this permit.

5.5 Antibacksliding

Under the antibacksliding regulations at 40 CFR § 122.44(l)(1), a permit may not be renewed, reissued or modified to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permits. *See also* 45 Fed. Reg. 33341 (May 19, 1980). Exceptions to this antibacksliding provision are allowed only if the circumstances on which the previous permit was based have materially and substantially changed since the time the permit was issued and would constitute cause for permit modification, revocation or reissuance under 40 CFR Part 122.62. One such cause includes where there is new information (other than revised regulations, guidance, or test methods) that was not available at the time of permit issuance and that would have justified the application of a less stringent effluent limitation at the time of permit issuance. See 40 CFR §122.44(l)(1); §122.62(a)(2).

In August 2010, the USCG issued an Environmental Assessment (2010 EA) prepared by the permittee evaluating the impact of the proposed changes in operation on the marine environment, including increased water usage and a higher rise in temperature from the main condenser. In October 2010, the permittee submitted a Request for Modification of its NPDES permit to allow less stringent limitations on flow and temperature. The permittee's request included increasing the total annual discharge duration and maximum daily discharge at Outfalls 001A/B and 002A/B and the maximum permitted rise in temperature at Outfalls 001A/B. In addition, the permittee requested authorization to discharge a maximum of up to 53.6 MGD from the EBRVs to support operations when conditions do not allow for operation in HRS mode. NEG's current permit expired on September 30, 2012. The permittee applied for reissuance of its NPDES permit in February 2012, and, as a result its current permit been administratively continued until a new permit is issued. In its permit application, NEG again requested relaxation of its permit limits based on the proposed operational changes and new information gained through operation of the port and EBRVs. During March of 2012, the permittee resubmitted the August 2010, EA evaluating the environmental impact of these changes.

The current permit limits were based on the pre-operational engineering design of the port and EBRVs and the discharge rates and temperature calculated based on use of an innovative technology and operation of the port as a baseload supply facility on a continuous, year-round basis. Experience operating the port under the current permit has established that 1) actual operating parameters are different from those predicted prior to its construction, and 2) changes in the natural gas market have eliminated the demand for baseload natural gas supply from the port. The permittee maintains that the effluent limitations from the 2007 permit are unachievable and has requested less stringent permit limits based on new information accumulated during actual port operations during the 2008/9 and 2009/10 winter seasons.

According to the permittee, the EBRVs are unable to engage in HRS mode as quickly or at as low a send-out rate as anticipated, the maximum rise in temperature at the main condenser (Outfalls 001A/B) is higher than predicted, and the 2007 permit does not authorize NEG to operate with flexibility outside of HRS mode necessary to operate safely and effectively under a wide range of conditions that were not fully understood or accounted for during initial permitting. These include the ability to respond to operation safety and security needs, maintenance and repair needs, to support commissioning and testing of new vessels and Port-specific technologies, and to meet standard vessel operating requirements when conducting regasification. Additionally, the permittee maintains that the current permit limits do not allow NEG to respond to restrictions in the downstream pipeline system or variations and fluctuations in daily, seasonal, and annual demand for natural gas. The proposed changes in the permit limits, and the conditions that have resulted in the need for these changes, are discussed in more detail in Section 6.1, below.

EPA has reviewed the permittee's Request for Modification, permit application, and environmental assessment of the proposed operational changes on the marine environment. EPA is proposing draft permit limits that are less stringent than the current NPDES permit based on new information amassed from actual operating experience at the port not available at the time of current permit issuance (prior to construction of the port). EPA has determined that the proposed permit limits, while less stringent than the current limits, are consistent with the best available technology (BAT) for temperature, reflect the best technology available (BTA) for minimizing adverse impacts due to the operation of cooling water intake structures, and ensure that the discharges will not result in unreasonable degradation of the marine environment under the Ocean Discharge Criteria at 40 CFR § 125.123(b). EPA has concluded that the information provided by the permittee and based on actual operation experience at the port would have justified the application of less stringent limitations at the time of permit issuance, pursuant to the exception to antibacksliding at 40 CFR 122.44(l)(1). EPA's analysis supporting this conclusion is provided in Section 6.0 of this fact sheet.

6.0 Explanation of the Permit's Effluent Limitation(s)

The operation of the port entails the operation of two LNG regasification and transmission units, each consisting of an EBRV interconnected with one of the two in-place Submerged Turret Loading (STL) Buoy systems (Buoy A and Buoy B). Although past experience suggests that there is not likely to be more than one ship at the port at any one time, the port is designed to support simultaneous operation of EBRV ships at two. Outfalls marked "A" represent the outfalls of an EBRV interconnected with Buoy A and outfalls marked "B" represent the outfalls of an EBRV interconnected with Buoy B. Under the 2006 EIS used during development of the current permit, an overlap of vessels was anticipated to occur at a maximum of 10 percent of annual operations. Overlap of vessels has not happened at the port since it began operating in 2008.

6.1 Changes in Operation of Port since Issuance of the Current Permit

According to the permittee, operating experience since the construction of the port has revealed

conditions and requirements that were not anticipated or fully considered at the time of initial permitting. These conditions are described below. EPA has considered these operational changes and the environmental impacts resulting from the increase in the permitted flows and temperature in Section 6.2 and 6.3.

6.1.1 Safety Checks

First, NEG has not been able to operate in HRS mode as quickly or as often as anticipated prior to port operation. During development of the current permit, NEG expected that it would be able to engage in regasification of LNG in HRS mode within four hours of connecting to the STL and shutdown regasification and depart the port in four hours. The current permit limits at Outfalls 001A/B and 002A/B for total discharge time (520 hours) and maximum daily flow (7.82 MGD and 0.99 MGD, respectively) were based on the maximum design flow of the main condenser and auxiliary cooling and NEG's estimated total discharge time of eight hours per delivery.

NEG has since confirmed that the time estimates for routine operations required and incorporated into the USCG-approved Port Operations Manual to support pre-regasification safety and security checks were not included in the initial 4-hour start-up period. In fact, the permittee states that approximately 8 hours are required to complete all the necessary safety and security checks before an EBRV can begin regasification. According to the permittee, the pre-gasification security checks were developed in concert with the USCG after the issuance of the final EIS and current NPDES permit and prior to the actual operation of the port. NEG has confirmed that, after conclusion of the 8-hour period to complete safety and security checks, EBRVs can successfully begin regasification in the HRS mode within four hours and safely complete the shutdown of regasification and depart from the port within 4 hours as contemplated in the current permit. Based on the actual operation of the port with the USCG pre-gasification safety checks, the total discharge time on day 1 of gas delivery will increase from four to twelve hours at Outfalls 001A/B and 002A/B. The maximum daily flow based on design flows would increase from 7.82 MGD to 23.54 MGD at Outfall 001A/B and from 0.99 MGD to 3.0 MGD at Outfall 002A/B. EPA has evaluated the proposed increase in discharge at Outfalls 001A/B and 002A/B and the resulting environmental impacts in Section 6.4.

6.1.2 Rise in Temperature

Operation of the port since the current permit was issued has also confirmed that the rise in temperature from the main condenser (discharged at Outfalls 001A/B) is higher than anticipated. The current permit's temperature limits are based on NEG's expectation that the maximum rise in temperature would be 2.6°C at Outfall 001A/B (the main condenser cooling system) and 5.5°C at Outfall 002A/B (the auxiliary cooling system). Actual operation of the port to date has demonstrated that the permittee can meet the maximum permitted rise in temperature at Outfall 002A/B. NEG, however, has determined that permittee cannot meet the permitted rise in temperature limit in discharges from the main condenser (at Outfall 001A/B). According to the permittee, the rise in temperature from the main condenser is governed by the steam plant cooling water flow rate and the management of excess steam. As the flow rate of seawater to the main condenser decreases and/or the management of excess steam is required, the temperature of

the discharge at Outfall 001A/B increases. NEG has calculated that the actual average rise in temperature from the main condenser cooling system ranges from approximately 4°C to 12°C, depending on the operating conditions. EPA has evaluated the proposed increase in the rise in temperature at Outfall 001A/B and the resulting environmental impacts in Section 6.2.2, below.

6.1.3 Use of the Heat Recovery System

The purpose of operating in the heat recovery mode is to recover the heat generated from the main condenser and central water system in the engine room and send this heat forward to the regasification plant. In order to ensure that sufficient cooling is available for the main condenser and the central cooling system, at least two regasification vaporizer trains (each train can operate up a 100 mmscfd rate), are required to be in service before activating the Heat Recovery System (HRS).

Actual operating experience of the port since issuance of the current permit has revealed that NEG overestimated its ability to engage in HRS mode and deliver natural gas at the total volume and rate described in the final EIS. During development of the current permit, NEG anticipated that vessels could engage in HRS mode at a natural gas send-out rate of 150 mmscfd and that the port would provide a base delivery load of approximately 400 mmscfd of natural gas to New England's gas supply via Algonquin's Hubline. In fact, EBRVs must re-gasify LNG at a rate of 200 mmscfd to operate in the HRS mode. Operation of the port during the 2008/2009 and 2009/2010 winter seasons revealed that, because the current permit restricts an EBRV to operating in HRS mode during the entire delivery period with the exception of the 4-hour start-up and shutdown, the permittee is unable to respond to variations in daily natural gas demand that would require a send-out rate less than 200 mmscfd (and thus result in regasification of LNG outside of HRS mode). In addition, a suite of other issues, including maintenance, repair, vessel commissioning, and restrictions in downstream pipeline system, can also preclude an EBRV from discharging natural gas at the 200 mmscfd send-out rate necessary to operate in HRS mode.

When the current NPDES Permit was issued, Excelerate Energy anticipated that the HRS, which was not previously used in the existing Excelerate fleet, could be consistently operated at a send-out rate of 150 mmscfd. Excelerate conducted tests on the EBRV Excellence during May of 2008, while it was in port at the Northeast Gateway facility to determine when HRS could be engaged and sustained. Beginning at a send-out rate of approximately 150 mmscfd, HRS was engaged; however, there was not sufficient cooling from the regasification process at this low rate to maintain the system in HRS and it would trip out. Excelerate repeated the tests at 20 mmscfd increments until the HRS system would engage and maintain a steady state without tripping out. It was determined that if regasification send-out rates fell below 200 mmscfd, there is insufficient cooling from the regasification process to provide complete cooling of the steam exhaust flows into the main condenser. Insufficient cooling in the main condenser leads to higher exhaust back-pressures and could result in tripping of the turbine generators supplying electric power to the EBRV, and it is necessary to resume direct sea water flow through the main condenser. Thus, Excelerate revised the minimum send-out rate to achieve and maintain HRS at

approximately 200 mmscfd.[3]

According to the permittee, the proposed operation of the port in 2006 assumed a steady demand for LNG imports into New England sufficient to operate the port as a baseload facility on a year-round basis. Since issuance of the permit, the global natural gas market has changed substantially, including the introduction of a domestic supply of relatively low-cost shale gas to New England and the 2011 earthquake in Japan, which dramatically impacted LNG demand and price. At this time, there is no demand for baseload natural gas supply from the port. However, the permittee proposes that the port can meet the need for natural gas during peak winter days when the regional supply cannot meet demand. In recent winters, steam electric generating plants have relied on fuel oil due to the limited supply of natural gas, resulting in higher emissions of pollutants than emissions associated with natural gas.

EBRVs at the NEG Port only use closed-loop shell-and-tube vaporization technology to re-gasify LNG; therefore, there is no discharge associated with regasification whether operating the EBRV in HRS mode or not. When operating in HRS mode, water used to warm the LNG is circulated through the vaporizers at a sufficient rate that it can be re-routed and used to satisfy the vessel's cooling needs, which eliminates the need for seawater intake and discharge. However, as described above, when the send-out rate for natural gas is less than 200 mmscfd the water in the vaporizers is not adequate to provide sufficient cooling, and intake and discharge of seawater for cooling is required for the main condenser and auxiliary cooling. The tables below summarize the intake and discharge requirements for an 8-day natural gas delivery during HRS mode (Table 2a) and non-HRS mode (Table 2b).

Table 2a. Summary of Intake and Discharge Maximum Design Volumes for 8-Day Cargo Delivery Event in HRS Mode (million gallons per day (MGD)).

Day[1]	Hours	Main Condenser (001A/B)	Auxiliary Cooling System (002A/B)	Safety Water Curtain (003A/B)	Ballast[2]	Freshwater Generator[3] (004A/B)	Total Daily Intake	Total Daily Discharge
		Intake						
1	12	23.46	2.97	0.6	1.87	0.3	29.2	27.3
2	24	0	0	0.6	1.87	0.3	2.77	0.87
3	24	0	0	0.6	1.87	0.3	2.77	0.87
4	24	0	0	0.6	1.87	0.3	2.77	0.87
5	24	0	0	0.6	1.87	0.3	2.77	0.87
6	24	0	0	0.6	1.87	0.3	2.77	0.87
7	24	0	0	0.6	1.87	0.3	2.77	0.87
8	4	7.82	0.99	0.6	1.87	0.3	11.58	9.68

[1] Represents 8 hours of pre-gasification safety and security checks on Day 1, 4 hours to ramp-up to HRS mode on Day 1, and 4 hours to shut down on Day 8.

2 No ballast water is discharged while the vessels are at the port.

[3] Freshwater generator discharge is 0.27 MGD because system consumes 0.03 MGD.

[3] Email from Mike Trammel, Excelerate Energy to Scott Wilson, EPA Office of Wastewater Management, November 5, 2014.

Table 2b. Summary of Intake and Discharge Maximum Design Volumes for 8-Day Cargo Delivery Event in Non-HRS Mode (MGD).

Day	Hours	Main Condenser (001A/B)	Auxiliary Cooling System (002A/B)	Safety Water Curtain (003A/B)	Ballast[1]	Freshwater Generator[2] (004A/B)	Total Daily Intake	Total Daily Discharge
		Intake						
1	24	47.0	6.0	0.6	1.87	0.3	55.8	53.9
2	24	47.0	6.0	0.6	1.87	0.3	55.8	53.9
3	24	47.0	6.0	0.6	1.87	0.3	55.8	53.9
4	24	47.0	6.0	0.6	1.87	0.3	55.8	53.9
5	24	47.0	6.0	0.6	1.87	0.3	55.8	53.9
6	24	47.0	6.0	0.6	1.87	0.3	55.8	53.9
7	24	47.0	6.0	0.6	1.87	0.3	55.8	53.9
8	24	47.0	6.0	0.6	1.87	0.3	55.8	53.9
[1] No ballast water is discharged while vessels are at the port.								
[2] Freshwater generator discharge is 0.27 MGD because system consumes 0.03 MGD.								

In its Request for Permit Modification (submitted on October 5, 2010) and subsequent permit application (submitted February 21, 2012), NEG proposed authorizing a worst-case scenario of operating in non-HRS mode during 50 percent of annual operation activities at the port. Under this scenario, the annual seawater intake would increase from 2.6 billion gallons per year (BGY) to 11 BGY. EPA evaluated the proposed increase in seawater intake for cooling in non-HRS mode and resulting environmental impacts in Section 6.4, below.

6.2 Outfall 001A and 001B – Main Condenser Cooling

6.2.1 Discharge Flow and Duration

The current permit limits the discharge from the main condenser cooling to 7.82 MGD, which is based on four hours of operation at the design flow (32,700 gpm) for startup and shutdown of regasification prior to engaging in HRS mode. Based on this operation, the current permit also limits the permittee to 520 hours of discharge per year, which was calculated based on a total of 65 cargo deliveries per year at 8 hours of discharge per delivery with 10 percent overlap in EBRVs connected to Buoys A and B. As discussed in Sections 5.5 and 6.1 of this fact sheet, since the construction and operation of the port, the permittee had determined that EBRVs are not able to operate in HRS mode as soon after connecting to the buoy or as often as was contemplated when the current permit was issued. As a result, the permittee cannot meet the current limits and has requested a relaxation of permit limits to allow for operation outside of HRS for up to 50 percent of annual operations at the port at a total projected intake of 11 BGY, including a discharge of up to 47 MGD from Outfall 001A/B.

Based on the analysis of the thermal and cooling water intake structure impacts, EPA has concluded that authorizing operation in non-HRS mode (with resulting discharge of 47 MGD

from Outfall 001A/B) during 50 percent of annual operations at the port is not consistent with Ocean Discharge Criteria for temperature or the requirement to minimize adverse environmental impacts from cooling water intake structures under Section 316(b) of the CWA (see Sections 6.2.2 and 6.4). In conjunction with the permittee, EPA developed more stringent limitations than were proposed by the permittee in its Request for Modification and permit application that would be consistent with operation of the port to meet the need for natural gas supply during peak winter demand. EPA proposes to constrain operation in non-HRS mode primarily to winter months when thermal and entrainment impacts are likely to be lowest. The proposed seasonal limits would restrict operation outside of HRS mode during the times of the year when densities of early life stages are highest. Therefore, Part I.A.1 of the draft permit authorizes a total discharge time of 2,160 hours between December 1 and February 28 and limits the discharge to 528 hours between March 1 and November 30 at a maximum hourly discharge rate of 1.96 MGH consistent with design flow. In addition, the permittee must engage in HRS mode when the nominal gas delivery send-out rate is 200 mmscfd or more under the BTA requirements at Part I.B.1.

6.2.2 Temperature

Heat is a non-conventional pollutant that, in the absence of an applicable ELG for the thermal discharge from deepwater LNG terminals, the permit writer is authorized under Section 402(a)(1)(B) of the CWA and 40 C.F.R § 125.3 to establish technology-based thermal discharge limits by applying the BAT standard on a case-by-case, BPJ basis. BAT limits were established for the NEG port based on the Best Professional Judgment and the anticipated operation of the facility at the time of permit development. Analysis of available technologies and re-gasification was done in the 2006 Final Environmental Impact Statement of the Deepwater Port Act license (2006 EIS). The closed-loop shell and tube vaporization (STV) technology utilized by the NEG vessels was determined to be the BAT for the current permit. The proposed draft permit temperature limits are consistent with the use of the same technology, including closed-loop STV vaporization technology, as in the current permit. However, the current permit limits were projected based on engineering calculation prior to construction of the port. The proposed increase in the rise in temperature at the main condenser is based on actual temperature data collected during operation of the port.

In addition to BAT based temperature limits, EPA evaluated water quality-based limits under the Ocean Discharge Criteria at Section 403 of the CWA. Under 40 CFR § 125.123(b), EPA may not issue a NPDES permit to authorize the discharge of any pollutant, including heat, that the Agency determines will cause “unreasonable degradation of the marine environment.” This determination includes an evaluation to determine whether and the extent that a discharge will cause “unreasonable degradation of the marine environment” consistent with the guidelines at 40 CFR §125.121(e) discussed in Section 5.3, above.

Applicable recommended EPA marine water quality criteria are among the factors to be considered in determining whether a discharge may cause unreasonable degradation of the marine environment. The Quality Criteria for Water, 1986 (also known as the “Gold Book”) states:

> In order to assure protection of the characteristic indigenous marine community of a water body segment from adverse thermal effects, the maximum acceptable increase in the weekly average temperature resulting from artificial sources is 1°C (1.8°F) during all seasons of the year, providing the summer maxima[4] are not exceeded and daily temperature cycles characteristic of the water body segment should not be altered in either amplitude or frequency.

In addition, the Ocean Discharge Criteria at 40 CFR §125.121(c) define a mixing zone as "extending from the sea's surface to seabed and extending laterally to a distance of 100 meters in all directions from the discharge point(s) or to the boundary of the zone of initial dilution as calculated by a plume model approved by the director, whichever is greater." That mixing zone size has been used in NPDES permits issued by the EPA to offshore facilities located in Federal waters since the 1980s.[5]

The current permit limits the maximum hourly rise in temperature (delta T) to 2.6°C at Outfall 001A/B (the main condenser) and 5.5°C at Outfall 002A/B (the auxiliary cooling system). There is no thermal discharge associated with the safety curtain from Outfall 003A/B. During issuance of the current permit, EPA concluded that, if the EBRVs comply with the permitted thermal limits, the discharge will not cause unreasonable degradation of the marine environment. This determination was based, in part, on the Cornell Mixing Zone Expert System (CORMIX) hydrodynamic model of the thermal plume submitted by the permittee. Model results suggested that the thermal discharge was small compared to the available mixing volume and would mix quickly to near ambient temperatures (2006 FEIS). In addition to compliance with the limits on the rise in temperature at Outfalls 001A/B and 002A/B, the permittee was required to conduct quarterly monitoring of the thermal plume to ensure the accuracy of the model predictions. The Request for Modification and the EA provided a revised CORMIX analysis to assess the potential thermal impacts on the marine environment from the proposed increase in the rise in temperature at the main condenser from 2.6°C to a maximum of 12°C.

For the permittee's analysis, input parameter values for the CORMIX modeling were revised to reflect a more accurate discharge height (between 20 and 25 feet below the surface) and an ambient velocity of 0.1 m/s, as compared to 0.02 m/s in the original analysis done in 2005. According to the permittee, this velocity is more appropriate considering the time scale of the plume dynamics and the tidally dominated current. This revised analysis assumed a uniform stratification in the water column during the winter and a stratified density profile during the summer with a pycnocline present 10 meters (m) below the water surface. A pycnocline is a boundary in the water column between two layers that have significant differences in water density. The model predicted the extent of the thermal plume with delta Ts from Outfall 001A/B ranging from 4°C to 12°C during simulated summer and winter conditions.

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[4] Summer thermal maxima, which define the upper thermal limits for the communities of the discharge area, should be established on a site specific basis.

[5] See the general permit Fact Sheets found online at: http://www.epa.gov/region6/water/npdes/genpermit/index.htm and http://www.epa.gov/region4/water/permits/oil_gas.html

Results of the permittee's revised analysis indicate that in summer, the higher discharge temperature causes the thermal plume to rise to the surface quickly. This result contrasts with the original model, which predicted no surface impact because the plume penetrated and was trapped by the pycnocline. Still, the revised model predicts that, even at a delta T of 12°C, the plume mixes quickly and the rise in temperature is no more than 1°C within about 65 m of the discharge point. In winter, the plume again mixes quickly with the available volume and the rise in temperature at the surface is no more than 1°C within 40 m of the discharge point. In both cases, the model indicates that the plume mixes rapidly and the temperature decreases substantially within 20 m from the discharge point. Based on these results, the permittee's revised CORMIX modeling predicts that the rise in temperature due to a thermal discharge with a delta T of 12°C and flow of 47 MGD from Outfall 001A/B and a delta T of 5.5°C and flow of 6 MGD from Outfall 002A/B is less than 1°C within the 100 m mixing zone under the Ocean Discharge Criteria at 40 CFR §125.121(c).

NEG has also completed temperature monitoring during operation of the port over recent years as required by the current permit. Monitoring data for these dates is included as Attachment B to the 2012 EA. Discharges from the EBRV in January 2009 were most similar to the proposed operation (38.02 MGD at a rise in temperature of 11°C from the main condenser and 6.6 MGD at a rise in temperature of 0.7°C from the auxiliary cooling system). In January 2009, temperature differences between the reference station and the plume was less than 0.15°C at all monitoring locations, which is within the measurement error of the equipment. In all cases, the temperature in the plume was slightly less than the reference station (see Table 2 of the 2009 Water Quality Report, 2012 EA Attachment B p. 25). According to the permittee and based on water quality monitoring performed under the current permit during port operations, there is no measurable difference in water temperature associated with the discharge from an EBRV at the observed flow rates and delta T. However, while discharges during January 2009 may have approached the levels of flow and delta T proposed in the draft permit, none of the thermal monitoring surveys were conducted when a vessel was discharging at a design capacity or at a delta T as high as 12°C from the main condenser. EPA is requiring additional thermal monitoring to confirm that ambient temperatures with a delta T of 12°C remain protective of marine resources consistent with previous monitoring data.

The permittee's revised CORMIX analysis predicts that the temperature difference between the plume and ambient would be less than 1°C within the 100 m mixing zone provided by Ocean Discharge Criteria at 40 CFR § 125.121(c). However, the permittee's analysis was performed at a higher ambient velocity than that done for the initial permit application and lacks documentation (such as site-specific data collected near the point of discharge) that would support this higher ambient velocity. In addition, the permittee lacks support for the depth of density stratification (including a pycnocline at 10 m) used to represent summer conditions during model runs. Finally, the permittee's analysis simulated conditions only during winter and summer, but conditions may vary year-round, not just during these two seasons. EPA performed an independent analysis of the potential impacts of a discharge from Outfall 001A/B of 47 MGD at a delta T of 12°C on receiving water temperature at a range of ambient velocities and density stratification for each month of the year. That analysis was conducted using the dispersion model CORMIX, version 9.0. A discussion of the input values used in dispersion modeling can be

found in Attachment B.

Dispersion Modeling Results

As shown in Table 1, EPA's simulation suggests that the temperature difference between ambient and the thermal plume at the edge of the 100 meter mixing zone could have the potential to exceed 1°C by less than 0.5°C at very low ambient velocities. Based on hourly current speed from October 1, 2013 through September 30, 2014, a velocity of 0.05 m/sec or less is only expected to occur approximately 10% of the time at the surface and at a depth of 10 m.[6] Also see Attachment B to the fact sheet. Additionally, dispersion modeling was done using a relatively conservative combination of input parameters, so results based on a 0.05 m/sec ambient velocity are likely to be overly protective.

At an ambient velocity of 0.1 m/sec, the temperature increase at the edge of the mixing zone is predicted to slightly exceed 1°C with average density stratification in June and high average stratification in September. The modeled increases are instantaneous values, whereas the Gold Book criterion for protection of marine resources is a maximum increase in the weekly average temperature. Given that the predicted temperature values greater than 1°C at this current velocity are within the accuracy range of monitoring equipment (0.15°C), the criterion is likely to be met as a weekly average.

Table 1: CORMIX Model Results: Temperature Increase (degrees C) at 100 m

	High Average Stratification			Average Stratification		
Ambient Velocity	0.05 m/sec	0.1 m/sec	0.3 m/sec	0.05 m/sec	0.1 m/sec	0.3 m/sec
January	1.13	0.48	0.36	0.64	0.51	0.34
February	0.97	0.41	0.31	0.62	0.46	0.32
March	1.3	0.87	0.44	0.88	0.48	0.33
April	1.41	0.994	0.46	1.25	0.54	0.39
May	1.32	0.92	0.45	1.4	0.96	0.43
June	1.45	0.99	0.46	1.4	1.02	0.45
July	1.385	0.98	0.45	1.4	0.97	0.46
August	1.47	0.94	0.46	1.4	0.97	0.46
September	1.44	1.06	0.46	1.4	1.0	0.44
October	1.3	0.95	0.39	0.71	0.59	0.37
November	1.18	0.55	0.37	0.68	0.56	0.36
December	1.14	0.487	0.34	0.66	0.52	0.34

Thermal modeling performed by NEG and EPA indicate that a temperature increase limit of

[6] Current data provided by the Northeastern Regional Association of Coastal and Ocean Observing Systems data portal for Massachusetts Bay Buoy A01 available at http://www.neracoos.org/datatools/historical/graphing_download.

12°C will generally be consistent with a less than 1°C rise in temperature at the edge of a 100 m mixing zone. These results predict that the proposed temperature limit of 12°C from the main condenser will not cause unreasonable degradation of the marine environment under the Ocean Discharge Criteria. Still, the results from the permittee's revised model and EPA's results provided in Table 1 should be seen are best estimates using available data rather than the exact temperature values at the edge of the mixing zone. To ensure the accuracy of the model predictions, thermal monitoring requirements are included in the draft permit. This monitoring will confirm that the proposed temperature limit is sufficient to prevent exceeding of marine water quality criterion of a maximum weekly average rise in temperature of 1°C.

6.3 Outfall 002A and 002B – Auxiliary Seawater Service Cooling

6.3.1 Discharge Flow and Duration

Like the main condenser, cooling water for the auxiliary system is needed during start-up and shut-down of the re-gasification process and when operating in non-HRS mode. The current permit includes a maximum daily discharge limit of 0.99 MGD. The current permit also limits the permittee to 520 hours of discharge per year, which was calculated based on a total of 65 cargo deliveries per year at 8 hours of discharge per delivery with 10 percent overlap in EBRVs connected to Buoys A and B. As discussed in Sections 5.5 and 6.1 of this fact sheet, since the construction and operation of the port, the permittee had determined that EBRVs are not able to operate in HRS mode as soon after connecting to the buoy or as often as was contemplated when the current permit was issued. As a result, the permittee cannot meet the current limits and has requested a relaxation of permit limits to allow for operation outside of HRS for up to 50 percent of annual operations at the port at a total projected intake of 11 BGY, including a discharge of up to 6 MGD from Outfall 002A/B.

As with Outfall 001A/B, EPA has concluded that authorizing operation in non-HRS mode (with resulting discharge of 6 MGD from Outfall 001A/B) during 50 percent of annual operations at the port is not consistent with the requirement to minimize adverse environmental impacts from cooling water intake structures under Section 316(b) of the CWA (see Section 6.4). In conjunction with the permittee, EPA developed more stringent limitations, consistent with operation of the port to meet peak winter natural gas supply demand rather than those limitations permittee had previously requested. EPA proposes to constrain operation in non-HRS mode primarily to winter months when thermal and entrainment impacts are likely to be lowest. The proposed seasonal limits would restrict operation outside of HRS mode during the times of the year when densities of early life stages are highest. Therefore, Part I.A.2 of the draft permit authorizes a total discharge duration of 2,160 hours between December 1 and February 28 and limits the discharge duration to 528 hours between March 1 and November 30 at a maximum hourly discharge rate of 0.25 MGH consistent with design flow. In addition, the permittee must engage in HRS mode when the nominal gas delivery send-out rate is 200 mmscfd or more under the BTA requirements at Part I.B.1.

6.3.2 Temperature

The current permit limit for the rise in temperature has been carried forward in the draft permit. The draft permit, like the current permit, restricts the allowed maximum temperature increase to 5.5°C based on hourly average discharge temperature. This limit is based on the use of closed-loop STV technology as BAT. The draft permit includes a maximum hourly rise in temperature of 5.5°C from Outfall 002A/B. This discharge temperature was used in CORMIX models to support the current permit. This analysis predicted that the temperature difference between the plume and ambient resulting from the discharge from Outfall 002A/B would be less than 1°C within the 100 m mixing zone provided by Ocean Discharge Criteria at 40 CFR § 125.121(c) and would not cause unreasonable degradation of the marine environment. The limited thermal monitoring performed at the port to date (described in Section 6.2.2) supports this conclusion. The draft permit requires the permittee to continue to monitor the thermal plume during port operations to confirm the results of the models and to ensure that the water quality criterion is met at the edge of the mixing zone.

6.4 Outfall 003A and 003B – Safety Water Curtain

The EBRVs maintain a constant flow of water over the deck and hull of the vessel during gasification to prevent potential cracking and stress of metal due to the low temperature of the LNG. That water is pumped through the sea chests onto the deck of the EBRV and discharges over its sides at a design flow rate of 0.571 MGD. According to the permit reissuance application and the Fact Sheet for the previous permit, no chemicals are added to this system.

The water curtain discharge was limited in the previous permit based on the design flow of the system. As stated in the Fact Sheet for the previous permit, no chemicals are added to the system and no significant temperature difference is expected between the discharge and the receiving water. No limits other than discharge rate were included in the previous permit and no new information is available suggesting that other parameters exist in the discharge that need to be limited based either on treatment technology or Ocean Discharge Criteria. Therefore, the current permit's discharge limit of 0.6 MGD is included in the draft permit.

The previous permit limited water curtain discharge duration to 9,640 hours per year. That limit appears to be based on an estimated 65 cargo deliveries and discharge from this outfall over the entire 8-day delivery period. The permittee has requested a decrease in the discharge duration from the water curtain to 8,496 hours, which is the equivalent of 2,160 hours of discharge between December 1 and February 28, and 6,336 hours, or 33 cargo deliveries in HRS mode, between March 1 and November 30. This duration is consistent with the maximum number of deliveries authorized in HRS mode based on 528 hours of discharge at Outfalls 001A/B and 002A/B. When fewer deliveries are made, the number of hours and total annual discharge from this outfall will also decrease. Because this limit is based on fewer LNG deliveries than the current limit of 9,640 hours per year, it results in a decrease in seawater intake and discharge associated with this outfall compared to the current permit.

6.5 Outfall 004A and 004B – Freshwater Generator Reject Water

A freshwater generator provides desalinated freshwater for galley, hoteling, and sanitary services

onboard each EBRV. The freshwater generator withdraws 0.3 MGD of seawater and generates approximately 0.03 MGD of freshwater. The remaining 0.27 MGD of seawater is discharged as reject through Outfall 004A/B. No chemicals are added to the system and no temperature difference is expected between the discharge and the receiving water. The reject water has a slightly higher salinity than the receiving water. However, the volume of reject is minor compared to the receiving water and therefore is not likely to adversely impact marine resources. Similar to the discharge for Outfall 003A/B, the draft permit limits the total discharge duration from Outfall 004A/B to 6,336 hours per year. The draft permit also includes a maximum daily flow limit of 0.27 MGD consistent with estimated discharge from each EBRV.

6.6 Cooling Water Intake Structure Requirements

6.6.1 Background

NPDES permit requirements for cooling water intake structures (CWISs) are based on CWA § 316(b), 33 U.S.C. § 1326(b), which requires "that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact" (BTA). The operation of CWISs can cause or contribute to a variety of adverse environmental effects, such as killing or injuring tiny aquatic organisms, including but not limited to fish larvae and eggs, by entraining them in the water withdrawn from a water body and sent through the facility's cooling system, and by killing or injuring larger organisms, including but not limited to juvenile and adult fish, by impinging them against the intake structure's screens, racks, or other structures. Section 316(b) applies if the applicant for a discharge permit seeks to withdraw cooling water from a water of the United States. Therefore, CWA Section 316(b) applies to this permit due to the presence and operation of CWISs on the EBRVs, specifically, the sea chests when the EBRVs are interconnected with the STL buoys and integrated within the Port.

EPA first promulgated regulations to implement section 316(b) in 1976. 41 Fed. Reg. 17387 (April 26, 1976). The U.S. Court of Appeals for the Fourth Circuit remanded these regulations to EPA (see *Appalachian Power Co. v. Train*, 566F.2d 451, 457 (4th Cir. 1977)), which withdrew them, leaving in place a provision that directed permitting authorities to determine BTA for each facility on a case-by-case basis. In the absence of applicable regulations, EPA has historically made § 316(b) determinations on a case-by-case basis based on best professional judgment (BPJ), for both new and existing facilities with regulated CWISs.

On June 16, 2006, EPA published the Phase III Rule under § 316(b) of the CWA, which established categorical requirements for new offshore oil and gas extraction facilities that have a design intake flow threshold of greater than 2 MGD. The Phase III Rule did not establish national categorical requirements for offshore LNG import terminals (like the NEG Port) and dictated that, for these facilities, the BTA would be determined on a case-by-case, BPJ basis where the facility is a point source and uses a cooling water intake structure. 71 Fed. Reg. 35008 (June 16, 2006). Indeed, the basis of the BTA determination for the current permit was case-by-case BPJ.

Since the issuance of the current permit, EPA published the final rule establishing requirements under 316(b) of the CWA for certain existing facilities. 79 Fed. Reg. 48300 (August 15, 2014) ("final rule" or "new 316(b) CWA regulations"). The final rule's requirements reflect the best technology available for minimizing adverse environmental impact, applicable to the location, design, construction, and capacity of cooling water intake structures for existing power generating facilities and existing manufacturing and industrial facilities that withdraw more than two million gallons per day of cooling water from waters of the United States and use at least twenty-five (25) percent of the water they withdraw exclusively for cooling purposes. As in the Phase III Rule, the final rule does not apply to existing offshore LNG terminals and directs that these facilities will be subject to Section 316(b) requirements on a BPJ basis. The preamble to the new rule states "LNG facilities that withdraw any volume of water for cooling purposes will be subject to site-specific, BPJ determinations of BTA." 79 Fed. Reg. 48310 (August 14, 2014). Consistent with federal regulations at 40 C.F.R. §125.90(b), which applies to cooling water intake structures not subject to national section 316(b) requirements, the BTA in compliance with Section 316(b) of the CWA for NEG is established on a case-by-case, BPJ basis.

6.6.2 NEG's Cooling Water Intake Structures

EBRVs are expected to take approximately eight days to gasify each cargo of LNG delivered to the port. Water use during these eight days is dependent upon the phase of regasification: in HRS mode (send-out rate of 200 mmscfd or more) or non-HRS mode (send-out rate less than 200 mmscfd). Tables 2a and 2b in Section 6.1 summarizes seawater intake for each EBRV in HRS and non-HRS mode.

All seawater at the port is withdrawn through one of four sea chests, or cavities, in the hull of a vessel: starboard high, starboard low, port high, and port low. The high sea chests are located on the rounded portion of the hull near the bilge, approximately 23 feet below the surface of the water. The low sea chests are located further down on the flat portion of the hull, with the centerline approximately 38 feet below the surface of the water. Each sea chest is covered with a metal grate with 21 mm (0.83 inch) slots between the bars. Seawater is drawn horizontally through the high sea chests and vertically through the low sea chests. Based on the number of grates at each chest and the open area per grate the permittee calculated a total open area of 195 square feet. At a maximum total intake of 56 MGD, the maximum through-screen velocity of the grids (equal to the total intake volume expressed as cubic feet per second divided by the total open area in square feet) is 0.45 feet per second.

The current permit limits the discharge (and indirectly, the intake) of seawater for cooling at the main condenser and auxiliary cooling system based on the proposed operation of HRS mode for the duration of cargo delivery with the exception of four hours at startup and shutdown. Actual operations of the port from 2008 through 2010 revealed that EBRVs are unable to operate in HRS as quickly or as often as anticipated during initial permitting for reasons discussed in more detail in Section 6.2. Anytime the facility is unable to gasify LNG at a sufficient send-out rate to use the HRS (200 mmscfd), additional cooling water is needed to condense steam and to support the vessel's engines and associated machinery. NEG maintains that it is committed to operating in the HRS mode whenever an EBRV can achieve a natural gas send-out rate sufficient to ensure

the safe and effective operation of the port. However, it anticipates that operational activities that do not enable the use of HRS mode, including maintenance, commissioning new vessels, restrictions in downstream pipeline capacity, and variations in demand for natural gas in the region, could account for up to 50 percent of all annual operational activities at the NEG Port. The proposed operations outside of HRS mode could substantially increase the volume of seawater withdrawn for cooling.

6.6.3 Potential for Entrainment and Impingement Mortality

As stated above, Section 316(b) of the CWA requires "that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact" (BTA). Below, EPA evaluates the potential for the existing location and design of NEG's CWISs to minimize adverse impacts from impingement and entrainment. EPA also considers the potential adverse impacts that could result from the proposed increase in intake capacity compared to the current permit that would allow NEG to operate in non-HRS mode.

The location of the CWIS on the vessel is a factor that affects the potential for impingement and entrainment at the facility. Seawater, mainly for cooling, is withdrawn from Massachusetts Bay through the EBRV's CWISs. Consistent with the current permit, EPA finds that the location of the sea chests (at a depth of 23 to 38 feet below the water surface) may minimize any potential harm to adult and juvenile groundfish species by avoiding withdrawing seawater close to the ocean floor.

In addition to location, the design of the CWIS is a factor that affects the potential for impingement and entrainment at the facility. Each of the sea chests is equipped with metal grates with openings of 0.83 inches, which is likely capable of physically excluding most adult and juvenile fish. Moreover, the through-screen velocity at the CWISs at a maximum design flow of 56 MGD is 0.45 fps. This velocity is less than the velocity calculated for the current permit (which allowed a maximum intake velocity of 0.82 fps during startup and shutdown) and is consistent with regulations establishing a maximum through-screen design or actual velocity of 0.5 fps as BTA at new and existing facilities for the protection of most adult and juvenile fish. (40 C.F.R. §125.84(b)(2) (Phase I Rule) and 40 C.F.R. §§ 125.94(c)(2) and (3) (New Existing Facility Rule)). [7] As a component of BTA for impingement mortality, the draft permit requires a maximum through-screen velocity of 0.45 fps be achieved under all conditions, including during minimum ambient source water surface elevations and during periods of maximum head loss

[7] As an example, the preamble to the new 316(b) Rule for existing facilities states "Impingement mortality can be reduced greatly by reducing the through-screen velocity in any screen. Reducing the rate of flow of cooling water through the screen (through-screen velocity) to 0.5 fps or less reduces impingement of most fish because it allows them to escape the intake current. (See 66 FR 65274 [December 18, 2001] and DCN 2–028A, EPRI's ''Technical Evaluation of the Utility of Intake Approach Velocity as an Indicator of Potential Adverse Environmental Impact Under Clean Water Act 316(b).'') As a result, some facilities have designed and operate their modified traveling screens or wedgewire screens so as not to exceed a through-screen velocity of 0.5 fps. Swim speed studies demonstrate that for most facilities, an intake velocity of 0.5 fps or less will result in 96 percent or better reductions in impingement mortality for most species.

across the grates during normal operation of the sea chests.

The "capacity" of the CWIS refers to the volume of cooling water that it withdraws and is directly related to the density of ichthyoplankton entrained.[8] NEG exclusively operates closed-loop shell-and-tube vaporization (STV) for the regasification of LNG at the port. This system requires no seawater to return LNG to a gaseous state. In contrast, an open-loop STV would require up to 133 MGD for regasification (2006 Final EIS pp. 2-38 to 2-41 and 2010 Request for Permit Modification pp.1-5). EPA proposes that the existing closed-loop STV remain the BTA for regasification of LNG at this facility, which is consistent with the BTA determination for the current permit.

As described elsewhere in this fact sheet, even with the exclusive use of the closed-loop STV for regasification, an EBRV at the port requires up to 56 MGD of seawater intake to condense steam and to cool the vessel's turbine generators and to support other vessel equipment and systems, including ballast water and water for the freshwater generator. During development of the current permit, in an effort to minimize the use of cooling water at the port, NEG proposed to operate in heat recovery mode (also known as heat recovery system (HRS)). In this mode of operation, cooled water from the regasification of LNG is re-routed to the main condenser and auxiliary cooling system to replace the need for once-through cooling water. The BTA determination for the current permit concluded that use of HRS mode minimizes entrainment impacts by minimizing the volume of seawater withdrawn. The current permit's maximum daily flow and total annual discharge limits are based on the proposed use of the HRS system for all cargo deliveries at the port as described in the 2006 EIS and in NEG's initial permit application (both of which were submitted prior to construction and operation of the port).

Since issuance of the current permit, actual operating experience at the port has confirmed that when regasifying LNG at a minimum rate of 200 mmscfd, the vessel is able to transition into HRS mode and eliminate the intake of cooling water. At a send-out rate less than 200 mmscfd, the recirculating water returning from the LNG vaporizers is not sufficient to support the cooling needs of the main condenser. Therefore, at send-out rates less than 200 mmscfd, once-through cooling water at an intake rate of 53 MGD is required.[9] This send-out rate is higher than the rate at which NEG anticipated that it could transition to HRS mode prior to construction of the port. As a result, NEG is not able to engage in HRS mode as often as it proposed under the current

[8] See the preamble to the new 316(b) Rule, which states "Entrainment is generally considered to be proportional to the flow and therefore a reduction in flow results in a proportional reduction in entrainment, as EPA assumes for purposes of national rulemaking that entrainable organisms are uniformly distributed throughout the source water. EPA has consistently applied this assumption throughout the 316(b) rulemaking process (for a discussion of proportional flow requirements in the Phase I and II rules see, *e.g.*, 66 FR 65276 and 69 FR 41599; also see EPA's 1977 draft guidance manual for 316(b)) and continues to assume that it is broadly applicable on a national scale and is an appropriate assumption for a national rulemaking." 79 Fed. Reg. 48331 (August 14, 2014).

[9] As explained elsewhere in this fact sheet, of the maximum daily seawater intake of 56 MGD, 53 MGD is cooling water for the main condenser (47 MGD) and auxiliary cooling system (6 MGD). While BTA for CWISs applies only to cooling water withdrawals, EPA also considered the impacts of entrainment on essential fish habitat and marine sanctuary resources, which are not specific to cooling water. For this reason, NEG and EPA have conservatively estimated impacts from entrainment resulting from the total seawater intake of 56 MGD, rather than just the intake of cooling water, in the following analysis.

permit and has requested an increase in permitted seawater discharge to support more frequent operation outside of HRS mode. Also see Sections 5.5 and 6.1.3.

In its Request for Permit Modification (October 2010) and in its permit application (submitted in February 2012), NEG proposed that issues requiring the facility to operate in non-HRS mode could account for 50 percent of annual operation activities at the port. Under this scenario, the annual seawater intake would increase from 2.6 billion gallons per year (BGY) authorized under the current permit to 11 BGY. In contrast, operating entirely outside of HRS mode would result in the annual intake of 23 BGY based on the current permit's assumption of 65 visits per year. The 2006 Final EIS evaluated the potential for entrainment on the phytoplankton, zooplankton, and ichthyoplankton communities resulting from port operations as proposed prior to the construction of the port. In consideration of the permittee's modification request and subsequent permit application, EPA first reviewed the analysis of entrainment impacts resulting from the withdrawal of 11 BGY provided in the 2012 EA. The Agency then evaluated more recent ichthyoplankton data in its own analysis of the potential impacts from entrainment under the proposed intake volume of 11 BGY.

The 2006 Final EIS estimated that operation of the port with the use of HRS mode for all cargo deliveries at all times except for 8-hours during startup and shutdown would result in entrainment of approximately 104 kg of phytoplankton and 226 kg of zooplankton per year. Considering a transfer of about 10 percent of biomass from one trophic level to the next, these values would result in the annual loss of about 23 kg of small planktivorous fish and about 2.3 kg of large planktivorous fish, or about 2 one-pound striped bass. The EIS concluded that these losses were minor relative to the total biomass of fish in Massachusetts Bay. Updating these values to reflect losses from the intake of 11 BGY results in an estimated maximum annual loss of about 429 kg of phytoplankton and 959 kg of zooplankton. These values translate to a loss of about 96 kg per year of small planktivorous fish and about 9.6 kg per year of large planktivorous fish, or about 20 one-pound striped bass per year. The entrainment losses from the increased intake for the proposed operation are likely to be minor relative to the available biomass in Massachusetts Bay. Similarly, the 2006 EIS assumes that the mean biomass of zooplankton consumed by a typical North Atlantic right whale on a daily basis is 501 kg per individual. Using this estimate, increasing seawater withdrawals to 11 BGY would result in the loss of approximately two days of food for a typical right whale. This loss is also minor relative to the available biomass in Massachusetts Bay.

The 2006 Final EIS estimated that operation of the port with the use of HRS mode for all cargo deliveries at all times except for 8-hours during startup and shutdown would result in entrainment of approximately 19 million eggs and 8.6 million larvae per year. This estimate was based on ichthyoplankton sampling data from NOAA's MARMAP and ECOMON surveys prior to construction of the port (Table 4-8 of the 2006 EIS, p 4-38). Since the development of the EIS, NEG has conducted annual ichthyoplankton monitoring in the vicinity of the buoys. According to the 2012 EA, ichthyoplankton losses were calculated based on actual monthly ichthyoplankton data collected in the port area from October 2005 through December 2009. Based on this data, NEG estimated that the increase in seawater withdrawals to 11 BGY to support cooling needs while operating outside of HRS mode would result in the entrainment of approximately 106

million eggs and 67 million larvae annually, which is substantially more than the 2006 estimate. The 2012 EA also states that estimated losses may be overestimated, because highest concentrations of ichthyoplankton were observed during spring and summer, while use of the port will likely be highest during the winter heating season.

Adult equivalency modeling estimates losses of early life stages of fish expressed as equivalents of a later life stage, either at a given age in years (*e.g.*, age 1) or as mature individuals (Goodyear 1978).[10] In both the 2006 EIS and 2012 EA, the number of eggs and larvae estimated to be entrained were converted to an equivalent number of age-1 fish based on the natural mortality rate that an early life stage experiences. The 2006 Final EIS estimated an annual loss of 48,499 equivalent age-1 individuals from the projected seawater intake of 2.6 BGY. The 2012 EA estimated a loss of 32,309 age-1 equivalent individuals from the proposed seawater intake of 11 BGY. The 2012 EA surmises that the difference of more than 16,000 equivalent age-1 fish between 2006 to 2012, despite withdrawing 8.4 BG more seawater per year, is due to the use of empirical ichthyoplankton data, which purportedly provides a more accurate estimate of species composition and density (2012 EA p. 4-22). However, it is unclear how the empirical ichthyoplankton was used in the 2012 model. For example, the difference in density (*i.e.*, the number of larvae entrained per volume of seawater) does not appear to be the cause of the difference in the number of equivalent age-1 losses for sand lance, which comprises the majority of equivalent age-1 losses in both evaluations (89.5% of all equivalent age-1 fish in 2006 and 73% of total in 2012). The estimated number of sand lance larvae entrained per year in the 2006 EIS and 2012 EA is approximately 5.1 million larvae; however, the estimated loss of equivalent age-1 sand lance in 2012 (23,701 individuals) is about half of the estimated loss in 2006 (43,431 individuals). The loss of nearly twice as many equivalent age-1 fish cannot be attributed to the use of empirical ichthyoplankton density data because the estimated number of sand lance larvae entrained is the same in both years. This difference is more likely related to a difference in the assumptions of the age-1 equivalent model for sand lance (*i.e.*, natural mortality rates). The 2012 EA does not offer an explanation for changes in the life history mortality values used in the age-1 equivalent models. However, the sensitivity analysis included as Appendix E to the 2012 EA indicates that while natural mortality rates in the 2006 analysis were based on literature, the 2012 mortality rates were calculated using larval length and abundance data collected during ichthyoplankton sampling at the site. EPA acknowledges the validity of this method for calculating natural mortality rates. Still, in this case, given the magnitude of the differences in the age-1 equivalent models in 2006 and 2012, and because EPA was unable to review the data and assumptions underlying the 2012 model, EPA is inclined to rely on natural mortality rates used in the 2006 Final EIS. The 2012 EA concluded that the impacts of the higher seawater withdrawal on ichthyoplankton would be low, consistent with the conclusions of the 2006 EIS, based primarily on the comparative losses of age-1 fish. Given the inconsistencies in the age-1 losses between the 2006 EIA and the 2012 EA, and the estimated loss of more than 2.5 times as many eggs and larvae at 11 BGY as compared to 2.6 BGY, EPA is does not have a sufficient record basis to agree with the conclusion in 2012 EA that the impacts at the proposed withdrawal would not be substantially different that at a withdrawal of 2.6 BGY.

[10] Goodyear, C.P. 1978. Entrainment Impact Estimates Using the Equivalent Adult Approach. Biological Services Program, Fish and Wildlife Service, US Dept. of the Interior. FWS/OBS-78/65.

For the development of this permit reissuance, upon EPA's request, NEG provided mean monthly ichthyoplankton densities updated to reflect sampling conducted by the permittee from October 2005 through December 2011. Based on this data, EPA calculated annual entrainment at the proposed intake volume of 11 BGY to be approximately 154 million eggs and 124 million larvae, which is substantially more than was estimated in the 2012 EA. The estimated annual entrainment under the current permitted withdrawal (2.6 BGY) based on the updated data is 36 million eggs and 29 million larvae (which is also more than was estimated in the 2006 EIS). The annual entrainment estimates based on the empirical ichthyoplankton survey data indicate that increasing the cooling water capacity from 2.6 BGY to 11 BGY would likely result in the entrainment of 213 million more eggs and larvae per year, which would likely increase adverse impacts from entrainment. Compared to the operating conditions proposed during the development of the current permit, which informed the current flow limits and BTA determination, operating the port in non-HRS mode withdrawing 56 MGD during up to 50 percent of annual port operations is not BTA for this facility.

Section 316(b) of the CWA requires that cooling water intake structures such as NEG's sea chests, reflect the best technology available (BTA) to minimize impacts, including those from entrainment. The current permit determined that BTA was the closed-loop STV used in conjunction with the HRS mode of operation, which decreased the intake of seawater withdrawals by 92% (from 446.4 million gallons to 35.2 million gallons per delivery). EPA has concluded that this combination of technologies continues to be the BTA at the port, and should be operated whenever possible. Nonetheless, EPA acknowledges that conditions not anticipated prior to operation of the port have limited the ability to operate in HRS mode, including the inability to engage in HRS mode at a send-out rate less than 200 mmscfd and variability in the demand for natural gas. Many of these conditions are outside the control of the permittee, including emergency maintenance and repair needs of an EBRV, downstream pipeline restrictions, and safety and/or security issues.

The permittee has confirmed that it cannot operate under the current permit conditions due to unforeseen conditions that preclude use of the HRS as proposed (*i.e.*, at all times for all cargo deliveries with the exception of 4 hours each during startup and shutdown). These conditions include both unanticipated technical limitations of a previously untested technology as well as the permittee's overestimate of the economic viability of a baseload LNG supply. Based on the discharge monitoring reports and information provided by the permittee in support of this reissuance, the port has not been used extensively for cargo delivery under the current permit, and no discharges from the port have been reported since 2010. The actual operation of the port appears to be significantly different than the proposed operation of 65 deliveries per year. Specifically, reduced demand for natural gas from the LNG terminal undoubtedly limits the port's ability to operate at the capacity required to use HRS mode operations.

Over the last 10 years, New England has become increasingly dependent on natural gas as the primary fuel for electricity generation. While the region generates more electricity from natural gas than ever before, expansions of the pipeline system have not kept up with the increase in natural gas demand for electricity generation. In particular, during winter months, competing

demand for that gas for space heating results in the inability of the majority of gas fired power plants to obtain fuel and therefore are idle. To meet electricity demand for the winter months, the region has become more reliant on an aging fleet of oil units. However, increasing concerns about the reliability of the oil supply chain, the operational reliability of many oil plants which are often more than 50 years old, and the likelihood that many of these plants will retire by 2020, is forcing the region to explore solutions to the natural gas delivery bottlenecks into the region. In addition, the increased utilization of oil and coal units during winter months come with significant adverse environmental impacts including the increased emissions of SO_2, NO_x, CO_2 and particulate matter, as well as entrainment impacts associated with the use of once-through cooling water at many of these vintage plants.

While the construction and expansion of pipeline systems are several years off, additional LNG supplies into the region offer an immediate option to relieve the reliability and environmental concerns described above. EPA recognizes the need for a reliable supply of natural gas during the winter to meet the demands for electric generation and space heating. To this end, EPA has evaluated the potential for NEG to operate part of the time in non-HRS mode, especially during the winter months when natural gas demand is highest, without resulting in substantially greater environmental impacts than what was previously assessed and permitted under the 2006 Final EIS.

Review of ichthyoplankton monitoring conducted in the vicinity of the port from 2006 to 2011 indicates that, while early life stages are present in Massachusetts Bay year-round, densities tend to be highest between May and August with peaks in June (for eggs) and July (for larvae). During the ichthyoplankton surveys from 2006 to 2011, 95% of the total catch of early life stages occurred between March and November, and 85% was captured from May to August. Limiting the use of non-HRS mode during the period when peak ichthyoplankton densities are present could effectively minimize the impacts of port operation from entrainment while allowing the permittee more flexibility to operate in non-HRS mode during the winter when natural gas demand is highest.

In a letter to EPA Attorney Mark Stein (September 19, 2014), the permittee confirmed that, at this time, the permittee plans to operate the port during peak demand to address the region's natural gas needs during the winter. In consultation with EPA, NEG agreed to limit the hours operating outside of HRS compared to the proposed operation at 11 BGY. The draft permit proposes to limit the facility to 2,160 hours of discharge from Outfalls 001A/B and 002A/B during the winter (December 1 to February 28) and 528 hours of discharge from these outfalls during the remainder of the year (March 1 to November 30), and 8,469 hours of discharge from Outfalls 003A/B and 004A/B, which results in a total annual discharge of 6.9 BGY. These proposed limits would restrict operation outside of HRS primarily to the period when densities of ichthyoplankton are lowest in order to minimize impacts from entrainment. A discharge up to 528 hours from Outfalls 001A/B and 002A/B during the remaining months is consistent with the current permit but results in fewer overall deliveries (33 as compared to 65 deliveries under the current permit) because of the increased discharge time on Day 1 (from 4 to 12 hours) to complete the required safety and security checks.

Based on the updated ichthyoplankton data (from 2006 through 2011), the draft permit limits could result in the entrainment of about 51 million eggs and 38 million larvae, as compared to 36 million eggs and 29 million larvae under the current permit. Although the proposed limits result in the entrainment of more eggs and larvae, the impacts are substantially less than the estimated 288 million eggs and larvae estimated to be entrained with the withdrawal of 11 BGY. As the permittee has described, a baseload supply of natural gas as proposed under the current permit is not economically viable. In response to a changing market, NEG proposes shifting towards serving the region on peak demand days during the winter. Meeting the demand for peak supply, as compared to baseload operations, will require more flexibility in port operations and a higher intake per delivery. However, a peak operation will also result in fewer cargo deliveries overall and deliveries will likely be concentrated in the winter months when the price of natural gas in the northeast is most competitive. Given these operating conditions, entrainment impacts considered in this determination, which are based on continuous operation from December 1 to February 28 and 33 HRS deliveries between March 1 and November 30, are likely conservative. Actual operation of the port is likely to withdraw less than 6.9 BGY. As an example, if the permittee were to operate the port in non-HRS mode for the duration of the winter months (2,160 hours) under the draft permit, but did not deliver cargo for the remainder of the year (when natural gas demand in the region is likely met but other sources), the total annual intake would be about 5 billion gallons and the estimated entrainment would be approximately 28 million eggs and larvae.

Actual ichthyoplankton data collected in the vicinity of the port indicates that EPA's proposed seasonal permit limits would minimize entrainment by limiting water usage during the times of the year when densities of early life stages are highest. Under the draft permit, water usage from March to November will be less than in the current permit because the permittee is authorized to have fewer deliveries. Compared to the operation of the port in the current permit, the draft permit limits will not increase the impacts on species with abundant early life stages during this time period, including yellowtail, cunner, winter flounder, butterfish, menhaden, and American lobster. However, authorizing higher water usage during the winter will have a disproportionate impact on those species that spawn in winter, including Atlantic cod, Pollock, and sand lance. Eggs and larvae of these three species dominated the total catch from December to February, with Atlantic cod eggs comprising nearly 54% of the total catch.

Atlantic cod is an important fishery resource for New England, and the Gulf of Maine Atlantic cod stock is currently estimated to be severely depleted. According to some estimates, fishing mortality of Atlantic cod may be at a historic high (DMF 2011). In response to the status of Atlantic cod in the Gulf of Maine, NMFS has recently issued emergency management measures, including additional seasonal interim closures to protect core area for remaining stock and spawning activities. These core Atlantic cod stock and spawning areas include the location of the NEG Port. EPA recognizes the importance of the Gulf of Maine Atlantic cod and the urgency of protecting remaining stock and spawning grounds in order to rebuild the fishery.

The draft permit would authorize NEG to withdraw more water during winter months when early life stages of cod are present in the water column. However, the projected impacts to Atlantic cod are relatively minimal and are unlikely to jeopardize the local population. Under worst-case

conditions (operation of the port in non-HRS mode for 90 days from December 1 to February 28) EPA estimates that entrainment of eggs and larvae would result in the loss of approximately 44 age-1 cod per year.[11] This loss is relatively minor compared to other sources of mortality, and fishing mortality in particular. In addition, actual entrainment is likely to be less than EPA's estimate because operation of the port as a peak supplier of LNG is likely to result in fewer than 90 days at port during the winter and, based on discharge monitoring reports during winter cargo deliveries in 2008 and 2009, water usage is likely to be less than 56 MGD. First, the draft permit requires the permittee to operate in HRS mode whenever the nominal delivery send-out rate allows, which will minimize water use. Second, the draft permit limits authorize intake up to design capacity for the main condenser and auxiliary cooling system, but actual cooling water use is often less than design capacity, particularly during the winter when ambient temperatures are very low. As an example, when delivering cargo in January 2009, NEG withdrew a daily maximum of 44 MGD. Finally, in response to concerns raised following the submittal of the 2010 EA to the Agencies, NEG prepared an assessment of possible effect of water usage on larval cod (included as Attachment G to the 2012 EA). Based on this analysis, water usage during winter under the draft permit would result in the entrainment of 0.016% of the estimated mean volume transport rate into Massachusetts Bay, which would likely have a negligible impact on the transport of larval cod to nursery habitats. For these reasons, EPA concludes that the impacts of entrainment due to increased water usage during winter compared to the current permit are relatively minor. Minimizing water usage during spring and summer, when early life stages are most abundant, could effectively minimize the impacts from entrainment while allowing the permittee more flexibility to operate in non-HRS mode during the winter when natural gas demand is highest.

EPA has determined that the use of HRS mode is a significant BTA factor which minimizes the volume of seawater needed for cooling, and as a result, minimizes the potential for entrainment because the proportion of eggs and larvae entrained is proportional to the volume of water withdrawn. Because HRS mode substantially reduces the need for cooling water, maximizing the use of HRS mode is the technology basis representing BTA for minimizing adverse environmental impact. The draft permit requires the facility to engage in HRS mode whenever the send-out rate is 200 mmscfd or greater. However, the draft permit flow limits authorize the permittee to operate in non-HRS mode for a limited number of hours per year and primarily during winter months when densities of eggs and larvae are lowest.

6.6.4 BTA Determination

In making this site-specific, BPJ determination of BTA, EPA considered the options for the location, design, construction, and capacity of the facility's CWIS to minimize adverse effects from impingement and entrainment. EPA determined that the location of the sea chests (at a depth of 23 to 38 feet below the surface), a through-screen velocity consistent with national standards applicable in other settings for BTA for impingement mortality, and the seasonal limitations on seawater intake will minimize the adverse impacts of the CWIS so long as the

[11] EPA's equivalent age-1 analysis used the same mortality rate for Atlantic cod as the 2006 Final EIS, which were based on literature values, rather than site-specific mortality rates based on empirical data.

facility meets the prescribed requirements for maximizing operations in the HRS mode. The draft permit requires that the EBRVs be constructed, maintained and operated to ensure that:

- The actual, through-screen intake velocity at each CWIS is no greater than 0.5 feet per second;
- The maximum opening in the grates covering the sea chests is 0.83 inches;
- The EBRVs exclusively use closed-loop shell-and-tube vaporization for regasification of LNG;
- The EBRVs engage in HRS mode whenever the nominal gas delivery send-out rate is 200 mmscfd or more; and
- Intake of seawater at design capacity (56 MGD) is limited to 528 hours from March 1 to November 30 when the density of ichythyoplankton is likely to be highest.

6.6.5 Cooling Water Intake Ambient Monitoring Requirements

EPA reviewed the permittee's projected impacts resulting from impingement of fish, entrainment of eggs and larvae in the 2007 Environmental Impact Statement (EIS) and the subsequent 2010 and 2012 Environmental Assessments (EA). While EPA has concluded that Northeast Gateway has minimized cooling water intake flow to the extent that is practicable, the vessels will still require substantial volumes of seawater during startup and shutdown of regasification, and when operating in non-HRS mode, and therefore, has the potential to entrain eggs and larvae. Entrainment monitoring completed under the current permit has demonstrated large seasonal and year-to-year variability in the density of eggs and larvae near the port, which complicates the ability to accurately estimate the impact of the port's operations on ichthyoplankton. For these reasons, the draft permit includes requirements to continue entrainment monitoring.

The calculated maximum design through-screen velocity of 0.45 fps is consistent with EPA's recently promulgated BTA standards for impingement mortality at existing facilities. One of the alternatives for complying the standard is the use of through-screens with a design velocity of 0.5 fps. See 40 CFR § 125.94(c)(2). While these standards do not apply to this facility, EPA has determined that the intake velocity is BTA for impingement mortality for NEG on a case-by-case, BPJ basis. Because the technology is BTA and impingement mortality is expected to be minimal, and because there is no readily available access point to sample the intake screens, the draft permit does not include impingement monitoring requirements at this time.

7.0 Essential Fish Habitat

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq. (1998)), EPA is required to consult with the National Marine Fisheries Service (NMFS) if EPA's actions or proposed actions that it funds, permits, or undertakes, may adversely impact any essential fish habitat, such as: waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity (16 U.S.C. § 1802(10)). "Adversely impact" means any impact which reduces the quality and/or quantity of EFH (50 C.F.R. § 600.910(a)). Adverse effects may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey, reduction in species' fecundity), site-specific or habitat-

wide impacts, including individual, cumulative, or synergistic consequences of actions.

Essential fish habitat is only designated for species for which federal fisheries management plans exist (16 U.S.C. §1855(b)(1)(A)). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999. The following is a list of the EFH species and applicable life stages for Massachusetts Bay associated with the permitting action:

Species	**Eggs**	**Larvae**	**Juveniles**	**Adults**
Atlantic cod *(Gadus morhua)*	X	X	X	X
Haddock *(Melanogrammus aeglefinus)*	X	X		
Pollock *(Pollachius virens)*	X	X	X	X
Whiting *(Mercluccius bilinearis)*	X	X	X	X
Red hake *(Urophycis chuss)*	X	X	X	X
White hake *(Urophycis tenuis)*	X	X	X	X
Winter flounder *(Pseudopleuronectes americanus)*	X	X	X	X
Yellowtail flounder *(Pleuronectes ferruginea)*	X	X	X	X
Windowpane flounder *(Scopthalmus aquosus)*	X	X	X	X
American plaice *(Hippoglossoides platessoides)*	X	X	X	X
Ocean pout *(Macrozoarces americanus)*	X	X	X	X
Atlantic halibut *(Hippoglossus hippoglossus)*	X	X	X	X
Atlantic sea scallop *(Placopecten magellanicus)*	X	X	X	X
Atlantic sea herring *(Clupea harengus)*		X	X	X
Long finned squid *(Loligo pealei)*	n/a	n/a	X	X
Short finned squid *(Illex illecebrosus)*	n/a	n/a	X	X
Atlantic butterfish *(Peprilus tricanthus)*	X	X	X	X
Atlantic mackerel *(Scomber scombrus)*	X	X	X	X
Summer flounder *(Paralicthys dentatus)*				X
Scup *(Stenotomus chrysops)*	n/a	n/a	X	X
Black sea bass *(Centropristus striata)*	n/a		X	X
Surf clam *(Spisula solidissima)*	n/a	n/a	X	X
Bluefin tuna *(Thunnus thynnus)*			X	X

A review of the relevant essential fish habitat information provided by NMFS indicates that EFH has been designated for 23 managed species during one or more of the life stage categories (*i.e.*, eggs, larvae, juveniles, adults, and spawning adults) within the NMFS boundaries that include the action area in Massachusetts Bay. It is possible that a number of these species utilize these receiving waters for spawning, while others are present seasonally.

The primary impacts to EFH species from this proposed permit action may result from potential entrainment of early life stages of organisms at the CWIS. Section 6.6.3 contains an analysis of potential adverse impacts resulting from entrainment of ELS associated with the withdrawal of cooling water.

Based on the relevant information examined, EPA has determined that the conditions and

limitations contained within the draft permit adequately protect all aquatic life, including those with designated EFH in the receiving water. Further mitigation is not warranted at this time. The analysis to support this determination is included in this fact sheet and in a correspondence sent to NMFS Habitat Division (NMFS HD) under separate cover during the public comment period. In addition, EPA provided a copy of the draft permit and fact sheet to the NMFS HD at the beginning of the comment period.

8.0 Endangered Species Act

Section 7(a) of the Endangered Species Act (ESA) of 1973, as amended, grants authority to and imposes requirements upon Federal agencies regarding endangered or threatened species of fish, wildlife, or plants ("listed species") and habitat of such species that has been designated as critical (a "critical habitat"). The ESA requires every Federal agency, in consultation with and with the assistance of the Secretary of Interior, to insure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. The United States Fish and Wildlife Service (USFWS) typically administers Section 7 consultations for bird, terrestrial, and freshwater aquatic species. NMFS typically administers Section 7 consultations for marine species and anadromous fish.

In 2007, NMFS Protected Resources Division (NMFS PRD) conducted consultations under section 7 of the ESA with the Maritime Administration (MARAD) and U.S. Coast Guard (USCG) on the proposed construction and operation of the NEG Deepwater Port. As part of the consultation process, NMFS PRD issued a Biological Opinion (BO) on February 5, 2007. NMFS PRD issued a revised BO on November 30, 2007 after consultation was reinitiated. Based on information in the BOs, EPA has concluded that federally listed threatened and endangered species that are likely to be found in the action area in Massachusetts Bay governed by the draft permit. The species include the northern right, humpback, fin, sperm, sei, and blue whales and the Kemp's ridley, loggerhead, green and leatherback sea turtles.

Based on the location of the intake and discharges, the draft permit limits, and the water quality impacts of the permit action, EPA has made the preliminary determination that the proposed reissuance of the NPDES permit for the deepwater port is not likely to adversely affect federally protected species. Therefore, EPA has judged that a formal consultation pursuant to Section 7 of the ESA is not required. The analysis to support this determination, along with a request for concurrence, is contained in a correspondence sent to NMFS PRD under separate cover during the public comment period. In addition, EPA provided a copy of the draft permit and fact sheet to NMFS PRD at the beginning of the comment period.

9.0 National Marine Sanctuaries Act

The Stellwagen Bank National Marine Sanctuary (SBNMS) was designated in 1992 and encompasses approximately 842 square miles in the Gulf of Maine and overlapping the eastern edge of Massachusetts Bay. The NEG Port is located 2 to 3 nautical miles from the western edge of the SBNMS. Section 304(d) of the National Marine Sanctuaries Act (NMSA), 16 U.S.C. §

1434(d), requires federal agencies to consult with the Secretary of Commerce, through NOAA, regarding any action or proposed action, including private activities authorized by licenses, leases, or permits, that is likely to destroy, cause the loss of, or injury any sanctuary resource. For the SBNMS, under Section 2202 of Public Law 102-587, the requirement to consult is triggered by any federal or federally-licensed activity that "may affect sanctuary resources," including the issuance of a NPDES permit.

As part of the consultation, NOAA's National Marine Sanctuaries Program (NMSP) may recommend "reasonable and prudent alternatives" for the federal action agencies to pursue in order to protect sanctuary resources. During consultation for the current permit, NOAA/NMSP recommended monitoring of the entrainment of marine organisms from seawater intake during facility operations. For this reissuance, EPA has considered the loss of eggs and larvae due to the CWIS under CWA Section 316(b) and proposes permit requirements informed by a case-by-case, BPJ-based BTA determination, including a protective through-screen velocity at the sea chests, regasification using only the closed-loop STV technology, operation in HRS mode (with the resulting decrease in the need for cooling water) whenever the nominal gas delivery send-out rate allows, and limiting the hours of water withdrawal and discharge during periods with the highest ichthyoplankton abundance. The draft permit also includes entrainment monitoring requirements consistent with NOAA's recommendations under the NMSA. This monitoring should help to characterize the entrainment that results from Port operations.

To evaluate potential impacts to sanctuary resources, EPA relied on information including the analysis of potential impacts to EFH species as well as the potential impacts to ESA species. The species included in these evaluations are associated with the SBNMS.

As listed earlier in the fact sheet, the proposed intakes and outfalls are located approximately 15 to 40 feet deep (4.6 to 12.2 meters). The water depth at the port is approximately 262 feet (79.9 meters). The boundary of the sanctuary is approximately 2 to 3 nautical miles from the deepwater port. Because the influence of the intake, discharge and thermal plume are not considered to reach a depth of 262 feet, or extend 2 to 3 miles along the bottom to the sanctuary boundary, EPA expects no adverse impacts to the non-living benthic resources of the sanctuary.

Based on the relevant information examined, EPA has determined that the conditions, limitations and monitoring in the draft permit will ensure the protection of sanctuary resources. The analysis to support this determination, along with a request for concurrence, is contained in a correspondence sent to NOAA/NMSP under separate cover during the public comment period. In addition, EPA provided a copy of the draft permit and fact sheet to NOAA NMSP at the beginning of the comment period.

10.0 Monitoring

EPA is proposing to continue requirements for monitoring at the frequencies established in the previous permit for temperature, discharge rate, and discharge duration are proposed to be continues without change in the reissued permit. To date, the port has experienced very few EBRV visits, so little effluent data currently exists, and the limited available data does not reflect

the proposed changes in temperature and water usage authorized by the current permit. Therefore, no changes in monitoring frequency are proposed.

The pervious permit includes requirements for ambient thermal monitoring and environmental impact monitoring. The thermal monitoring requirements were intended to provide information to verify the results of CORMIX dispersion monitoring and help to determine whether the permit's temperature limits are appropriate. The biological monitoring program was intended to provide information to better determine the potential impacts to fisheries. Due to the limited operational history of the NEG Port and the EBRVs the past monitoring only provided a limited snapshot of potential impacts. In addition, the draft permit authorizes changes in temperature limits that have not been observed in thermal monitoring to date. The draft permit requires additional biological and thermal monitoring consistent with the current permit study design included as Attachment A to the draft permit.

11.0 Comment Period, Hearing Requests, and Procedures for Final Decisions

All persons, including applicants, who believe any condition of the draft permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to Danielle Gaito, U.S. EPA, Office of Ecosystem Protection**,** Industrial Permits Branch, Mailcode OEP 06-4, 5 Post Office Square, Suite 100, Boston, Massachusetts 02109-3912. Any person, prior to such date, may submit a request in writing for a public hearing to consider the draft permit to EPA and the State Agency. Such requests shall state the nature of the issues proposed to be raised in the hearing. A public meeting may be held if the criteria stated in 40 C.F.R. § 124.12 are satisfied. In reaching a final decision on the draft permit, the EPA will respond to all significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period, and after any public hearings, if such hearings are held, the EPA will issue a Final Permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice. Within 30 days following the notice of the Final Permit decision, any interested person may submit a petition for review of the permit to EPA's Environmental Appeals Board consistent with 40 C.F.R. § 124.19.

12.0 EPA Contact

Additional information concerning the draft permit may be obtained between the hours of 9:00 a.m. and 5:00 p.m., Monday through Friday, excluding holidays, from the EPA contact below:

Danielle Gaito,
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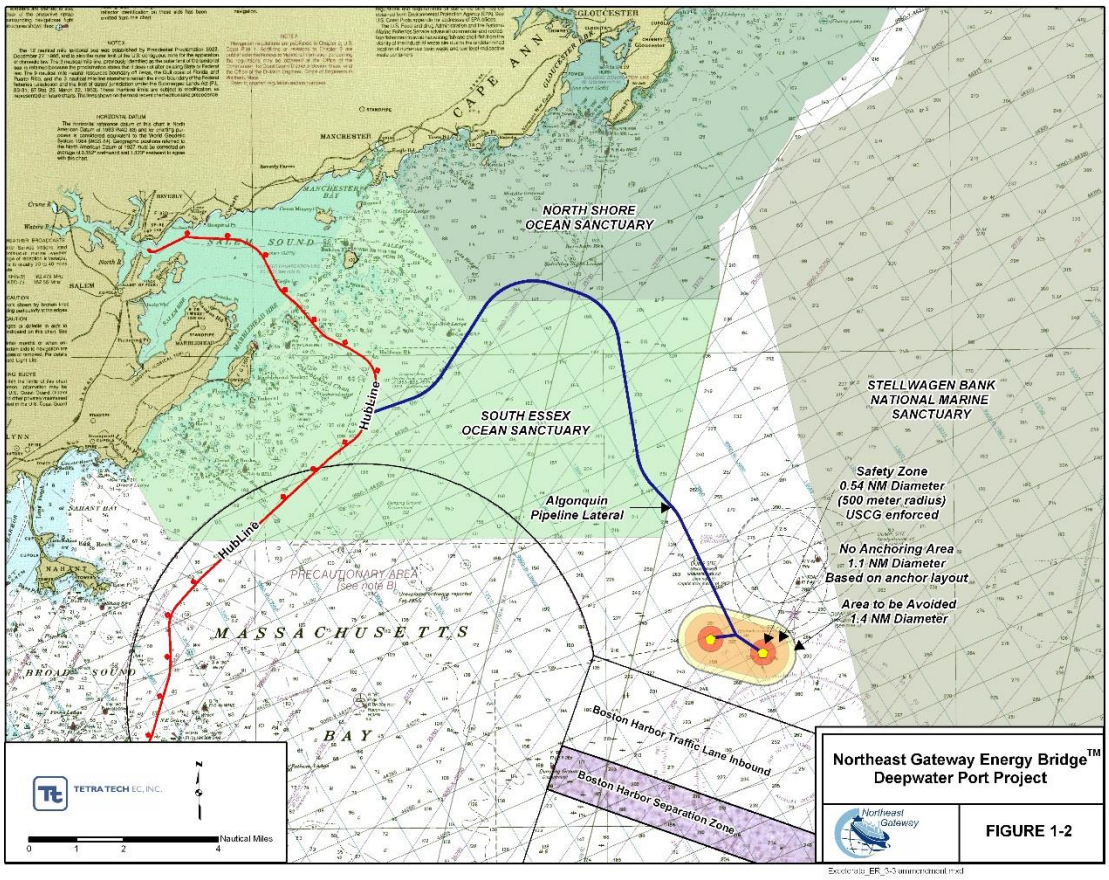
Attachment A: Location of Northeast Gateway Deepwater Port



Attachment B: Dispersion Model Input Parameters

The density stratification of the water column is a measure of how much the density changes from the bottom and the water's surface. Water at the bottom is typically denser than at the surface and the amount of stratification as measured by the relative difference in densities between the bottom and the surface tends to change seasonally. Those changes in stratification are affected mostly by air temperature, ocean, currents, and storms. Stratification has a significant impact on plume dynamics and mixing. A highly stratified water column will tend to trap the effluent plume near the depth of discharge and inhibit mixing.

The stratification used in previous dispersion modeling for NEG represented the summer and winter seasons only and did not address the varying degrees of stratification found throughout the year. The density stratification used in modeling submitted by the permittee for summertime conditions consisted of a linearly stratified density from the bottom to 10 meters from the surface, with a pycnocline, or density jump at 10 meters. The near surface water above 10 meters in depth was unstratified, with no difference in density between 10 meters and the surface. For the winter months, the permittee's modeling was conducted using a uniform density throughout the water column (the bottom density was the same as the surface). The permit modification request stated that density stratifications used were obtain from the Massachusetts Water Resources Authority station 19. No other information was included in the permit modification request, such as which months were represented by the data used to determine stratification or whether the densities used were representative of an average or some other statistical interpretation of the station data. Limited information was referenced to support the use of a pycnocline in either the initial or revised dispersion modeling.

Pycnoclines could be used to force CORMIX to switch from near field turbulent mixing and far field mixing. This would be appropriate if available data showed some condition existed that caused the effluent plume to become trapped in the water column sooner than CORMIX predicted. Use of an artificial pycnocline in the manner could alter the amount of mixing predicted by the model and the accuracy of the simulation. Although density anomalies, such as pycnoclines are common in offshore waters, their use in dispersion modeling should be supported by data showing that they are representative of ambient conditions and that the depth chosen for the pycnocline is appropriate.

In an effort to verify the appropriate density stratification that would be representative of conditions at the point of discharge, available data from a nearby NERACOOS buoy A01 were examined. Densities representative of the average stratification and the maximum average stratification were obtained for each month. As shown in Tables B-1 and B-2, summertime stratification was more substantial than wintertime stratification; however, data showed that some stratification exists throughout the year. Modeling was done for each month in an effort to increase the discrimination of analysis and ensure that seasonal conditions throughout the year were examined rather than just summer and wintertime conditions.

Table B-1: Water Density (kg/m^3) Range of Means Reported by NERACOOS Buoy A01 Years 2001 to 2014

Month	1 meter depth	20 meter depth	50 meter depth
January 1	1024.7 - 1026.0	1025.2 – 1026.0	1025.2 - 1025.9
February 1	1025.0 – 1026.1	1025.9 – 1026.2	1025.4 - 1026.2
March 1	1023.6 – 1026.1	1024.7 – 1026.3	1025.4 - 1026.4
April 1	1022.3 – 1024.9	1024.5 – 1025.6	1025.4 – 1026.2
May 1	1022.0 – 1024.0	1023.9 – 1025.3	1024.8 – 1025.7
June 1	1021.2 – 1023.0	1024.1 – 1025.1	1024.8 – 1025.5
July 1	1020.7 – 1022.6	1024.1 – 1025.2	1024.8 – 1025.4
August 1	1020.7 – 1022.6	1024.1 – 1025.3	1024.7 – 1025.3
September 1	1022.0 – 1023.1	1023.2 – 1024.7	1024.9 – 1025.4
October 1	1023.5 - 1024.0	1023.1 – 1024.4	1024.6 – 1025.5
November 1	1023.8 – 1025.0	1024.0 – 1025.0	1024.7 – 1025.3
December 1	1024.5 – 1025.6	1024.7 – 1025.7	1025.1 – 1025.6

Table B-2: Long Term Mean Water Density (kg/m^3) Reported by NERACOOS Buoy A01 Years 2001 to 2014

Month	1 meter depth	20 meter depth	50 meter depth
January 1	1025.4	1025.5	1025.6
February 1	1025.6	1025.7	1025.8
March 1	1025.3	1025.6	1025.9
April 1	1024.0	1025.3	1025.7
May 1	1023.0	1024.7	1025.5
June 1	1022.1	1024.5	1025.3
July 1	1021.9	1024.7	1025.2
August 1	1021.9	1024.7	1025.2
September 1	1022.5	1024.2	1025.2
October 1	1023.7	1024.0	1025.1
November 1	1024.5	1024.6	1025.0
December 1	1025.0	1025.2	1025.3

Ambient water densities used to model the effluent plume were obtained from the range of means reported by Buoy A01. Multiple dispersion model calculations were conducted in an attempt to simulate the temperature at the edge of the mixing zone for the most and least stratified condition expected. Ambient water densities used in modeling are shown in the Table B-3. The densities for the 80 meter water depth were estimated based on the reported difference between the 1 meter and 50 meter depths.

Table B-3: Densities Used in Dispersion Modeling

	Ambient Densities at Reasonable Maximum Stratification (kg/m^3)		Ambient Density at Average Stratification (kg/m^3)	
Month	Surface	Bottom	Surface	Bottom
January 1	1024.7	1026.7	1025.4	1025.7
February 1	1025.0	1026.0	1025.6	1025.9
March 1	1023.5	1028.1	1025.3	1026.9
April 1	1022.2	1028.9	1024.0	1026.8
May 1	1021.2	1027.2	1023.0	1027.1
June 1	1021.1	1028.1	1022.1	1027.2
July 1	1020.6	1028.3	1021.9	1027.3
August 1	1020.6	1028.1	1021.9	1027.3
September 1	1021.9	1027.5	1022.5	1026.9
October 1	1023.5	1026.8	1023.7	1026.0
November 1	1023.8	1026.2	1024.5	1025.3
December 1	1024.5	1026.3	1025.0	1025.5

Ambient Velocity (current speed)

Dispersion modeling that was done for the previous permit used an ambient velocity of 0.02 m/sec. In its request to modify this permit, the permittee submitted modeling based on a current speed of 0.1 m/sec. Available data were examined to determine whether either of those velocities are representative of conditions expected to be present at the discharge location.

The ambient velocity reported by the NERACOOS buoy A01 was used to determine appropriate values to use for dispersion modeling.[12] Buoy data were examined for the 2 meter depth during the period of October 1, 2013 through September 15, 2014. Data values ranged from 0 m/sec to 0.8 m/sec with an average of 0.23 m/sec and an average daily low velocity of 0.02 m/sec. The ambient velocity of 0.1 m/sec that was chosen by the permittee is equivalent to the 25th percentile of the hourly values recorded at buoy A01. The CWA Section 304(a) recommended temperature criterion is based on chronic exposure. Therefore, the permittee's use of an ambient velocity of 0.1 m/sec will result in relatively conservative model predictions that will likely be representative of conditons comparable to the chronic criterion.

Dispersion modeling was conducted based on the ambient velocity data for the surface. The surface velocity is likely to better represent the water column at the discharge point, which is located 6.45 meters from the surface, than would data collected at a depth of 50 meters. CORMIX was run using a range of ambient velocities in an effort to understand the effects of different velocities on dispersion and to ensure that permit limits are sufficiently protective. The velocities used were 0.05 m/sec, 0.1 m/sec, and 0.3 m/sec.

[12] See http://www.neracoos.org/datatools

Effluent Density

The permittee requested a limit for maximum temperature increase of 12^{o} C. The effluent density used for dispersion modeling was calculated using this maximum temperature increase relative to the ambient water temperature and the salinity of seawater as measured at Buoy A01. Given a lack of temperature data for the discharge depth of 6.45 meters, temperature data collected at a depth of 20 meters were used to calculate effluent density. Data collected near the surface are likely to be impacted by changes in weather that would not affect the temperature at the discharge depth as significantly; therefore, temperature data collected at a 20 meter depth are likely to be more representative than data collected at 1 meter (Table B-4). The salinity measured at a depth of 20 meters was also used due to lack of information showing that the 1 meter data are more representative (Table B-5).

Table B-4: Mean Ambient Water Temperature (degree C)

Month	Mean Temp. 1 meter depth	Mean Temp. 20 meter depth
January 1	5	5.5
February 1	3.5	4
March 1	4	3.8
April 1	6	4.6
May 1	10	6.4
June 1	15	8
July 1	17.5	8.2
August 1	18	9.2
September 1	17	12
October 1	13	12.5
November 1	10	10
December 1	8	7.5

Table B-5: Salinity (mg/l TDS)

Month	Salinity at 1 meter depth	Salinity at 20 meter Depth	Calculated Salinity at 6.35 meter depth
January 1	32,100	32,300	32,160
February 1	32,200	32,400	32,260
March 1	32,000	32,300	32,080
April 1	30,600	31,900	30,970
May 1	30,000	31,500	30,400
June 1	30,000	31,500	30,400
July 1	30,500	31,750	30,850
August 1	30,700	31,900	31,040
September 1	31,200	31,900	31,400
October 1	31,700	31,800	31,730
November 1	31,900	32,000	31,930
December 1	32,100	32,250	32,140

Table B-6: Mean Ambient Water Temperature (degrees C), Salinity (mg/l TDS), and Calculated Effluent Density (kg/m^3)

Month	Calculated Salinity at 6.35 meter depth	Mean Temp. 20 meter depth	Calculated Effluent Density
January 1	32,160	5.5	1023.2
February 1	32,260	4	1023.7
March 1	32,080	3.8	1023.6
April 1	30,970	4.6	1022.5
May 1	30,400	6.4	1021.7
June 1	30,400	8	1021.3
July 1	30,850	8.2	1021.6
August 1	31,040	9.2	1021.5
September 1	31,400	12	1020.9
October 1	31,730	12.5	1021.1
November 1	31,930	10	1021.9
December 1	32,140	7.5	1022.7